THE FARMER'S PROMOTION BOOK

By C. E. REINHOLD.

Digitized by the Internet Archive
in 2009 with funding from
University of Pittsburgh Library System

<http://www.archive.org/details/farmerspromotion00rein>

T H E

FARMER'S PROMOTION BOOK,

A NEW AND SCIENTIFIC MANURING SYSTEM,

FOR THE CULTIVATION AND INCREASE OF ALL KINDS OF

GRAINS, GRASSES AND FODDER AND PASTURE,

UPON ALL KINDS OF SOIL,

PROVED BY ACTUAL EXPERIMENTS AND BASED ON EVIDENT TRUTHS.

DESIGNED TO IMPROVE AGRICULTURE IN ALL ITS BRANCHES.

Represented by upward of One Hundred and Fifty Engravings, of the most valuable Grasses and Plants
connected with the System.

BY

DR. C. G. REINHOLD.

PITTSBURGH:

PRINTED BY W. S. HAVEN, CORNER OF MARKET AND SECOND STREETS.

1856.

Entered according to Act of Congress, in the year 1856, by

DR. C. G. REINHOLD,

In the Clerk's Office of the District Court of the United States for the Western District of Pennsylvania.

INDEX.

PREFACE,	PAGE. 5
INTRODUCTION,	8

PART I.

ON THE RELATION OF THE PRESENT SYSTEM OF FARMING.

Winter Produce,	16
Produce of Fodder Cultivation,	16
Pasture,	16
Return by Stable Manure,	17
Return by Sod Manure,	17
Aim, Advantage and Aid of a Produce Table,	18
Annual Produce Table,	20

PART II.

ON THE IMPROVED VEGETABLE MANURING.

How does Nature fertilize the soil?	21
Occurrence at Natural Vegetable Manuring	22
Occurrence at Agricultural Vegetable Manuring,	22
Importance of Green Manuring in Fallows and Stubbles, for the quick promotion of the Farmer,	22
Cheapness of Seed,	23
Strength of the Masses by the use of different kinds of Plants and Grasses,	24
Shadiness, or right proportion of the Plant and Grass Manuring Mixture,	26
Number of grains per lb. of the Plant and Grass Seeds,	26
Pounds of Seed in the hollow measure, ...	26
Number of grains on a Plant Manuring seed inch,	26
Plant Mass on a square foot, and its estimation,	27
How great the strength of the Plant Manuring can be made by the density, shadiness, and the different kinds of mixtures,	27
Loosening, purifying and deepening the soil by Vegetable Manure,	28

ON THE APPLICATION OF THE GREEN MANURE AS TOPSEED IN GRAIN, LIKE CLOVER, ON FALLOWS AND STUBBLES, IN FOUR DIFFERENT MODES.

<i>First Mode—</i>	PAGE.
As Topseed on Winter Grain,	28
Instructions on the Seed,	28
Forbearance after Harvest,	29
Rolling down and ploughing in the Vegetable Mass,	29
<i>Second Mode—</i>	
Of the Topseed on Summer Grain, ..	29
<i>Third Mode—</i>	
Of the Vegetable Manure on Stubbles,	30
<i>Fourth Mode—</i>	
Of Seeds for Fallows,	30
Instructions on the description of the Plants used in the improved system of Green Manure,	31
Names of the Seeds—For Topseed, Fallows and Stubbles,	32
Explanation of the Marks,	33
On the variety of Seeds,	33
The necessary quantity of Seeds in the Transition,	33
The Cheapness and Convenience of the production of Seeds,	34

DESCRIPTION OF THE CLASS OF PLANTS OF TOPSEED IN GRAIN, LIKE CLOVER OR WINTER SEEDS.

First Vegetable form,	35
Second Vegetable form,	36
Third Vegetable form,	39
Fourth Vegetable form,	43
Fifth Vegetable form,	46
Sixth Vegetable form,	48
Seventh Vegetable form,	49
Eighth Vegetable form,	50
Ninth Vegetable form,	51
Tenth Vegetable form,	54
Kinds of Grasses for the Topseed Mixture, ..	56
The most frequent wild-growing Fodder and Pasture Grasses,	59

REVIEW AND APPLICATION OF THE MOST FREQUENTLY GROWING PLANTS & GRASS SEEDS, IN FIELDS AND GARDENS, FOR THE TOPSEED IN GENERAL.

	PAGE.
Topseed mixture of the Winter Grain in Middle Soils,	60
First Review of the most general Topseed Plants of the Middle Soil,	61
Second Review,	62
Topseed Mixture of Heavy Soil in Winter Grain,	63
Topseed Mixture of Winter Grain on Light Soils,	63
Topseed Mixture of Summer Grain on Middle Soils,	64
Topseed Mixture of Summer grain of Heavy Soils,	65
Topseed Mixture of Summer grain of Light Soils,	65
Instructions for the beginning of Topseed Manuring,	65
Explanation of Plates representing Plants of the Topseed Manuring, on Table I, ...	67
Description of the kinds of Plants of the Fallow Manuring, or Summer Seeds, ...	69
First Vegetable form of the Fallow Manuring,	70
Second Vegetable form of the Fallow Manuring,	71
Third Vegetable form of the Fallow Manuring,	72
Fourth Vegetable form of the Fallow Manuring,	74
Fifth Vegetable form of the Fallow Manuring,	75
Sixth Vegetable form of the Fallow Manuring,	76
Seventh Vegetable form of the Fallow Manuring,	78
Eighth Vegetable form of the Fallow Manuring,	79
Ninth Vegetable form of the Fallow Manuring,	80
Tenth Vegetable form of the Fallow Manuring,	82

	PAGE.
Kinds of Grasses in the Fallow Mixture, 83	
Review of the most frequently growing Plant and Grass Seeds for the Fallow Manuring in general, and especially of the Middle Soils,.....	84
Selection of the Fallow Mixtures for Heavy Soils,.....	85
Selection of the Fallow Mixtures for Light Soils,.....	86
Explanation of Plate II,.....	86
Plants of the Fallow Manuring,.....	86
Description of the kinds of Plants of the Stubble Manuring,.....	89
Selection of the Stubble Mixture for Middle Soils,.....	89
First Vegetable form,.....	89
Second Vegetable form,.....	89
Third Vegetable form,.....	89
Fourth Vegetable form,.....	90
Fifth Vegetable form,.....	90
Sixth Vegetable form,.....	90
Seventh Vegetable form,.....	90
Eighth Vegetable form,.....	90
Ninth Vegetable form,.....	90
Tenth Vegetable form,.....	90
Of the Selection of the Grasses for the Stubble Mixture,.....	91
Selection of the Stubble Mixture for Heavy Soils,.....	91
Selection of the Stubble Mixture for Light Soils,.....	91
On the application of the Stubble Mixture, 91	
A few Remarks on the Cultivation of the described Plants and Grasses in the Garden,.....	91
Cultivation of single Bushes,.....	91
Cultivation in Lines or Hedges,.....	92
Cultivation in Groups,.....	92
Cultivation in Beds,.....	92
Retrospective view of Part II,.....	93

PART III.

ON THE IMPROVED FODDER CULTIVATION.

How Nature nourishes the animal,.....	94
Proportion of the kinds of Grasses and Herbs on the Meadows and Pastures,...	95
The number of Plants on one square foot of the Meadows and Pastures,.....	95
Examples on the Pastures,.....	96
Example on Fodder and Clover Pasture, 96	
Review of the Winter Feeding,.....	96
Reason of the Improved Fodder Cultivation,.....	96
Object of the Mixed Fodder Cultivation,...	97
Of the Mixed Fodder Cultivation for 1 year, 97	
The Plants of the Annual Mixed Fodder Cultivation,.....	97

	PAGE.
Of the 2 and 3 years' Fodder Cultivation Mixture, or the Clover-grass Mixture, 97	
On Clover-grass Mixtures <i>before</i> the introduction of the improved Green Manuring, 98	
Review of the kinds of Plants of the Clover Mixture <i>before</i> the introduction of the improved Green Manuring,.....	98
Of the density of the Clover Mixture and the agricultural measures of its estimation and seed calculation,.....	98
Example of a Hedysarum Mixture on gravelly dry soil,.....	99
Example of a Clover-Grass Mixture on the Middle Soil,.....	100
Example of Lucerne Mixtures on warm, dry Middle Soils,.....	100
Example of Clover-Grass and Lucerne Mixtures on rich soils,.....	101
Clover-grass Mixtures <i>after</i> the introduction of the improved Green Manuring, 102	
Of the Fodder Cultivation for many years mixed, or artificial meadow mixtures,...	102

PART IV.

ON THE IMPROVED PASTURE CULTIVATION.

How Pasture is to be constituted,.....	104
Proportions of the Grasses and Plants on the Pastures,.....	105
Of the number of Pasture Plants on the square foot,.....	105
On the disadvantages of Poor Pastures,...	105
On the disadvantages of Stable Feeding,...	105
Review of the Present Pastures,.....	105
Reason for improved Pasture Cultivation, 106	
Object of the Mixed Pasture Cultivation, 106	
Of the annual Mixed Pastures,.....	106
The Plants of the same,.....	106
Of the Pasture Mixtures for 2 and 3 years, 107	
Of the Pasture Mixtures <i>before</i> the introduction of the Green Manuring,.....	107
A List of the Plants of the Pasture Mixtures <i>before</i> the introduction of the improved Green Manuring,.....	107
Of the density of the Pasture Mixtures and of the Agricultural Measures, of its estimation and its seed calculation,.....	107
Example of a Pasture Mixture on dry, gravelly soil,.....	108
Example of a Pasture Mixture on middle soil,.....	109
Example of a Pasture Mixture on rich highlands, for sheep,.....	109
Example of a Pasture Mixture on rich low soil, for cattle,.....	109
On the Pasture Mixtures <i>after</i> the introduction of the improved Green Manuring,...	110

	PAGE.
Of Pasture Mixtures designed to last for several years, or Artificial Pastures,...	111
Description of the Grasses and Plants of the improved Fodder and Pasture Cultivation,.....	111
The Fox-tail family,.....	112
The Fescue family,.....	113
The Oats-grass family,.....	115
The Bent-grass family,.....	116
The Wheat and Barley-grass family, 116	
THE MOST PREFERABLE HERBS OF MEADOWS AND PASTURES.	
The lasting kinds of Clover,.....	117
The Meadow Vetches,.....	118
The Meadow Peas,.....	119
Lucerne, Hedysarum, Goat's Rue and Stone Clover,.....	120
By-plants of the Meadows and Pastures,.....	121

APPENDIX.

Seed mixtures that serve for Cattle for Stable Fodder,.....	122
Mixtures for Mowing the first and second years, and the third year for Pasture, on dry, loamy and sandy soil,.....	123
For good Clay soil, one to two years mowing,.....	123
For good Limestone land, two to four years mowing,.....	123
Seed Mixture for Cattle Pasture,.....	124
Grass Mixture for light soil,.....	124
For rich soil,.....	124
For Moor or Bog land,.....	124
Seed Mixture for Sheep Pasture,.....	124
For dry, poor Sandy soil,.....	124
For loamy Sandy soil,.....	125
For Limestone and Clay soil,.....	125
The best Meadow Plants for moist, wet, moory, flat meadows, of which the water cannot be drained,.....	126
On moderate moist soils, of which the water can be drained off,.....	126
On moist and dry meadows,.....	126
Best Grasses for raising Cattle,.....	126
Best Grasses for raising Horses,.....	126
Grasses best suited for raising Sheep,.....	126
Meadow Plants blossoming early and ripening in May,.....	127
Meadow Plants blossoming and ripening (later) in June,.....	127
Meadow Plants which blossom and ripen in July,.....	127
Meadow Plants for Milch Cattle,.....	127
Meadow Plants which possess a particular ability for massing,.....	127

P R E F A C E .

IN this treatise, I present a course of procedure to Agriculturists, which is in accordance with the laws and efforts of nature, and which, if practically followed, will be productive of more wealth and happiness than all the gold of California, or pearls of the ocean.

No profession or calling in life is of as great importance in the pursuits of man as that of the Agriculturist; nor is there any cause of man's action so closely and intimately connected with the prosperity and happiness of mankind.

The advancement of arts and sciences, the enterprise and energy, and the wealth and happiness of society, is increased and sustained by the progress of the science of agriculture. All our institutions are dependent on, and sustained by, agriculture. It is the great *lever* that moves, sustains, and keeps in life and healthy operation all the various departments of civilized society. Agriculture is the great centre around which all other departments of business revolve, and on which all are dependent for their support and very existence.

Agriculture began with man's first operations

and duty. It is, in the ordination of things, made the instrument of progress on which depend the happiness and useful developments of the powers of man, and the profitable improvements of useful and necessary animals. Hence, in the high and honorable pursuit of agriculture, every principle must be examined, and carefully digested, in accordance with the laws of nature; every truth agreeable thereto must be carefully applied and understandingly practiced, so as to reward the farmer for his toil, and to make his lands produce abundantly.

Although agriculture occupies the most important position in the business departments of life, although the welfare and happiness of man are so intimately connected with its advancement, and a large number of all civilized communities engaged in it, as a business or pursuit in life, yet, through mistaken prejudices, its progress has been less, in proportion to means and capital, than that of any other department of business. It is still clogged with the forms and prejudices of past ages, so as, in too many instances, to retard improvement and to render

the pursuit not only laborious and unprofitable, but apparently unworthy the attention and unfitted for the pursuit and employment of intelligent citizens. It is important, however, that former prejudices be dispensed with, and truth adopted as our guide. There is no sphere in which is found a more ample field for the application of scientific principles, or intellectual investigation; nor is there any calling that so amply rewards the intelligent operator as that of agriculture, when practically carried out, in accordance with scientific principles, based on the laws of nature. There are three modes by which farming is practiced, viz: *mechanically*, by the *rules of art*, and *scientifically*. The mechanical, or tradesmanlike farmer, imitates the modes and customs he has seen and practiced; he exercises no other judgment than the one referring to the manner and time of doing his work, destitute of the developments of intellectual comprehension. The farmer succeeds by rules of art—if the rules he has adopted happen to suit the case—if not, he fails. But the scientific farmer needs no positive rules to practice; he is guided by a knowledge of all the facts connected with the nature of the soil, its component parts, and the requirements necessary to render it more fertile. This knowledge develops the proper method of executing the mechanical part of the operation in the right way and manner, and in proper season. Hence the opinion often expressed: “*Theory* (scientific knowledge) is of no avail; but practice crowns our efforts with success,” is erroneous; for it is evident no practice can be correct unless based on correct *theory*; thus we require an intelligent and correct *theory* on which to build our practice, in forming an intimate

combination of both; for practice without theory is blind, and theory without practice is lame.

In all important reforms, in order that a general advantage may be realized, the more extensive the spread of a knowledge of the principles embodied, is, the greater are the benefits resulting; and the more the system herein set forth gains publicity throughout the agricultural community, the greater will be the interest manifested; and as the subject is made the test of trial, its results will confirm the public mind of its utility and correctness. It is not uncommon to meet with failures in important enterprises, in the hands of neglectful and careless operators; whilst under the care and superintendence of judicious and careful men, the most happy and profitable consequences are realized. Hence, in introducing this system, every farmer desiring success must give strict attention to its application, so that a proper development of the principles and benefits of it may be fully realized, that the many thousands of farmers, in the North and the South, the East and the West, may speedily be made acquainted with a system of farming calculated to enrich the soil, lessen the labor, and double the produce throughout the United States.

This new manuring system is based on the principle of ploughing down a coat of green plants, in order to enrich the soil, and consequently to produce a greater harvest of grain, fodder and pasturage; to improve the farm and stock, and to render the farmer an abundant reward for his labor: particularly showing how a farmer, at small expense, and with comparatively little labor, can manure and enrich his farm, and prepare the soil for the reception of seeds, in a manner that it will produce more

than under the usual method of manuring, and still continue to increase its fruitfulness.

The present work contains the principles and instructions of this new and scientific system, and the practical manner of manuring and cultivating the soil, by the use and application of a mixture of various plant and grass seeds, which are found growing on the various localities in the United States, as suited to the various

soils, and sowed on ploughed fallows, stubbles, and as topseed on winter grain and summer grain, and at the required time of growth to be ploughed under. It contains also the principles, modes and instructions of a new fodder and pasture cultivation, and the practical manner of increasing the hay and fodder by various admixtures of the best grasses and fodder plants.

INTRODUCTION.

ON the expensive manner of producing manure, in usage to the present time, rests the whole success of agriculture, and without it, all efforts would prove inefficacious. But according to the system established in this treatise, a beginning can be made on the most inferior soil, almost without expense, so that, from year to year, it will be more richly manured, rendered more productive and profitable, and increased in value. Plants and roots could be cultivated, and even in a soil which but a season or two before was sterile and unproductive. This system of manuring I here present for the benefit and advancement of the *farmer*, under the title of the "*Farmer's Promotion Book*."

The elements by which the promotion of the farmer is as yet chiefly sought for, viz: fodder and dung manure, marl, lime, salt, ashes, chemical manure, etc., are not the only, much less the original ones. For these are merely second handed elements, or means of second productions, and as such must decrease and finally be totally consumed, as is the case in all manner of store. If there were no original elements, or means of first production in nature, from which every thing existing originated, grows, and is continued, and by which alone it can increase and multiply, then man would be unable to resort to any other remedy; but we have the universal elements of the first cause, or production, which also must be the *same* from which

(viii)

the first food originated. From this, manure and mould took their origin, and, as we shall presently show, the earth itself, with all things on it, were produced. Consequently we have to describe those universal and natural elements of agricultural promotion in all their indisputableness, because they are still too little regarded.

The farmer is indisputably the cultivator of nature, consequently its practical scholar. His workshop is the extensive earth. But how this workshop (the globe) with all its beings, was produced and built up, by the same means through which the farmer alone, as cultivator of nature, can be elevated: this we must briefly show. The art or law by which the farmer can be promoted to, and sustained by, a state of prosperity, is contained and drawn from the centre of the earth and from the depth of the ocean.

It is undeniable, that during millenniums of undisturbed rest (in the primitive geological periods of earth's formation) the earth aggregated itself as precipitate. Now what else could this precipitate have been, but such, as in a great measure, is still found to be, although on a smaller scale, continued, in calm and muddy ponds, the mould produced by light and water from the immense masses of primitive floating plants, as food for the innumerable fishes, slimy and shelly animals? Consequently their original

food and mould must have increased the universal precipitation, and caused its composition to be of various matters. By means of internal heat of this precipitate, or the heat of the earth, the giant members of the earth—the mountains—have, during thousands of years of rest, out of transformations from the depth of the primeval ocean, been crystalized and cemented together. From the streams of the ocean, which were caused by the planetary revolution of the earth, the gaps and valleys originated. Through the additional prepondering pressure of the primeval ocean upon the substantial heat of the earth, the mountains, which at first appeared above the level of the ocean, were forced up to the highest peaks, so that these peaks could accomplish the design of the primitive Paradisiacal creation. As soon as the pressure of the earth became preponderating, the precipitations became quicker and stronger, and the pressure of the ocean accordingly weaker, as it sunk more rapid on account of its transformations; then, from the conflict, arose those volcanic floatings, from the subterraneous fire which covered the ocean, in which conflict the interior creation was ruined; and these revolutions were continued until the substantial heat of the earth could deliver itself more freely, in the production of one-third of land, as it exists at present.

But from the time the earth came forth from the primeval ocean, it likewise accumulated continually by the productive powers of Nature: light, air, water and heat, and by that element of formation “vegetativeness,” (as the universal food.) On the surface of the ocean, at first appeared thin water threads, fibres, moss, &c., formed only by light and water; but as soon as the mould increased, grass, vegetables and trees also came forth, produced and formed by air and nourishment of the earth.

As these accumulations under the water, and on the dry land, are thus constantly continued,

and as the “green vegetable” is among all, the only universal and natural element by which these accumulations are produced—because “green vegetable” is the food of all the vermin and the most of the animals in the water and upon the land—it may become clear to the reader how the earth, through the same means by which the farmer does cultivate it, viz: “green vegetable,” was produced and built up, from the centre up to its surface, and by which it clothes itself with fertility, and is sustained in the same.

Hence it will become obvious to the reader, that “green vegetable” is the only manure to be used in order to enrich the soil and promote the farmer. And why? Because it has the ingredients to corporify the matter of light, and thus to increase itself as the universal food, and consequently to increase also the accumulation of mould and manure. For to this end the whole earth is covered with it, by the masses of leaves of the forest and thickets, of plants and grasses of the fields, meadows and pasturages, and its soil is fertilized continually by its mould, as can be seen everywhere, especially in the forests and prairies of the West, where the grass grows from five to six feet long, dies in autumn, and turns to mould. Now, if the farmer wishes to profit by this property of “green vegetable,” he must follow the course of nature, viz: manuring the soil with “sowed green vegetable masses.” Such is the productive course of nature by which the entire globe, with all its manifold treasures, in and upon the earth, together with all its animate beings, was built up. Accordingly the farmer must make use of the various local and serviceable plants in the artful manuring of his fields, in order to be promoted to a state of prosperity.

On the contrary, when every thing is cut down, fed or sold, where agriculture is sustained only by stable, or salty, or earthy

manure, which, in part, is the product of the universal food, and not like the "green vegetable manure" produced in accordance with the laws of Nature—a course of wasting is followed, which will bring us to the same results our ancestors experienced in their day, in the exhaustion of their farms; for whenever we desire to obtain a more abundant crop, we can effect it only by exterior means, by the application of which the productiveness of the farm must rather decrease than increase.

In order to illustrate a few preliminary inferences for the design of this book, we must abide by the simple course of the *Farmer's Promotion*, namely: the course of "green vegetable manure," in accordance with the laws of Nature.

It cannot be denied that the destroying, and continually consuming, grasping hand of man must, by the growing population of the earth, be felt more and more, as it is everywhere engaged in the ravaging of countries. And how much cheaper can the farmer produce, and how much more abundant will the produce be, if, in the cultivation of land, he follows the simple course of nature? By careful observation, a great difference can be seen between the productive course of nature and that of the present mode of farming; for instance, let us look at the immeasurable beds of coal, with which Nature, from the abundance of its vegetable manure, has filled the bosom of the earth. These beds of coal are nothing but absorbed *moors* and forests, and layers of mould, which the floating ages deposited. In similar proportion is the productiveness of nature in many other respects. But, comparatively speaking, how trifling is the produce which the farmer receives by the present mode, as handed down to us from our grandfathers; by which he is pillaging the country around and about him, as much and as long as he may have the liberty, to obtain materials to manure his impoverished fields? The first step, there-

fore, from this course of wasting, toward a course of productiveness, must indisputably be the "Green Vegetable Manure."

In this business, Nature also everywhere comes to the assistance of the husbandman; for everywhere it is designed and so constituted to fertilize, as if it were itself the forest, as well as the field of the farmer. To this may also be added, that with us, in the temperate zone, the most of the trees and shrubs cast off their masses of leaves annually, and the lasting herbs and grasses on the earth have to wither and die, whilst, in the meantime, the plants and vegetables in the torrid zone always keep their verdure. This, no doubt, has its source in the law of Nature, constituted for our climate to fertilize the earth by vegetables, because with us vegetation is shorter, and not so luxuriant as it is in warm climates; therefore the masses of fallen leaves of the forest, and the masses of herbs and plants of the fields, which wither and die annually, must contribute to fertilize the soil of our climate. In hot countries this is not necessary, because its vegetable creation furnishes the soil with sufficient mould without its annual decay and putrefaction. And has not our climate also its evergreens, as fir, pine, juniper, laurel, ivy, &c.? No doubt many more would exist if it were not that the design of the natural vegetable manure of the soil for our climate was lodged in the annual withering and putrefaction of leaves and vegetable masses. Or is our climate deficient in plants of rapid growth, or in herbs abundantly filled with seed, to sow and to produce masses of vegetable manure for our fields? Do not all the undisturbed forests, and all neglected fields and gardens, clothe themselves profusely with them? Does not a close observation often prompt us to say, to what purpose may be all these plants? Yea, God blessed the extensive earth with them for the purpose that they might serve to their proper use.

Thus it is certain that the earth, in consequence of its "green vegetables," possesses the power to accumulate and to manure itself. Hence the question arises, whence came the first food? From the mould by which nature fertilizes the earth; and thus it becomes necessary for us to regard and to treat "green vegetables" as the first principle, the first production, and consequently in all manner possible, to increase the manure of the soil by masses of sowed vegetables.

It follows from the above, that the *green vegetable* manure of nature is the greatest, or the principal manure of the earth, and, consequently, as such, it must also be considered, applied and used by the farmer, if he desires his own promotion. The animal manure is to be looked upon as the inferior or secondary manure of the earth, because the animal kingdom is nourished and borne by the vegetable creation, as the child is by its nurse. In addition to this, the animal and the farmer are the consumers, and give back to the soil much less than they take from it; the animal indeed transmits its food into animal productions, and the farmer sells a considerable part of his harvest, in consequence of which he gives back that much less. Now this diminishment can only be restored to the soil by the generative powers of nature, viz: by *light, air, heat* and *water* acting on *green vegetables*. Thus it is explicable why for centuries past most of the farmers have remained on the decline in the produce per acre, and why a larger production can only be effected by exterior means. By green manure of sowed vegetable masses, however, the soil receives more than is taken from it, for the accumulated properties, generated by *light, air, heat* and *water*, are ploughed in on the spot, as they receive the greatest part of their masses from those powers of nature; and thus the reader may, by this demonstration, become clearly convinced of the advantage and

necessity of using an abundant vegetable manuring of the soil. Those, therefore, who merely mow and reap, and depend for their promotion alone on animal manure in manuring their lands, are certainly not in the right course. Their farming, in some degree, has a similarity to the progress of the grass-hopper or caterpillar, which is not calculated to produce, but to consume; it goes well with them in the beginning, as long as there is something at hand to consume, but gradually their stock decreases, and in the end their fields become impoverished.

It cannot be denied either, that, according to the present mode of farming, much manure can be procured and used, but in such a way as becomes detrimental to the farm at large; for instance, by robbing the meadows and pastures, by pillaging the forest, by feeding grain, by buying hay and manure, borrowing money, &c., which, in the end, must prove more or less ruinous to the farmer, in its oppressive and embarrassing tenor. The part of a farm thus manured may prove productive, but it is the smaller portion that can be reached, and that, moreover, at a heavy expense, whilst the largest portion of the farm is in an impoverished and unproductive state. Now, money is the very thing needed by the farmer who is in pressed circumstances; and in order to meet or obtain relief successfully, he must follow nature's course in manuring his soil—change an expensive and unsuccessful process, adapt the latter to the laws and requirements of nature, and manure his land with green vegetable masses. For where more can grow, or be produced at less expense, a cheaper and better manure must be applied. That green and vegetable masses fructify the soil, is a truth well attested by experience, and well known by all farmers who have been in the practice of ploughing down oats, corn, buckwheat, grass and clover sod. But as experience has proved that the present practice of green manuring is

too lack in its properties to nourish the land sufficiently, and too expensive, I came to the idea to make use of other vegetable seeds, and to establish a manuring system which will meet the wants of the soil, and prove a real promotion to the farmer. For if we mix other vegetable seeds with the offals of the barn, we can form a vegetable manure of from ten to twenty different kinds, which will be more powerful than dung manure, and not requiring one-tenth the labor or expense. Therefore it cannot be disputed, that in the promotion of husbandry, no better and no cheaper means can be found than this system of green vegetable manuring.

These natural means of promoting the farmer's best interests, by green vegetable masses of seed manuring, depend, as this work will show, on the proper selection of suitable plants, which offer themselves in fields, woods, mea-

dows, gardens, &c. But the growth of these plants differs with the climate, soil, situation and circumstances in which they are placed. Hence, I have given, in the selection of the different masses of seeds, a large contribution, such as will suit all localities and circumstances; so that it can be used as topseed in the grain, like clover. The description of the most serviceable plants, together with the collection, cultivation and application of their seeds, will form the contents of the second part of this work.

The natural conformable character of this green vegetable manuring system is, that it gives the farmer also the strength and the seeds to the improved cultivation of his fodder and pasture. The instructions and explanations on these subjects form the third and fourth parts of this book; the first part treats of the present system of farming.

THE FARMER'S PROMOTION BOOK.

PART I.

ON THE RELATION OF THE PRESENT SYSTEM OF FARMING.

NATURAL SIZE OF A SQUARE HAND.

FOUR INCHES SQUARE.

At first we must determine the mensuration of an acre, for it is necessary to have a correct method of judging the quantity of manuring seed sowed, that the produce of the improved green manuring, and the fodder and pasture cultivation, may be sufficiently dense. Hence we take a square of 4 inches, which contains 16 inches, which we divide into 4 parts, and each part contains 4 inches (superficial,) as shown in

the cut above. An acre contains 43,560 square feet, and each foot 144 square inches, making in the acre 6,272,640 square inches, which, divided by 4, is 1,568,160 squares of 4 inches each, as shown in the one-fourth of the cut, so that on 4 inches there must stand five plants; on one square hand 20 plants; and on one square foot 200 plants, for the green manuring; and to make the fodder cultivation, 500

plants on the square foot; and for pasture, when the grass only grows from 4 to 6 inches high, 1000 plants on the square foot, which will render it more productive.

We can measure the density of the square foot by counting the grains that fall on 4 square inches, as there are 26 squares of 4 inches, or 9 squares of 16 inches, in a foot, which, multiplied by the number of feet in an acre, will give the density of the seeding of plant and grass seeds, as proposed in the second part, and thereby determine the strength of the manuring.

In order to ascertain to a certainty the number of grains sowed to the foot, or to the square of two inches, which we call an agricultural seed inch, we take, say the $\frac{1}{256}$ of a pound, or one dram, and count the grains, which being divided by the number of inches in a foot, or seed inch, and thus we can tell the number we sow on the seed inch, foot, or any given surface.

In order that no mistake may occur, I take the representation of the inner surface of a man's hand, or 4 inches square, which is the ninth part of a foot—an acre contains 392,040 of these squares, and if multiplied by the number of grains on a seed inch, will accurately produce the amount sowed, or to be sowed, in broadcast, drill or otherwise. If $1\frac{1}{2}$ bushels of wheat be sowed to the acre, or 90 pounds—one pound contains 20,000 grains, which is 41 grains to the foot, or $4\frac{5}{8}$ on the square hand, or on to the seed inch. If thus we divide the hand, or four inches square, into four smaller parts, as it is represented at the beginning of Part II, we have four smaller seed inches, and hence the acre contains four times as many green manuring seed inches as grain seed inches.

Further; if we divide the hand, or the four inches square, into 25 parts, as the figure represents at the beginning of Part III, we have still smaller seed inches, better adapted to the fodder cultivation, or grass mixture, which we call the fodder and grass seed inches, being 25 times as many grass seed inches as we have grain seed inches, or 250 to the square foot. Again, we divide the hand, or four inches square, into 100 parts, as the figure represents at the beginning of Part IV, and we have the size for the density of the pasture cultivation. We call these the seed inches of the pasture

cultivation, and our acre contains 1000 times as many as it does square feet.

We will now remark that the cultivation and proportion of fodder on middle soils, must be so adjusted as to afford the necessary manure; but this rests on the proportion of fodder and grain cultivation. The grain cultivation on a middle soil draws more out of its strength than the weight of the crop amounts to, for it has less absorption of airy matter, whilst the green mowed or pasture draws far less, viz: not one-half of its strength from the soil; for the green plant has the ability to absorb a large part of its support from the air manuring, for which reason we so arrange our farm that one-half the land lies in fodder and grass cultivation whilst the other part is used in raising grain. For instance:

20 acres in winter grain, cultivated partly after the manured fallows are partly sod fallows.

5 acres potatoes and other summer crops.

15 “ oats and corn.

40 “ fodder and pasture.

20 “ fallows, part manuring, part sod, of two — or three years fodder and pasture cultivation.

100 acres.

I would remark, that on a small farm, a farmer cannot always keep up this rotation; but there must always be kept so much fodder cultivation, so that the green manuring can be applied, which is done only by the proportion of grain and fodder cultivation, so that the soil may retain and increase in strength and fruitfulness, and yield an increased harvest. In order to awaken the farmer to his interest and welfare, we will venture here a valuation of the crops in dry weight.

Every attentive farmer knows how many dozen of grain he has, how many tons of hay, the amount of grain threshed, of all crops raised, and with little trouble he may test and know accurately what his farm has produced in dry weight, hay, straw, &c. He can easily weigh the straw, hay, grain, vegetables, &c., by the dozen, and make his calculation; which will enable him to judge of the quantity fed to the stock per day, week, month, &c. He can also know the number of days on which he feeds on pasture, and, if he feeds potatoes, turnips, beets, &c., he can easily tell their amount and weight. In this

way he can range his stock to his means of fodder, and have his animals always in good condition, as well as tell to a certainty the dry weight of all his food. From roots he has only to subtract the weight of the water contained from the weight green, to find the dry weight, which is in the following proportion:

100 lbs. of potatoes have solid	25 lbs., dry weight.
100 " sheep pasture "	20 " "
100 " turnips "	20 " "
100 " carrots "	20 " "
100 " red beets "	20 " "
100 " green clover "	20 " "
100 " rutabaga "	15 " "
100 " turnips "	10 " "

Hence, as stated above, it is very easy to make an accurate calculation on the whole crop in dry weight.

It is well known that 5 tons of hay and straw, or potatoes, beets, &c., dry weight, make ten tons of manure, wet weight, litter included, and in the following proportions, dry weight:

Sheep, 6 tons, wet; horses, $8\frac{1}{2}$ tons, wet; cows, 11 tons, wet; or, " $2\frac{1}{20}$ " dry; " $2\frac{1}{10}$ " dry; " $2\frac{3}{20}$ " dry.

From which follows: 1st. That, on an average, five tons of fodder make only ten tons of wet, or $2\frac{1}{10}$ tons of dry manure; 2d. That the dry manure of these kinds of animals is nearly equal; 3d. That animals, from five tons of dry fodder, digest and use, in forming bone, muscle, sinew, hair, &c., nearly three tons of the dry weight of the fodder: consequently only a small fraction over two tons are, or can be, appropriated to the support of the soil. Thus the soil must become poor and unproductive, for it loses three-fifths of the amount it yearly produces.

If a farmer thus knows the weight of his crop of straw and grass, he cannot be at a loss in judging the quantity of manure he will be able to make. It is therefore important for a farmer to estimate the whole annual produce of his farm, in dry weight, so as to know the amount of manure he is able to make during the winter. A careful farmer, however, will go still further; he will estimate the amount of his pasture in dry weight, the amount he sells, and carefully

learn the produce per acre, of whatever crop it may be, whether grain, fodder, pasturage, or green sward—so as to know the true amount of manure he gives to his soil per acre. For if a farmer knows the amount his land produces in dry weight, and thus calculates the amount he returns to the soil, he knows the true amount lost by the soil in every operation, or crop he raises.

These remarks are made in order to instruct the farmer how he may give every attention to increase the productiveness and strength of his soil by the system of green manuring, and obtain a larger produce of fodder and pasture.

To keep one plough, three, and sometimes four horses, with other necessary uses, are required. For the keeping of these, we cannot estimate less than 32 lbs. of fodder, per day, together with litter, or 24 tons per year, including the dry weight of pasture and hay. Pasture is by far the cheapest food; therefore it is important, that pasture grasses be well set down, and of dense growth—on account of their being much sweeter and more nourishing.

A farmer also requires—say, 3 milk cows and 5 head of young cattle; 10 hogs and 10 sheep,—for a cow he must estimate at least 5 tons of hay and straw, or its equivalent in dry weight of pasture—making 15 tons; for a young animal not less than $3\frac{3}{4}$ tons, making 18 tons—for 5 sheep and 5 hogs the equivalent of one cow, making 20 tons—in all, 77 tons dry weight. Now every observer can see the cause why farm land becomes poor and unproductive—these 77 tons will only, when fed, produce 38 tons of dry manure, being a loss of 39 tons, (annually) to keep up the soil, which, by the system of green manuring, may be saved, and more than doubled in its application to the soil. Thus any farmer may see, on examination, how he can bring his farm to produce abundantly, so that everyone in his local circumstances can command any amount of invigorating manure he may desire.

The potato, for instance, is calculated to afford a larger produce per acre than grain, on account of the larger quantity of air manuring in the absorption of gases. An acre of potatoes will produce 80 bushels, at 60 lbs., 4800 lbs., one-fourth of which is dry weight, 1200 lbs., stalks, leaves and herbage, (too frequently left lying on the field) equal to 1200 lbs., making in all 2400 lbs. The potato thus affords a

larger proportion, with less labor, than grain, and five acres would produce 12,000 lbs dry weight; of which, if one-half is sold, a deduction of manure of one-half that amount, which is 3000 lbs., or $1\frac{1}{2}$ tons, will be made.

Winter Produce.—A farm of 100 acres will produce 20 acres of wheat, which, to pay expenses, must produce 15 bushels per acre; if we estimate one bushel of grain, straw and chaff to weigh 130 lbs., the acre would produce 1950 lbs. and twenty acres 39,000 lbs.

Of the summer grain we have already 5 acres of potatoes, and there remain only 15 acres for oats and corn. We take 5 acres for oats, which may bring 30 bushels per acre on light soil. One bushel of oats, with straw and chaff, will weigh, say, 90 lbs. —2,700 lbs. per acre, dry weight, or 13,500 lbs. on 5 acres, in grain and straw.

The 10 acres of corn, we will estimate at 4,000 lbs. per acre—corn and stalks, or 40,000 lbs., or 20 tons in all.

Produce of Fodder Cultivation.—20 acres of clover and grass, 2,000 lbs. per acre; hay, 40,000 lbs, or 20 tons in all.

Pasture.—If we estimate pasture equal to hay, it will make 40,000 lbs. or 20 tons. We have made this estimate for middle soils, and have included stubble pasture, as it is very uncertain until the soil has a few good coatings of green manure.

In the extraction of strength from the soil, it is a well authenticated truth, that to raise one bushel of wheat with the straw to mature it, it requires the strength of 1000 lbs. (extracted from the soil) of dung manure, which in the growing process is reduced to 130 lbs. dry weight. Wheat and straw, which leave 70 lbs. of fodder, when fed will only make 28 lbs. of dry manure per bushel, and 28 lbs. deducted from 1000, make 972 lbs. loss per bushel, in impoverishing the soil, in the growth of the wheat.

The reader may ask the reason why a middle or light soil, gives out more strength in grain, than heavy soil. We answer, that middle and light soil, being bare and mellow, the grain and the heat of the sun extract the juices and the strength of the soil more rapidly; hence much is carried off by evapo-

ration, and driven in the air. Heavy soils, being cold and inactive, need a greater quantity of dry manure than they return in harvest, in order to keep warmth and action, so as to promote the growth of grain. But when the soil has had a course of green manure, the extraction will be less, we require less dung to produce a bushel of wheat, as well on a stony, as on a lighter soil; for the airy decomposition is greater in corporifying the gases with the soil, whereas the enlarging of the manuring power of the soil by stable manure, lime and other processes, is so slow and expensive, that the most of farmers continue to lose money and run in debt, to their ruin, before they can accomplish their purpose. But, by *green manure* all this labor and expense are unnecessary, for it is a manure, without dung, and without fodder, and can be interpolated between crops—consequently an extra manure. If we dare not estimate the straw and grain, not less than $1\frac{1}{2}$ times its weight in the sheaf, the extraction of the *potatoes* is equal to that of the grain, in dry weight—for, although the potato exercises absorption of the carbonic acid air gases, there is a large evaporation from the bare surface, before the tops are high enough to cover and shade the surface.

For the cultivation of fodder and pasture, we must take an inferior soil, as these extract but $\frac{1}{2}$ of their dry weight from the nourishment, and the other half from the air. This cultivation affords an important advantage in being ploughed under as sod manure for the roots, &c., which it has formed in the ground, and is equal to $\frac{1}{2}$ its whole value. Adding to this the dung manure it produces, an important advantage results for the farmer, as the urine and manure of animals, whilst pasturing, help the soil, if not pastured too bare. Every farmer, however, should avoid having his fields eaten off close, for, if so, there will be an incalculable loss by evaporation.

Our readers must be aware of, that to restore and enrich the soil, we must put on it more than we take off. In the usual method of farming, it was, and is still out of our power to do so, and hence the decline of farms, and the enormous expense and outlay of farmers. Whilst the crops fail to meet expenses, and the extraction from the soil continues to be greater than the aid or manure used, no farmer can prosper. It thus follows, that in order to learn the truth of the case, we should estimate closely the

amount of strength we extract from the soil, and also the means we use to supply it with nutriment. We observe, 1st. That, by a considerable cultivation of fodder and pasture, the increase of strength to the soil is little, and, in dry seasons, none at all. 2d. That it is only when stable manure is used, that any benefit is discovered; but, on the whole, the farm is losing in strength of soil, notwithstanding the increased annual expense. 3d. It is evident that every thinking, reflecting man desires to prosper in his business; and there is no method by which a man arrives at a correct knowledge of the true state of his affairs as good as in keeping an account of his income and expenditures. A farmer that will make a *produce table*, and carefully note the amount of his crop, viz: wheat, rye, oats, corn, potatoes, straw, hay, &c., (and other roots, if he raises them,) can easily tell the amount of dry weight produced by his farm, and also the number of stock he can feed, and the amount of manure he can return to the soil, in dry weight, which will discover and prove the solemn truth that, to prosper, he must adopt a different manner of procedure, to give the soil more than he extracts from it. This instruction we design giving in the system presented in this work. If the reader objects, saying that this is impossible; we answer—the soil is not a money purse, the subtractions of which always balance in the issue the amount deposited, without any other source of accumulation. It is the work of God governed by laws based on infinite wisdom, and possessing means by which its strength and productiveness are increased, independent of any effort of man. If, then, we discover these means, and use our efforts to aid the progress and design of the laws of nature, in rendering the soil productive, we overcome every obstacle, and are on the direct path to prosperity.

Return by Stable Manure.—We have shown that a farm of 100 acres requires 67 tons, to feed the necessary stock, (of fodder and straw,) producing 26 tons manure, dry weight, which is to be applied to 10 acres, designed to raise 20 bushels per acre. The question is—What amount of manure is required per acre for this crop, so that the amount desired may be raised? One bushel requires the relative strength of 1000 pounds, and 20 bushels, 20,000 pounds, or 10 tons per acre. Now, we have shown that dry

fodder will produce, when fed, only a small fraction over $\frac{2}{3}$ of the dry weight of the fodder in dry manure—thus making $1\frac{1}{3}$ tons of produce, which lacks $8\frac{2}{3}$ tons of the quantity required, and a failure must follow in the next crops.

Return of the Sod Manure.—The sod, in its roots and short herbage, contains about one-fourth the quantity of the grass mowed or eaten off—say 2 tons per acre, which would be 1000 pounds, or $\frac{1}{2}$ ton, dry weight, to the acre, lacking $\frac{19}{20}$ in the amount required for the mentioned crop. Thus, by a continued mowing of fodder, or bare pasture, the soil becomes poorer and poorer the longer it is continued; owing to the surface being kept bare, and the evaporation continually going on by the action of light and heat, the juices, as gases are wasted and carried off in the air. Hence a mowed or pastured sod affords, comparatively, a very light and inefficient manure. I will offer here a few additional remarks on the component principles of dung manure. If a pound of dung manure be washed out clean, it will be found that about 80 per cent. is made up of fibres, somewhat like flax straw, which appears not the least affected by fermentation or decay; and another part, making all of ten per cent. resinous, indissoluble matter; leaving about ten per cent. available. Thus, in viewing the whole tenor of making dung manure, the process is a sinking matter, and cannot be relied on; and whoever does so, as the main source of manuring, will be disappointed in his expectations, as thousands have been, and continue to be.

In regard to sod manuring, the soil realizes as small a benefit by the dung and urine of the stock spread on the pasturage, and washed in by the rains. But with all the means the farmer can command on the old system, thus examined, none can, at the best, enrich more than a small portion of his land; for, as we have seen, the extraction always exceeds, in a more than four-fold ratio, the amount put on the land, and is, at all events, a slow and expensive method of improvement.

We have now two questions to answer. 1st. What are 100 pounds, dry weight, of the different field crops worth? We answer: This is wholly dependent on the markets. 2d. What do 100 pounds of the above cost? In order to learn correctly the cost, we must estimate the nutriment exhausted, the labor

expended, and time occupied, together with interest on capital, &c.; all of which a systematic farmer can tell from a glance at his *Produce Table* and *Day Book*.

There is, however, of this subject, another view, which every farmer ought to take and examine carefully. Wheat is the most important of all grain, and possesses the largest portion of nutritive matter; we will therefore adopt it as a standard whereby to learn the relative value of the other field productions. The following observations are also important, to notice the different effects which different kinds of grain, grass, fodder, &c., may have on stock—the quantity of fat, or onset, milk, butter, wool, increase of growth, &c.—which will enable the farmer to judge of their relative value.

Another method is, to extract the substance of the hay, &c., as you would in making a strong tea, in boiling water; then dry the hay, &c., and weigh it, and the fodder which gives the greatest weight, imparts the most nourishment to the stock; for the quantity it lacks in weight will be imparted to the stock fed. Although this process is wanting, to a certain degree, in exactness—the boiling water not acting as acutely as the gastric juice of the animal stomach, in its power of dissolving—yet it arrives so near the truth, that we can easily judge of the relative value of all kinds of fodder.

We will give a review of the different grains, roots and fodder, dry weight, based on the standard of 100 pounds, and the value in money—making wheat to bring \$1 per bushel, or 60 pounds.

Per cent. of nutritive matter, in dry weight, by hot water extraction.		Proportionable price of wheat, Per 100 lbs.	
		\$	Cts.
100 lbs. Wheat,.....	95	1	66
100 " Rye,.....	80	1	40
100 " Corn,.....	68	1	18
100 " Peas and Beans,.....	57	1	00
100 " Barley,.....	92	1	60
100 " Oats,.....	74	1	29
100 " Potatoes,.....	20 to 25		44
100 " Best Hay,.....	25 to 30		52
100 " Common Hay,.....	20 to 25		43
100 " Red Beets,.....	10 to 15		26
100 " Carrots,.....	8 to 15		26
100 " Cabbage,.....	6 to 7		12
100 " Turnips,.....	5 to 7		12
100 " Leaves of Beets,.....	4 to 5		8
100 " Sheep Pasture,.....	5		8
100 " Green Clover,.....	4		7
100 " Water Turnips,.....	3 to 4		7
100 " Summer Straw,.....	1 to 2		3
100 " Winter Straw,.....	1 to 1½		2

AIM, ADVANTAGE AND AID OF A PRODUCE TABLE.

Every farmer should make himself a Produce Table, and carefully note every item his farm produces, as he gathers it in. By doing this, he can so arrange his stock and fodder that there will be no want. He knows to a certainty the amount of manure he will have for the next summer for the cultivation of grain or fodder, and make his arrange-

ments with judgment and to the best advantage possible.

Again: If the farmer wishes to change his arrangements—either by extending or lessening his operations, or make a change either in his cultivation of grain or fodder, or in the division of his fields—he can know by his Produce Table how to make his arrange-

ments without suffering loss—when to increase his stock and when to reduce it, in order to suit his supply of fodder. He can know the amount of strength he extracts from the soil, and also the amount he puts on, so that in every instance, every circumstance connected with his farm, stock, and farming operations, may be exactly known. By the first column of the Yearly Produce Table, he has the amount of acres he has in the different kinds of grains and grasses; in the second, third, fourth and fifth, the amount of the whole produce, in sum total, in grain, fodder and pasture, in dry weight; in the sixth, the extraction from the soil; in the seventh, the return made to it; the weight and its value, in the eighth, ninth and tenth; and then follows the ex-

pense for cultivation, and labor, &c.; and, by comparing, he may tell, at any time, the increase of produce per acre, which is a great advantage to any farmer; for if he can tell the amount of strength he has extracted from his soil, he is better prepared to judge of the quantity of manure required to keep it in a productive state. In the system we are introducing, whereby we can give to the soil, by *green manure*, considerably more than we extract from, it will be truly interesting and profitable to know and understand every circumstance in regard to the operations and business of the farm, and thus to be able to tell our clear profits, and, at the same time, to know the relative requirement of each field, in order to continue a course of prosperity.

ANNUAL PRODUCE TABLE, AND EXPENSE OF CULTIVATION.

Number of Bushels, Pounds of Grain, &c., per Acre.		Whole Produce	Grain.	Fodder.	Pasture	Extraction.	Return.	Value of Fodder.			Expense of Cultivation.		
Pounds of Dry Weight.								Lbs., Dry Weight.	Dollars.	Cents.	Lbs., Dry Weight.	Dollars.	Cents.
WINTER GRAIN.—20 Acres.													
Per Acre,	Bushels,												
“	Bushel,	Lbs. of Grain,											
“	“	“	Straw,										
“	Acre,	“	Sheafs,										
“	“		Stubble Pasture,										
POTATOES.—5 Acres.													
Per Acre,	Bushels,												
“	Bushel,	Lbs., Dry Weight,											
“	Acre,	Lbs., Tubers, Dry Weight,											
“	“		Tops,										
OATS.—5 Acres.													
Per Acre,	Bushels,												
“	Bushel,	Lbs. Grain,											
“	“	“	Straw,										
“	Acre,	“	of Sheafs,										
“	“	“	Dry Wt., Stub. Pasture,										
CORN.—10 Acres.													
Per Acre,	Bushels,												
“	Bushel,	Lbs. Grain,											
“	Acre,	Lbs. of Fodder,											
FODDER AND PASTURE.—40 Acres.													
Per Acre,	Hay and Clover,	Lbs. Dry Wt.											
“	“	Pasture,	Lbs. Dry Wt.										
SOD FALLOWS.—10 Acres.													
Per Acre,	Pasture,	Lbs., Dry Wt...											
“	“	Sod Manuring,	“ “ “										
The annual produce of the whole Fodder Cultivation is $\frac{1}{2}$ per acre.													
DUNG FALLOWS.—10 Acres.													
Per Acre,	Pasture,	Lbs., Dry Weight,											

PART II.

ON THE IMPROVED VEGETABLE MANURING.

NATURAL SIZE OF A-SQUARE HAND, DIVIDED INTO FOUR VEGETABLE MANURE
SEED INCHES.

MEASURE OF FOUR INCHES SQUARE.

SECTION I.

To illustrate the question—How Nature does fertilize the soil?

The answer, from the beginning of the world, is as follows: "Behold, I have given you every green herb bearing seed which is upon the face of all the earth;" and it is evident that the fertility of the earth, and the increase of all creatures, is continued by means of green vegetable productions.

But it is necessary to know, how it is that this continued increase of produce, by green vegetables,

becomes possible. This consists in the susceptibility and vitality of plants to absorb and corporify the light of the sun, as the matter of light is a necessary condition to the matter of carbon, and that they absorb the air itself, which is composed of oxygen, from 22 to 25 per cent., and the remainder of nitrogen; the part of nitrogen which they do not corporify, is again, in various ways, secreted and evaporated by them. It is, therefore, a compounded nourishment, which they draw or attract from the air, and consequently not from the soil, or the

manure of the soil, alone. Therefore, if the matter of light is the main thing, it can be called nothing else than the air nourishment of the plants. But as the vitality of air nourishment is much stronger in young plants than it is in those which begin to ripen and die, so also in green vegetables a much larger gain of air nourishment will be corporified than where, in the meantime, the maturing plant can nourish itself and its seed only from the sap of the earth; hence, in this consists the increase of produce and of creatures; no difference whether ploughed in or pastured off. In such manner the surface of the earth covers itself annually, with green vegetable and leaf masses, dying, increasing and nourishing the mould of the earth, and being the course according to which nature fertilizes the soil.

SECTION II.

Occurrence at Natural Vegetable Manuring.—When the forest and plains are left undisturbed, the mould is increased and enriched, by the constant accumulation of the mass of leaves and plants; as is the case in the prairies, moors, woods, &c., which are composed altogether of vegetable manure. The cause of their existence, as well as the marks of their distinction, can give the reader some preliminary hints, respecting the design of vegetable or green manuring. Of this fertile pattern of nature, agriculture is a manifest imitation; for what streams (or the various means by which flowing rivulets, rains, &c., in mixing the particles and properties of the soil,) are in nature—ploughs are in agriculture; both effect a mixture of mould formed by vegetable manure with the earth. It is evident, therefore, that the oftener the farmer ploughs in a green and sappy mass of vegetable manure, and the more these masses are composed of various kinds of plants, the more he will add to the fertility and productiveness of his soil.

SECTION III.

Occurrences at Agricultural Vegetable Manuring.—The soil every where (even the poorest lands,) evinces an aptness to clothe itself with grasses of various kinds; which is nature's own effort to repair the wound, and restore her exhausted powers of fertility; hence, some have thrown out their lands as useless—for years—until through the effort of nature, by vegetable productions, the soil had accumulated a

sufficiency of mould and gaseous elements to restore fertility; without ever taking the hint from nature's lessons; that they had it in their power to render those lands productive and profitable, by a proper cultivation of vegetable masses, at the least possible expense.

SECTION IV.

Importance of Green Manuring, in Fallows and Stubbles, for the quick promotion of the Farmer.—Further, *green manuring* is important to the farmer on fallow and stubble land, in reference to a cheap and quick promotion of his best interest, and beneficial to his interest to sow plant seeds; to enable him to turn down, a vigorous supply of vegetable masses, when ploughing down his stubbles, or giving the second ploughing to his fallow fields, so as to replenish more than the amount absorbed from the soil by the former crop. The effect would be, that the spring or summer crops would become as vigorous, as the best stable manured fall crops, and the soil, accumulating increased strength and fertility in every operation, would thereby increase the amount of grain, straw, hay, &c.,—enabling him to support larger stocks profitably;—consequently to make more stable manure, and place him in a prosperous state, both in regard to enriching of his farm and purse, and placing him in easy and respectable circumstances.

Green vegetable manure has a tenfold advantage over any other. 1st. It is in accordance with nature's own effort. 2d. It embodies the absorption of the gases, increases the mould, and replenishes the soil with an excess of principles required for the growth of various grains and grasses. 3d. It supports a healthier stalk and more perfect grain. 4th. It can be spread in vigorous masses, by the prudent farmer, over the soil (without the labor of hauling or expense of teams) ready for use at all times required; whereas, in the process of stable manure, a period of from three to four years intervenes between that of sowing the seed producing the manure, and receiving any benefit from it on the succeeding crop; and if we take into the account the labor in gathering fodder, &c., it renders it a matter very expensive and laborious; whilst on the contrary, one pound of proper selected seed will add one hundred per cent. more to the fruitfulness of the soil of the same quantity of land, than one load of stable manure, and

the saving in expense of cultivation, would be not less than from thirty to fifty per cent. Here is embodied the decided advantage of *green manuring*. Stable manure only contains a part of that which perfects the growth of a crop of wheat, &c. It will produce the stalk, but fails to afford, to a great extent, the necessary properties to perfect the kernel. *Green manure* not only furnishes the properties necessary to make the stem grow and put out the ear, but it also gives the soil the necessary properties of building a stem, having a strong chrysalis, and plump full kernel; hence, one-third more grain, will grow on the same quantity of ground, by using *green manure*, and stand supported by a strong, stiff stem, sufficient to bear the ear and to ripen perfectly, than can be raised by stable manure, which brings forth a brash brickle stem, and breaks under its own weight, before the ripening process is attained.

Stable manure universally produces wheat with a thick, husky bran; of light weight. *Green manure* produces wheat with a well rounded grain, and thin bran, of heavy weight; which, apart from every other consideration, should induce the farmer to adopt the system of *green manure*. Farmers dependent on stable manure, fail to enrich more than a small portion of their farms, whereas, under a well directed system of green manure, the farmer can raise all his tillable land to a state of healthy and profitable productiveness, with one-third the labor, and at an expense of less than fifty cents worth of seeds, without any outlaying of capital, per acre.

Many experienced farmers are convinced that *green manure* tends to the raising of the best crops, and is the best means of raising the vigor, and enriching the soil; but, unfortunately, failed in the selection of the matter, ploughing down, clover, buck-wheat, turnips, peas, &c. These masses lacked both in quantity, and in the compound principles required to invigorate the soil and replenish it with the principles necessary to the growth and perfection of the various grains. Thus, my mind was directed to an investigation of the component principles, embodied in the various grains, both in their growing and ripening processes; and to the selection and application of the grasses and plants which embody those principles, and which, in their decomposition, when turned down in their green state, furnish the soil with the proper food

to nourish, sustain, and produce an abundant harvest.

SECTION V.

Agriculture is the most important of all pursuits, and in order that the farmer may be amply rewarded for his labor, and his profession rendered more productive of happy and beneficial results, I devote this work to his advancement and promotion. As we have stated before, that *green manure* is in accordance with nature's effort, we will notice a few particulars in regard to its benefits and operations. 1st. The manner of procuring, and cheapness of, the seeds. 2d. The vigorousness of their vegetable masses. 3d. The manner of applying the seeds, as suited to the different crops and state of the soil—in their general application, as topseeds on winter and summer grain, like clover, &c., and also in stubbles and fallows, in four different manners; and lastly, describe the species of plants, and how we must apply them. D. Seeds used as topseeds to wheat and rye, (winter grains). E. Seeds used as topseeds in stubbles and fallows. F. Seeds used as topseeds on oats and barley, (summer grains).

But to attract the attention of the reader, I will here state that about 10 lbs. of these seeds will be sufficient to sow an acre, (not amounting to fifty cents worth of labor in procuring) which will produce a *green mass*, that when ploughed under at the proper time, will enrich the soil more than ten loads of stable manure; and that these beds of green manuring can be cultivated between every crop on wheat, rye, corn, oats, barley, and fallow and stubble fields, enabling the farmer, by a quick succession of *green manure*, to raise his farm in the shortest time possible, to a high state of cultivation and productiveness.

SECTION VI.

Cheapness of Seeds.—The cheapness of seeds for the green manuring consists in simply gathering those plant seeds, which grow in crowds around and on your farm, (most frequently, and have the most seeds) come up the best, and have the most strengthening and invigorating effects upon the soil which I have designated with this (*) mark at the end of this part. In gathering the plant seeds, they ought to be taken off by cutting, the plants gathered when the seed is sufficiently ripe, and before it shells. Great care should be taken to have the seed well

dried, shelled off, and put up in a dry place, so as not to mould or injure its growth. In this, every farmer, to be successful, must use care; an airy, dry, cool place is the best to keep seeds in.

Inasmuch as the successful operation of *green manure* depends greatly on the germination of the seeds, care must be used in selecting those plants that bring a well filled and perfect seed; and as different localities or farms produce plants naturally differing in their families (and even on different portions of the same farm) attention must be given to suit the selection of seed to the nature of the soil, and always using such as are most useful, locally, such as produce many and well germinated seeds, and of a small root. When the seeds are fresh and well preserved, and properly cultivated, every seed, however small and minute, will germinate and spring up, producing its plants. It is not always the case that small seeds produce small or slow growing plants; for the annual and biennial plants, containing the smallest seeds, are frequently of the most sudden growth. Hence, the cheapness and ease in procuring a supply—for, besides the number of seeds of natural plants—the separate grains are very small. For instance, the seeds used by some farmers—as

The Small Pea has	5,000 grains	per lb.
Vetch.....	10,000	“ “
Buckwheat.....	15,000	“ “
Rye and Oats.....	20,000	“ “
Rutabaga and Millet	125,000	“ “
Red Clover.....	200,000	“ “
Spurry.....	500,000	“ “
White Clover.....	600,000	“ “

Which, from the largeness of the seeds, fail to form a dense coating, whilst a greater quantity of seed is required without gaining the end desired. But in this system of green manure—as shown at the end of this part, a great majority of the most useful plants contain over 1,000,000—as the goose-foot and others. The common mugwort from 4,000,000 to 5,000,000 grains per lb.

But we sometimes find farms, on which it is difficult to procure natural seeds for *Green Manuring*. In such cases they can be obtained elsewhere, along ditches, fence corners, meadows, &c. Many farmers find their meadows often set in with herbs consid-

ered injurious to hay and cattle, which contain much nutrition and valuable manuring qualities. They are generally the best manuring herbs, and do not increase when the seed is collected from them. We often find in woods, many of the most useful herbs and grass seeds, well adapted to Green Manure, and to the improvement of fodder and pasture cultivation—herbs which may be easily gathered. On our farms, however, we find an abundance of natural herbage that is considered a nuisance, which, when rightly appropriated, possess the highest manuring qualities, and accumulating and enriching principles, and from which we draw a portion of our most beneficial aid in Green Manuring.

SECTION VII.

The Strength of the Masses by the use of different kinds of Plants and Grasses.

The distinction in the strength of the masses of *Green Manure*, embodying many different kinds of plants and grasses, is very significant, as the use of them is abundantly more nutritious than the use of only one kind. In proportion to the vigorousness and variety of the mass of Green Manure, the soil is replenished and its productiveness increased; it is therefore necessary that we sow a mixture of ten to twenty different kinds of plants and grasses, for the reason which I have before mentioned, viz: that nature, in her operations for enriching and forming mould, uses much variety on the same surface. Every plant has its own appropriate strength derived from the air and ground nourishment, and its own peculiar secretions; hence the leaves and stocks of different plants are differently formed, in accordance with the action of the air, as it rests upon them, in their secreting and digesting operations. Bulbous and different other plants live by the air entirely, and their roots are formed for the purpose of nourishing themselves by the juice or water in the ground. What air is to the leaves, water is to the roots of such plants. It is, therefore, explicable, why a mixture of many kinds of plants and grasses can stand closer in growing luxuriously, than when we sow only one kind. The mass is composed of a greater variety, consequently more mould is formed in the soil, and more of the air and other nourishments communicated to the mould in order to invigorate and strengthen the soil. There exists in every

kind of plants a peculiar organization, differing from each other in their connections of matter, and the preponderations of the different kinds of matter. Hence we see nature producing herbs and grasses of an acid or sour taste, others sweet, others bitter, others salty, others aromatic, others have an unpleasant, others a pleasant flavor, others so sharp that they draw blisters on the skin, others mild and pleasant to the taste, others have much astringency, others slimy, others eruminous or resinous, others poisonous, others narcotic or stunning, etc. The fermentation of a mixture of such plants going on, when ploughed down, furnishes the soil with the natural food or grasses, and corporifies with it the productive elements of its nature, hence the greater benefit derived over that of one kind of plants, or stable manure; for the greater the variety of plants used in *Green Manure*, the mixtures thereby embracing more of the different organizations of vegetable matter, the greater the heating influence in fermentation, and the supply of nutriment afforded to the soil. Hence results the great advantage of *Green* over *Stable Manure*, in being richer in its ingredients, and more active in its corporifying action on the soil. But another evident reason why stable manure lacks much of the nutriment originally embodied in plants, herbs and grasses, is, that fodder, hay, &c. fed to stock gives out its invigorating principles in the process of digestion—in the formation of *bone, sinew, muscle, fat, hair*, &c. necessary to the growth of animal structure; whilst little else is returned to the soil, of benefit, than the alkaline of animal water, a great portion of which is lost by evaporation before it can be incorporated with the soil. But *Green Manure* produces a fermentation, and by the warmth thus created in the soil, incorporifies with it, the *oxygen, nitrogen*, carbon and alkali of plants, embodying all that is lost and given out through the process of ripening and feeding, committing the whole to the soil as the rich treasure of nature.

Where there is fermentation, there is warmth, and a natural warmth is a necessary condition to the germination and growth of vegetation; the more natural warmth can be embodied in the soil, the faster the growth will be accomplished. If a thermometer be put five inches deep in a soil manured with a heavy coating of *Green Manure*, it will be several degrees warmer than a soil of the same kind

manured with stable manure; hence a continued healthy growth, forming a hard chrysalis on the stem, and producing a well matured grain, hay, fodder, &c. Grown by *Green Manure* of a proper mixture of plants, grasses, &c. furnish cattle with more of the animal *ferment* or *Gum*, (*Gluten*), which augments or increases their growth; for to a great extent, the constituent principles required to enrich, fertilize and render the soil productive, viz: *Oxygen, Nitrogen, Carbon, Alkali, Salts*, &c., are also required and obtained through digestion, to promote animal growth. As evidence of the truth of this, the cattle raised on the natural meadows and lands of the west, attain a much larger size than those east of the Allegheny mountains, so that, whether we design raising grain or stock, or both, we are decidedly benefited by *Green Manure*, which imparts the associated constituents to the soil, and thus supports a natural healthy nourishment, developing the blade, stalk, ear and grain, and supplying all the wants required in perfecting the growing process of grass and grain, without acting as an over stimulus, which is often the case in stable manure, in sending forth a large brash stalk, without the requisite constituents to harden or strengthen the stalk, or fill and mature the grain. By analysis, we discover that all plants contain more or less of the organic acids of various compositions and properties, and which are all combined on a *basis*, such as *Potash, Soda, Lime, Silica, Magnesia, Ammonia, Sulphates, Phosphates*, &c. (which are the constituents of our field crops.) Hence it is readily discovered, *that* manure which contains the largest combination of nutritive principles, is best calculated to improve the soil, and promote the farmer's best interests.

In nature, the animal kingdom, and consequently animal manure, produces only a very small portion, compared to the vegetable kingdom, and vegetable manure of the soil. The present mode of farming is carried on almost entirely by dung manure. What grasses are cultivated, are either mowed or eaten off; thus the soil lacks the necessary principles required to perfect the maturing of the grain; from which arise the many diseases of field crops. But the more the *Green Manuring* is practiced by the farmers, these defects will disappear, for the juices of the soil are made of more variety of matter in the mixture of vegetable manure.

SECTION VIII.

Shadiness, or the right Proportion of the Plant and Grass Manuring Mixture.

Experience teaches, that if we only sow plants, the mixture will not stand dense enough, consequently the mass will be too thin on the surface; and to sow only one grass mixture, the mass will not stand compact to keep the soil moist in dry weather, and cause a vigorous growth, consequently the grain will not be so good as when the plant mass is well closed.

This led me to give attention to observe those plants that grow up the most rapidly, and which are used as *protection plants* for the smaller and slowly growing plants, filling up and rendering the mass close and heavy. The main and protection plants I have marked with two * * in their description at the end of this part. Other plants produce only a thin and slender growth, and make only small plants, as they are not of a quick growing kind; but on that account not less valuable, as they fill out the spaces of the protection plants and grasses, and render the mass close and dense. We therefore call such, *middle plants*. The proper grasses will then, owing to the protection and moisture, grow in the spaces and form a perfect mat or mass of manure, consequently the soil is kept moist and shady. But it is important that the plant masses be so arranged in their selection as to stand as compact as possible, so that the soil may be well shaded and kept moist: in this condition, it absorbs more of the carbonic acid out of the air, for *carbonic acid gas floats* mostly near the surface, on account of its weight, (unless exhausted by violent evaporation, or driven away by wind,) it readily combines itself with the moist warmth of the air, and is absorbed by the plants and loose moist soil thus densely shaded, adding amazingly to the growing and maturing of wheat and other grains.

The shadiness or density of plant and grass masses depends on the proper proportion of seeds forming the selection or combination, and also their vigorousness of growth. Hence, in order to be able to determine with accuracy the proper proportion of plant and grass seeds necessary to form a well suited mass, we must acquire a knowledge of the number of seeds in a pound.

SECTION IX.

Number of Grains per lb. of the Plant and Grass Seeds.

It is easy for any person to learn with tolerable accuracy the number of seeds or grains in a pound of any kind of seeds: for instance, weigh one ounce, then take a small thimble and measure the seed thus weighed, and suppose it contains twenty thimbles full; then count a thimble full, say 100 grains—100 multiplied by 20 will be 2,000 grains to the ounce, and 32,000 to the pound. In this way any one can easily determine the [number of grains in a pound of any kind of seed, whether large or small.

It is important that the farmer in seeding his *Green Manure* thus make a calculation in order to arrive at as great a degree of accuracy as possible.

Having learned the number of seeds in a pound, he can mark his bags with the name of the seed, the number of pounds, and the number of seeds in a pound. In doing so, there will be much convenience to make the selection for the proper seeding.

Pounds of Seeds in the hollow measure.

The weight of the seed, the number of grains, and the number of pounds, show by decimal calculation the number of seeds which can be used as a common measure. If, for instance, one pound contains 1,000,000, and a quart contains two pounds, then the bushel will contain 64 lbs. or 64,000,000 seeds.

SECTION X.

Number of Grains on a Plant Manuring Seed Inch.

(See Cut at the commencement of Part II.)

We now notice the manner in which we can ascertain the proper proportion of plant and grass seeds in their mixture as sowed. The cut at the commencement of Part II, represents four inches square, or sixteen superficial inches, which, divided into four seed inches, gives four inches, or two inches square to every seed inch; and in order that the mass be dense enough, it will require not less than five good sure grains to every seed inch, and if the seed is not sound and pure, we must sow thicker or more seed on the same ground, as the shadiness assists the quick growth and preserves the moisture.

The arrangement in mixing the seeds will be most

successful in manuring by observing the following proportions to the seed inch:

1. Grains of the larger and quick growing protection plants.
2. Grains of the smaller or middle plants.
3. Grains of the grass kinds.

If we suppose that an acre would require to form a proper density and shadiness in sowing, 5,000,000

This would be of the larger protection plants,	-	-	1,000,000
Of the middle plants,	-	-	2,000,000
Of the grasses,	-	-	2,000,000
			5,000,000

We can thus compare our sowing of this calculation by spreading on the ground a piece of muslin a foot square, and counting the grains which ought to contain 180 seeds. Now if a mixture of small and large grains on an average contains 500,000 seeds to the pound, then ten pounds would make 5,000,000, and if a pound contains 1,000,000 seeds, an acre would require only five pounds, and if we have our seeds arranged as directed in section 8, the quantity is very easily compounded or mixed, to meet the required density. Experience has shown that the proportion mentioned forms a dense and heavy mass.

It now remains for me to show and estimate the strength and density of the plant masses before they are plowed under.

SECTION XI.

Plant Mass on a Square Foot, and its estimation.

Farmers estimate the plant mass of green manure generally too high, be it clover, green pasture, or green manure in fallows, stubbles, &c. It is not the appearance, but the substance in weight, that yields a lasting and substantial benefit, communicated to the soil; hence we should examine the subject and arrive at the truth, if possible, and become acquainted with the vigorousness of the mass without deception. The method of testing the strength of a green mass is very simple; we can raise in different parts of the field, a foot square of the mass and sod, and wash off the adhering mould and clay, dry and weigh it, and make a calculation of the amount per acre, in tons, as ploughed under.

SECTION XII.

We will now examine how great the Strength of the Plant Manuring can be made by the density, shadiness, and the different kinds of mixtures.

This is easy to arrive at if we make our calculation in the following manner: At the rate of two inches square, or one seed inch, we sow five grains, which is 180 grains to the square foot, from 10 to 12 inches high, before ploughing under. Now, for the sake of illustration, suppose we take 180 straws, 12 inches long; each of these straws weighs 10 grains, which would be 1,800 grains, dry weight, to the foot, or 13,612 lbs. to the acre, dry weight; leaving out of the calculation the roots and leaves, which is fully equal to the stem, doubling the amount, and make 27,224 lbs. or 13 tons 12 hundred, dry weight, to the acre. In this calculation we fall short of a true estimate, for when we consider this mass ploughed under in a green state, embodying all the fertilizing principles, as oxygen, carbon, &c., and thus undergoing decomposition in the soil, and corporifying and uniting the same with the basis of soil, a true estimate would not fall short of the equivalent of 40 tons to the acre of stable or dry manure; for in this manner of green manuring, all that is lost in drying, feeding, &c. is communicated to the soil, and is, on the whole, to the farmer, a clear gain of 200 per cent. In comparing fields sowed with wheat, growing on a soil in which green manure has been used, we observe that it stands erect, and possesses a firm stock and well rounded grain, whilst that growing on stable manured land has a brash soft stalk and husky bran on the grain, and is universally sinking under its own weight before it is matured. In Green Manure, the properties and juices required to make the stem grow and mature the grain, are incorporated in the soil and given out freely; in the stable manure a portion of these properties are lacking, hence we often see heavy brash straw and but little grain. Green Manure keeps the soil lively and sweet, and under all circumstances gives out freely the properties required to produce a crop, building up all the parts in just proportion. These properties and benefits are the effects of *density, shadiness*, and the different kinds of mixtures of plants of the improved *Green Manure*. Hence it is plain, that the

oftener he follows in succession the ploughing down of these green masses between his crops, the sooner he will improve his soil, and the greater will be his benefits.

SECTION XIII.

Loosening, Purifying and Deepening of Soil by Vegetable Manure.

Fields having been manured with these dense and shady masses of vegetables, even heavy clay soil, will become mellow. Such are always the effects produced, where the vegetable manure is dense and shady, for the soil being closely set with roots, the clods mellow down into a pleasant mould. Whosoever will practice this system of vegetable manure, in accordance with the following directions, for a few years, will save one half the labor in ploughing heavy soil, and in light soils, one horse will be able to do the ploughing in a proper manner. The fields brought under the influence of Green Manure, will continue to produce clean grain and grass; for the soil continues in a pure and healthy state, by the influence of continued vegetable fermentation; whilst worms, insects, weeds, and other nuisances to the farmer will cease to be, for the variety of vegetable matter thus committed to the soil, in the operation of fermentation, and the secretion of juices, in their combination renders an important benefit, as it destroys worms, insects and other causes which are continually preying on vegetation. The smell, the taste of the soil under the influence of this compound vegetable fermentation, prevents their existence. The properties of the Green Manure act in accordance with the *laws of nature*; for, while by virtue of the many different kinds of matter contained in the mixture, the juices of the soil are rendered fertilizing, producing the most perfect grain and grasses, it also destroys vermin, &c. It is evident from a view of the operations of agriculture now practiced, that only by the system of *Green Manure* thus set forth, the farmer can keep up his soil, and obtain more abundant crops, and that, without the introduction of Green Manure, as before described, to correct the impurities and fertilize the soil, he cannot attain to a profitable and beneficial pasture cultivation, nor be successful in producing profitable and healthy crops of wheat and other grains, nor promote his own prosperity, nor the welfare of our commercial relations.

SECTION XIV.

ON THE APPLICATION OF THE IMPROVED GREEN MANURE AS TOPSEED IN GRAIN, LIKE CLOVER, ON FALLOW AND STUBBLES, IN FOUR DIFFERENT MODES.

FIRST MODE OF VEGETABLE MANURE.

As topseed on Winter Grain.

The topseed of the different kinds of clover, and of the fodder grass in the summer and winter grain is an old method, and well known to farmers; but the topseed of the *Vegetable Plant Manure* on winter and summer grain, fallows and stubbles, is a new matter. The constantly arising difficulties and failures in producing the various crops, on account of a lack of the proper nutriment of manures, causing the destruction of smut, blast, vermin or insect, &c. induced me to an investigation, and to adopt a natural and corrective system of Green Manure. In order that the correctness and benefits of this mode of manuring may be fully tested, let a farmer make the trial on a small lot of ground, and satisfy his own mind. He will thereby gain the necessary facilities, habits and ways of treatment, which I give in the following treatise.

SECTION XV.

Instructions on the Seed.

In the use of Vegetable Manure on winter grain on the poorest soil, it will be well to sow the seed in November or December, before the fall of snow, so that the seeds may be soaked by the moisture of the winter, and be pressed into the soil. In the first experiment it may be well to take reasonable good soil, until a practical knowledge is obtained. In sowing, care must be taken not to sow the winter grain too thick, so as to choke the vegetable manure. Nothing need be apprehended on account of weeds among the grain, and that the manuring mixture will shoot up and spoil the straw which is sowed there, as it only forms leaves the first year, for they are a selection of kinds that only form roots and leaves the first year, consequently they are a green mass, which forms in from four to six weeks after the grain is cut, and makes a heavy coat of manure, but if left to the second year, will run up to seed, which if ploughed down in stubbles the first year, it will enrich and fertilize the soil, and purify its ele-

ments. If sowed late in the fall, it will come up in the spring, shade the roots of the grain, keep up a moisture, and, the harvest being cut, will form a thick coated mass, suited to plough down in August. A great benefit is thus afforded to the growing of grain; for the soil being green and moist, the growth is rapid, and aided in its efforts by the green mass around the roots, which keeps the earth moist and free.

In respect to sowing the seed, it must be mixed with moist sand, and so minutely, that the smallest seeds be separated as to be sowed evenly. It is best to throw the seed twice over the ground, once the lengthway, and once across the lands, in order that all parts may have an equal share. In preparing the ground for receiving the plant seeds, it ought to be rolled before the manuring seed is sowed; so that the small seeds be spread evenly. We dare not mix too many of the smallest grained kind of seeds on a heavy cloddy soil, for it is indispensable to a heavy soil, that such kinds of plants, as possess good roots and large leaves, be used as protection plants to the Green Manure; indeed, they form leaves the most rapidly, cover the soil, and allow the small plants to grow under them and nourish the grass seeds.

SECTION XVI.

Forbearance after Harvest.

It is not advisable to pasture the fields after harvest, as there are so many plants mixed with the sweet grass and herbs, and so densely grown together, that animals, even sheep, cannot well separate them. For spring grain on heavy soils, we allow the mass to grow till late in the fall, then turn it down before the arrival of frost.

On light soils, we allow it to pass through the winter, and when it greens up again in the spring, then plough it under. The mass of matter turned down in heavy soils, with the action of the frost, will tend to mellow the soil; and in winter but little of the strength of the fermentation escapes. In every ploughing down of Green Manure, the harrow should be drawn the same way the furrow is made, so as to close the soil, and prevent the escape of the gases formed by fermentation.

SECTION XVII.

Rolling Down and Ploughing in the Vegetable Mass.

A well set *Green Manure* is a dense and close mass

from twelve to fifteen inches high, of vegetables and grass, and this cannot be formed of less than from ten to twenty different kinds of plants and grasses. When we desire to plough the mass down, we must draw a heavy roller in the same direction the furrows are to run; it is best to roll in the morning when the dew is on, as the mass will then be pressed down more effectually. In this way it can be well covered.

SECTION XVIII.

SECOND MODE OF THE GREEN MANURE.

Of the Topseed on Summer Grain.

In sowing the topseed on summer grain, it will be more successful if we use a soil that has had a Green Manure on winter grain. If the summer grain stands on a soil which has received a good vegetable manure, the success is certain, as the soil contains more moisture, and endures dry weather better. In all summer crops, such as barley, oats, buckwheat, etc. the topseed of the Green Manure is applicable, (where clover is not sowed,) and must consist of biennial and perennial kinds of plants, which do not shoot up, but form a dense herbage, standing shady and low, which are, as already stated, *winter seeds*.

For the seeding on summer crops, it is important that the seeds of Green Manure be sowed on the fresh ploughed ground, immediately after the oats, &c. are harrowed in, or just before a rain. The mixture of the plant seeds must be divided, and the large seeds sowed with the barley, oats, &c. and the small seeds sowed after the barley is harrowed in, and rolled well across the land. If the weather is dry, it is important to repeat the rolling; for without being well rolled, it will not be likely to come up in dry weather, and root well and prosper. It is important that fine seeds should be sown on the top of the ground and pressed in with a roller; but extremely fine seeds must be sowed on fresh ground after it is rolled, and they will come up after the first rain.

On cloddy, heavy ground, the fine seeds on summer crops will not come up so well, as they are pressed by the drouth before being well rooted; but it is no injury to the land, as they will come up at the next manuring or ploughing. They remain in the ground, and will come forth and prevent weeds from rising, for by Green Manure the fields are kept clean from impure elements. In all cases, however, Green

Manure will succeed better, if first sowed on winter grain, until the soil becomes moist and mellow, or on fallow fields.

SECTION XIX.

THIRD MODE OF VEGETABLE MANURE.

Of the Vegetable Manure on Stubbles.

This is the third method or mode of the application to the winter seeds of Green Manure, but it is only expedient, when we can spare the stubble pasture, to apply this topseed selection. We should also be advanced in the system so as to have spare time, for the ground should be ploughed as soon as the grain is cut off and the seeds sowed. It will then form a mass to pass through the winter, and grow up to be ploughed down for summer grain. It is better, however, to defer stubble Green Manure, until the soil may have had several dense manurings on the winter grain. Let the stubble follow the Green Manure of the winter grain or fallows, so that the soil may have acquired a greater strength and susceptibility to bring forth the Green Manure in the dry season. When the grain is removed, let the stock be put on the stubble, then immediately plough it down, harrow it once, and sow the plant seed, and let it be rolled. The vegetable mixture for stubbles is of another nature; it consists of such kinds of plants as we dare not apply to winter and summer grain, but which are highly nutritious and useful on stubbles and fallows. If sowed on the winter grain, they often bring forth stems and run to seed. There are, among them, a majority of biennial plants, which have shell-like seeds and do not freeze out, but pass through the winter and form a green mass early in the spring, then to be ploughed down. One part is also of that kind of summer or annual plants, which come up in the fall, and shoot their blossoms in the spring.

SECTION XX.

FOURTH MODE OF GREEN MANURING.

Of Seeds for Fallows.

"No furrow without a Green Manure," must be the principle in regard to the promotion of poor soils and farms. Here we apply another part of summer seeds—the annual herbs and grasses, especially such as can be gathered in abundance. That the soil, however, may be benefited and enriched, it must be made mellow by a condensed mass of different

kinds of useful grasses, herbs and plants, which will prepare it for a strong and vigorous clover pasture and sweet grasses. Where the farmer can use his fallows as he pleases, it will be proper to adopt the following mode: He begins with the Green Manure on the fallows, so that the dung manure may be more extended, especially on the poorer places of the soil, or he applies to the meadows that which is not required on the grain crops. The careful farmer, in pursuing the Green Manuring system, will soon find that his soil yields better crops than where he uses dung manure. The reader will find the suitable seeds described in the description of plants for the fallow manuring.

Many farmers believe that fallows should be kept clean and bare, and that in order to raise a good crop of wheat, every little plant and spear of grass must be extirpated by a repetition of ploughing and harrowing; but they are greatly in error as to the plan of nature. The effect is a somewhat greater absorption of air in the loose soil, which, however, by the bare surface being exposed to the rays of the sun, the action of the rays of the sun absorbs the nutriment of the soil, and thus its juices are lost. It may happen that a favorable crop follows in some cases; but we should recollect that the soil is left in a worse state, and runs into a retrograde condition. By the repetition of Green Manure, however, with strong rooty and shady kinds of plants, it will be mellowed down durably, and enriched still farther by the increase of mould, juices and gases, which are incorporated with the soil from time to time. Hence, from the mellow state of the surface of the fallows, and the shadiness of the plant masses, the soil absorbs and retains the gases and juices, and they, in addition with mould, become incorporated with the soil in rendering it richer and more fertile; for thus the process of drying up and induration of heavy soils, is kept off by the shadiness of the plant masses. In order to render a heavy soil mellow and productive, we should give it a deep ploughing late in the fall, and sow it with a winter seed mixture, which should be allowed to grow to the middle of June, and then ploughed down and sowed a second time. It will be ready to be turned down again by the last of August. The soil will be enriched and mellowed, and produce a heavy crop of wheat. By thus following the system of Green Manure, from

year to year, the soil will continue to increase in productiveness, and richly repay the farmer for his labor. This manner of manuring is of great importance and profit to the farmer, as he can put on an ample supply every year on his fallows, without the trouble and labor of hauling stable manure, often from a great distance. Here we apply another part of the summer seeds, the annual herbs and grasses, especially such as can be gathered in abundance. By the repetition of Green Manure, with strong rooted and shady kinds of vegetables, the heavy clay soil will become more mellow the oftener they are applied, and the absorption of airy nourishment by the fallow soil is much greater: for the process of drying up, and the induration of the heavy soil is kept off by the green shady mass. It is, therefore, the only efficient and proper treatment, (with deep ploughing,) to pulverize and fertilize heavy soils. When such thick set, strong rooted and shady mass mixtures grow till the last of August, and are rolled, ploughed down and sowed with wheat, they continue in a loose and moist state; if the mass is ploughed down before it comes to blossom, the gain will be greater. If the soil is poor, plaster may be used to give the seeds a start. If, after the wheat is sowed, before the snow falls, we sow the topseed of the winter grain manure, in a few seasons the soil will become as rich and mellow as a garden, and will produce a double crop.

We have now given the four different ways in which the farmer can apply the seeds, and raise his land by green manure to a state of profitable productiveness, and place himself in easy circumstances. We will now give a description of the different kinds of plants and grasses used most profitably in Green Manure.

SECTION XXI.

Instructions on the Description of the Plants used in the Improved System of Green Manure.

For the better elucidation of the subject, we divide this treatise into three parts: The first is marked with D, the seeds used for the topseed; the second with E, the fallow seeds; the third with F, the stubble seeds.

SECTION XXII.

In the division of the vegetable seeds marked with D, which can be sowed on grain like clover, we select such winter plants as are sure not to shoot up into

grain and injure the straw. We will omit, in this division, that kind of plants which may be exchanged; we will describe the latter in the division of stubble seeds.

SECTION XXIII.

In the division of the fallow seeds, E, we will select only the most common and fast growing summer plants, which blossom first in the summer and fall, and grow fast to leaves and stalks, and which ripen the same year.

SECTION XXIV.

In the division of stubble seeds, F, we will select that kind of winter plants which grow up and blossom early in the spring, and, if sowed on unploughed stubbles, will soon form roots and stalks, and also that kind which, if sowed in the spring on winter or summer grain, would shoot up and spoil the grain; but, when sowed on stubbles, will form merely roots and leaves, and pass through the winter and grow up in the spring, forming a dense mass for early manure, as in corn ground, &c.

SECTION XXV.

In each of these three divisions, we give ten vegetable forms, whilst the mixtures of green manure must be composed of, at least, from ten to twenty, or more kinds of herbs and grasses, in order to embody sufficient fertilizing nutriment.

SECTION XXVI.

At the top of each of these vegetable forms of the following description, the reader will find some plants that are marked with *, which plants grow plentifully, and are found everywhere, so that seed may be easily met with and collected, to make a beginning in Green Manure, and which are known by every farmer as sufficient to make a mixture of from ten to twenty kinds.

SECTION XXVII.

After these, will follow, in each vegetable form, such plants as are not so generally met with, but, nevertheless, so valuable to Green Manure, that they deserve cultivation. These we have marked with one *. There are also among them many garden, especially perennial plants, which need no seeding or planting, if they are once sowed or planted.

SECTION XXVIII.

They will be followed by plants in each vegetable forms which are not marked, but useful in the mixture, and which can be easily collected in the fields or gardens.

SECTION XXIX.

NAMES OF THE SEEDS.

For Topseeds, Fallows and Stubbles.

The following I give for topseeds of the first vegetable form—all kinds of Dock, (*Rumex*.)

The second vegetable form of topseed are the fast increasing biennial and perennial plants—*Mullein*, and sharp juicy plants which resemble in their growth the general known *Mullein*, (*Verbascum*.)

The third vegetable form of topseed we find pointed out in the biennial and perennial meadow and field plants which contain the most seeds.

The fourth vegetable form of topseeds are the winter umbelliferous flower plants, (*Umbellatum*.) as, for instance, the well known Parsnip, common Cow Parsnip, (*Heracleum Spondylium*.) Cow Weed, or *chervil* (*Chaerophyllum*.) the Wild Carrot, &c.

The fifth vegetable form of topseed contains the winter labial flowers, as, for instance, the Catmint, Cornmint, Hoarhound, &c.

The sixth vegetable form of topseed contains the winter Husk plants, as, for instance, all kinds of Cabbage, Turnips and hedge Mustard, (*Erysimum*.)

The seventh vegetable form of the topseed contains all kinds of the Winter Mallows, (*Malvo Rotundifolio*.)

The eighth vegetable form of the topseed contains all kinds of winter hull plants, as the Melilot tri-foil, &c.

The ninth vegetable form of the topseed contains all kinds of Feather flowers, Winter Thistle, &c.

The tenth vegetable form of the topseed contains all kinds of Wormwood Plants, and all kinds of Sun Flowers, &c.

SECTION XXX.

For the Fallows, especially, the family or species of Goosefoot is highly important, as Lambsquarter, &c., so that they combine the first vegetable form of the fallow mixture. The second vegetable form of the fallows contains the sharp juicy Summer Plants. The third vegetable form of the fallows contains the Barnseeds.

The last seven vegetable forms of the fallows consist of the summer plants of the seven last families of plants of the topseed.

We can also sow on the fallows, or the corn stubbles, when the corn is taken off the field, a vegetable mixture for manuring, which can be selected from the mixture of stubble or topseed, as hereafter described, for the winter grain, having regard to the quality of soil, as heavy, middle, or light soil. After such a mixture is sowed on corn stubbles, it forms roots, passes through the winter, and early in the spring starts growing, and by the last of May forms a heavy coat of manure, which, if ploughed down and sowed, (as fallows,) with fallow seed, again the last of August will be again covered with a dense coat or mass, and then, if ploughed down, afford two heavy coats of vegetable manure for the support of a wheat crop, without any additional labor of ploughing, more than any farmer gives to his corn stubbles in preparing them for wheat. There can arise no doubt in the mind as to the danger of their shooting up to injure the wheat, as they are ploughed down in both coatings before the corn begins to seed. In sowing the fallow seeds, first draw a harrow the same way the furrows run, and after sowing the fallow seeds it must be rolled.

SECTION XXXI.

For the stubbles, we must apply only such early plants as, when sowed after harvest, form good roots, they may pass through the winter and grow up early in the spring, so as to turn down a heavy coating early. A proper selection can be made from the topseeds and the fallow seeds. We will here give the names:

1st (vegetable form,)	Early Dock.
2d	" " " Mullein.
3d	" " " Meadow & field plants.
4th	" " " Umbelliferous Plants.
5th	" " " Labial Flowers.
6th	" " " Husk Plants.
7th	" " " Mallow Plants.
8th	" " " Hull Plants.
9th	" " " Feather Flowers and Winter Thistle.
10th	" " " Wormwood.

Those farmers who have a knowledge of Botany, will see that the first three vegetable forms must be selected for their usefulness in the *Green Manuring* of the soil; and that with them several families of plants must be joined together. The seven last vegetable forms are also families of plants which, in their varieties, are sufficiently large to form a selection of topseeds, (for winter grain,) fallows and stubbles.

SECTION XXXII.

Explanation of the Marks.

There are, however, other marks in the following description which require an explanation. The two * * have a further indication. These kinds of plants are very valuable, for they grow rapidly and are large leaved, forming the protection plants of the Green Manure. They generally are found plentifully growing wild in our country. The one * indicates, not only that they are less generally met with; but that they are so very valuable in their enriching properties, that they deserve cultivation with the greatest care, as it must be remembered that the seeds will decrease if not sowed again—(in raising seeds—in the seed garden or lot.)

Those plants which last for many years when once planted in fields or gardens, and continue to grow stronger, are called *perennial*, and have the mark 2.

Those plants which are biennial and triennial, if they grow up the first year in leaves, and in the second year form stalks and seeds, and die off, have the mark 3. Those plants which are annual, or last one year, have the mark 4.

But such summer plants, which, when sowed in the fall, blossom the next spring, bear seeds and can live through the winter, have both of these marks, thus, 4 3.

Other plants, which some soils and situations are marked 2, but in other soils and situations thus 3, have both these marks, 3 2; and as the time of the ripening of the seeds is about one month after blossoming, I will give only the month of blossoming of the different plants.

But there are three things the reader is requested to bear in mind, if he desires his own promotion and interest, in a quick and durable improvement of his soil by Green Manuring, viz:

1st. The many kinds of plants, in order to embody

and form a rich invigorating manure by the mixture of seeds.

2d. The necessary quantity of seeds of the transition in the mixture.

3d. The cheapness and convenience of their production.

SECTION XXXIII.

1.] *On the Variety of Seeds.*

It is highly important that the mixture embody as many kinds of plants as the locality and circumstances will possibly permit; for the greater the variety in Green Manuring, the more vigorous and productive will be its effects. I have set at the head of each vegetable form, (*description*,) some of those kinds of plants and grasses, which the farmer can easily obtain a selection sufficiently large at the commencement, so as to form his mixture of from ten to twenty different kinds of plants and grasses.

SECTION XXXIV.

In making selections, the utmost care must be used, so that in changing plants from one application to another, no errors may occur; as it is not designed that any of the plants ripen before they are ploughed down. Hence, in making changes, it will be well to test the change on a small portion of soil, until a practical knowledge is obtained, under close observation and care, in accordance with the instructions given, as to the local habitual facilities for his topseed on fallows and stubbles.

SECTION XXXV.

2.] *The necessary quantity of Seeds in the Transition.*

It must be evident to every farmer, that if he wishes to prosper by *Green Manuring*, he must increase his quantity of seeds every year; consequently he must know the quantity of land he designs sowing, and the quantity of seed he will require.

For instance, if he commences with ten acres, and increases ten acres yearly, with the mixture of Green Manuring, and fodder and pasture, the increase of seeds must be in proportion to the increase of land, and he will likewise receive an increased proportion in produce. Suppose the first year he sows ten acres—then

1st year, 10 acres, at 10 lbs. per acre, is	100 lbs.
2d " 20 " " "	200 "
3d " 30 " " "	300 "
4th " 40 " " "	400 "
5th " 50 " " "	500 "
6th " 60 " " "	600 "

If a farmer would increase his seeds to 600 pounds in six years, and effect a yield of only five bushels more per acre, which is far below the truth, he would in six years have a clear gain of increase of 2,750 bushels, whilst his labor would be less than the ordinary manner of farming, and his land made doubly productive and valuable, affording an increase in stable manure, and a better condition of stock.

SECTION XXXVI.

3.] *The Cheapness and convenience of the Production of Seeds.*

In manuring with the green mass, a farmer can, in all locations, obtain seed to make commencement, from the fields, gardens, meadows, barns, lanes, alleys, &c. until he can cultivate and raise the seed in a lot appropriated to that purpose. But the farmer must, in every instance, have the supervision of the procuring and raising of the seeds, so that he may have them sound and healthy.

SECTION XXXVII.

It is much the best and surest, as well as the cheapest method, to cultivate the *perennial plants*; for such plants, when once sowed in a regular lot or bed, require no further trouble than to gather the seeds when ripe, as the roots, year after year, will produce strong heavy stalks and mature seeds.

Perennial plants produce abundant quantities of seeds, and should be cultivated in separate beds, each part or kind by itself. In a garden of this kind all the necessary seeds can be raised. It is also evident that such plants as bear many seeds have a great number of blossoms, and such gardens make an abundance of *Bee Pasture*, which renders it profitable for wax and honey. (The plant garden should be as near the house as practicable.)

Many of these plants contain valuable medical properties in their leaves, blossoms, seeds, roots, &c. and are at all times a profitable article to druggists. These plants also contain dye-stuffs of all kinds,

which are bought up in large quantities by chemists and dyers. These are all extra profits, which a farmer can make by care and very little labor.

SECTION XXXVIII.

Farmers who are not acquainted with all kinds of plants and grasses which grow around their farms, and in the neighborhood, can find their names and character in any Botanical Class Book, where they can become acquainted with their nature, and every particular in regard to them. He can obtain, for a trifle, the various garden plant seeds in any botanical seed store, in a quantity sufficient to start this cultivation for his own use.

The reader will find at the end of this volume, engravings representing a description of the most useful plants for the Green Manure. Plates I and II, and Plate III, represent the most useful grasses and herbs, of the improved fodder and pasture cultivation. Plate I represents plants which belong to the *topseed manuring*, and Plate II, plants which belong to the fallow manuring. They will be explained in the following description; but as it would exceed our limits to give a description of all the plants used in the *Green Manuring*, we give a representation of but a few of the most important, and also of those represented on Plate II, such of the fallows as are in connection with the plant forms of the stubbles.

The reason why they are thus represented is, that readers may see them in a mixture; for it is a great hindrance to our progress to see them in a single position, as, for instance, clover—and timothy—agriculture, a manner to which we all have been accustomed. Fodder plants, as clover, or a single grass, as timothy, afford the animal far less nourishment than a mixture of the most distinguished grasses and herbs, for the mixture nourishes the soil and the animal with more variable elements. Hence, in Plate III we represent the distinguished grasses and herbs of the improved fodder and pasture cultivation. The reader will perceive, by examining this plate, that out of this mixture of grasses and herbs, the most productive meadows and pastures in nature are formed, producing more *milk, butter, meat, fat* and *wool* than any other combination of meadows and pastures, and this simply by forming a dense mass of the most nutritious grasses and herbs. Plates I and II repre-

sent the mixture of the *Plant Manuring* system, by which the soil is enriched and made productive; and Plate III the fodder and pasture mixture by which the farmer can increase the growth and value of his stock, and better his condition.

Each of these plates are arranged in the order which we here describe. Each plate represents three rows. On Plates I and II, the first row contains the grasses of the topseed manuring, and the other two rows the plants of it, each plant being marked with its own peculiar name. On Plate III, the *first* row represents the mowing grasses; the *second*, the pasture grasses, and the *third*, the mowing and pasture grasses, of which the most distinguished meadow and pasture mixtures are composed.

Since this work is wholly designed for the use and benefit of the farmer, it will be his interest to devote a careful attention to this important subject, and obtain all the useful seeds in the fields, gardens, meadows, &c. which we will now more fully describe.

SECTION XXXIX.

D.—A DESCRIPTION OF THE CLASS OF PLANTS OF TOPSEED IN GRAIN, LIKE CLOVER OR WINTER SEEDS.

FIRST VEGETABLE FORM OF THE TOPSEED.

The Class of Docks and Marigolds.

THE CLASS OF DOCKS.—Every farmer knows the large kind of Dock, with a stalk of from two to three feet high, large leaves and dark brown seed bunches. (No animal will eat it.)

To the improved Green Manure they are of the greatest importance, produce a great number of seeds, and grow up rapidly. They thrive as well in summer as winter grain, and when ploughed down, supply a large herbage in the mixture.

That of middle size, as, for instance, the curled dock, grows on middle soil, and the sheep sorrel on dry sand.

Thus every farmer can judge of the nature of the soil for which they are suited.

A.—THE LARGE WILD CLASS, AS PROTECTION PLANTS.

1.

The large Curled or Yellow Dock. ** (*Rumex Crispus*. 2)

This class grows on all kinds of soil, dry fields, waysides, along ditches, etc.—known by its curled

waving leaves. It grows from two to three feet high; its brown seed bunches stand till after harvest untouched, is easy to be gathered, and has 300,000 grains in a pound. Blossoms June to July.

2.

*Broad Leafed Dock.** (*Rumex Obtusifolius*. 2)

This Dock grows almost everywhere in fields and waste places. It has leaves one and a half feet long, grows from three to four feet high, and blossoms from June till August. 300,000 grains per pound.

3.

*The Pointed Dock.** (*Rumex Acutus*. 2)

This plant is as common as the two kinds mentioned above. It grows along creeks, ditches, in wet places, and thrives on all kinds of soil which are not too dry. Its leaves are as large as the above mentioned, but pointy; it also grows three to four feet high, with large roots. Blossoms in August; 300,000 grains per pound.

4.

*The Water Dock.** (*Rumex Aquaticus*. 2)

This kind of Dock grows the same as the above, but is still larger in stalks, leaves and roots, often five feet high; it belongs to the topseed, if not too heavy nor too dry soils. Blossoms June and July. 300,000 grains per pound.

5.

*The Wood Dock.** (*Rumex Nemulapathum*. 2)

It is known by its somewhat woolly leaves, and is not so frequent as the former kinds. Grows two to three feet high, and in the woods higher. Blossoms July to August. 300,000 grains per pound.

The above five kinds of Docks grow wild almost everywhere. We now give such kinds as will compensate well to cultivate them in the garden. 300,000 grains per pound.

B.—LARGE GARDEN PLANTS, AS PROTECTION PLANTS.

1.

*Mountain Dock.** (*Rumex Alpinus*. 2)

Grows frequently along mountains. Some have it in gardens. It is called by some the false Rhubarb, as its root resembles Rhubarb. It has very long leaves and roots, and grows from three to five feet high. Blossoms July and August. 300,000 grains per pound.

2.

*Garden Dock.** (Rumex Patientia. 24)

Is frequently cultivated in gardens. Grows from three to five feet high, bears large, long and high seed bunches. Blossoms in May. It produces a large herb and thick roots, and thrives in summer as well as winter grain. It must be sowed in rows in the garden for cultivation, so as to hoe the plants, as they last many years. 300,000 grains per pound.

3.

*English Water Dock.** (Rumex Britanica. 24)

The leaves of this plant grow from four to five feet long, and one foot broad. The plant itself has a stem from one to two feet long, and stalk from five to seven feet high, with immense large seed bunches, which often yield from one to two pounds of seed.

4.

*The bloody-veined Dock.** (Rumex Sanguineus. 24)

The leaves have red veins. It resembles the pointed Dock, but blossoms earlier—in May and June; grows in waste and cultivated ground; stem two to three feet high.

C.—THE SMALL OR MIDDLE PLANTS OF THIS FORM.

1.

*The Sour Dock.*** (Rumex Acetosa. 24)

Is a native of most meadows and pastures, and produces many seeds. It also thrives on sandy soils; the stalk grows from two to four feet high, leaves six inches long. Blossoms in June. 400,000 grains to the pound.

2.

*Sheep Sorrel.** (Rumex Acetosella. 24)

Grows six inches high; excellent on sandy poor soils, to fill up the density of the mixture. Blossoms May and June—is excellent as sheep pasture; grows on dry and sandy soils. 500,000 grains to the pound.

II.

Common Beet. (Beta Vulgaris. 3)

We have in our gardens the Red and White Marigold, (*Beta Cicla.*) A garden bed sowed with Beets to raise seeds, pays well for the Green Manuring for winter and summer grain. 10,000 grains to the pound.

III.

Selection for the Beginning.

If the farm is of a middle soil, the *Yellow Dock* is the best; if of a low heavy soil, the other *large Docks* are preferable; both can be used in the beginning as *protection plants*, of the first vegetable form. As *middle plants* of this form, we use *Sheep Sorrel* on sandy soils, and *Sour Dock*.

These are the most common, and most frequently found of this vegetable form, with which every farmer can make a beginning, and as he extends the Green Manuring, he may add others, especially garden plants.

SECTION XL.

SECOND VEGETABLE FORM OF THE TOPSEED.

The Mullein Plants and Winter Plants.

To this kind belong such plants which thrive only one or a few stems, with blossoms that are quite erect and pyramid like—as the *common Mullein*, (*Verbascum*,) the *common Evening Primrose*, (*Oenothera*,) the *Viper's Bugloss*, or *Blue Weed*, (*Echium*,) and similar others.

1.

Common Mullein. (*Verbascum*.)

The following kinds of this species grow on barren, dry, sandy and stony grounds. When sowed on the winter grain on such soils, they make a luxurious plant. But when sowed on the summer grain, they will have a moist and fertile soil. They contain much volatile stuff when green, whereby vermin and insects are driven off. Their roots, stems and leaves have good manuring qualities, and are all good bee plants.

1.] THE PROTECTION PLANTS OF THIS SPECIES ARE:

The Large Mullein. (*Verbascum Thapsus*. 3) **

We find them on sandy, stony, dry soils. The leaves thrive in mixtures, often to a foot long; they are wrinkled and felty, as also the stem, which grows upward from four to six feet, on the top of which the yellow blossoms look like lights; it blossoms from July till fall. One pound of the seed contains 800,000 grains.

The White Mullein. (*Verbascum Lychnitis*. 3) **

Grows very similar to the above, only the leaves are smaller and less felty; rises from three to four

feet high, and blossoms from June till fall. A pound has 800,000 grains.

2.] THE MIDDLE PLANTS OF THIS SPECIES ARE:

Black Mullein. (*Verbascum Nigrum*. 2)*

Is found on barren, sandy soils. It produces large dark green, nearly black, leaves. Blossoms June and July; from two to three feet high.

The Red Mullein. (*Verbascum Phœniceum*. ♂)*

Grows on dry sandy high fields. The leaves are tolerably large. Blossoms June to July; from two to three feet high.

The Moth Mullein. (*V. Blattaria*. ♂)*

Is called thus on account of its destroying the moth, when the fresh plant is in blossom—grows like the above mentioned. Blossoms June, July and August. The small Mulleins of this kind have, on an average, 800,000 grains to the pound.

2.

Evening Primrose. (*Enothera*.)

Is so called, because its large yellow blossoms are only open on cloudy days, in the evening and at night. It grows on dry sandy soil, from three to four feet high, produce large bushy leaves and thick slimy roots. It is very important for the Green Manuring on dry sandy soils; thrives only on the winter grain, for when sowed on the summer grain it grows only on moist fertile soils. It is an excellent *Bee Plant*.

1.] THE PROTECTION PLANTS OF THIS SPECIES.

Common Evening Primrose. (*Enothera Biennis*. ♂)**

Is common in fields and waste places; the leaves grow often a foot long and two inches broad. The roots are knotty, sometimes like turnips, sometimes like carrots, and sometimes of a white and red color, and, moreover, slimy. Grows three to six feet high, and blossoms from July till September. One pound contains 1,400,000 grains.

2.

Sundrops, or Perennial Evening Primrose. (*Enothera Fruticosa*. 2)

Common in open places, one to three feet high, with yellow flowers. Blossoms June to August.

The Biennial Gaura. (*Gaura Biennis*.) ♂

We find it often in gardens, on account of its splendid red flowers. It resembles the Evening Primrose, grows from six to eight feet high, has many seeds, and does well in winter grain.

3.

Viper's Bugloss. (*Echium*.)

Is called so because the flowers resemble a snake's head. It grows on barren, sandy and stony places, thrives well, has blue, torch-like flowers, stems three to five feet, and is in the first year large small leaved root plant in the mixture. One pound of seeds, 50,000 grains.

A.—WILD GROWING AND PROTECTION PLANTS.

Blue Weed. (*Echium Vulgare*. ♂)**

These plants are quite bristly. They blossom the whole summer, and are excellent *Bee plants*. Care must be taken in gathering the seed, as it falls out easily, to cut the stem in the proper time. The leaves thrive in the mixture tolerably large, and the roots grow deep in the ground.

4.

Bellflower Family. (*Campanula*.)

This family produces very fine seeds, and is surest on winter grain, but as they grow in gardens, woods and meadows, they serve well as by-plants. They are very nourishing for bees. Common on moist rich soils.

American Bellflower. (*Campanula Americana*. ♂) July, August; two to three feet high.

Slender Bellflower. (*C. Aparinoides*. ♂)

Rock Bellflower. (*C. Rotundifolia*. 2)

Pyramidal Bellflower. (*C. Pyramidalis*. 2)

Peach Leafed Bellflower. (*C. Persicifolia*. 2)

Carpatie Bellflower. (*C. Carpatica*. 2)

Canterbury Bellflower. (*C. Medium*. 2)

5.

Hound's-Tongue. (*Cynoglossum*.)

These plants often grow with the blue weed, and have also bristly and long root leaves. The stems are lower and more bushy.

A.J.—WILD GROWING AND PROTECTION PLANTS.

The Common Hound's-Tongue. (*C. Officinale*. ♂)**

Found in waste grounds—May, June. An erect

downy plant of a dark green color, two feet high, flowers purplish, red; seeds rough, adhering to the fleece of sheep. One pound, 50,000 grains.

Wild Comfrey. (C. Virginicum. ♂)*

Resembles the above, grows from three to four feet high, has more seeds, and drab white flowers—May and June, in rich shady woods.

Beggar's-Lice. (C. Morisani. ♂)

Grows on the borders of woods—July—stem two to three feet high. They all thrive well in the mixture.

6.

Ox-Tongue. (Anchusa.)

These plants do not produce so many seeds, but thrive and manure well. The leaves are larger and the roots fleshier, and grow in places as the above.

Common Bugloss Ox-Tongue. (A. Officinalis. 24)

A rough garden plant with bristly hair, two feet high, leaves a foot broad. Cattle are fond of it—blossoms May to fall; first red, then blue. Very attractive to bees.

Small Leafed Ox-Tongue. (A. Angustifolio. 24)

Resembles the above.

7.

Willow Herb. (Epilobium Lythrum Lysimachia.)

Called so because their leaves resemble the willow leaves, and grow partly between willow brushes, moist shores and ditches; are used as middle plants; but the following are only for use in the mixture.

Swamp Willow Herb. (L. Verticellatum. 24)*

Found near shores and ditches, two feet high. Cattle pasture on the young herb. A good bee pasture, grows in moist soils, and does well on winter grain; produces a great number of seeds. Blossoms from July till fall.

The Mountain Willow Herb. (Epilobium Montanum. ♂)*—This is the only wild willow herb that is of use; it grows exuberantly and gives a great many fine seeds.

The Russian Willow Herb. (Epilobium Dauricum. ♂)*

Is still superior, and is worth to obtain the seeds for cultivation. It germinates and grows rapidly. One pound, 8,000,000 grains.

The Common Willow Herb. (Epil. Angustifolium. 24)*

Grows on newly cleared land and waste places—July. Stem four to six feet high, flowers numerous, suited to moist soil; when young is a pasture fodder.

8.

Reseda.

Grows in sandy, stony ground, and is particularly useful in forming the density of the mixtures in winter and summer grain; belongs to the middle plants.

Dyer's Weed, (Reseda Luteola, ♂) * from two to four feet high; June till fall.

The White Mignonette, (Reseda Odorata, ♂) *

Wave Leafed Reseda, (R. Undata, ♂) from two to three feet, found in gardens.

Yellow Reseda, (R. Lutea, ♂) * Grows on field borders, two feet high; per pound, 1,000,000 grains.

9.

Speedwell. (Veronica.)

This family has many kinds that produce fine seeds, and are particularly useful in forming the density of the mixture on dry soil. They are middle plants, found in meadows, bushes, woods, &c. July, August, September.

10.

Larkspur. (Delphinium.)

This family of plants are used in gardens as ornaments, on account of their beautiful flowers; they give also a great amount of seeds; they are perennial, and form every year stronger stalks; they germinate well in summer grain, are middle plants in the mixture, and average 250,000 grains to the pound.

II.—THE WINTER NARCOTIC PLANTS.

Wolfs-bane, (Aconitum,) *Henbane,* (Hyoscyamus,) *Bane-berry,* (Actæa,) which have an erect growth, to which we add the *Deadly Nightshade,* (Atropa,) the *Ground Cherry,* (Physalis,) *Poke Weed,* (Phytolacca.)

1.

Wolfs-bane. (Aconitum.)

Is frequently found in the garden as an ornamental plant. It has many seeds, which only germinate in winter grain. It manures excellently, through its sharp juicy leaves and roots, and forms a middle plant in the mixture.

The American Monks-hood. (*Aconitum Uncinatum.*) 2*—Grows on mountains and rich shady soils, along streams. August—five to six feet high.

Blue Wolfs-bane. (*Aco. Napellus.* 2) *—Grows from three to seven feet high; blossoms June, August.

Yellow Wolfs-bane. (*A. Lyeoetionum.* 2) *—Two to three feet high. The juice of this plant destroys all kinds of vermin. June and July.

Pyrenaic Wolfs-bane. (*Aco. Pyrenaicum.* 2) *—Three to six feet; yellow; June, July.

Large Wolfs-bane. (*Aco. Camarum.* 2) *—This resembles the *Blue Wolfs-bane*, but is larger. It has, on an average, 250,000 grains per pound.

2.

Black Henbane. (*Hyoscyamus Niger.* 3) *

A tall foetid weed, growing about waste places, from two to three feet high; July; flowers large; color, dull yellow. Germinates well in the winter grain. 700,000 grains per pound.

3.

Baneberry. (*Actæa.*)

Of this family, we find two kinds in gardens. They only thrive on the winter grain, are good herbs, and their juice destroys all kinds of vermin.

Earshaped Baneberry. (*A. Spicata.* 2) —Grows two to three feet high; blossoms May and June; its berries give a black inky juice.

Grape-like Baneberry. (*A. Vacemosa.*)—Grows four to five feet high, and blossoms in June and July.

4.

Deadly Nightshade. (*Atropa.*)—We find this family in mountain woods; it is excellent in winter grain.

Common Nightshade. (*Atropa Belladonna.* 2) *—Is cultivated in gardens, groves, often six feet high, and bears a great number of berries. (The seeds must be washed out.) It germinates very well, and forms a fine plant; blossoms in June and July, and contains 300,000 grains per pound.

5.

Common Poke. (*Phytolacca Decandra.*)

This well known plant is common in fence corners and moist grounds; blossoms in July and Septem-

ber. It forms, in the summer grain and fallows, a stout plant, with juicy leaves and thick fleshy roots. The cluster of seeds must be dried, and the seeds rubbed out. 20,000 grains to the pound.

III.—SELECTION FOR THE BEGINNING.

The *Common Mullein* and the *Common Evening Primrose* are to be found almost everywhere, in fields, roadsides, &c., and will aid to make a beginning in the fall. But all the other plants we have mentioned in this vegetable form should be cultivated, as they can be obtained so easily, when the seeds are once planted, so that at all times the mass can be rendered more dense, stronger, and more readily mixed.

SECTION XLI.

THIRD VEGETABLE FORM OF THE TOPSEED.

Meadow and Field Plants.

The most important of these are the *Meadow Rue*, (*Thalictrum*,) *St. John's Wort*, (*Hypericum*,) *Great Burnet*, (*Sanguisorba*,) *Sheep Burnet*, (*Poterium*,) *Plantain*, (*Plantago*,) *Corn Cockle*, or *Sweet William*, or *Single Pink*, (*Lychnis*,) etc., all being the most luxuriant plants, and producing a great number of seeds.

A.)—BUNCH FLOWERS.

*The kinds of Meadow Rue.*** (*Thalictrum*,)

These kinds of plants grow in meadows, bushes and open fields. They are generally pastured, and seldom come to seed; but, by cultivation in gardens, they assume strong stalks, and produce a great number of seeds. They have a spreading herb and large branchy roots in the mixture, germinate well in winter grain, as they grow well on moist ground. They belong to the most important plants for topseed, and are mostly *protection plants*. They are also good Bee plants; on an average, one pound will contain 300,000 grains.

Meadow Rue, (*T. Cornuti*, 2) *—Is found in most meadows, grows three to five feet high, and blossoms in June and July. This plant is liked by cattle as pasture.

Early Meadow Rue, (*T. Divicum*, 2) —Common on the banks of streams; April, May; one to two feet high.

Rugos-Leafed Meadow Rue, (*T. Rugosum*, 2) —Common on shady swampy rivulets; June, July; three to five feet high.

Rue Anemone, (T. Anemonoides. 2) —Is found in woods; April, May; eight to twelve inches high.

2.

St. John's Wort. (Hypersicum.)*

This family produce a great number of fine seeds, which germinate only on winter grain, and moist soils in summer grain; they are middle plants, and are important in forming the density of the mass or mixture. The cultivation of these plants is especially important, as they are perennial, and their gain of seeds considerable. This family are all excellent Bee plants. They have all yellow blossoms, and average 800,000 grains to the pound.

Common St. John's Wort, (H. Perforatum. 2)* —In pasture fields very common; June, July.

Giant St. John's Wort, (H. Pyramitatum. 2)* —River banks and hills; July, August.

Spotted St. John's Wort, (H. Corymbosum. 2)* —Shady woods and wet meadows; June, July; one and a half to two feet high.

Elliptic St. John's Wort, (H. Ellipticum. 2)* —Moist grounds; July; one to two feet high.

Winged St. John's Wort, (H. Adpressum. 2)* —Grows in swamps, two feet high.

Naked St. John's Wort, (H. Nudiflorum. 2)* —Wet grounds; August; one to two feet high.

Shrubby St. John's Wort, (H. Prolificum. 2)* —On the banks of streams; July; a highly ornamental herb, two to four feet high.

3.

Cleavers. (Galium. 2)

Goose-grass, (G. Aparine.) —Moist thickets two to six feet high; June.

Rough Bedstraw, (G. Asprellum.) —Low thickets, two to five feet high; July.

Dyer's Cleavers, (G. Trifidum.) —Swamps and low grounds; June, August; two to four feet high.

Sweet Scented Bedstraw, (G. Triflorum.) —Rich wood-lands; July; two to four feet high.

Hairy Bedstraw, (G. Pilosum.) —Dry woods, from June to August; one to two feet high.

B.]—HEAD FLOWERS.

1.

Burnets. (Sanguisorba Poterium.)

These plants are excellent meadow and pasture

plants in the mixture; but too bitter when sown by themselves. They produce a great number of seeds, and grow up well in the summer grain. The *Meadow Burnet* make fine protection plants in the mixture, and the *Sheep Burnet* very good middle plants.

The Common Meadow Burnet, (Sanguisorba Officinalis. 2) * * —Three to four feet high; August; grows well on winter grain, has roots and leaves from one to two feet. When cultivated in the garden, its stalks grow from five to six feet high, and produce many seeds; one pound contains 250,000 grains.

The Great Burnet, or B. Saxifrage, (S. Canadensis. 2) * * —Wet meadows; August, September; stem from two to four feet high.

Sheep Burnet, (Poterium Sanguisorba. 2) * * —Is very common on dry soils, from one to two feet high, and blossoms in June and July. It is an excellent pasture plant, endures dry weather well, and is properly used in summer grain; one pound contains 300,000 grains.

2.

Plantain. (Plantaga.)

This well known family have healthy juices in their leaves, and, when young, are liked by cattle. The seed thrives on winter grain. They produce a tolerably useful herb. The following kinds have, on an average, 400,000 grains to the pound.

Common Plantain Leaf, (P. Major.)

Heart Leafed Plantain, (P. Cordata. 2) —One to two feet high; June, July.

Lance Leafed Plantain, (P. Lanceolata. 2) —Twelve to eighteen inches high, common on dry fields among grasses; it has erect spear shaped leaves of six inches long, of which, when young, cattle are fond. It is also an excellent pasture plant, blossoms the whole summer, and contains 300,000 grains.

Virginia Plantain, (P. Virginica. 2) —Sandy fields, April until September, four to ten inches high.

3.

Knotweed. (Polygonum.)

To this family belong the Buckwheat, and most of the following seeds which germinate as quick as Buckwheat; thrive in summer grain and on fallows. They are middle plants, and average per pound 40,000 to 50,000 grains.

Meadow Knotweed, (P. Bistorta. 21)—Grows on meadows, from one to two feet high, has large root leaves.

Pennsylvania Knotgrass, (P. Pennsylvanicum. 21)—At the margin of ponds and ditches, July to October; stem from two to three feet high.

Ladies' Thumb, or Spotted Knotweed, (P. Persicaria. 21)—Is very common in waste and damp places; July, August; stem twelve to eighteen inches.

Pale Knotweed, (Lapathifolium. 21)—Swamps and ditches; stem two to four feet high; August.

Water Pepper, or Smartweed, (P. Hydropiper. 21)—Very common on low grounds; August, September. A well known intensely acrid plant, grows from twelve to twenty inches high, and manures excellently in the mixture.

Mild Water Pepper, (P. Hydropiperoides. 21)—Swamps and along streams; July, August; twelve to fifteen inches high.

Virginian Knotweed, (P. Virginianum. 21)—Very common in thickets in rich soil; August; two to four feet high.

Princes' Feather, (P. Orientale. 21)—Natural sized in gardens; August, September; stem four to six feet high.

C.3.—SINGLE PINK PLANTS.

These plants have a great many fine seeds; a grass leaved herb; are natives of light soils, and of the greatest importance in forming the density of the mixture in light sandy soils. They are seldom met in a wild state, and are, therefore, to be cultivated in gardens; they repay, however, richly in their quantity of seed—on an average, per pound, 1,000,000 grains.

1.

Soap Plants. *(Gypsophila Saponaria.)

The slimy qualities of these plants prove their manuring strength. The following are the most frequent in fields and gardens:

Longstemmy Gypsplant, (G. Fastigiata. 21)—Grows from three to four feet high, with large reddish flower bunches, on sandy places; July; per pound, 5,000,000 grains.

The Bunchy Gypsplant, (G. Paniculata. 21)—Grows from three to four feet high, with large reddish flower bunches, on sandy places; July; 1,000,000 grains per pound.

The Sand Gypsplant, (G. Arenaria. 21)—From one to two feet high; August; blossoms white; 5,000,000 grains per pound.

The Pink Gypsplant, (G. Saxifrage. 21)—In fields, one foot high; August; 1,000,000 grains per pound.

The Common Soap Wort, (Saponaria Officinalis. 21)—Grows in waste places, from one to three feet high, with large purple or flesh colored pink flowers. 200,000 grains per pound.

2.

Lychnis.

This family yields a great number of good seeds, when cultivated in gardens. They thrive better in winter than summer grain.

Corncockle, (Lychnis Githago. 21)—In grain fields; June, July; a well known pale green handsome plant; stem eighteen to thirty inches.

The Scarlet Lychnis, (L. Chalcedonica. 21)—A fine garden flower, one to two feet high, dark green leaves and scarlet flowers; June, July.

The Mullein Pink, (L. Coronaria. 21)—A popular garden flower, the whole plant covered with dense wool; one to two feet high, blossoms purple; July.

Ragged Robbin, (L. Flascucula. 21)—A handsome flower, pink color, one to two feet high; June to August; on an average, per pound, 1,000,000 grains.

3.

Pinks. (Dianthus.)*

The following kinds form, in the summer grain and fallows of dry soils, a small herb, of rapid growth, yield a good number of fine seeds, and are easily raised.

Sweet William, (D. Barbatus. 21)—An ornamental garden flower, of from ten to fifteen inches high; May, July.

China Pink, (D. Chinensis. 21)—A beautiful species of from white to red colored flowers; June.

Single Pink, (D. Plumarius. 21)—Flowers purple; from June to August.

Superb Pink, (D. Superbus. 21)—A singularly beautiful and highly fragrant species; one to two feet; June.

Coronation Pink, (D. Coryophilles. 21)—From one to two and a half feet high, stem branched, flowers white and crimson; July, August; on an average, 1,000,000 grains per pound.

4.

Silene.

These bring a great number of fine seeds, are small plants of rapid growth, and very useful in the mixture of the mass in forming the density.

Starry Campion, (S. Stellata. 21)*—Grows on shady banks and woods, two to four feet high; flowers white; August.

White Catchfly, (S. Nivea. 21)—One to two feet high; flowers white; June, July.

Virginia Catchfly, (S. Virginica. 21)—Open woods, one to two feet high; flowers few, but large and showy; May, June.

Snap Dragon Catchfly, (S. Anterrhina. 21)—Dry hills, one to two feet high; flowers small, white or pale purple; July.

Night Flowering Catchfly, (S. Noctiflora. 21)—Cultivated grounds, one to three feet high; flowers large, white and purplish; July.

Sweet William Catchfly, (S. America. 21)—A popular garden flower, twelve to eighteen inches high.

All these, on an average, have 2,000,000 grains per pound.

5.

Stitchweed. (Stellaria.)

These plants grow on moist soils, are weak and slender, stand erect in the mixture. Although they have more blossoms, still they yield not as many seeds as the *Silenes*; but they are important, deserve a place for cultivation, and give about 1,000,000 grains per pound.

Common Chickweed, (S. Media. 21 & 22)—Grassy roadsides, fields, yards, &c.; twelve to eighteen inches high; flowers small white; May, November.

Long Leafed Stitchwort, (S. Longifolia. 21)—Grassy places; eight to fifteen inches high; June.

Northern Stitchwort, (S. Borealis. 21)—Shady swamps; six to fifteen inches high; June, August.

6.

Sandwort. (Arenaria.)*

This family of plants are generally low, from four to twelve inches high, yield a great number of fine seeds, germinate quickly in the mixture on light soils, and form a very dense mass.

The Upright Sandwort, (A. Stricta. 21)—Rocks and dry banks; eight to ten inches; flowers white; May, June.

Thyme-Leafed Sandwort, (A. Serpillifolia.)—Sandy fields; stems numerous, with reflexed hair; four to eight inches high; blossoms white; May to August.

Side Flowering Sandwort, (A. Lateriflora. 21)—Shady gravelly banks and woods; stem five to ten inches high; flowers white; June; average 5,000,000 grains per pound.

D.]—*Classes of Flax.* (Linum.)*

They grow often on dry fields, roadsides, etc. The seeds germinate as well as the common flax, and thrive well in summer grain. Per pound, 100,000 grains.

The Common Flax, (Linum Usitatissimum. 21)—Two to three feet high; flowers purple blue. The seeds are very important for the Green Manuring, as they yield a great number of seeds, and thrive well in summer grain and fallows. On account of its slippery juices it manures very strongly. As a middle plant it is excellent for the density of the mixture; and if cultivated, it delivers cheap and abundant seeds.

The Wild Flax, (L. Virginianum. 21 & 22)—Grows in woods and fields; one to two feet high; flowers very small and yellow. It has the same quality as the former.

E.]—*Garlic.* (Allium.)*

This herb manures remarkably well. It only suits the winter grain. The seeds of onions also do well in the mixture on summer and winter grain.

F.]—*Live Forever.* (Sedum Telephium. 21)*

This plant is an excellent manure on poor soil. The whole plant is exceedingly fat and nourishing; it contains a large quantity of potash and sticky juice; grows from one to two feet high, possesses a reddish flower, blooms in July and August, and pays well for the trouble of gathering the seeds. It must be sowed by itself, (as it will not grow when sowed with the mixture,) mixed with a considerable quantity of sand, so as to be sufficiently spread on the ground after using the roller; for, if put in too deep, it will not come up. Observe, also, that it must be sowed on winter grain, on sandy or grassy soils, (not on clay soils.) It grows on sandy soils, rocks, &c., and contains from 6,000,000 to 10,000,000 grains per pound.

Evergreen Stone Crop, (*Sedum Anacampseros*. 24)—Grows from one to two feet high; flowers purple; July.

Wall Pepper, (*S. Acre*. 24)

American Orpine, (*Telephoides*. 24)

The Three Leafed Stone Crop, (*S. Termatum*.)

G.]—*Winter Poppy*. (*Papaver, Chelidonium Glancium*.)

We frequently find some of the following Poppies in gardens. They are excellent manuring herbs, and do well in summer grain and fallows. The poppies have, on an average, 1,000,000 grains to the pound, and the *Celendine*, 500,000 grains.

Oriental Poppy, (*Papaver Orientale*. 24)—Three to four feet high.

Cambrie Poppy, (*Papaver Cambricum*. 24)—Two to three feet high.

Field or Corn Poppy, (*Papaver Dubium*. 24)—Two feet high.

Common Poppy, (*P. Somniferum*.)—Common in cultivation.

Common Red Poppy, (*P. Rhœas*.)—Cultivated.

Common Celendine, (*Chelidonium Majus*. 24)—A pale green juicy plant, which grows in waste places; May, August; flowers yellow; one to two feet high.

Horn Poppy, (*Chelidonium Glancium*. 3)—Grows on sandy fields, two feet high; blossoms from May until July, with large yellow flowers. The leaves are of a greyish green.

SELECTION FOR THE BEGINNING.

In localities where the *Meadow Rues* do not grow wild, they can often be found in gardens or adjacent places, and thus be procured. The different kinds of *St. Johns Wort* are easily found. *The Great Burnet* and *Sheep Burnet* are in all meadows. *The Plantain Leaf* is common on fields, lanes and fences, and the different *Pink Plants* grow wild abundantly in gardens.

SECTION XLII.

THE FOURTH VEGETABLE FORM OF THE TOPSEED.

Winter Umbelliferous Plants.

In this family of plants are included the Parsnips, Carrots, Caraways, Fennels, etc. They are of high importance in the *Green Manuring mass*, as they possess peculiar enriching principles, and contribute, in a high degree, to the enrichment of the soil, by their

large leaves and roots. They possess sharp gummy-like and aromatic juices, and yield a large quantity of seeds. Every farmer will perceive, that the leaves and stalks of these plants, during their growth, as well as during their fermentation, after being ploughed under, will destroy mice, insects and vermin.

The perennial and biennial Umbelliferous Plants do not shoot up in stem the first year after their seedling, but grow in leaves and roots over winter, as carrots, parsnips, and other plants of this kind. Many of these plants continue to have green leaves through the winter, and cover the ground against frost.

The seeds of most of these plants have a strong aromatic odor, and for this reason, are easily spoiled if they are not kept in cool dry places. Their volatile oils evaporate, and their fat oils decompose themselves in dry confined air, and are subject to become rancid before sowing; the best method for their preservation is to hang them in bags, in an open cool shed. I will divide the following families according to the size and density of their root leaves, into five divisions. In the first, I will name the large and broad leafed umbelliferous plants; the *Cow Parsnip* and *Common Parsnip*; in the second I place the small and light leafed umbelliferous plants, as *Wild Chervil* and *Wild Carrots*; in the third, I place the *Fennel leafed* umbelliferous plants; in the fourth I put the *Thorough Waxes*, and in the fifth, the *Spurges*.

I select first—the large leafed umbelliferous, as they belong to the protection plants. The light leafed are also plants of this family, and I put them in the second division, as middle plants; the *Fennel leafed* as an addition, and for the further perfection of the mixture, I add the *Thorough Wax* and *Spurges*.

I.—THE FAMILY OF THE PROTECTION PLANTS, OR THE LARGE AND BROAD LEAFED UMBELLIFEROUS.

1.

Parsnips. (*Heracleum*.)

This family is very useful in the mixture for *Green Manuring*, for it grows almost everywhere, thrives well in the winter and summer grain, and produces an excellent herbage.

The Low or Wild Parsnip, (*H. Lanatum*. 5)**—Grows from three to six feet high, in moist cultivated

grounds, and blossoms from June to August. It grows on almost any soil, within six or eight weeks, has large leaves and thick roots, when sowed on *summer grain, fallows* or stubbles, and yields 150,000 grains per pound.

2.

Common Parsnip. (*Pastinacasativa*. ♂)**

Grows in fields and waste places, from three to six feet high, especially on moist places; blossoms July, August. It grows well, and in six or eight weeks be twelve inches high, with thick roots, in fallows and stubbles. It is also a good pasture plant. When it is young, cattle are fond of it. It is not material whether we use the seeds of the wild or tame parsnip in the mixture; their leaves are very similar. 150,000 grains per pound.

These are two kinds of Parsnips for the winter and summer grain. The following are not so general, but are as valuable and worthy of cultivation in the garden, and also thrive well in summer grain, fallows and stubbles.

3.

Angelica.

This plant has extraordinary large leaves, and very large fleshy roots, in the mixture of the winter and summer grain.

Great Angelica, (*A. Atropurpurea*. 21)*—Grows in meadows, and furrows, and gardens; flowers greenish white; July, August; six to eight feet high. The stalk is thick, hollow and leafed, the growth large in the mixture of the winter grain. 100,000 grains per pound.

Small Angelica, (*A. Silvestrius*. 21)*—Grows in moist meadows and woods, from one to two feet high; July. Bees love to feed on its flowers; dark green leaves and deep branchy roots. 150,000 grains per pound.

Hersuti Angelica, (*A. Hersuta*. 21)*—Dry open woods; from two to five feet high; numerous white flowers; July, August. 100,000 grains per pound.

4.

Lovage. (*Sigusticum*.)

This well known plant is cultivated in gardens. When sowed on winter and summer grain, forms a large herb, and resembles the parsnip leaves. 200,000 grains per pound.

5.

Laser Plants. (*Laserpitium*. 21)*

This kind of umbelliferous plants have also large leaves, and is important in the Green Manuring, and does well in winter and summer grain. They deserve cultivation in the garden, grow from four to eight feet high, and blossom in June and August. 100,000 grains per pound.

6.

Masterwort. (*Imperatoria*. 21)*

This species have also very high, large leafed stalks, and resemble the parsnip in its manuring qualities; three to four feet high; seeds, 150,000 grains per pound.

7.

Water Parsnip. (*Sium Latifolium*. 21)

On moist cold fields. The seeds of this kind do well on winter grain; it is found on ditches and in swamps; stem from three to five feet high; flowers small and white; July, August, September.

Narrow Leafed Water Parsnip, (*S. Lineare*. 21)—Found in swamps, stem three to four feet high, with numerous small white flowers; July, August. The seeds of these plants must be kept in the air, preserved in dry sand, or must be sowed directly after being collected, or they will not germinate. 200,000 grains per pound.

Water Fennel, (*Phellandrium*. ♂)—Germinates as well as the former under the same circumstances; is found in standing waters and swamps, three to four feet high; July, August; 200,000 grains per pound.

Water Hemlock, (*Cicutavivrosa*. 21)—Common in wet meadows; blossoms July, August; three to six feet high; grows only when sowed immediately after the seed is ripe, in wet low fields; produces a good leaf and root mass; 300,000 grains per pound.

Poison Hemlock, (*Conium Maculatum*. ♂)—Grows in waste places, a large branching herb, about four feet high, flowers small and white, stem round and hollow, with purplish spots; seeds, 300,000 grains per pound.

This plant thrives well on both dry and wet ground, has a quick growth, and forms large bushy leaves. It cannot be too highly recommended as one of the most important plants in the Green Manuring, especially if the seeds of this plant be mixed

with the seeds of the Water Parsnip and Chess, it will enrich poor fields better than the strongest stable manure.

II.—THE CLASSES OF MIDDLE PLANTS, OR THE SMALL LEAFED UMBELLIFEROUS.

1.

The Classes of *Wild Chervil*. (Chaerophyllum.)

The following of this family of plants will only do well on winter grain, and must be sowed early, before winter. They are found in shady moist places, hence they do best on winter grain.

Common Wild Chervil, (Ch. Sylvestris. 2)*—Moist shady places; blossoms in May, June; stem two to three feet high; yields many seeds, and forms an herb of dark green color, with large milky roots. 150,000 grains per pound.

Knobby Chervil, (Ch. Bulbosum. 3)**—Found generally in shady meadows; blossoms June, July; grows often seven to eight feet high.

2.

The Wild Carrot. (Daucus Carota.)*

Found on old fields, road-sides, and on dry and sandy places, often in abundance; blossoms from June till August; grows only when sowed early on the winter grain; produces a good herbage in the mixture. The seeds must be kept in a dry, cool place, and not in a closed room. 300,000 grains per pound. N.B.—The *Tame Carrot* answers as well for the mixture.

3.

Wild Parslies. (Selimune.)

This family has several kinds, which contain a milky juice. They thrive well in winter grain.

Wild Parsley, (S. Sylvestris. 2)—Found on both dry and moist soils, three to five feet high; blossoms July, August. Herb and root have a milky juice; averages 200,000 grains per pound.

Swamp Parsley, (S. Palustre. 2)—Resembles the former, and grows from four to five feet high, blossoms white; July, August; 200,000 grains.

The Garden Parsley does well in the winter grain and fallows.

4.

Meadow Parsnip. (Thapsium. 2)

This family has large milky and sharp juicy roots.

The seeds are large and winged, blossoms yellow; suited to the topseed in winter grain.

Hairy Pointed Thapsium, (Barbinode. 2)—Found on river banks; blossoms June; stem tall and branched; two to three feet high; flowers yellow; 50,000 to 100,000 grains per pound.

Golden Thapsium, (T. Aureum. 2)—Banks and moist meadows: June; one to three feet high; 50,000 grains to the pound.

The Purple Alexanders, (T. Atropurpureum. 2)—Grows on rocky hills, and from one to two feet high; July; 100,000 grains to the pound.

5.

The kind of Pimpinell. (Pimpinella.)

This family is found growing in almost every location. They produce excellent pasture plants, yield a great number of small seeds, and are an important addition to the summer grain mixture.

The Large Pimpinell, (P. Magna. 2)*—Grows from three to four feet high, on sandy stony field borders, hills, meadows and pastures; blossoms through the summer, white and red; 300,000 grains per pound.

Small Pimpinell, (P. Saxifrage. 2)*—From two to three feet high; grows the same as the former.

The Blue Green Pimpinell, (P. Droca. 2)*—One to three feet high; 300,000 grains per pound.

6.

All kinds of *Fennel* and *Anis* grow well on poor soils, especially on winter grain.

7.

Spurge. (Euphorbia.)

This class is very useful. Their leaves and roots manure excellently, on account of their sharp, milky, juicy qualities. The seeds must be preserved in very cool, airy places. They are only suited for the winter grain.

The Flowering Spurge, (E. Corollata. 2)—Is found on dry banks and sandy fields, blossoms from July to September, one to two feet high.

Darlington's Spurge, (E. Darlingtonii, 2)—Grows in moist woods; blossoms May and June: two to four feet high.

Sun Spurge, (E. Helioscopia. 3)—Found in waste places; blossoms from July to September; grows ten to sixteen inches high.

Petty Spurge, (E. Peplus. ☉)—Waste grounds; July and August; six to twelve inches high.

Common Spurge, *Eyebright*, (E. Hypericifolia. ☉)—Is found on waste and cultivated places; July, September; ten to twenty inches high.

Spotted Spurge, (E. Maculata. ☉)—Grows on gravelly banks and open places; blossoms June, September; six to twelve inches high.

Wild Ipecac, *Ipecac Spurge*, (E. Ipecacuanha. 24) Is found on dry and sandy soils; May, July; five to ten inches high.

Toothed Spurge, (E. Dentata. ☉)—On shady hill sides in rich soils; blossoms August; one foot high.

II.—SELECTION FOR THE BEGINNING.

For protection plants, we find the *Parsnip* and *Cow Parsnip* almost everywhere; middle plants, as the *Wild Chervil*, *Carrots*, *Pimpinell*s and *Parsleys*, in the gardens and fields in abundance, to make a common cement. They can be increased from time to time, by adding others of the same vegetable form and family of plants, to any amount of seed, in variety, for a mixture, and can easily be raised in abundance; their mixture will have a powerful manuring effect on the soil.

SECTION XLIII.

FIFTH VEGETABLE FORM OF THE TOPSEED.

The Winter Labial Flowers.

The peculiarity of this vegetable form is, that the plants have lip and mouth-shaped flowers. They are classified in such as have *bare* seeds, and such as have *covered* seeds.

The former have mostly a square stem; their flowers stand whirled one over the other; they have many seeds, (placed in open capsules,) which easily fall out; they must, therefore, be cut in time. The seed germinates quickly, and is well suited to the summer grains. These herbs have a strong smell, and possess highly invigorating manuring principles. The other division have closed capsules, as the kinds of Snap Dragon, the kinds of Common Figwort and Fox-Glove. Many of these plants are garden flowers, which will be applicable when the soil has become more fertile by the *Green Manuring*, for they will thrive better, yield more seeds, and afford more matter to the soil.

1.—THE OPEN SEED PLANTS.

A.] *Kind of Mints. The Catmints.* (Nepeta.)**

This family are of a rapid growth, and we can take the following kinds for protection plants. They make no root leaves, but form only stalks; grow up quickly, and are well suited to fallows and summer grain; they grow, however, in the winter grain, too high before harvest. They bear, also, many seeds, in large bunches, grow on dry soils luxuriantly, and contain much manuring matter; some have a pleasant, and some an offensive odor; they are worth cultivating.

The Catnips, (Cataria. 24)**—Grow on waste and cultivated grounds, as common plants; July, August; two to three feet high; 600,000 grains per pound.

Ground Ivy, (N. Glechoma. 24)—Found in shady places; blossoms May, August; one to two feet high.

Garden Mints of different kinds.

2.

Sage. (Salvia.)*

Mostly garden plants. The seeds germinate quickly, and grow well in summer grain and fallows. They produce fine root-leaves, grow from one to two feet high, and deserve a place in the garden. 500,000 grains per pound.

Lyre-leaved Sage, (S. Lyrata. 8)*—Is found in wood lands and meadows; May, June; ten to twelve inches high.

Common Sage, (S. Officinalis. 8)—A well known garden plant; grows from one to two feet high.

Clary Sage, (S. Sclarea. 8)—One to three feet high.

Splendid Sage, (S. Splendens. 24)—A beautiful species, cultivated in gardens; two to four feet high.

3.

Balm. (Melissia. 24)

The seeds germinate rapidly, have a strong odor, and enrich the soil; their volatile parts have superior enriching qualities.

The Common Balm, (M. Officinalis. 24)—Grows from two to three feet high.

The Stone Balm, (M. Calamintha. 24)—Grows on mountains and stony hills; two to three feet high.

The Neptha Balm, (M. Nepta. 24)—Grows in sandy mountainous regions; blossoms July, August; has a strong odor.

Large Flowered Balm, (M. Grandiflora. 21)—Grows from one to two feet high; blossoms June and July; has also a strong odor, and averages 1,600,000 grains per pound.

4.

Horse Mint. (Monarda. 21)

This family are mostly raised and cultivated in gardens; their plants grow from three to five feet high, yield good seeds. Their leaves are spicy; their flowers are food for bees; require moisture, and do better on winter than summer grain; 500,000 grains per pound.

Bergamot, (M. Didima. 21)—Two to three feet high.

Wild Bergamot, (M. Fistula. 21)—Two to five feet high.

Horse Mint, (M. Punctata. 21)—Two to three feet high.

5.

Basil. (Clinopodium. 21)

This plant resembles the Horse Mint, but grows not so high on dry sunny ground; has a strong spicy odor; 1,000,000 grains per pound.

The Wild Basil, (C. Vulgare. 21)—Is found on hills and old fields; grows from one to two feet high.

Gray Basil, (C. Incanum. 21)—One to two feet high.

6.

Wood Betony. (Betonica. 21)

This plant deserves the attention of the farmer, and is well adapted to winter and summer grain.

The Meadow Betony, (B. Officinalis. 21)—Grows on meadows and in bushes; one to two feet high; blossoms red, May and July; is a good bee plant.

The Erect Betony, (B. Stricta. 21)—Grows from one to two feet high; blossoms yellow, July; has an odor like elder; 500,000 grains per pound.

7.

Dragon's Head. (Dracocephalum Virginianum. 21)

This plant has a strong odor, and produces a good number of seeds, which do well on summer grain; two to four feet high; blossoms August; 500,000 grains per pound.

8.

Hedge Nettle. (Stachys. 21)

This plant grows in fence corners, bushes, &c.; its seed is well adapted to moist soils, and on winter grain, and has 600,000 grains per pound.

Rough Hedge Nettle, (St. Aspera. 21)—Grows on wet banks and thickets; June and August; flowers pale purple.

Marsh Hedge Nettle, (St. Palustris. 21)—Wet places; July, August; two to three feet high; flowers purplish.

The Wood Hedge Nettle, (St. Sylvatica. 21)—Two to four feet high; blossoms June, August.

Yellow Hedge Nettle, (A. Recta. 21)—Two to three feet high; blossoms from May till July.

Woolly Hedge Nettle, (St. Lanata. 21)—Two to three feet high.

9.

Germander. (Teucrium;)

These small plants resemble the Hedge Nettles. They are good bee plants, with small grained seeds, and well adapted to summer grain; they are low spicy aromatic herbs; 1,000,000 grains per pound.

10.

Hyssop. (Hysoppus.) 21

The seeds of this plant are small-grained, but thrive well on middle soils. They are perennial; from one to two feet high; blossom July, August; from 1,000,000 to 2,000,000 grains per pound.

11.

Marjoram, (Origanum,) and *Garden Thyme*.

Excellent bee plants, which, in the mixture, form a short herb; but thrive well in summer grain, in barley soil; 4,000,000 grains per pound.

12.

Hoarhound, (Marrubium. 21) and *Pennyroyal*, (Trichostema. 21)

Found in waste places and around houses, lanes, &c., do well in summer grain, and form a fine herb in the mixture; has 600,000 grains per pound.

13.

Motherwort. (Leonurus. 21)

Found on waste places, around houses, &c., thrives well in summer grain; blossoms July, September; two to three feet high; 500,000 grains per pound.

11.

Snap Dragon. (Antirrhinum. 21)

This is a garden plant, (flower,) growing well in

dry sandy soil, and adapted to the mixture in summer grain; 1,000,000 grains per pound.

15.

Figwort Family. (Scrofularia. 4)

These plants thrive in the winter grain, and only on moist soils in the summer grain; three to five feet high; blossom June and July, and have 1,000,000 grains per pound.

III.—SELECTION FOR THE BEGINNING.

Where the *Common Catnip* does not grow wild, it is important for the farmer to cultivate it, as it belongs to the list of the best protection plants.

The different kinds of *Sage*, *Balm*, *Hedge Nettle*, *Hoarhound*, *Pennyroyal*, *Motherwort*, *Figwort* and *Snap Dragon*, are found growing on almost every farm, so that there can be no difficulty in making a beginning with this vegetable form.

SECTION XLIV.

SIXTH VEGETABLE FORM OF THE TOPSEED.

The Winter Shell Plants.

These plant families have a great number of seeds, of rapid growth, and do well in the summer grain. Most of them are not to be used on the winter grain, as they shoot up to seed if sowed too early. They thrive well, even on light sandy soils, and form strong bunches, and are also of an early growth, on account of which they are well suited to fallow and stubble mixtures; they are worthy of cultivation, and should be used in abundance. They distinguish themselves into *long shelly* and *round shelly* kinds.

I.—THOSE WITH LONG SHELLS.

The kinds of Winter Cabbage. (Brassica. 8)

To this family belong biennial kinds of Cabbage and Turnips which shoot up in stalks first, in their second year. They are better suited to summer grain and fallows than winter grain; 125,000 to 150,000 grains per pound.

Swedish Turnip, (Rutabaga.)

Rape, (B. Rapa.)

Common Beet, (Beta Vulgaris.)

Mangel Wurzel, (Beta Cycala.)

2.

Treacle Mustards. (Erisylum. 8)

These plants yield a great number of small grained

seeds, which are well suited to summer grain, and form strong dense bunches. Where they do not grow wild, they should be cultivated. If sowed in late summer grain, they will only form leaves, and shoot up in May, and also if sowed in stubbles. If sowed on winter grain, they shoot up and blossom in July, August and September. They grow as well on sandy and stony, as on rich soil; grow faster, however, in rich soil, and average 2,000,000 grains per pound.

Wild Mustards. *Black Mustard*, (Sinapis Migra,) *White Mustard*, (S. Alba.)

3.

Winter Cresses, (Barbarea. 4)

Can be sowed on winter grain, as they do not shoot up into stems, but make large leaves, like the *Rape* and *Turnip*. Their roots are bulbous. They grow, mostly, in moist places and roadsides, two to three feet high; blossom in April, May and August, and yield a great number of seeds; 2,000,000 grains per pound.

4.

Hedge Mustard. (Sisymbrium. 4)

This family contains the same qualities as the *Treacle Mustards* for *Green Manuring*; is generally found in waste places; May to September; flowers yellow; one to two feet high; seeds average about 4,000,000 grains per pound.

Hedge Mustard, (S. Officinalis.)

Mouse Ear Hedge Mustard, (S. Thalianum.)

Hoary Hedge Mustard, (S. Canescens.)

5.

Sky Rocket. (Hesperis Matronalis. 4)

A garden plant, which also grows wild, so that we can collect seeds in abundance; thrives well in winter and summer grain on the *poorest soils*. 200,000 grains per pound.

6.

Wall Cress. (Arabis. 8)

Is suited only to summer grain, as otherwise it would shoot up; yields a multitude of fine seeds, and its bunches are especially adapted to forming the density of the mixture.

Sickle Pod, (A. Canadensis. 8)—Grows on dry hills and roadsides, in bushes and rocky places; two

to three feet high; May to August; flowers white; 8,000,000 grains per pound.

Hairy Wall Cress, (*A. Hirsuta*. ♂)—Grows like the former, but only twelve to fifteen inches high; 4,000,000 grains per pound.

7.

Wood. (*Isatis Tinctoria*. ♂)**

This plant produces rapidly a large bunch, and thick roots in the mass. It thrives as well in heavy as in middle soils, in winter grain, summer grain, fallows and stubbles. The seeds are rather large, but the *Common Wood* is to the Green Manuring of the greatest importance as a protection plant. It grows three to four feet high; 60,000 grains per pound.

8.

Rock Alyssum Madwort. (*Alyssum Saxatile*. ♂)*

Germinates rapidly, forms bunches, does well in summer and winter grain, and on dry soils. It deserves cultivation in gardens, as it yields a great number of seeds. 500,000 grains per pound.

9.

Pepper Grass. (*Lepidium*. ♀)

Thrives well in summer grain; seeds very small, and germinate rapidly.

Wild Pepper Grass, (*L. Virginicum*. ♂ ♂)—Dry fields and roadsides; May, September; one foot high; 1,000,000 grains per pound.

Pepper Grass, Tongue Grass, (*L. Sativum*. ♂ ♂)—One to three feet high; 2,000,000 grains per pound.

III.—SELECTION FOR THE BEGINNING.

Winter Turnips, Rape, some kinds of *Mustard*, and *Madwort*, grow wild almost everywhere; are to be found wild on almost every farm, yield an abundance of seeds, and increase rapidly for the first commencement.

SECTION XLV.

SEVENTH VEGETABLE FORM OF THE TOPSEED.

The Winter Mallow Plants.

These plants are mostly of slimy juices in leaves and roots. They also form tolerably large leaves, and for this reason serve as protection plants in the mixture. Their seeds, however, are not so numerous, and, therefore, on account of the qualities above

mentioned, highly important for cultivation in gardens; some of the plants are excellent for *pasture* and *fodder*.

1.

Winter Mallows. (*Malva*.)

These plants are good for fodder when sowed in the mixture, but if sowed alone would grow too rapidly. They do not yield many seeds, but thrive well in summer grain, produce fine bunches of leaves, and when raised as fodder plants, give seeds for Green Manuring. They grow on all kinds of soil, in summer and winter grain; average number of seeds per pound, 100,000 grains.

American Mallow, (*M. Americana*. ♂)

Low Mallow, (*M. Rotundifolia*. ♂)

High Mallow, (*M. Sylvestris*. ♂ ♀)

2.

Hollyhock. (*Althea*. ♀)

These plants are frequently found in gardens, and deserve still more cultivation, as their seeds produce large bunches of leaves in the mixture, and thrive as well in winter as in summer grain.

Marsh Hollyhock, (*A. Officinalis*.)

Hollyhock in Gardens, (*A. Rosea*.)

Fig-leaved Hollyhock, (*A. Focifolia*.)

3.

Crane's Bill. (*Geranium*. ♀)

We find this family in gardens, and frequently growing wild. They suit summer and winter grain, form bunches of leaves like the Mallows, and grow best on moist and heavy soils.

Spotted Crane's bill, (*G. Maculatum*.)—Common in open woods; May, June; ten to twenty inches high.

Small-flowered Crane's bill, (*G. Pusillum*.)—Sandy soil; May to July; one foot high.

Caroline Crane's bill, (*G. Carolinianum*.)—Fields and hills; May to July; eight to sixteen inches high.

SELECTION FOR THE BEGINNING.

The *Mallows* are common, easy to be gathered, and very useful in the mixture, as well as the seeds of the *Garden Hollyhocks*. We may begin with these two, and continue with others of the same vegetable form, as may be easily obtained.

SECTION XLVI.

EIGHTH VEGETABLE FORM OF THE TOPSEED.

The Winter Hull Plants.

The leaves and stalks of these plants contain, after a chemical examination, a good deal of gummiferous or animal matter, and for this reason, they give much animal nutriment, as well by their stalks as by their pea-like and rapidly germinating seeds. It is evident, therefore, that these plants manure well; for instance, where a clover mass has been ploughed down, of one foot high, the clover having stood thick enough, experience has shown a great improvement. The copious mixture of the following *hull* plants, for topseed, is highly important in Green Manuring, and should be used in preference to *sweet* or *honey clover*, as being the most enriching to the soil, and yielding a large quantity of seeds.

1.

The kinds of Honey Clover. (Melilotus.)

This kind of Clover is very important in *Green Manuring*. Besides yielding a great number of seeds, it is of rapid growth. In order to be successful, however, in collecting the seeds, there must be at least a portion of it raised in remote or separate places from other clover, the seed being liable to fall out while it is handled, so that great care is necessary in procuring it. Unlike the common red and white clover, we should cultivate it in the garden, and not in the field. Nature has supplied these plants with all that is wanted to benefit and enrich our lands, from the fact that they penetrate the soil, and render it mellow with their strong thrifty roots; by applying them frequently in succession, they tend much to enrich the soil. They grow on the heaviest clay soil, as well as on swamp or sandy ground.

The Common White Honey Clover, or Sweet Clover. (Melilotus Vulgare, or Trifolium Melilotus Officinalis Flora Alba. ♂)—This plant is of very rapid growth, furnishes stalks and leaves in abundance, and supersedes all others in the amount of seeds. We can raise on one *rod* square, from ten to fifteen pounds of seed, and besides, its growth is just as rapid in fallows as in stubbles and topseed; within four to six weeks it will produce leaves and bunches one foot high. On rich soil, it frequently grows too high in winter grain; in such cases it should not be

sowed in winter grain until the spring following, so as to prevent its growing too high in the mass. In order to prevent crowding the plants in the mass, I have selected first, the White *Melilotus*, or common White Sweet Clover; the others, which are the most preferable, may follow in their order. It is found in fields and waste places, where it can sow itself freely; grows from three to five feet high, blossoms in June, and produces 200,000 grains per pound.

The Common Yellow Melilot, (M. Officinalis. ♂)—It grows mostly on moist soils, on meadows and field-borders, often in a great quantity, and about half as high as the former. The root is thick and long; the stem from two to three feet high, and gives a yellow hemp. It blossoms earlier than the White Honey Clover, and has 150,000 grains per pound.

2.

Kinds of Clover. (Trifolium.)

The Common Red Clover, (T. Pratense,) and the *Common White Clover, (T. Repens,)* are known to every farmer; he will therefore have some seed to spare, as the by-mixture, in *Green Manuring* for the topseed. Every farmer knows best to what heights the red and white Clover would grow in the mixture, but they will only suit as middle plants in the mass, since white Honey Clover would *out-grow* them three times. The Red Clover has 200,000 grains per pound; the White Clover 600,000 grains per pound.

3.

Canadian Milk Vetch. (Astragalus Canadensis. 21)

Forms fine leafy bunches in the mixture, and grows two to three feet high; 70,000 grains per pound.

4.

*Lucerne. (Medicago Sativa.)**

If we keep the common *Blue Lucerne* separate in a garden, the stalks will improve, increase in size, yield two crops of very fine seeds in one year, and 200,000 grains per pound.

The Common Yellow Lucerne, (Medicago Falcata.)—May be treated in the same manner as the one mentioned above. The seeds are very easily obtained; but by planting them in poor, stony or sandy ground, they will produce more *seeds* than on *rich* soil, for in the latter they grow too thrifty to run

into seed. It is most excellent for pasture; number of seeds per pound, 300,000 grains.

5.

Vetchlings. (Lathyrus).*

The following are most excellent *fodder* and *pasture* plants, though their seeds be somewhat scarce and large; in order to obtain them, it is best to rear them among shrubbery or near fences. They are only adapted to the mixture, as by themselves they are not calculated to form a mass. For the Green Manuring, they would not be very profitable in the mixture, their seeds being too large; but in the cultivation of pasture and fodder, they would be excellent ingredients. The four first large kinds here specified, only yield 5,000 grains per pound.

The Broad-leaved Vetchling, (L. Latifolius. 21)—Bears large leaves and stems; its flowers are very large, white and rosy red color; June till August; is an excellent fodder plant.

The Knobby Vetchling, (L. Tuberosus. 21)—Is a very wholesome and nourishing fodder plant, grows among the grain as well as in meadows; blossoms red; May and June; grows from two to four feet high.

The two and four-leaved Vetchling, (L. Heterophyllus. 21)—Bears large spear-like leaves and numerous stems; grows four feet high; flowers white and flesh colored; July and August.

The Wood Vetchling, (L. Sylvestris. 21)—Bears flesh-colored and greenish white flowers, two, five, and seven in a cluster, and has large sword-like leaves; five to six feet high, and blossoms in June and July.

The Common Vetchling, (L. Pretensis. 21)—Is found from two to three feet high, in meadows, erect; yellow flowers; June and July; bears an abundance of small leaves, with globular black seeds; 12,000 grains per pound.

The Marsh Vetchling grows erect, from one to two feet high; bears purple or bluish flowers; June and July; 20,000 grains per pound.

The four first mentioned should be cultivated apart from other garden plants or shrubbery, and the two latter in beds, so as to be able to perpetuate the propagation of seed for the several purposes designed. They are most excellent in the meadow mixtures, as they increase the produce per acre, and will yield two or three times as much grass on the same

ground. The two latter are better in pasture mixtures.

6.

Vetches. (Vicia).*

In order to gather seed, they should be cultivated in gardens, among bushes, so that the plant may rest on the bush to climb. Their nutriment and produce is the same as that of the *Vetchlings*, but they are snited better for forming a density in the mass in the mixture for pasture. They want good middle soil.

Carolina Vetch, (V. Caroliniana. 21)—Climbs on borders of woods and along fences; May and June; two to four feet long.

American Vetch, (V. Americana. 21)—Moist thickets and woods; June; stem one to three feet long.

Tufted Vetch, (V. Cracca.)—Borders of fields, woods and meadows; June to July; two to three feet long.

Slender Vetch, (V. Tetrasperma.)—Fields and banks of streams; May, June; one to two feet long.

Common Vetch or Tare, (V. Sativa.)—Cultivated fields and waste places; June; stem one to two feet high.

Hairy Vetch, (V. Hirsuta.)—In cultivated fields; June; two to three feet long; on an average, from 20,000 to 40,000 grains per pound.

SELECTION FOR THE BEGINNING.

Of this vegetable form, we take for the beginning the common *White Honey* or *Sweet Clover*, and *Yellow Clover*, as protection plants; it is adapted to every soil, and of a very rapid and thrifty growth. The *Red* and *White Clover* serve for *Middle Plants*.

SECTION XLVII.

NINTH VEGETABLE FORM OF THE TOPSEED.

The Winter Thistle and the Feather Seed Plants.

The following Thistle Plants have a strong manuring quality, and are of speedy growth. The thornless featherseed plants I have endeavored to distinguish as much as practicable, in (A.) milky, juicy; and in (B.) not milky. The former contain more manuring qualities, while the latter produce more leafy bunches.

I.—THISTLE PLANTS.

1.

Common Burdocks. (Lappa).**

This family is useful for manuring, because they

are of thrifty and speedy growth, and form very large leaves; they require, however, a somewhat heavy soil.

The Common Large Burdock, (L. Majus. 2 ♂)—Grows nearly everywhere, from three to five feet high.

The Small Burdock, (L. Minus. ♂ 2)—Grows only half the size of the former.

The Felty Burdock, (L. Tomentosum. ♂ 2)—As frequently found as the former; three to four feet high. The stalks, leaves and roots are of a very slimy nature, and manure most excellently; 30,000 grains per pound.

2.

Cotton Thistle. (Eupordon Acanthium.)

These Thistles form larger bunches of leaves in the mixture than the *Burdocks*, and thrive well on dry sandy soils; grow from four to six feet high, are a good ingredient to green manuring, and yield 40,000 grains per pound.

3.

Field Thistles. (Cirsium.)**

Of this species, the biennial are the best for Green Manuring, on account of their stalks and roots; the perennial, also, grow exuberantly in fields, but die off by the *Green Manuring*. They cannot thrive, however, in the mass, on account of being too densely crowded and shaded. In this respect they resemble other plants which have strong or vigorous roots; still the biennial Thistles are not so tender, because they propagate themselves from the seed, and form large protection plants in the mixture. By cutting off the ripe heads and threshing out the seed, we rid ourselves of them at once. Among these biennial Thistles, the following produce the largest bunches of leaves, and most numerous seeds, and thrive as well in the winter as in the summer grain. They must not be used in too light a soil.

Common Thistle, (C. Lanceolatum. ♂)—Grows everywhere on fields and roadsides; blossoms from July till September; two to four feet high.

Two-Colored Thistle, (C. Discolor. ♂)—Meadows and open woods; August to September; three to six feet high.

Pasture Thistle, (C. Pumilum. ♂)—Generally in low and dry fields; July, August; two to three feet high.

The Wool Thistle, (C. Eriophorus. ♂)—Covered

with wool; six to eight feet high; July to September.

The Swamp Thistle, (C. Muticum. 2)—Common in swamps and low places; August; four to eight feet high; average 80,000 grains per pound.

4.

Teasel. (Dipsacus.)**

This plant produces a large herb in the mixture, and forms bulbous roots. The seeds thrive well, and are smaller than any of the field Thistles. They are just as good in winter as in summer grain, especially on heavy soil. In fallows and stubbles, they form, in six or eight weeks, large roots, and an herb one foot high. They ought to be cultivated in gardens, so as to enable us always to procure the seed, but like most biennial plants, they sow themselves.

Fuller's Teasel, (D. Fullonum. ♂)**—A cultivated European plant used by *Clothiers*, who raise the nape of woolen cloth with the hard hooked scales it bears; it grows about five feet high; July; 125,000 grains per pound.

The Wild Teasel, (D. Sylvestris. ♂)—Naturalized; found in hedges and roadsides; August; stem three to four feet high; 120,000 seeds per pound.

5.

Button Snake Root. (Liatris.)**

This species form also a large herb in the mixture, do as well in winter as in summer grain, and in fallows and stubbles, but not on light soils. They are perennial, and if we cultivate them in gardens, their seed is cheap to obtain. They produce more and smaller seeds than any of the Thistles mentioned above; 200,000 grains per pound.

The Blazing Star, (L. Squarrosa. 2)—Dry soils; a handsome plant, bearing long linear leaves, brilliant purple flowers; from one to three feet high; August.

The Gay Feather, (L. Scariosa. 2)—Dry sandy soils; rather stout; flowers bright purple; two to five feet high; September.

The Blue Blazing Star, (L. Spicata. 2)—Moist grounds; a handsome species; two to five feet high; August.

6.

Centaurea.

These plants thrive well on middle soils, and pro-

duce a fine herb in the mixture, and have, on an average, from 50,000 to 100,000 grains per pound.

Brown Knapweed, (C. Sacca. 24)—Waste places; July, August; branching; two feet high.

Black Knapweed, (C. Miara. 24)—Common in gardens; two to three feet high.

Blue Bottle Bachelor's Buttons, (C. Cyanus. 24)—Common in gardens; two to three feet high.

II.—THE THORNLESS FEATHERSEED PLANTS.

A.]—Milky Juicy Plants.

These are all middle plants, and thrive best in good soils, in summer grain, but do well also in winter grain on poor soil, as they have moisture enough to develop their germinating principles or qualities.

1.

Hawkbit. (Leontodon.)*

These plants have most excellent manuring qualities, and are therefore an excellent ingredient in forming a mass. As they tend to make fodder and pasture bitter, it is well to collect the heads as fast as we see them ripen in the meadows, so as to accumulate a quantity of their important seeds, and to prevent them from rendering the pasture bitter.

The Common Dandelion, (L. Taraxacum. 24)—Common everywhere.

Autumnal Hawkbit, (L. Autumnales. 24)—Meadows and roadsides; July and September; ten to eighteen inches high. Both these plants have 600,000 grains per pound.

2.

Wild Lettuce. (Lactuca Elongata. 24)

These milky juice plants mostly grow on dry places, and yield a great number of seeds; two to eight feet high; 500,000 grains per pound.

3.

(Crepis Biennis. L. 24)

This plant should be cultivated by itself in corners of gardens or fields; it yields a great number of seeds, and is an excellent middle plant, which, by no means, shoots up the first year. It is also just as useful for topseed in summer grain, as it is in the fallows and stubble mixtures. It will thrive in all kinds of soil, can be found in fields, meadows and pastures, and blossoms from July till August; seeds per pound, 600,000 grains.

4.

Hawkweed. (Hieracium. 24)

Thrives well in summer grain, fallows and stubbles, and produces a fine herb in the mass; of the following kind, we can raise a great quantity of seed.

Rough Hawkweed, (H. Scabrum.)—Woods and dry hills; flowers yellow; July, August; one to three feet high.

Gronovious Hawkweed, (H. Gronovii.)—Common in dry, sterile soil; flowers yellow; July, August; one to four feet high.

Veiny Hawkweed, *Rattle Snake Hawkweed*, (H. Venosum.)—Common in dry soils and pine woods; June to August; one to two feet high.

Panicled Hawkweed, (H. Paniculatum.)—Common in damp woods; one to three feet high; August; seeds average, per pound, 600,000 grains.

5.

Common Succory, or *Cickory*. (Cichorium Intybus. 24)

Cultivated and somewhat naturalized in grass fields, found on roadsides, etc.; thrives well in summer grain, fallows and dry middle soils; flowers blue; from June till September; two to three feet high; 300,000 seeds per pound.

1.

Thoroughwort. (Eupatorium. 24)

Does well in the winter grain and fallows, and yields a great quantity of seeds.

The Common Water Hemp, (E. Cannabinum.)—Found along creeks; four to five feet high; July and August.

Trumpet Weed, (E. Purpurium.)—Common in low grounds; July to September; six to twelve feet high.

Narrow-Leafed Thoroughwort, (E. Hysopifolium.)—Dry fields and sterile soils; August, September; one to two feet high.

Fall Thoroughwort, (E. Altissimum.)—Woods and sandy soils; September and October; three to seven feet high.

Vervein-Leafed Thoroughwort, (E. Teucrifolium.)—Low grounds; August to October; two to three feet high.

Round-Leafed Thoroughwort, (E. Rotundifolium.)—Dry soils; August, September; three to four feet high.

Hairy Thoroughwort, (E. Pubescens.)—Dry grounds; August, September; three to four feet high.

Thoroughwort Boneset, (E. Perfoliatum.)—Abundant in meadows and low grounds; August; two to four feet high.

Nettle-Leafed Thoroughwort, (E. Ageratoides.)—Rich woods and rocky hills; August, September; two to three feet high.

Aromatic Thoroughwort, (E. Aromaticum.)—Low woods; August, September; two feet high; average 1,000,000 grains per pound.

2.

Indian Plantain. (Cacalia. 2f)

These are of the same nature as the *Thoroughwort*. They form large roots and leaves the first year, and only do well to be sowed in the fall or winter, in the fallows; average, 1,000,000 grains per pound.

Pale Indian Plantain, (C. Atriplicifolia.)—Moist, rich woods; August, September; three to five feet high.

Great Indian Plantain, (C. Reniformis.)—Rich, damp woods; August, September; four to eight feet high.

Sweet Scented Cacalia, (C. Suavolens.)—Rich woods and banks of streams; September; three to four feet high; seeds per pound, 1,000,000 grains.

III.—SELECTION FOR THE BEGINNING.

Common Burdock, *Cotton Thistle*, *Pasture Thistle*, *Dandelion* and *Wild Lettuce* grow everywhere, so that we can find a sufficient quantity of seeds for the beginning.

Every farmer knows the locality of his own lands, as well as the character of the soil thereon, and as we have enumerated and specified a variety of plants adapted to the various kinds of soil, he must select those that are peculiarly adapted to his own farm. He ought also to appropriate a garden or small lot to the raising of seed, from the fact, that after collecting all that have been growing wild, the seeds will become scarce.

SECTION XLVIII.

TENTH VEGETABLE FORM OF THE TOPSEED.

Common Wormwood, *Tansy*, *Yarrows* and *Winter Chamomile*; also, the perennial *Sunflower-like Plants*.

It is our intention here to mention, in the first

place, the *Wormwood*, *Tansy*, *Yarrow*, *Chamomile*, etc., as they possess great and important *manuring qualities*. We think they deserve attention in making a collection for the beginning; and secondly, we will notice the sunflower-like plants of this vegetable form.

I.—*Wormwoods*, *Tansy*, *Yarrows*, *Chamomiles*.

These are all aromatic plants, and therefore of a rich manuring tenor. We must thresh and sift out the seeds from a large quantity of chaff; but they produce a larger amount of easily germinating seeds than those in the former vegetable form. They resemble each other, however, in this respect, that they germinate slowly, and, therefore, dare only be sowed in winter grain, so as to have sufficient moisture to insure success. If we sow them on summer grain, we cannot promise ourselves a luxurious mass of this class of seeds, except on rich land; but in winter grain they will thrive in the poorest soils.

1.

Wormwoods. (Artemisia. 2f)**

This family yield a great quantity of fine seeds, which germinate well, and form large leafy bunches, when sowed on winter grain; by virtue of their aromatic stalks and leaves, they possess very strong, good manuring qualities.

Common Mugwort, (A. Vulgaris.)—Banks of streams and waste places; September; two to three feet high; seeds per pound, 5,000,000 grains. This plant we find on almost any farm; it is of great value for its enriching strength in manuring, and large quantity of seed, but we must not deem it too much trouble to rub out the seeds, as beating and threshing will not take them out, but by using a little care we will be repaid for all our labor.

Common Wormwood, (A. Absinthium.)—Common in gardens; manures very well; August; two to four feet high; seeds per pound, 4,000,000 grains.

The Field Mugwort, (A. Campestris.)—Sandy soils; on roadsides; August, September; two to five feet high. It is also very important in forming a mass in the mixture. 3,000,000 seeds per pound.

Southern Wood, (A. Absotanium.)—A well known shrubby plant, common in cultivation, three feet high.

The High Wormwood, (A. Annua. ☉)—Five to six

feet high; must not be used in the winter grain, because it will shoot up into seeds; but in summer grain and fallows, it produces a good herb; 6,000,000 seeds per pound.

Roman Wormwood, (A. Pontica.)—Cultivated in gardens; three to four feet high.

2.

Common Tansy. (Tanacetum Vulgare. 2) **

Thrives well only in winter grain, forms large leaves, produces a great number of fine seeds, which must be rubbed and sketched out of a great amount of chaff; two to three feet high; 1,000,000 seeds per pound.

3.

Common Yarrow. (Achillea Millefolium. 2) *

Thrives best in winter grain; common in fields and on hills; one to two feet high; 1,000,000 seeds per pound.

4.

Chamomile. (Anthemis. 2 ♂) *

Yields a great quantity of fine seeds, and is a good middle plant on dry soils; 1,000,000 grains per pound.

Corn Chamomile, (A. Arvensis.)—Fields and cultivated grounds; June till August; ten to fifteen inches high.

Garden Chamomile, (A. Nobilis.)—Cultivated in gardens; one to two feet high.

II.—*Sunflower Plants*.

This family yields not a great number of seeds, but as they are perennial, they may be obtained at small expense. They are also very good bee plants.

1.

Winter Sunflowers. (Helianthus.) **

Every farmer knows that these produce large stalks and leaves. They thrive well in the winter grain, and form large bunches of leaves; average 100,000 seeds per pound.

Dark Red Sunflower, (H. Atrorubens.)—Gravelly soils; August, September; three to four feet high.

Common Sunflower, (H. Annuus. ☉)—In gardens; July, August; seven to twelve feet high.

Downy Sunflower, (H. Mollis.)—Low grounds; July to September; two to four feet high.

Pale-Leafed Sunflower, (H. Strumosus.)—Common on river banks and dry woods; August and September; two to four feet high.

Cross-Leafed Sunflower, (H. Divaricatus.)—Common in thickets and barren places; August to October; one to five feet high.

Thin-Leafed Sunflower, (H. Decapetalus.)—Common on low banks of streams; August to October; three to five feet high.

Tall Sunflower, (H. Gigantus.)—Thickets and swamps; three to ten feet high.

Small-Headed Sunflower, (H. Nicrocephalus.)—Woods and thickets, western states; August, September; three to eight feet high.

2.

Cone-Flower. (Rudbeckia. 2)

They are often found in gardens, and its seeds thrive well in winter and in summer grain; 100,000 seeds per pound.

Tall Cone-flower, (R. Laciniata.)—Common in low thickets; July to September; six to eight feet high; a tall, showy plant.

Three-lobed Cone-flower, (R. Triloba.)—Dry soils; July to October; one to three feet high.

Showy Cone-flower, (R. Speciosa.)—Dry soils; August, October; one to two feet high.

Small-flowered Rudbeckia, (R. Fulgida.)—Dry soils; July, October; one to three feet high.

Hairy Rudbeckia, (R. Hirta.)—Dry soil; July, August; showy plant; two to three feet high.

3.

Tickseed. (Coreopsis.)

This family yields a good many seeds, while it is prolific in flowers; thrives well in winter and summer grain; average 500,000 grains per pound.

Tickseed Sunflower, (C. Trichosperma. ♂)—Swamps near the coast; August to October; two to three feet high.

Three-leafed Tickseed, (C. Tripteris. 2)—An elegant species found on the banks of streams; August to October; four to six feet high.

Dyer's Coreopsis, (C. Tinctoria. ☉)—Native of Upper Missouri; blossoms all summer; one to three feet high.

4.

Common Elecampane. (*Inula Helenium*. 24)*

This species contain a large number of garden flowers, the seeds of which thrive well in winter and summer grain, produce a fine herb, bloom most all summer, and are good bee plants. It is a large coarse looking plant, naturally growing on roadsides; four to six feet high; 1,000,000 seeds per pound.

5.

Rosin Plant. (*Silphium*. 24)

Deserves a place in the garden for cultivation, as it produces luxurious stalks and masses of leaves, in summer and winter grain.

Three-leafed Rosin Plant. (*S. Trifoliatum*.)—Dry woods and plains; August; five to six feet high.

Cup Plant. (*S. Perfoliatum*.)—Rich soil, along streams; August; four to six feet high.

6.

Leaf Cup. (*Polymnia Canadensis*. 24)

Moist shaded ravines; June, July; two to five feet high.

Large Leaf Cup. (*P. Uvedalia*. 24)—Rich soils; July, August; three to six feet high.

III.—SELECTION FOR THE BEGINNING.

Wormwood, *Tansy* and *Yarrow* are easily obtained, and they can be collected in sufficient quantities for the beginning. The cheapest and best seed cultivation of field and garden plants, will be to have them in a garden, when the wild ones will cease to afford a sufficient supply.

SECTION XLIX.

KINDS OF GRASSES FOR THE TOPSEED MIXTURE.

There are a number of Grasses growing wild and in abundance, bearing many seeds, that would not answer for fodder and pasture; they must be wholly appropriated to manuring grasses. We will, therefore, in the following description and sub-division, mark those which are especially worth cultivating, with a *, so as to distinguish them from the herbs.

I.—PROPER MANURING GRASSES.

1.

The Brome Grasses. (*Bromus*.)

The following *Brome Grasses* are most excellent

of their kind, for the *Topseed*, as they are of a speedy growth, and produce a great number of seeds. They are also most excellent in *fallows* and *stubbles*, since they form broad leaves and bunches, one foot high, in six to eight weeks. Some farmers have used them for fodder grasses, but they are not so profitable for this use, as they are only biennial, and contain but little nourishment. The fields are also too much injured with their seeds, when we cultivate them as fodder grass, as they fall out so easily. Some, as, for instance, the *Field Brome Grass*, [*Bromus Arvensis*], produces a good swath or pasture, but it blossoms and ripens already when only three to six inches high, and spoils the pasture and fields with its seeds. Thus, we must bear in mind, that biennial have a greater propensity to run into seed than perennial plants, but if used only in *Green Manuring*, they have not the chance of blossoming and running into seed. For their seed cultivation, we should appropriate the corners of the garden, or a field, as they will perpetuate themselves forever with their own seeds, and can manure themselves with their own leaves.

Cheat, *Chess*, [*B. Secalinus*. 3]—In wet seasons, we too frequently find it in the winter grain. The reason why it is such an injury to the grain is, that it germinates in the fall, and forms stalks before winter, so that for *Green Manuring*, it must be sowed in the winter, and then it will form *strong*, *short grass* in the mixture. It is generally sifted out of the grain in barns, and has, per pound, 70,000 to 100,000 grains.

**Field Brome Grass*, (*B. Arvensis*. 3)—Found in fields and meadows in West Chester and Darlington; June, July; two to three feet high. Yields an extraordinary number of seeds, and is of rapid growth; also, excellent manuring grass; seeds per pound, 150,000 grains.

**Soft Brome Grass*, (*B. Molliis*. 3)—Same nature as the *Field Brome Grass* in *Green Manuring*. Found in fields and pastures, but not often met with; one to two feet high; yields 100,000 grains per pound.

**The Large Fodder Bromus*, (*B. Gigantus*. 24)—Along creeks, bushes and wood-lands; July, August; three to four feet high; thrives well in winter grain, and on moist soils in summer grain, produces a large, broad, shining grass; does not shoot up the first year;

will perpetuate itself for many years, and does not scatter its seeds so easily. We can raise a sufficient quantity of the latter for manuring, on a small patch of ground. It does not belong to the best of fodder grasses, although it yields a large crop, and may be mowed several times; 200,000 grains per pound.

* *Ciliate Brome Grass*, (B. Ciliatus. 21)—River banks; July; three to four feet high; 100,000 grains per pound.

* *The Erect Bromus*, (B. Erectus. 21)—Also a fodder grass; one to two feet high; 100,000 grains per pound.

By collecting and cultivating these Brome Grasses, we can make a very dense plant manuring mixture, as they are the best and most frequently found among the biennial and perennial, and, therefore, easily obtained.

2.

* *Common Darnel, Rye Grass*. (Solium Perenne. 21)

Meadows and fields; one to two feet high; June. We can frequently, when ripe, procure a large quantity of these seeds at little expense. It is a hard grass, when young; however, a good pasture plant. When the pasture stands not dense enough, as in a rich, luxurious meadow, the stalks will shoot up to seed and die out. In the meantime, on good pasture, it will last for six years. We cannot expect to raise good pasturage until we have improved the ground by Green Manuring; thus, our meadows will become vigorous and produce good pasture, when the grass seeds, calculated to make good pasture, are sowed on. The Rye Grass is, therefore, for the present, only valuable for Green Manuring, because it does not shoot up the first year, and is useful in forming the density of the mixture. Seeds per pound, 300,000 grains.

3.

* *Velvet Grass, White Timothy*. (Holcus Lanatus. 24)

This grass grows almost everywhere, on dry moist or sandy soils and swamps; June; one to two feet high; has soft spongy and juicy leaves. Cattle like it in the mixture, but not so well in too great abundance, or by itself, as it is too rough and spongy. It has the same disposition to shoot up which the Rye Grass has, and then will not be touched any longer by animals; therefore, as long as we have not rendered the soil vigorous enough for pasture and fod-

der cultivation, by Green Manuring, it is only fit for topseed in winter grain, because in summer grain it forms too small leaves, and often will not come up at all. It deserves cultivation in a remote part of the garden, and will become stronger every year. If the seed is rubbed out carefully, we will have 3,000,000 grains per pound.

4.

Hair Grasses. (Aira.)

The following two kinds are the most useful for the Topseed of the Green Manuring. The first on middle and moist soils, the other on sandy soils, but they grow only to a small low herb on winter grain, and will not come up in summer grain on poor soils; they will do so, however, on rich ground.

* *Tufted Hair Grass*, (A. Cerpitosa. 21)—Often found in meadows and pastures, on moist soils, in large quantities; three to four feet high; yields a quantity of seeds in large waving panicles, and root leaves one to two feet long; two sharp edges, and five tooth-like ribs, so that no animal touches it while green. In hay it will be eaten, but is yet a bad kind of grass; per pound, 2,000,000 grains.

* *Common Hair Grass*, (A. Hexuosa. 21)—Common on dry, rocky and sandy places; June; one to two feet high. Makes good sheep pasture grass on sandy soil, after having been invigorated by the Green Manuring, so that the pasture may well be set in with grasses; otherwise it will shoot up immediately into stems, and the sheep then will not touch it again. For the present, it is only good in the winter grain of such soils, where it brings forth a short, dense grass in the mixture; seeds per pound, 4,000,000 grains.

5.

* *Rough Bristle Grass*. (Setaria Verticillata. 21)

Naturally near dwellings; about two feet high. It has a great quantity of seeds, which are easily obtained by cutting off the grass. In the mixture it produces a fine low grass. In dry soils we must sow it on winter grain; in moist soils it should be sowed in summer grain; June, July; 600,000 grains per pound.

6.

Millet Grasses. (Milium. 21)

The two following kinds grow in woods and shady places. They have a flirry appearance; have a few

millet-like seeds, and are not fit for fodder and pasture cultivation. The third kind grows along the borders of fields, and bears a great number of flowers, but is of no use in fodder and pasture cultivation. Its seed, however, thrive well in summer grain.

The flirry or waving Millet Grass, (M. Effusum).—Grows from two to three feet high, and the leaves have the odor of the honey clover; June; 150,000 seeds per pound.

The Oats-like Millet Grass, (M. Paradoxum).—Resembles the meadow oats; May, June; 150,000 seeds per pound.

**The many-flowered Millet Grass*, (M. Multiflorum).—It forms thick bundles of tube-like stems; grows to three feet high; July; 500,000 grains per pound.

7.

Melic Grass. (Melico. 2)

These grasses possess no value for fodder and pasture cultivation; but as they grow wild, their seeds can be used in the winter grain mixture.

Melic Grass, (M. Speciosa).—Rich soil; three to four feet high; June; 500,000 grains per pound.

The Blue Melic Grass, (M. Cocrulea).—Grows on most meadows and pastures; July; two to three feet high; 500,000 grains per pound.

8.

Oats Grasses. (Avena.)

The following kinds are very common and lasting; when sowed on winter and summer grain, they have large leaves, which render them important in the Green Manuring.

The Common Meadow Oats Grass, (A. Pratensis).—Blossoms in May; grows on dry meadows; from three to four feet high; 500,000 grains per pound.

The Hairy Meadow Oats Grass, (A. Prodescens).—Blossoms in May; has flat, soft, hairy leaves; grows on dry meadows and pastures; three feet high; 500,000 grains per pound.

Silver Oats Grass, (A. Sesquiteria).—Blossoms in May; three feet high; grows like the former; 500,000 grains per pound.

The Gold Oats Grass, (A. Flavescens).—The ear is yellow; blossoms in June; one to two feet high; grows on dry meadows and pastures. ~

**The Oat Rye Grass*, (A. Elatior).—Found often in

gardens and orchards, under the name of *French Rye Grass*; sometimes in meadows and field borders, and is an excellent enduring mowing grass. For the Green Manuring, it is of the greatest importance. When sowed in summer grain, it forms a plant of twelve to fifteen inches high; grows faster than the former Oats Grasses, germinates and grows rapidly, and will produce two crops of seed in one season. When cultivated in the garden, it richly rewards the cultivator.

We can easily discover the Green Manuring as used until now, made by sowing saleable grains, is ten times more expensive, and much less beneficial. Oats have, per pound, only 20,000 grains, and form not so large a stalk, hence, are not, by one half, as beneficial as the Oats Rye Grass, which has in a pound, 200,000 grains, and bears seeds twice a year.

9.

A few enduring Litter Grasses.

The following Litter Grasses will produce more straw on an acre, than a heavy crop of rye, and as they are enduring, or perennial, and need not be re-sowed, but only occasionally manured, their cultivation will be much cheaper. We can also obtain seeds for the Green Manuring; hence, I only mention them for the benefit of scientific and industrious farmers.

The Knotty Barley Grass, (Hordeum Bulbosum).—Grows four feet high, on river banks; root leaves a foot long; 30,000 grains per pound.

Common Reed Grass, (Phragmites Communis. 2).—Edges of ponds and swamps; August, September; nine to ten feet high; 50,000 grains per pound.

Wild Rye, (Elymus Virginicus. 2).—Four to five feet; river banks; 100,000 grains per pound.

Canadian Lyme Grass, (Elymus Canadensis. 2).—River banks; August; four to five feet high; 100,000 grains per pound.

Hairy Reed Grass, (Elymus Villosus. 2).—River banks; August; three to four feet high; 100,000 grains per pound. These rough and coarse grasses have very broad leaves, and long straws, and afford a reedy litter.

The Stiff Wheat Grass, (Triticum Rigidum. 2).—Sowed by itself, affords the finest litter cultivation, forms good stalks, entirely leafless straws; contains 100,000 grains per pound.

Rush-like Wheat Grass, (T. Junceum. 21)

The High Wheat Grass, (T. Gigantum. 21)

The Blue-green Wheat Grass, (T. Glaucum. 21)

At the same time, we can use as a fodder grass, the *Common Wheat Grass*, or the *Awned Wheat Grass*, (T. Caninum, 21) for poor soils, and with good profit; it is important for Green Manuring; 100,000 grains per pound.

10.

Bent Grass. (Agrostis.)

They are most generally under-grasses, have many fine and well germinating seeds, and are important in forming the density of the mixture. They are not well adapted to the Topseed of the summer grain, in dry soils, but on the winter grain they thrive well on the very poorest soils, having moistness to aid the germinating process. The Bent Grasses are also fine pasture grasses, especially the five following, which are marked with a *. They grow well only on good soils, for on poor soils they soon run up into seed.

**Red-Top*, *Herl Grass*, (A. Vulgaris. 21)—June; one to two feet high,

**White Bent Grass*, *Fiarin Grass*, (A. Alba. 21)—Moist meadows and fields; July; one to two feet high.

**Hair Grass*, (A. Laxiflorum. 21)—Dry fields, common; June, August; one to two feet high.

**Rough Thin Grass*, (A. Scabrum. 21)—Damp, shady places; July to August; one to two feet high.

**Gigantic Agrostic*, (A. Gigantea. 21)—Meadows and pastures; three to four feet high; has a large, yellow, broad bunch, high stems and broad leaves. Both its husks are hairy at the points, and at the joints of the stems; roots will grow when lying on the ground.

These five *Agrostis*, marked with a *, are important grasses, and when not found in sufficient quantity to gather seed, they must be cultivated; when well cleaned, they have 6,000,000 grains per pound.

THE MOST FREQUENT WILD-GROWING FODDER AND PASTURE GRASSES.

1.

Spear Grasses. (Poa.)*

These important and nourishing grasses ripen so early, that their seeds can be gathered before har-

vest, or hay-making, and are found abundantly in all locations, so that they can easily be collected for fodder and pasture cultivation, and for the Green Manuring. In the summer grain they do not germinate so well, and remain too small; but in the winter grain they are excellent, and form splendid pasturage. Cattle and stock of all kinds are very fond of them, and they tend much to improve the clover and pasture cultivation, and the stock that feed on them improves much faster than on clover alone. It is, therefore, highly beneficial and important, that these grasses be added to the clover pasture; they are also easily obtained, and very nourishing. On an average, they have 1,000,000 grains per pound.

Spear Grass, *Meadow Grass*, (Poa Pratensis. 21)—Grows on field, meadows, &c., is very common in cultivation; blossoms May, July; two to three feet high. It belongs to the mowing grasses.

Red Top, (P. Trivialis. 21)—Banks of streams, wet meadows, common; June, July; one to two feet high. A valuable mowing grass.

Blue Grass, *Wire Grass*, (P. Compressa.)—Fields and pastures; June, July; one to two feet high. A pasture grass.

Vernal Spear Grass, (P. Pungens. 21)—Rocky places; May; one to two feet high. A pasture grass.

2.

A few Fescue Grasses, (Festuca.)*

These grasses ripen next after the Spear Grasses. The following kinds are very common, and we can easily obtain a large seed contribution; they ripen mostly at the time of hay-making.

Meadow Fescue Grass, (F. Pratensis. 21)—Common in fields and meadows; June, July; two to three feet high. It is often in grassy places in such abundance that we can easily gather hundreds of pounds of seed; 250,000 grains per pound.

Tall Fescue Grass, (F. Elatior. 21)—Found in moist meadows and pastures; June; three to five feet high. Its produce is double as large as the Meadow Fescue Grass; has more moisture, and is not so abundant. It deserves cultivation in the highest degree, as it is the most productive mowing grass, and surpasses in nutrition and produce of seeds, the clover. 100,000 grains per pound.

THE SMALL FESCUE GRASSES.

The Sheep Fescue Grass, (F. Ovina. 2f)—Grows on all dry meadows and field borders; frequently one foot high; blossoms May and June; 600,000 grains per pound.

Red or Creeping Fescue Grass, (F. Rubra. 2f)—Dry soils; June; one to two feet high; 500,000 grains per pound.

Hard Fescue Grass, (F. Duriuscula. 2f)—Dry pastures; June; has larger ears than the Sheep Fescue, and is more productive than the two former; 500,000 grains per pound.

All these kinds of Fescue have very little, or no chaff, whilst other kinds of grasses have more chaff than seed. They thrive well on summer grain, if the soil is not too poor.

3.

Orchard Grass. (Dactylis Glomerata. 2f)*

Grows on fields and meadows; two to three feet high; is very useful for the density of fodder and pasture mixtures, and for the Green Manuring; blossoms almost all summer; per pound, 400,000 grains.

4.

Timothy Herd's Grass. (Phleum Pratense. 2f)

This well known important fodder grass grows from two to three feet high, and holds the preference for cultivation on meadows and fields; its seeds do not shell out, and are very easily gathered. This plant is cultivated to such an extent, that we can have a supply at all times; is well suited to winter grain, and, on account of forming a density, it is also useful in summer grain; has 800,000 grains per pound.

5.

Common Quaking Grass. (Briza Media. 2f)*

This is also a very excellent pasture plant, and can be abundantly collected on dry meadows. In gathering it for the manure, we must strip the seeds off by single straws. It is an important grass, and should be used generally; blossoms June, and grows one to two feet high; per pound, 700,000 grains.

6.

Red Canary Grass, *Ribbon Grass*. (Phalaris Arundinacea. 2f)

Grows in swamps and along shores; three to six

feet high; thrives well on winter grain, and produces a large herb. In gardens, we have sometimes a grass of this kind, with colored ribbon-like striped leaves, the seeds of which germinate just as well. It is a good mowing grass, and if we keep a bed of it for seed cultivation, we can meet our wants for *Green Manuring*. 500,000 grains per pound.

III.—SELECTION FOR THE BEGINNING.

We find all the above described grasses as natives on pastures, meadows and field borders, in large quantities, and thus they will enable the farmer to commence this system of farming with the greatest ease, for such as we find on the farm, and in the neighborhood, we may be assured that they are suited to the soil, and we can apply them in the beginning. Such as do not grow wild, must be raised on garden beds. The second and third part will treat of the latter.

SECTION L.

Review and application of the most frequently growing plants and grass seeds, in fields and gardens, for the Topseed in general.

A.]—AS TOPSEED MIXTURES IN THE WINTER GRAIN.

Topseed Mixture of the Winter Grain in Middle Soils.

Having laid before the reader the whole store of the most useful plants, as found growing in fields, woods, marshes, lanes, alleys, meadows, &c., we will select but such as grow the most frequently, as we have done already at the end of each vegetable form. Those which grow on every farm, and in the surrounding country, are generally known, being always present to the eye, in gardens, meadows, &c.; they are best suited to middle soils. The heavy soils and very light soils, however, have their particular plants, which mostly succeed in growth, also, on the middle soils.

To this review we will add the number of seed grains of each kind of plants, which they contain per pound. The kind of plants which are used as protection plants in the mixture, we will mark with two **, but those used as middle plants with one *.

The farmers of the middle soils have, therefore, the convenience in the following review, to see the kinds of plants, and the number of seeds per pound, which the collection of seeds contain, for if they have collected several pounds of the different seeds, they

can tell by the review the number they have, as it sets down the number contained in a pound. But as the number of grains, in the collected seed, depends much upon the locality and plants cultivated, we must select the seed so as to form the due proportion of plants, and proper quantity, in order to have five seeds to the seed-inch, or 5,000,000 grains to the acre, or ten pounds of seeds. Hence, by knowing the number of seeds in a pound of each kind, we can form a selection correctly, always having due regard to the proper number of protection and middle plants, and grass seeds.

We will now give two reviews of the topseed plants of the middle soil, the first of which contains a selection of all tested topseed plants of the middle soil; the second contains only *ten* kinds of plants of the same soil, viz: *one* kind of plants out of each of the *ten* vegetable forms of plants as before given.

FIRST REVIEW.

Of the most general Topseed Plants of the Middle Soil.

From the First Vegetable Form.

1 lb. Large kinds of Dock,.....	300,000 **
1 " Small kinds of Dock,	400,000 *

From the Second Vegetable Form.

1 lb. Large Mulleins,.....	800,000 **
1 " Small kinds of Mullein,.....	800,000 *
1 " Common Evening Primrose,.....	1,400,000 **
1 " Dyer's Weed,.....	1,000,000 *

From the Third Vegetable Form.

1 lb. Meadow Rue,	300,000 **
1 " St. John's Wort,.....	800,000 *
1 " Kinds of Clover,.....	400,000 **
1 " Great Burnet, Burnet Saxifrage,	250,000 **
1 " Burnet,	300,000 *
1 " Plantain Leaves,.....	400,000 *
1 " Single Pinks, Corncockle, Sweet Williams,	1,000,000 *

From the Fourth Vegetable Form.

1 lb. Cow Parsnip,.....	150,000 **
1 " Wild or Tame Parsnip,	150,000 **
1 " Wild Chervil,	150,000 *
1 " Carrots,.....	300,000 *

1 lb. Anise,	300,000
1 " Parsley,	200,000

From the Fifth Vegetable Form.

1 lb. Common Catnip,.....	600,000 **
1 " Hoarhound,	600,000 **
1 " Great Snap Dragon,.....	1,000,000 *
1 " Common Figwort,.....	1,000,000 *

From the Sixth Vegetable Form.

1 lb. Rutabaga,.....	150,000 **
1 " Mustard,	2,000,000 *
1 " Hedge Mustard,	4,000,000 *
1 " Rock Alyssum, Madwort,.....	6,000,000
1 " Woad,	50,000 **
1 " Turnips,.....	150,000 *

From the Seventh Vegetable Form.

1 lb. Mallows,	100,000 **
1 " Hollyhocks,	100,000 **
1 " Crane's-bill,	100,000 *

From the Eighth Vegetable Form.

1 lb. White Melilot, Honey Clover,...	200,000 **
1 " Red Clover,	200,000 *
1 " White Clover,	600,000 *

From the Ninth Vegetable Form.

1 lb. Common Burdock,	100,000 **
1 " Field Thistle,.....	80,000 **
1 " Common Dandelion,.....	600,000 *
1 " Wild Lettuce,	600,000 *

From the Tenth Vegetable Form.

1 lb. Common Wormwood,	5,000,000 **
1 " Common Tansy,	1,000,000 *
1 " Common Yarrow,	1,000,000 *
1 " Common Chamomile,.....	100,000 *

OF THE WINTER GRASSES.

A.) Manuring Grasses.

1 lb. Brome Grass,	150,000
1 " Cheat,.....	150,000
1 " Common Darnel,	300,000
1 " Velvet Grass, or White Timothy,	2,000,000
1 " Tufted Hair Grass,.....	2,000,000
1 " Common Hair Grass,.....	2,000,000
1 " Rough Bristle Grass,	600,000

1 lb. Millet Grass,.....	500,000
1 " Melic Grass,.....	500,000
1 " Oats Grass,.....	500,000
1 " Wild Oats Grass,.....	200,000
1 " Agrostis, (Rough Thin Grass),...	4,000,000

B.) Fodder and Pasture Grasses.

1 lb. Tall Fescue Grass,	200,000
1 " Poa Grass,.....	1,000,000
1 " Meadow Fescue Grass,.....	500,000
1 " Orchard Grass,.....	400,000
1 " Timothy Grass,.....	800,000
1 " Quaking Grass,.....	700,000
1 " Bermuda Grass,.....	700,000
1 " Ribbon Grass,	500,000
63 lbs.	55,000,000

We see by this review, that sixty-three pounds of seed, of the most common manuring plants, contain over 55,000,000 grains. Hence, we have a mass of seeds for eleven acres, as we only need five millions for one *acre*, and five pounds and more than a half to the *acre*.

Of this review we select *one* kind of plants, of each vegetable form, which are generally found, and often in abundance, to make a commencement. Having ten kinds of plant seeds, we add a few of the generally known grass seeds, which are not used for fodder or pasture cultivation, but only for the *Green Manuring*. Of the different kinds of plants, the least number used in the mixture should not be less than *ten*, otherwise it will not be dense and powerful enough. When one or more of these kinds of plants grow not on a farm, or in the neighborhood, we can take others of the same review or family in their place, as set forth above. In the following review we will take *one* pound of seeds of each vegetable form, in order to illustrate the number of grains in a mixture.

SECOND REVIEW,

Of ten plants and a few of the Grass Seeds, of the most general Topseed Plants of the Middle Soils.

A.)—Of Plants.

1 lb. Docks,.....	350,000 **
1 " Mullein,.....	800,000 **
1 " St. John's Wort,.....	800,000 *
1 " Wild Parsnip,.....	150,000 **

1 lb. Common Catnip,.....	600,000 *
1 " Rutabaga, or Turnip,.....	200,000 **
1 " Mallows,	100,000 *
1 " White Melilot, (White Clover),...	200,000 **
1 " Dandelion,.....	600,000 *
1 " Common Yarrow,.....	3,000,000 *
	6,800,000

B.)—Of Grasses.

1 lb. Cheat,	150,000
1 " Common Darnel,.....	300,000
1 " Tufted Grass,.....	2,000,000
1 " Agrostis, Rough Thin Grass,.....	4,000,000
14 lbs.	13,250,000

Then, at 5,000,000 of grains per acre, this mixture would be sufficient for two and three-fifths acres; hence it would only take five pounds per acre. It will be better, however, to take a larger amount, so as to insure success. We find it also necessary to take into consideration the shadiness of the mixture; hence it should consist of one-fifth protection plants, two-fifths middle plants, and two-fifths grasses, which we illustrate in the following manner:

A.)—Protection Plants.

1 lb. Docks,	350,000
1 " Mullein,	800,000
1 " Wild Parsnip,.....	150,000
1 " Melilot,	200,000
1 " Rutabaga, (or Turnip,)	200,000
	1,700,000

B.)—Middle Plants.

1 lb. Yarrow,	3,000,000
1 " St. John's Wort,.....	800,000
1 " Catnip,	600,000
1 " Mallows,	100,000
1 " Dandelion,.....	600,000
	5,100,000

Of Grasses in grains or seeds as stated above, 6,450,000

In this experiment we see the number of protection plants is too small, and must be increased to 3,000,000
And middle plants to..... 6,000,000
And the grasses lessened to..... 6,000,000

15,000,000

In this manner we can easily form a Green Manuring mixture very accurately.

SECTION LI.

Topseed Mixture of Heavy Soil in Winter Grain.

For this purpose we select of the former list those kinds of plants which grow best to leaves and roots on heavy soils; and as the procuring of seeds depends on the locality and cultivation, I will specify the number of pounds, and number of seeds to a pound, of the protection and middle plants.

From the First Vegetable Form.

1 lb. Large Dock,	300,000 **
1 " Sour Dock,	400,000 *
1 " Marigold,	20,000 *

Second Vegetable Form.

1 lb. Common Evening Primrose,.....	1,400,000 **
-------------------------------------	--------------

Third Vegetable Form.

1 lb. Meadow Rue,	200,000 **
1 " St. John's Wort,	800,000 *
1 " Great Burnet,	250,000 **

Fourth Vegetable Form.

1 lb. Cow Parsnip,	150,000 **
1 " Common Parsnip,	150,000 *

Fifth Vegetable Form.

1 lb. Catnip,	600,000 **
1 " Hoarhound,	300,000 **

Sixth Vegetable Form.

1 lb. Winter Cress,	2,000,000 **
1 " Hedge Mustard,	4,000,000 *
1 " Woad,	50,000 **

Seventh Vegetable Form.

1 lb. Mallows,	100,000 **
1 " Crane's-bill,	100,000 **

Eighth Vegetable Form.

1 lb. White Melilot,	200,000 **
1 " Yellow Melilot,	150,000 **

Ninth Vegetable Form.

1 lb. Burdock,	100,000 **
1 " Thistle, (Pasture Thistle,).....	100,000 **
1 " Chicory,	300,000 *

Tenth Vegetable Form.

1 lb. Common Mugwort,	5,000,000 **
1 " Winter Sunflower,	100,000 **

From Winter Grasses.

1 lb. Cheat,	100,000
1 " Brome Grass,	200,000
1 " Common Darnel,	300,000
1 " Velvet Grass,	2,000,000
1 " Tufted Hair Grass,	2,000,000
1 " Millet Grass,	200,000
1 " Fescue Grass,	250,000
1 " Timothy Grass,	800,000
1 " Orchard Grass,	400,000
1 " Ribbon Grass,	500,000
33 lbs.	23,520,000

This would be sufficient for $4\frac{3}{4}$ acres, at 5,000,000 grains per acre, about seven pounds for five acres—on an average.

In this review of the most general plants, we have more than twenty kinds, with strong roots, and natives of such soils; they thrive well, form a shade which mellow and moistens the tough clay surface. The kinds of grasses selected have, also, the same effect. If we make use of from ten to twenty of these plants and grasses, which are easily obtained, we can form a dense shady mass, and a powerful mixture, which will manure, enrich and fertilize the soil, and render it as mellow and productive as that of a garden. On this kind of soil it is necessary to have more protection plants, viz: plants with large seeds, marked **, than of middle plants with small seeds; for on heavy clay soils, the fine or small seeds germinate and grow not so well as coarse ones. The coarse seeds bring forth plants with large roots and broad, long leaves, which tend to mellow the soil and render it fruitful, by obtaining larger portions of air matter. The middle or sandy soils, also, require a shady mixture, to prevent their drying out, and enable them to gain a large decomposition of air.

SECTION LII.

Topseed Mixture of Winter Grain on Light Soils.

For light soils, the following list of thriving plants contains nearly a double quantity of plants of the kind with fine seeds. to that of large ones.

From the First Vegetable Form.

1 lb. Garden Dock,.....	300,000 **
1 " Sheep Sorrel,	500,000 *

Second Vegetable Form.

1 lb. Mullein,.....	800,000 **
1 " Evening Primrose,.....	1,400,000 **
1 " Viper's Bugloss, or Blue Weed,	100,000 **
1 " Hound's Tongue,.....	50,000 *
1 " Dyer's Weed,	1,000,000 *

Third Vegetable Form.

1 lb. St. John's Wort,.....	800,000 *
1 " Cleavers,.....	400,000 *
1 " Sheep Burnet,.....	300,000 *
1 " Plantain Leaves,.....	400,000 *
1 " Kind of Pinks, (Corncockle,).....	1,000,000 *

Fourth Vegetable Form.

1 lb. Wild Carrots,.....	300,000 *
1 " Anise,.....	300,000 *
1 " Parsley,	200,000 *

Fifth Vegetable Form.

1 lb. Catnip,	600,000 **
1 " Great Snap Dragon,.....	600,000 *

Sixth Vegetable Form.

1 lb. Turnips,.....	200,000 *
1 " Mustard,.....	2,000,000 **
1 " Hedge Mustard,	4,000,000 *
1 " Sky Rocket,.....	200,000 *
1 " Madwort,	1,000,000 *
1 " Tower Cress,.....	6,000,000 *

Seventh Vegetable Form.

1 lb. Mallows,.....	100,000 **
---------------------	------------

Eighth Vegetable Form.

1 lb. White Melilot,	200,000 **
1 " Hedysarum,.....	25,000 **
1 " White Clover,.....	600,000 *

Ninth Vegetable Form.

1 lb. Cotton Thistle,.....	80,000 **
1 " Dandelion and Lettuce,.....	600,000 *
1 " Hawkweed,	600,000 *

Tenth Vegetable Form.

1 lb. Wormwood,.....	5,000,000 **
1 " Tansy and Yarrow,	1,000,000 *

From the Winter Grasses

1 lb. Field or Brome Grass,.....	150,000
1 " Common Darnel,	300,000
1 " Cheat,	100,000 .
1 " Velvet Grass, or White Timothy,	2,000,000
1 " Hair Grass,.....	4,000,000
1 " Rough Bristly Grass,.....	600,000
1 " Fiorin Grass,	5,000,000
1 " Fescue Grass,	600,000
1 " Red or Creeping Grass,.....	600,000
1 " Orchard Grass,	400,000
42 lbs.	44,405,000

Here we have a mixture for eight and a half acres, at the rate of five pounds per acre. Every farmer's experience shows that, on light soils, the fine or small-grained seeds are better suited, than on heavy soils, where the examination has given per acre, seven pounds.

By this examination we see that light soils bring forth not so great a mass of protection as of native plants, as heavy soils, but they afford a larger plant manuring, by their mass. The heavy soils are more dependent on the mellowing influence of the *Green Manuring*, which enables them to absorb more of the air gases, and consequently of the shadiness and influence of the plant mixture.

The sandy and light soils also require a shady protection of the plant mixture; thus we sow the seed on the winter grain, which enables it to come up earlier, to find more moisture, and to grow larger. The soil will thus absorb more nutriment from the air, and supply a dense mass of herbage, which, when turned down, affords a large supply of those qualities to the soil, necessary to the successful growing of grain. It only remains for us to specify the kinds of plants that especially appropriate themselves to the topseed of summer grain.

SECTION LIII.

Topseed Mixture of the Summer Grain on Middle Soils.

In summer grain we only use such seeds as germinate and come up early and easily, after having

been sowed—for instance, clover. In the summer grain, the soil has less moisture, and the season is more dry than at the time of sowing the winter grain. Thus, there is a difference of from four to eight weeks in the growth and size of the plants on the winter and summer grain. The seed sowed before the falling of snow, comes up early in the spring, and grows fast in roots in the wet season, and when the grain is harvested, it comes to leaves, whereas the one sowed in summer grain does not grow so rapidly, on account of the season; hence, in the summer grain, we must use seeds which are of a rapid growth, and germinate easily. Such plants are as follows:

From the first vegetable form, all kinds of *Docks*, if we apply them according to the soils described; also, the *Marigold* produces considerable herbage, much smaller, however, than in the winter grain. From the second vegetable form, the large and small *Mullein*, *Evening Primrose* and *Dye-weed*, do well on middle soils; also the plants of the third vegetable form, as mentioned in *Section 51*, as the most frequently growing plants. From the fourth vegetable form, *Wild Chervil* and *Carrots* do well on the middle soils, as also the other plants in this form, (§ 51.) All the remaining plants of *Section 51* do well on the summer grain of the middle soils, except the *Yarrow* and *Tansy*, which are unsafe, on account of their very small seeds.

Of the Grasses, the *Velvet Grass*, *Bermuda Grass*, the *Hair Grass*, the *Ribbon Grass* and *Quaking Grass*, are not sure, but thrive only on the winter grain. All the other Grasses of *Section 51*, thrive well in the summer grain of the middle soils.

SECTION LIV.

Topseed Mixtures of the Summer Grain of Heavy Soils.

To this belong all the seeds, without exception, of *Section 52*. The heavier the soil is, however, the more the protection plants are to be increased, and the procedure of the seeding well observed, as in *Section 20*. But for the commencement, it will in all cases be safer, with the winter grain and fallows, so that the plant manuring of the summer grain may have a plant manuring of the soil in the winter grain.

SECTION LV.

Topseed Mixture in the Summer Grain of Light Soils.

Of the plants mentioned in *Section 52*, for the top-

seed of winter grain in light soils, there are only a few used in this mixture. The seeds sure in the mixture are *Sheep Sorrel*, *Dyer's Weed*, *Sheep Burnet*, *Anise*, *Sandwort*, *Snap Dragon*, *Turnips*, *Beets*, *Hedge Mustard*, *Tower Mustard*, *Madwort*, *White Melilot*, *White Clover*, *Hedysarum*, and of the winter grasses, *Cheat*.

It is always best to begin the topseed manuring on light soil, on winter grain; in the summer grain, on fields which have been manured in this manner on the winter grain. It is also a good plan to make a beginning on the summer grain with the pasture grasses, as they produce a larger sod, penetrate the soil, and lay longer as vegetable manure. The topseed of Clover, Timothy, etc., is an old method, and from it much benefit has been realized. Yet it fails to supply the soil with the principles, (in a great measure,) essential to the nourishment required in the growing of grain, as wheat, &c., by which the farmer is repaid for his toil and labor; neither can those principles be supplied, and the soil rendered fertile and productive, otherwise than by the system of Green Manuring, by which the farmer can only successfully promote his best interests, and enrich his soil. In order to illustrate the benefit of the Green Manuring, and adapt it to the use of the farmer, I have divided the subject into three classes. 1. Topseed for winter grain, like clover. 2. On spring grain and fallows. 3. On stubbles. Having described the plant and grass seeds, and shown the required combination as suited to the various soils on which they are designed to be used, in order to form a dense vegetable mass, with less than ten pounds of wild seeds per acre, I now direct the attention of the reader to the manner in which seeds may be obtained, in order to make a beginning. We believe every attentive observer must see, that nature, in her efforts to sustain the soil, lays down a course of procedure worthy of our imitation, and teaches the best lessons on this important subject; hence, we must have recourse to the natural productions for our first collections of plants and grasses for topseed, fodder and pasture cultivation.

SECTION LVI.

Instructions for the beginning of Topseed Manuring.

In collecting seeds, we will find it the most economical plan to resort to the places where the plants

and grasses grow naturally or spontaneously; for with care any farmer can in one season gather, without expense, a sufficient quantity of seeds to make a beginning, and thus he will become acquainted with the plants forming the vegetable manure. In gathering seeds, care must be taken to keep each sort separate. By observing attentively the plants, as they grow in the fields, along fences, roads, alleys, ditches, bogs, meadows, woods and gardens, any person can obtain a sufficient quantity to introduce the system of green manure, on the cheapest plan, simply requiring some time and attention. The farmer may have all his seeds fresh and good, until he possesses experience sufficient to raise them himself; in thus gathering his seeds, a knowledge is obtained of the plants and grasses which are used. It is also important that particular observations be taken of plants and grasses. The farmer should note down in his blank book, all the particular features of every different plant and species of grass he designs to use in his mixture, the time it requires in attaining its growth, the time it blossoms and ripens, and the class of plants it belongs to; so that he may be able to place its use in the proper selection, always remembering that all selections should be made so that they mature at or about the same time; for all green manuring should be ploughed down just before it blossoms, so that the virtue of the plant may be taken up by the soil. He must recollect that such plants as gain the height of from ten to fifteen inches towards the time of ploughing down, form the richest mass. It is an easy matter for any farmer to collect in this way, from his fields, meadows, gardens, lanes, fences, ditches, woods, &c., an ample supply of the various seeds required to make a beginning. Every farmer should attend to this duty personally, as the gathering of the seeds, or the securing and preserving them, *with care*. Taking at the commencement a small field, any farmer can, in one season, by observing, as we have stated before, the growth and character of the plants, so arrange his selections, as to get into a proper and successful method of *Green Manuring*. Inasmuch as the selections for winter grain, stubbles, summer grain and fallows, are all differently mixed, or made up of plants to suit the different crops and soils, every peculiarity of the plants and grasses must be understood, viz: the time and manner of their growth, whether quick or slow,

whether four, six or eight weeks in attaining their growth; the height they reach, whether they immediately run to stem, or only form leaves; the size of the leaf, &c., remarking that plants which shoot early to stem are injurious to winter or summer grain, but useful on fallows. Any farmer wishing to test the system, can do so on a few square rods of ground, treating it on the principle of the fallow and topseed manuring, and thereby learn its beneficial results. He will discern the benefit, and also the kind of plants most invigorating to the soil. If, after the plants have reached the proper size, he turns them under, and sows down wheat, rye, oats, barley, etc., he will clearly see the advantage. By such tests we become acquainted with the plants which grow most luxuriously, and *manure the best*, a qualification essentially necessary. It is not required, however, to exclude from the mixture those plants which do not appear so invigorating; for in the mixtures, in many cases, they neutralize and have a beneficial effect, which tends very much to increase the strength of the mass, and invigorates the soil, rendering it more productive than stable manure. The greater the collection in the mass of Green Manuring, the stronger and more invigorating will be the decomposition. In making the first selections in the summer and fall, less than from ten to twenty kinds of plants and grass seeds should not be taken to each collection.

If we carefully notice and collect our seeds, having become acquainted with the plants and their peculiar qualities, we can commence on the winter grain or on a corn stubble field, and adapting the composition to suit its soil, we must also collect a sufficient quantity of seeds to suit the summer grain in heavy and light soils, and thus we will gain by it one year's observation and practice.

We can also test the utility of the topseed mixture of grass seeds and plant seeds, collected for the clover cultivation, or the mixed fodder cultivation, which will give in the result, a stronger, denser and heavier swarth, than clover alone, by the mixture of suitable plants and grasses for the soil. If we follow the instructions above detailed on a large scale, we will always find the result to be of a double quantity of grain and straw over the present mode of the various manurings of plaster, lime, &c. In seeding clover and pasture mixtures more densely, there will be an enlarged quantity of pasture and

hay; whilst the manure to the soil will be much greater, and the soil remain purer, and cleaner, and more mellow. The promotion of the farmer depends upon the industry and attention given, in paying strict regard to the instructions above, so as to put down all he possibly can of his land in Green Manuring. As, for instance, if he sows the Green Manuring on ten acres, he will double his harvest. It is, therefore, highly important that early and strict attention be given to the collection of seeds, for there is no other method by which a farmer may enrich his soil so effectually, and render it productive, on so economical a plan.

The following truths appear *indisputable*: 1st. The farmer can only promote his interest by the appropriate knowledge, care and local art, in the improved *Green Manuring* of the soil, and arrangement of the *Topseed*. 2d. The method of Green Manuring, as practiced for ages, has been insufficient to sustain and enrich the soil, and consequently nothing less is required than a dense mass, formed by the local and wild plants of his soil and his garden, combining in their principles, the necessary properties and stimulants to sustain and enrich the soil. In order to effect this important improvement, he must become acquainted with the most serviceable plants and grasses, and those which form the most dense and thriving masses. By obtaining a knowledge of the fodder and pasture cultivation, grasses and the plant manuring forms, he can collect, in his own locality, and also procure such as grow in the neighborhood. The description of plants for the *Topseed* has now come to a close. The farmer can see and judge of its good effects, and easily make the experiment on one acre, and proceed until he can, by extending the application, apply the process to his whole farm. The seeds can be collected in the first year in abundance on his own soil, and in the neighborhood. From the illustrations mentioned, the observing farmer may see the decisive advantages which this system of Green Manuring has over every other practiced, until now. 1st. The small expense. 2d. The decrease of labor; and 3d. The certain and efficient means of enriching his soil, and producing abundant crops. By observing carefully the instructions, and following the plan as laid down, we may overcome the pressure of the times, and leave as matter of history, (not of practice,) in ages past, the

many unsuccessful efforts of the farmer to sustain himself, under the old methods that have been in use.

I will, however, illustrate the peculiarity of the plants of the topseed. They are mostly of the enduring kinds, and when once planted, for the cultivation of seeds, they acquire stronger stalks every year. The biennial plants generally seed themselves; for which reason there is but little trouble and no expense necessary in their cultivation, and in procuring seeds for the Green Manuring. The garden or lot appropriated to this purpose, is the best place to raise them. By this course there can always be obtained a sufficient amount of seeds of the various kinds for usage. It will be found that the wild seeds are insufficient to afford a supply, when the system is generally used; thus the cultivation of the perennial plants is necessary, and thus we should begin in time to raise them. They serve also as good bee pasture, and are also in high demand by manufacturers of dye-stuffs, at a high price.

SECTION LVII.

Explanation of Plates representing Plants of the Topseed Manuring on Table I.

The Plants represented on this Plate all belong to the topseed, and the design of its composition is to give the farmer a representation of the topseed manure, as the improved Green Manuring must consist in a mixture of many different plants. However, these three plates cannot give a full representation of the *plant mass* in the topseed manure, as they are ploughed down before they blossom—most of them having grown only to the height of nine to twelve inches, and standing so closely pressed that we can hardly distinguish one from another. Thus, Plate I only represents a mixture of such plants as are most frequently met with, and tested by experience to be the most serviceable, in general, for topseed manuring. I will therefore try to represent some in blossom, and some in seed, or the ripened state.

It would, however, be impossible (in this book,) to represent all the plants which might be of service in Green Manuring, because there is such a quantity and variety of wild plants, differing on almost every farm. For this reason, I have selected and arranged them in such a manner that we can easily know them to be of service, as described in the ten vegetable forms mentioned. On this depends the simi-

larity of the blossoms, the seeds, the leaves, and the whole formation of the plant. If we represent, for instance, the condition of the blossoms and seeds of an umbelliferous plant, a shell or hull plant, etc., the reader will know the nature or condition of the blossoms and seeds of all the species of this family, and therefore, compare those he can find in his own region, with the mentioned description of their use and adaptation.

In the upper row, on Plate I, I have placed the grasses most generally met with, and most serviceable for topseed manuring; I have, moreover, interpolated a representation of the principal topseed plants. In this way we have been enabled to represent more than fifty plants on each plate.

If we had represented each plant singly, it would not have been as convenient in overseeing a selection, to form a mixture of ten to twenty kinds of plants and grasses for topseed, fallows, stubble, pasture and fodder cultivation.

EXPLANATION OF PLATE I.

First Vegetable Form of the Topseed.

First we represent a branch with seeds and a leaf, at the left hand of the middle row, the natural size of the *Curled Dock*, (*Rumex Crispus*, L. 21) Thus the reader can have an idea of the whole seed bunch of this plant. Below this, on Plate II, in the left corner, is the top of the seed bunches of the *Garden Dock*, (*Rumex Patientia*, L. 21) which often grows from two to three feet high, and forms an excellent herbage in stubble and fallow mixtures. The farmer can easily know the rest of the large and small kinds of Dock, and where to find them, for collecting the seeds.

Second Vegetable Form of the Topseed.

Next to the Dock, we represent the *Common Mullein*, (*Verbascum Thapsus*, L. 8) These may easily be recognized by the former description, as well as the rest of the Mulleins. Then follows the *Common Evening Primrose*, (*Oenothera Biennis*, L. 8) so rich in the production of leaves and seeds, as well as the rest of this order of plants, which are easily known, and only garden plants. Between the Evening Primrose and the Mullein we have placed the representation of the *Common Dyer's Weed*, (*Reseda Luteola*, L. 8) the *Bellflower*, (*Campanula Ranun-*

culus, L. 8) and the *Long-leaved Speedwell*, (*Veronica Longifolia*, L. 21) so that by them the other families rich in seed may easily be known.

Third Vegetable Form of the Topseed.

Next to the Evening Primrose, stands the *Meadow Rue*, (*Thalictrum Minus*, L. 21) This family is one of the most important for topseed manuring, and is easily known. Below it is represented the blossom of the *Common St. John's Wort*, (*Hypericum Perforatum*, L. 21) with its ripe capsules; by this the rest of the *St. John's Wort* family are easily known. With the "head flowers," the *Great Burnet*, (*Sanguisorba Officinalis*, L. 21) every farmer is so well acquainted that they are not represented; but the *Sheep Burnet*, (*Poterium Sanguisorba*, L. 21) is represented below, in Plate III. It is an excellent pasture plant. The Plantain leaves are too well known to each farmer to need further illustration; but the *Lance-leaved Plantain*, (*Plantago Lanceolata*, L. 21) represented below, on Plate II, is also a good pasture plant. Of the "Pink Plants," the following are represented in the second row on Plate II, while they are excellent plants for the density of the fallow and stubble mixtures, for instance, of the Soap Plants. The *Common Soap Plant*, (*Saponaria Officinalis*, L. 21) is omitted, as it is so well known; but the *Gypsum Plant*, (*Gypsophilla Paniculata*, L. 21) is represented, on account of its rich leaves and seeds. The rest of the family are also well known by this. Of the *Corncockle*, we represent some of the most common kinds, namely, those blooming in the morning and evening, (*Lynchis Vespertina* and *Diurna*. 21) *Pinks* are too well known in gardens, and by them also the Wild Pinks. Of the *Catchflies*, the most common are represented, namely, the *Silena Inflata* and *Silena Nutans*, (L. 21) Of the *Sandworts*, the *Arenaria Verna*, (L. 21) and a few more, are represented on Plate II. Flax, the *Common Flax*, (*Linum Perenne*, L. 21) and the *Yellow Flax*, (*Linum Flavum*, L. 21) are represented in the second row on Plate II, because they thrive well in fallow mixtures.

Fourth Vegetable Form of the Topseed.

Next to the Meadow Rue and St. John's Wort, we represent a branch, with blossom and seed, of the *Common Cow Parsnip*, (*Heracleum Sphondylium*, L. 8) as being one of the most important ingredients, as

well in the topseed, as in the fallow and stubble mixtures. Under the same is the umbelliferous seed of the *Wild Chervil*, (*Cherophyllum Sylvestre*, L. 3) and on the other side is the umbelliferous blossom of *Anise*, (*Pimpinella Saxifrage*, L. 21) The *Common Parsnip*, (*Pastinaca Sativa*, L. 3) is omitted, as it is well known, and besides, the umbelliferous plants are so numerous, that we can trace the whole family by these three representations. On Plate II, there are also a few winter umbelliferous plants represented, which are very important for the fallow manuring, as, for instance, the *Thorough Wax*, (*Bublerum Falcetum*, 24) and a few others.

Fifth Vegetable Form of the Topseed.

Next to the Cow Parsnip, the *Common Catnip*, (*Nepeta Cataria*, L. 21) is represented alone, because, of all the Catnip family, it is the most important in the topseed, fallows and stubbles. However, the rest of the Catnip family render good service, but are not to be considered of as much importance as the *Common Catnip*.

Sixth Vegetable Form of the Topseed.

Of the Winter Cabbage, a representation is unnecessary; it is well known in fields and gardens; the *Ruta Baga* and *Turnips* are sufficient. The *Mustards*, (*Erysimum Repandum* and *Erysimum Cheirantoides*, L. 3 6) stand first under the Cow Parsnip. The representation of the *Winter Cress*, (*Barbarea Vulgaris*, 21) stands to the right under the Catnip; the smooth *Tower Mustard*, (*Turritis Glabra*, L. 3) between both of the large Melilotus.

Seventh Vegetable Form of the Topseed.

On Plate I. you will see the *Low Mallow*, (*Malva Rotundifolia*, 3) represented with blossoms and seeds. The wild high or *Fodder Mallow*, (*Malva Sylvestris*, L. 3) is very frequently met with, and easily known. Next to the Low Mallow, the *Meadow Crane's-bill*, (*Geranium Pratense*, L. 21) is represented with blossoms and seeds.

Eighth Vegetable Form of the Topseed.

Of this form, the two highly useful kinds of Melilotus are represented at the right hand of the second row, namely, the *White Melilotus*, and the *Yellow Melilotus*.

Ninth Vegetable Form of the Topseed.

On the left part of the lower row, the large *Fuller's Teasel*, (*Dipsacus Fullonum*, L. 3) the wild *Cotton Thistle*, (*Onopordon Acanthium*, L. 3) the *Carlina Thistle*, (*Carlina Vulgaris*, L. 3 24) and the *Throatwort*, (*Serratula Tinctoria*, L. 21) are represented, because these plants produce a large herbage in the summer and winter grain.

Of the featherseed plants, the different kinds of Dandelion grow so frequently, and are so well known, as they resemble each other greatly, that a representation of a blossom and a leaf, below at the right hand, on Plate I, will suffice simply to remind us, in collecting the seeds. Of the different kinds of *Wild Lettuce*, there are several represented below, on Plate II. Of the biennial, (*Crepis Bienus*, 3) there is a blossom represented below, on Plate I, because it is a very important plant in the mixture of summer and winter grain; it resembles the *Hawkweeds*, (*Hieracium*), the seeds of which should, by all means, be procured by garden cultivation, where they do not grow wild.

Tenth Vegetable Form of the Topseed.

The *Common Mugwort*, and common *Wormwood*, generally the *Field Mugwort*, (*Artemisia Campetris*, L. 21) are represented below, on Plate I. It is for the topseed on soil, of the utmost importance, but often overlooked, the common Mugwort being so large under the common Evening Primrose. A bunch of *Tansy*, (*Tanacetum Vulgare*, L. 21) is represented, because it is also very useful. Of the Chamomiles, there is a blossom of the *Garden Chamomile*, (*Anthemis Nobilis*, L. 21) represented, as it forms a good herbage in the mixture of the topseed. The common Yarrow is too well known. The *Showy Aster*, (*Chrysanthemum Macrophyllum* and *Corymbosum*), resembles the *Motherwort*, (*Matricaria Parthenium*, L. 21) and like it, is good for Green Manuring. Of the Sunflower-like plants, I have only represented the *Smooth Sunflower*, (*Helianthus Laevis*, L. 21) on Plate I. These are very important, and being mostly garden plants, their seeds are easily obtained.

SECTION LVIII.

E.] *Description of the kinds of Plants of the Fallow Manuring, or Summer Seeds.*

The plants suitable for Fallow Manuring must be

of a rapid growth, since they have to grow in a few, say from four to eight weeks, to cover a field with their herbage. Most of this selection are annual, or summer plants, as they live only one year, and therefore shoot up in stems in a few weeks to blossom, but there are also many of the biennial plants in the selection, and some of the perennial; also, quick growing plants, which I shall mention at the end of each vegetable form. Further, it is a peculiar property of the annual plants, serviceable in Green Manuring, that many of them are the so-called weeds of cultivated grounds. These are plants of warmer climates, and can mature good seed in our regions in gardens. They are cultivated as ornamental plants, on account of their flowers, &c. Thus we are supplied by the garden with a number of our fallow seeds.

Those readers who only give this book a hasty perusal, may (owing to the great number of plants brought forth,) consider our selection too large, as described, but if they will observe that this selection embraces every variety of climate, and as each farmer has to select from the productions of his own climate and locality, hence the mixture is purely local, and as plants do not all grow in the locality, or in the same climate, we must, in order to follow the guide of nature, adapt our selections to meet its requirements, as suited to all countries, sections and locations, whether North, South, East or West.

SECTION LXIX.

FIRST VEGETABLE FORM OF THE FALLOW MANURING.

Goosefoot Plants. (Chenopodum.)◎**

The manuring effects of this family of plants are excellent. They have also a large number of seeds, which germinate rapidly; in six to eight weeks they grow a foot high, on the fallows.

Lamb's Quarter, (C. Album.◎)—Every farmer knows this plant; it is always met with in gardens, potato fields, and grows from three to five feet high; blossoms in August. No plant grows faster; some fields and gardens are profusely covered with it, and although we are vexed with this apparent intruder, without taking the hint this valuable plant gives, it usefully serves in manuring our fallows, as it has 1,500,000 grains per pound.

Green Goosefoot, (Ch. Viride.◎)**—Has leaves of a deep green color, and dusted on the upper side;

reddish stem corners, and is otherwise quite like the former.

Fig-Leafed Goosefoot, (Ch. Ficifolium.)◎**—Surpasses the Lamb's Quarter, in growing quicker, and in the quantity of seeds; it has the same number of seeds in a pound.

Red Goosefoot, (Ch. Rubrum.◎)*—Grows two to three feet high. In the beginning, the stems and blossoms are green, but short—the whole plant turns red; it grows on poor places, in fields, and has 3,000,000 grains per pound.

Glaucous Goosefoot, (Ch. Glaucum.◎)—Grows on roads, dung-hills and waste places; from one to two feet high.

Maple-Leafed Goosefoot, (Ch. Hybridum.◎)—Common in waste places; blossoms July, August; two to three feet high; has large shining green leaves, which resemble the leaves of Jamestown weed, with reddish green stems.

Triangular-Leafed Goosefoot, (Ch. Arbricum.◎)—Grows often in field corners and waste places; one to two feet high; flowers green and very numerous; the leaves are clammy; July, August.

Sweet Pigweed, or Mexican Tea, (Ch. Ambrosioides.◎)—Roadsides, (common,) August, September; two feet high.

2.

Strawberry Blite. (Blitum.)

This family resembles the leaves of the spinage, the seeds are numerous and very small-grained, and must be washed out of the berries. It must also be sowed on the top of the rolled ground, and for this reason is best suited on sandy or mellow barley soils. It grows in six or eight weeks, four inches high, of an herbage on fallows.

Strawberry Blite, (B. Capitatum. ◎)—Grows two feet high; June; has fruit of the size of a cherry; the leaves are used as greens.

Slender Strawberry Blite, (B. Virgatum. ◎)—Found in fields and waste places; June; two feet; in one pound, 6,000,000 grains.

3.

Spinage. (Spinacia.)

There are two kinds of this plant which are similar in their habits. If we sow them in the stubbles, they do not shoot up, but in the spring grain or on fallows, they grow up, produce a good herbage, and

are good manuring plants; grow from one to two feet high, and bear a great number of seeds; are also good pasture and early fodder plants. They are of the first growing in spring.

The Smooth Spinage, (S. Glabra ☉)

The Prickly Spinage, (S. Spinasa ☉)—Has per lb. 80,000 grains.

4.

Ragweed, (Ambrosia.)

Great Ragweed, (A. Trifida. ☉)—Low, moist grounds and banks of streams; very common; August; six to twelve feet high.

Common Ragweed, (A. Artemisiæfolia, ☉)—Common in fields.

5.

Common Hemp, (Canabus Sativus. ☉)—Waste land thrown out of cultivation; June; 40,000 grains per lb.

6.

Nettle. (Urtica.)

The following *Nettles* do well in the fallows, as they produce rapidly a strong herbage.

Small stinging Nettle, (U. Urens. ☉)—When cultivated, grows in July, to ten or fifteen inches high.

Canadian Nettle, (U. Canadensis. 21)—Found on moist, shady grounds, and along streams; August; three to six feet high.

The Hemp Nettle, (U. Cannabina. 21)—July, August; three to six feet.

7.

Amaranth. (Amaranthus. ☉.)

This family renders the most important services in the fallows; manures well, and produces an immense quantity of seeds.

We have the wild or small *Amaranth*, and the large or garden *Amaranth*, with splendid flowers, and a great quantity of seeds. Since on one square rod we can raise from twelve to fifteen lbs., they must be sowed early in the garden, or they will not have time to ripen. They are well suited to fallow green manuring, as they grow up quickly, and in six or eight weeks to a foot high, in the mixture, and have in a pound 1,000,000 grains.

A.]—*The Small Amaranth*.

Low Amaranth, (A. Blitum. ☉)—In gardens and waste grounds; July, Sept.; two feet high.

The Green Amaranth, (A. Virides. ☉)—Gardens and waste grounds; July, Sept.; two to three feet high.

The White Coxcomb, (A. Albus. ☉)—Open waste places and roadsides; very common; August; one to three feet high.

B.]—*The large Garden Amaranth*.

Prince's Feather, (A. Hypochondriacus. ☉)—Around gardens; July, September; five to six feet high.

Hairy Amaranth, (A. Retroflexus. ☉)—Two to three feet high.

SELECTION FOR THE BEGINNING.

The *Goosefoot*, the *Spinage*, the *Hemp*, and the variety of *Amaranths* and the *Docks*, are all of a rapid growth, and enable us to make a topseed to commence with, and are well suited to the fallows.

SECTION LX.

SECOND VEGETABLE FORM OF THE FALLOW MANURING.

The Summer Narcotic Plants.

They are annual plants, but as the following four families render important services in the green manuring, I have given them the preference, viz: *Jamestown Weed*, *Henbane*, *Ground Cherry*, and *Nightshade*. Any person trying these plants on a garden bed, will convince himself of their strong manuring properties, their rapid growth, and that they will richly reward their cultivation in a garden.

1.

The kinds of Jamestown Weed. (Datura.) * *

This plant is valuable in the fallows; its growth is rapid, and its leaves shady; it is one of the best protection plants in fallow mixtures, and possesses strong manuring properties.

The Common White Jamestown Weed, (Datura Stramonium. ☉)—Found in waste grounds; blossoms July to September; two to three feet high.

The Bluish Jamestown Weed, (D. Fatula. ☉)—September; two to three feet high.

Red Jamestown Weed, (D. Fastuosa. ☉)—June, September; three to six feet high; has, on an average, 50,000 grains per lb.

2.

The Black Henbane, (Hyoscyamus Niger. ☉)—A tall, fetid weed, growing about waste places; July;

one to two feet high; flowers large; dull yellow, with dark, purple veins.

The White Henbane, (H. Albus. ☉)—June, July; one foot high; 800,000 grains lb.

3.

Ground Cherry, (Physalis Pubescens. ☉)—Grows fast on fallows, and makes a fine herbage; blossoms June, July, and grows three to four feet high.

Philadelphia Ground Cherry, (P. Philadelphica. ☉)—Dry river banks; July; two to three feet high; 300,000 grains per lb.

Nightshade, (Solanum Nigrum. ☉)—Waste places, mostly indented on the margin as if gnawed by insects; flowers very small and white, with yellow antlers, berries black. It manures excellently, and comes up rapidly; the best way to save the seed, is to dry the berries in the sun, and at the time of sowing rub them out.

Tomatoes, (Solanum Lycopersicum. ☉)—This well-known plant makes a strong herbage, and manures in fallows. The seed has to be washed out and dried for using. Both have per lb., 500,000 grains.

SELECTION FOR THE BEGINNING.

Jamestown Weed, *Nightshade* and *Tomatoes* can be found in abundance, and the rest procured from the garden.

SECTION LXI.

THIRD VEGETABLE FORM OF THE FALLOW MANURING.

The Barn Seeds.

By these seeds, we mean the annual field plants in the grain, and the seeds of the annual in meadows, which are gathered with the grain and hay. We do not count, however, all the following as barn seeds, but have added some others suited to this vegetable form.

1.

Buckwheat and the larger Knotweeds.** (Polygamum.)

The Buckwheat, (Fagopyrum. L. ☉)—Has been used long since for green manuring of sandy soils, but when sowed alone, being large grained, it stands too thin in order to nourish and shade the soil. It is more profitable for marketing or family use; but it grows fast in the fallow mixtures of sandy soils; makes a good protection plant, and is always useful as a part of the mixture. It has, per lb., 15,000 grains.

A.]—On dry sandy Soils.

Black Bind Weed, (P. Convolvulus, L. ☉)—On cultivated and waste grounds, very common; July, September; two to six feet high; per pound 20,000 grains.

Pale Knotweed, (P. Lapathifolium. ☉)—Found in swamps and ditches; August; two to four feet high.

Water Pepper or Smartweed, (P. Hydropiper. ☉)—Found in low grounds, lanes and barn yards; an intensely acrid plant, ten to twenty inches high; per lb., 50,000 grains.

Ladies' Thumb or Spotted Knotweed, (P. Persicaria. ☉)—Found in waste and damp places; common; July, August; grows from twelve to eighteen inches high; 50,000 grains per lb.

Virginian Persicaria, (P. Virginianum. ☉)—Thickets, in rich soil; (common,) August; two to four feet high; per lb., 20,000 grains.

Pennsylvania Knotgrass, (P. Pennsylvanicum. ☉)—Margin of ponds and ditches; July, October; two to three feet high.

The large Knotweed, (P. Orientale, L. ☉)—Forms in the fallowing mixture, a large, quickly-growing herbage; five to eight feet; 20,000 grains.

2.

Corn Spurry, (Spergula Arvensis. ☉*)—Grain fields and sandy soils; June, August; eight to twelve inches high. It is known on all sandy and middle soils, and is important in forming the density of the mixture of these soils. The Corn Spurry makes also a nutritive milk pasture for cows, and like the most of sand plants, contains much salt; 500,000 grains per lb.

3.

Flax. (Linum. ☉*)

Flaxseed is easily obtained, and is important in the fallow mixture. It is an excellent manuring and middle plant.

Common Flax, (L. Usitatissimum. ☉)—Cultivated.

Wild Flax, (L. Virginianum. ☉)—Woods and fields; one to two feet high; 100,000 grains per lb.

4.

Poppy. (Papaver.) *

The Poppies are very important for green manuring. They make a good middle plant in the fallow

mixture, produce a large quantity of seeds, and should be cultivated in the garden.

Field or Corn Poppy, (P. Dubium. ☉)—One to two feet high; June, July.

Common Poppy, (P. Somniferum. ☉)—One to two feet high.

Common Red Poppy, (P. Rhas. ☉)—Cultivated in gardens, and average 1,500,000 grains per lb.

Horn Poppy, (Argemone Mexicana. ☉)—Banks of streams; June to July; one to three feet high; 600,000 grains per lb.

Pheasant's Eye, (Adonis Autumnalis. ☉)—June, July; one foot high.

5.

Fennel-Flower. Larkspur. (Nigella Delphinium. ☉)
Caraway. (Carum Carvi. ☉)

Fennel Flower, (Nigella Damascena. ☉)—A hardy annual garden plant; June to August.

Nutmeg Flower, (N. Sativa. ☉)—Also a garden plant; June, July; two feet high.

Caraway, (Carum Carvi. ☉)—One to two feet high; cultivated for its fine aromatic seed.

Common Larkspur, (Delphinium Consolida. ☉)—one foot high; June and July.

Garden Larkspur, (D. Ajacis. ☉)—June, July; one foot high; average per pound, 200,000 grains.

6.

Cockle, Fieldpinks, Catchflies, Chickweed, and Sandworts. These are field plants, which resemble the pinks, and down to the sandwort they have finer and cheaper seed; grow on light soils, and contribute well to the density of the fallow-mixture. The early ones, viz: those which blossom in May and June, do not shoot up as well in the heat of summer, as in the fall. They are, therefore, better adapted to the stubble mixture. They manure well.

A.]—*Cockle*.

The Common Cockle, (Lyopnis Githago. ☉)—Bears blue flowers and black seeds; three feet high; per pound, 100,000 grains.

The Mullen Pink, (A Coronaria. ☉)—The seeds are brown, and much smaller than the former; per pound, 500,000 grains.

B.]—*Field Pinks*.

Fly-trap or Cow Herb, (Saponaria Vaccaria. ☉)—

Is a good plant for feeding cows; grows on sandy fields; two and a half feet high; July, August; 200,000 grains per pound.

Common Soapwort, (S. officinalis. ☉)—Naturally in waste places; July, September; a stout plant; one to two feet high.

C.]—*Catchflies*.

Sweet William Catchfly, (Silene America. ☉)—A popular garden flower; one to two feet high; July, September.

Nocturnal Catchfly, (Silene Nocturna. ☉)—June, July; one to two feet high.

Night-blooming Catchfly, (S. Noctiflora. ☉)—Cultivated grounds; July; one to three feet high; has per pound, 2,000,000 grains.

D.]—*Chickweed*.

Common Chickweed, (Stellaria Media. ☉)—Roadsides, fields, and around dwellings; March, November; one to two feet high.

Northern Stichwort, (St. Borealis. ☉)—Shady swamps; July till August; ten to fifteen inches long; 1,000,000 grains per pound.

E.]—*Sandwort*.

Thyme-Leaved Sandwort, (Avenaria Serpyllifolia. ☉)—Sandy fields; May to August; four to eight inches high.

The Red Sandwort, (A. Rubra. ☉)—Sandy soils; May, September; five to twelve inches high; 5,000,000 grains per pound.

7.

Corn Salad, Gentian, Pimpernel, Bellflowers, Violets, Speedwell.

These small early field plants often grow in large quantities; their seeds are very small, and do not shoot up freely in the heat of summer; hence they do better in the stubble mixtures, as they will germinate better towards fall.

A.]—*Corn Salad*, (Fedia.*)

Is often found in fields, and is used in the spring as salad. Sheep are very fond of this early plant, and for this reason, it is called Lamb Lettuce. It is good for sheep pasture.

Lamb Lettuce, (Fedia Olitoria. ☉)—Fields; June; five to ten inches high.

The Toothed Corn Salad, (F. Dentata. ☉)—Resembles the former in height.

B.]—*Gentian*.

Five-flowered Gentian, (*Gentiana Quinquiflora*.☉)—Hill-sides and pastures; Aug., Sept.; one foot high.

Fringed Gentian, (*G. Grinita*.☉)—Low grounds and hillsides; September to October; six to twelve inches high; 6,000,000 grains.

C.]—*Pimpernel*.

Common Pimpernel, (*Anagallis arvensis*.☉)—Waste sandy fields; June to August; six to twenty inches high.

The Blue Pimpernel, (*A. Coerulea*.☉)—In fields; May, August.

The broad-leaved Pimpernel, (*A. Latifolia*.☉)—Fields; May to August; grains per pound, 1,000,000.

D.]—*Bell-flowers*.

Clasping Bellflower, (*Specularia Perfoliata*.☉)—Common dry hills and open fields; May to August; nine to twelve inches high.

Venus Looking-glass, (*S. Speculum*.☉)—In fields; August; six to twelve inches high.

E.]—*Violets*.

Pansy Heartsease, (*Viola tricolor*.☉)—Gardens; different sizes.

Downy Yellow Violets, (*Viola Pubescens*.☉)—Common in rich woods; May; six to twelve inches high.

Striped Violets, (*Viola Striata*.☉)—Common in wet grounds; May; six to twelve inches high; per pound, 1,000,000 grains.

F.]—*Speedwell*.

Spiked Garden Speedwell, (*Veronica Spicata*.☉)—In gardens; May till July; six to twelve inches high.

Common Speedwell, (*V. Officinalis*.☉)—Dry hills and woods; May to July; six to twelve inches high.

8.

Field Plantains. Devil's-bit. Summer Cleavers.

A.]—*Plantain*.

Dwarf Plantain, (*Plantago Pusilla*.☉)—Dry bare soil; April to August; three to four inches high.

The stunning Plantain, (*Ps. Psyllium*.☉)—Sandy fields; July, August; one to two feet high.

B.]—*Devil's-bit*.

Devil's-bit, (*Scabiosa succisa*.☉)—Cultivated in gardens; one foot high.

Morning Bride, (*S. Atropurpurea*.☉)—September; two to three feet high.

C.]—*Cleavers*.

Cleavers, Goose-grass, (*Galium Aparine*.☉)—Moist thickets; June; two to six feet high.

Yellow Cleavers, (*G. Infestum*.☉)—Fields; June, July; two to three feet high.

SELECTION FOR THE BEGINNING.

Buckwheat, Corn Spurry, Poppies, and the rest of the *Barn seeds*, will yield anywhere, a sufficient quantity for the beginning.

SECTION LXII.

FOURTH VEGETABLE FORM OF THE FALLOW MANURING.

The Summer Umbelliferous Plants.

One or the other of the following annual umbelliferous plants, we find partly in fields and partly in gardens, in abundance. They thrive well in the fallows, and those that blossom in May and June, are also good in the stubble.

I.—*The Chervil*.

Common Shepherd's Needle, (*Scandix Cerefolium*.☉)—Gardens and fields; one to two feet high; May; blossoms white; 150,000 grains per pound.

Great Chervil, (*Scandix Anthriscus*.☉)—Along hedges; two feet high; blossoms white; May; 200,000 grains per pound.

Upright Hedge Parsley, (*Torillis Anthriscus*.☉)—Fields and hedges; June, July; three to four feet high; yellow roots; bristly seeds, which adhere to cloth; number of seeds per pound, 200,000 grains.

Knotted Hedge Parsley, (*Torillis Nodosa*.☉)—Found in fields; August to September; two to three feet high; bristly seeds; per pound, 200,000 grains.

Shepherd's Needle, (*Scandix infesta*.☉)—Grows in fields; July, August; blossoms white; two to three feet high; 200,000 grains per pound.

Garden Hemlock, (*Aethusa Cynapium*.☉)—Resembles the Parsley; grows in hedges, and blossoms all summer; two to four feet high; 200,000 grains per pound.

2.

*Bur Parsley. (Caucalis.)**

The seeds of these umbelliferous plants, have hook-like bristles, that adhere to cloth. They are often

found growing wild, and therefore, can be gathered in large quantities. They spring up soon in the fallow, and are also very good in the stubble mixture.

Carrot-like Burr Parsley, (*Caucalis dancoides*. ☉)—In grainfields; blooms all summer; bears large seeds; number of seeds per pound, 50,000.

Prickled Burr Parsley, (*C. Latifolia*. ☉)—In grainfields; blossoms through the summer; 10,000 seeds per pound.

Slender Leaved Burr Parsley, (*C. Leptophylla*. ☉)—In grainfields and waste places; June; 200,000 grains per pound.

Large Burr Parsley, (*C. Grandiflora*. ☉)—Fields; one to two feet high; July to August; 50,000 grains per pound.

3.

Hartwort. (*Tordylium*.)

The following are very useful in the *fallow mixture*. They deserve cultivation in gardens, because they yield a great number of seeds. The seed resembles that of the Parsnip.

Great Hartwort, (*Tordylium Maximum*. ☉)—A bristly herb; grows in hedges; three to five feet high; June, July; 100,000 grains per pound.

Official Hartwort, (*Tordylium Officinalis*. ☉)—Often in gardens; two to three feet high; August; 200,000 grains per pound.

4.

Summer Spice Umbelliferous.

Dill or Sackel, (*Anethum Graveolens*. ☉)—Gardens; two to three feet high; June, July; 500,000 grains per pound.

Coriander, (*Coriandrum Sativum*. ☉)—In gardens; June; one to two feet high; 100,000 grains per pound.

Anise, (*Pimpinella Anisum*. ☉)—Gardens; 80,000 seeds per pound.

Fennel, (*Anethum Vulgare*. ☉)—Gardens; three to four feet high; 70,000 grains per pound.

5.

Modesty Thorough Wax, (*Bupleurum Rotundifolium*. ☉)—In cultivated grounds; July, August; ten to fifteen inches high; 20,000 grains per pound.

SELECTION FOR THE BEGINNING.

Chervil, *Dill* or *Sockel*, *Fennel*, and the *Cauculis* are

often found in abundance for the beginning, as also the *Parsnip* and *Cow Parsnip*.

SECTION LXIII.

FIFTH VEGETABLE FORM OF THE FALLOW MANURING.

The Summer Labial Flowers.

Among the wild growing plants of this vegetable form, the *Toad Flaxes* only are very frequently found. The others abound in some places, and yield vast numbers of seeds. The *Elsholzia* I would recommend strongly, as being most excellent for the *Fallows*.

1.

The Elsholzia Cristata. ☉

Is a pleasant garden weed; flowers, pale blue; blooms from July till August; two to three feet high. This plant is preferred to all the other kinds which have open seed-pods. It is the same to the *fallows* that the Catnips are to the topseed manuring for the quickness of growth; yields a great quantity of seed; has 1,800,000 grains per pound.

2.

Dragon's Head. (*Dracocephalum*.)

Small-Flowered Dragon's Head, (*Drac. Parviflorum*. ☉)—Rocky places and gravelly shores along the Susquehanna; May till August; one to two feet high; 1,000,000 grains per pound.

The Thyme-Flowered Dragon's Head, (*D. Thymiflorum*. ☉)—One to two feet high, but has more seeds than the former; is useful in the stubbles because it lives through the winter; 1,500,000 grains per pound.

These plants are of speedy growth, and yield a great number of seeds.

3.

Summer Hedge Nettle. (*Stachys*.)

Grows on dry grounds; has a great quantity of seeds, and forms a small herbage; 1,500,000 grains per pound.

The Field Hedge Nettle, (*St. Arvensis*. ☉)—July, August; one foot high.

The Annual Hedge Nettle, (*St. Annua*. ☉)—July, August; one foot high.

4.

The Annual Germander, *Summer Savory*, *Field Thyme*.*

These are small aromatic herbs, very frequently

found in fields, on dry pastures, and in gardens. They yield good germinating seeds, and form good under plants in the mixture for fallows.

The Bunch Germander, (*Taucrium Batrys.* ☉)—On dry hills and fields; June and July; one foot high, with reddish blossoms; sticky or hard stalks and leaves.

Summer Savory, (*Satureja Hortensis.* ☉)—Cultivated as a culinary aromatic; one to one and a half feet high; July, August; 2,000,000 grains per pound.

Field Thyme, (*Thymus Acinos.* ☉)—On sandy hills; July to August; six inches high; 200,000 grains per pound.

5.

The Common Hemp Nettles, and the Common Dead Nettles.

These grow almost everywhere in fields in the summer grain and on waste places. The Hemp Nettle is best suited to the fallows, and the Dead Nettle to the Stubbles, because they bloom early. The seeds germinate well.

The Hemp Nettle, (*Galeopsis Tetrahit.* ☉)—Common in waste places; July; one to two feet high; numerous red and purple flowers.

The Dead Nettle, or *Henbit*, (*Lamium Amplexicaule.* ☉)—Waste and cultivated grounds; May to November; one foot high; average per pound, 800,000 grains.

6.

The Toad Flaxes. (*Linaria.*)

These rank next in importance to the *Elsholzia*, for the reason that they serve as middle plants to fill up the mixture, and yield many small-grained and quickly germinating seeds. They average, per pound, 1,000,000 grains.

Common Toad Flax, (*L. Vulgaris.* ☉)—Roadsides and waste places; June to October; one to two feet high; blossoms yellow.

Sharp Pointed Toad Flax, (*L. Elatine.* ☉)—Fields and banks; July, August; one to two feet high; flowers yellow, purplish.

Wild Toad Flax, (*L. Canadensis.* ☉)—Low grounds; bears numerous large, pale, yellow flowers; May to August; one foot high.

7.

Cow Wheat. (*Melanpyrum.*)

The seed resembles that of wheat, and when used

as cow pasture, gives good milk and butter; 50,000 grains per pound.

Cow Wheat, (*M. Pratense.* ☉)—Common in dry woods; June and July; eight to twelve inches high, with slender yellowish flowers.

Field Cow Wheat, (*M. Arvense.* ☉)—Fields; blossoms yellow and red; the seeds make flour bitter; June, August; one to two feet high.

The Meadow Cow Wheat, (*M. Vulgatum.* ☉)—May to August; yellow and white flowers.

SELECTION FOR THE BEGINNING.

It would be important to procure the *Elsholzia* from a *Seed Merchant*. The *Toad Flaxes* mostly grow wild, and likewise some of the other mentioned plants; the *Catnips* also thrive quickly in fallows.

SECTION LXIV.

SIXTH VEGETABLE FORM OF THE FALLOW MANURING.

The Summer Shell Plants.

Here we have a family of plants which are of rapid growth, and prolific in seeds; when ripe they are full of seed shells. It is known that among the long shell plants, the Rape or Cole bears the greatest number of seeds of all the productions of the field, excepting the *Mustards* and *Wild Hedge Mustards*, which are still richer. Among the *round shell plants*, there are, however, the *Garden Cress* and others, that yield a great quantity of seed, but the wild species of these classes of plants, when searched for, will be found to contain a still greater number, so that we can enlarge the mixture sufficiently to be enabled to sow a large fallow field.

I.—WITH LONG SHELLS.

1.

The Summer Cales and Summer Turnips. (*Brassica.*)**

Among the kinds of *Winter Cales* use for topseed, the *Rape* and *Turnip* will form fine plants in a few weeks in the fallows, and are, therefore, of great use in the mixture, but the following are only annual and grow wild in fields. In the mixture, they mostly form protection plants. They average about 150,000 grains per pound.

The Field Cale, (*B. Campestris.* ☉)—Fields; one to two feet high; May, June.

B. Eruca. ☉—Sandy fields and waste places; yellow flowers; June and July; two to three feet high.

B. Erucastum. ☉—Sandy soils and waste places; yellow flowers; June, July; two to three feet high.

French Turnips, (*B. Napus*.)—Cultivated plant; three to four feet high.

2.

Kinds of Mustards. (*Sinapis*.)**

These are also of rapid growth, yield a great number of seeds, and serve as protection plants. Some of the following deserve cultivation in gardens. Number of seeds per pound, 100,000.

The Common Field Mustard, (*S. Arvensis*. ☉)—Some fields look quite yellow in summer time with this plant. It is good cattle pasture, and yields a great quantity of seeds for *fallow manuring*; June, July; one to three feet high.

The White Mustard, (*S. Alba*. ☉)—Grows spontaneously in some old fields; sometimes cultivated; June, July; two to six feet high.

Black Mustard, (*S. Nigra*. ☉)

3.

The Kinds of Radishes. (*Raphanus*.)**

The different kinds of radishes we raise in the garden will yield a small contribution of seeds; we say *small*, because they do not produce as many seeds as the *Cales* and *Mustards*, but in the fallows they form fine protection plants. They average from 100,000 to 150,000 grains per pound.

4.

Treacle Mustards. (*Erysimum*.)*

Next to the Winter Mustards, the Treacle Mustards rank in importance for fallow manuring; for they thrive just as quickly as the *Cale*, *Mustards* and *Radishes*, and will not be eaten by the ground fleas. They deserve cultivation, for the quantity of seeds is much larger in them. They serve as middle plants, and for this reason are highly important, to increase the density of the mixture, and will grow on all kinds of soils.

Common Treacle Mustard, (*E. Officinalis*. ☉)—Grows almost everywhere along roads and waste places, and is easily known, on account of its seed shell growing close to the stem, and its iron-colored leaves. The leaves have a sharp taste, and the seeds nearly as strong as Mustard. In some places it can be gathered even in the winter, for the shells remain

closed for some months. In some places it grows in such abundance that any quantity of it can be collected. It germinates and grows rapidly; blossoms yellow, from June to October, and has 1,800,000 grains per pound. The two following kinds render the same service in the fallows as already stated in the topseed.

Wormseed Mustard, (*E. Cherianthoides*. ♂)—Along streams; July to September; one to two feet high; flowers yellow.

Western Wallflower, (*E. Arkansanum*. ♂)—A fine plant, with handsome, showy flowers, resembling the wallflower; native of the Western States; June, July; one to three feet high, and averages 2,000,000 grains per pound.

5.

Hedge Mustards. (*Sisymbrium*.)*

They correspond in their usefulness exactly to the *Treacle Mustards*, and distinguish themselves by their round shells; one or the other of the following kinds often grow in large quantities, and are to be found almost everywhere.

The Small-Leaved Hedge Mustard, (*S. Sophia*. ☉)—Grows along roads and margins, and in waste sandy places; June, July; yellow; two to four feet high. The small leaves are exceedingly fine, and the numerous seeds as small as dust; must be cleaned; number of seeds per pound, 4,000,000.

The Common Hedge Mustard, (*S. Officinalis*. ☉)—Waste places; May to September; yellow; a branchy, unsightly plant; one to two feet high.

Mouse-ear Hedge Mustard, (*S. Thalianum*. ☉)—Rocks and sandy fields; April, May; small white flowers; six to fifteen inches high.

Hoary Hedge Mustard, (*S. Canescens*. ☉)—Banks of streams; May; flowers pale yellow; one to two feet high; average 4,000,000 seeds per pound.

6.

Wall Cress. (*Arabis*.)*

These small plants have a great many seeds, in somewhat long shells.

Sickle Pod, (*A. Canadensis*. ☉)—Rocky places; May to August; small white flowers.

American Rock Cress, (*A. Lyrata*. ☉)—Rocky hills; April to June; eight to twelve inches high; flower middle size, white, or rarely pale purple.

Smooth Wall Cress, (A. Laevigata.⊙)—Rocky places; May; one to two feet high; flowers white.

Hairy Wall Cress, (A. Hirsuta.⊙)—Low Rocky grounds; May, June; six to twelve inches long; flowers greenish white; average 6,000,000 seeds per pound.

7.

Cardamines. (Cardamine.)

This family mostly grow on moist meadows, and will, therefore, only thrive on moist fallow fields; but they do not yield many seeds, and are of slow growth, and, therefore, better adapted to the stubble mixture, because they bloom as early as April and May. Those that are perennial have knotty roots. They have 1,000,000 grains per pound.

Hairy Cardamine, (C. Hirsuta.⊙)—Common in wet places; blossoms from May to July; grows six to ten inches high.

Spring Cress, (C. Rhomboidea.⊙)—Wet meadows; April to June; nine to twelve inches high.

Round-Leafed Spring Cress, (C. Rotundifolia.⊙)—Wet grounds near springs; July; six to fifteen inches high.

II.—WITH ROUND SHELLS.

1.

False Flax. (Camelina.**)

Among these we place the common False Flax as one of the most important plants for the green manuring of fallows. It grows extremely fast to an herbage, so that, in six weeks, it is one foot high. It bears a great number of seeds, which do not easily fall out. It is also an exceedingly good oil yielding plant, suited to feed geese, and is good bee pasture.

False Flax, (C. Sativa.⊙)—Cultivated grounds; common in flax fields; May and June; two to three feet high; yellow blossoms.

Thorough Growing False Flax, (C. Perfoliata.⊙)—Cultivated grounds; May and June; two to three feet high; 300,000 seeds per pound.

2.

Pepper Grass, Tongue Grass. (Lepidium.*)

Common Tongue Grass is the most important among the following selection, for the green manuring of fallows; it makes an herbage of a foot high in six weeks; manures strongly, and yields a great quantity of seeds; 1,000,000 grains per pound.

Common Tongue Grass, (L. Sativum.⊙)—Cultivated in gardens; one to three feet high; May and June.

Wild Pepper Grass, (L. Virginicum.⊙)—Dry fields and roadsides; May to September; one foot high.

Small leafed Peppergrass, (L. Iberis.⊙)—Along roads and walls; one to two feet high; July and August; white blossoms.

SELECTION FOR THE BEGINNING.

The Summer Rapes, Mustards, Hedge Mustards, Radishes, False Flax, Tongue Grass, or Wild Pepper Grass, yield a great quantity of seeds for the beginning; *Cale* and *Winter Rape* are also applicable to the fallow and stubble mixtures.

SECTION LXV.

SEVENTH VEGETABLE FORM OF THE FALLOW MANURING.

The Summer Mallow Plants.

The following annual mallow plants are found growing wild, but they are also cultivated among the flower plants in the gardens. They have, in the fallow mixture, a rapid growth and large herbage.

1.

*Summer Mallows.*** (Malva, Sida, Althea, Hibiscus.)

The following mallow plants grow wild in fields, and are also cultivated in gardens. The seeds thrive well in the fallow mixture, and form, in from six to eight weeks, in the summer season, a large leafed herb; but on heavy, cold, or dry sandy soil, they do not thrive. They have, on an average, from 50,000 to 100,000 seeds per pound.

Curled-leafed Mallow, (M. Crispa,⊙) In gardens; June to August; small white flower; five to six feet high.

American Mallow, (M. Americana,⊙)—Southern States; twelve to eighteen inches high.

Prickly Sida, (Sida. Spinosa.⊙)—Waste places and road sides; July and August; one to two feet high.

Hollyhock, (Althea, Rosea,⊙ ♂) — Cultivated in gardens.

Marsh Hollyhock, (Althea, officinalis.)—Gardens.

Fig-leafed Hollyhock, (Althea, Ficifolia.)—Gardens.

Flower of an hour, (Hibiscus Trionum.⊙)—Gardens; one to two feet high; July to October; blossoms yellow.

2.

Crane's bill. (Geranium.)

They grow wild in fields, hedges, and borders of woods, and have, on an average, from 50,000 to 100,000 grains per pound.

Small flowered Geranium, (G. Pusillum.⊙)—Sandy soils; May to July; one foot high; purplish flower.

Carolina Crane's-bill, (C. Carolinianum.⊙)—Fields and hills; May to July; eight to fifteen inches high.

Herb Robert, (G. Robertianum.⊙)—Rocky places, and shady ravines; June to October.

SELECTION FOR THE BEGINNING.

One or the other of the above described *Summer Mallows*, we find everywhere in gardens and fields; they are all well suited to the topseed in the fallow mixture.

SECTION LXVI.

EIGHTH VEGETABLE FORM OF THE FALLOW MANURING.

June Hull Plants.

I divide this vegetable form into three parts:

1. *The Hull Plants* raised on farms, of which we use some seeds for the green manuring. 2. The annual *Wild Hull Plants*. 3. The annual *Garden Hull Plants*. They are too large grained to be extensively used in the green manuring, but in the proper kind of soil we may use them in the mixture, as they bring forth good protection plants.

The Horse Bean, (Folia Vulgaris.⊙)**—Produces a fat herbage; but its seed being so large, it is of but little profit in the green manuring. As the Horse Bean, however, in the fallow mixtures of heavy soils, belongs to the protection plants, it requires only a small proportion in the mixture. Cultivated in gardens; one to two feet high.

The Black Fodder Bean, (F. Narbonensis.⊙)—Grows much higher and faster than the former; three to five feet high; has a rich herbage, and black round seeds.

The Tooth-leaved Fodder Bean, (F. Serratifolia.⊙)—Is valuable for fodder, and grows faster and higher than the former.

The Bush Bean, (Phaseolus nanus.⊙)

2.

Peas. (Pisum.)*

The Peas, like Beans, have too large seeds, but

where they can be raised they are useful in the fallow mixture. From 1,000 to 6,000 grains per pound.

Chick Pea, (Cicer arctinum.⊙)—Cultivated; nine to eighteen inches high.

3.

The Vetches. (Vicia.⊙)**

Vetches are well suited for green manuring, as they are not very saleable, and, therefore, not expensive. Some have in a pound 10,000 grains.

The common Vetch, or Tare, (V. Sativa.⊙)—In cultivated fields and waste places. One to two feet high; June.

Hairy Vetch, (V. Hirsuta.⊙)—In cultivated fields; May, June; two to three feet high.

II.—THE ANNUAL WILD HULL PLANTS OF THE FALLOW MANURING.

1.

The kinds of Summer Honey Clover, (Melilotus.)*

I have already mentioned that among all the Sweet Clovers, the *annual* as well as the *biennial*, the two most common kinds, viz: the *white* and *yellow Melilotus*, are also most valuable in the fallows.

2.

The Kinds of Summer Clover, (Trefails.)*

The following only are the most important: *The Incarnate Clover*, which is often found in gardens, and of which, therefore, the seeds may be easily obtained. *The Rabbit Foot*, or *Stone Clover*, grows wild, generally, in dry fields. *Hop Trifol*, on sandy soils. These Summer Clovers, however, do not all deserve cultivation; I simply quote them here so that they may be collected where they grow wild. They are all middle plants; the seeds germinate well; only form small stalks to contribute to the density of the mixture.

The Incarnate Clover, (Trifolium incarnatum.⊙)—Often in gardens; red seeds; July and August; one to two feet high; per pound, 300,000 grains.

Rabbit Foot Clover, (T. Arvense.⊙)—Common in old fields and roadsides; May to September; six to twelve inches high; per pound, 1,000,000 grains.

Hop Trifol, or *Golden Clover*, (T. Agrarium.⊙)—Sandy fields; June to August; six to fifteen inches high; 400,000 grains per pound.

III—THE ANNUAL GARDEN HULL PLANTS OF THE FALLOW MANURING.

1.

*Lupines, (Lupinus.)**

The herb of these plants manures well, but the seeds are too large grained, and, as stated before of Beans and Peas, they must be applied as a small part of the mixture in the fallows. The following are the most common kinds, and often raised in the gardens.

The White or Tame Lupine, (L. Albus.⊙)—One to two feet high; June and July; per pound, 1,000 grains.

The Variegated Lupine, (L. Varius.⊙)—Blue and red flowers; 1,000 seeds per pound.

The Wild Lupine, (L. Perennis.⊙)—Gardens; purplish blue; one foot high; May and June; 2,000 grains per pound.

The Yellow Lupine, (L. Luteus.⊙)—Two to three feet high; per pound, 2,000 grains.

The Hairy Lupine, (L. Pilosus.⊙)—Two to four feet high; flowers blue; 1,000 grains per pound.

2.

*Vetchlings, (Lathyrus.)**

Do not manure as strongly as the Lupines, but are more bushy in the fallow mixtures, and yield more seeds. They must be sowed along hedges, or must be provided with sticks, like peas, for their cultivation.

The Chick Pea, (L. Sativus.⊙)—June; blossoms white and blue; 1,000 grains per pound.

The Sweet Pea, (L. Odoratus.⊙)—Three to four feet high; June; 6,000 to 8,000 grains per pound.

The Annual Pea, (L. Annuus.⊙)—Pale yellow; July to September; four to six feet high; 4,000 grains per pound.

Coffee Pea, Chick Pea, (Cicer Arietinum.⊙)—Cultivated in gardens; nine to eighteen inches high; July; reddish flowers; 2,000 grains per pound.

SELECTION FOR THE BEGINNING.

Beans or Peas, Vetches or Vetchlings, Lupines, White, Yellow, or Winter Sweet Clover, are all applicable to the *Fallow* mixture.

SECTION LXVII.

NINTH VEGETABLE FORM FOR FALLOW MANURING.

The collection of the feather-seed plants may, at

first, appear too troublesome; no more, however, than all the other wild plant seeds. We need only cut off the heads of the thistles when they begin to feather, and likewise the heads of thornless plants, as soon as they appear downy. For the first beginning we do not require much seed, and can, of ourselves, very easily make the collection: but the more we extend the green manuring over our fields, the more practice we will have in collecting, and the more familiar we will become with the seeds required. Children will be capable of rendering service in picking these seeds, which prove to be of great utility in farming on this system.

1.—THE SUMMER THISTLE.

1.

*Cockle Burr. (Xanthium.)**

These grow partly wild, partly in gardens, and often form large burrs. They thrive well in the fallows, form thrifty bunches of leaves, but the seed is large. Contains per pound, 2,000 grains.

The Common Cockle Burr, or Clot Weed, (X. Strumarium.⊙)—Roadsides and waste places; July to September; two to three feet high.

Thorn Clot Burr, (X. Spinosum.⊙)—Waste places; September to November; one to three feet high.

2.

The Annual Field and Garden Thistle.

Having described the biennial field Thistles in the *Topseed*, as they form large bunches of leaves, in a very short time, in the fallows, I will notice here the following garden thistles:

The Milk Thistle, (Carduus Marianus.⊙)—Fields and gardens; four to six feet high. Per pound, 20,000 grains.

Common Saffron, (Carthamus Tinctorius.⊙)—Common in cultivation; one to two feet high; flowers yellow and red; 20,000 grains per pound.

The White Saffron, (C. Creticus.⊙)—Blossoms white; July and August; two to three feet high; 30,000 grains per pound.

The Blue Saffron, (C. Coeruleus.⊙)—Flowers blue; July and August; two to three feet high; 30,000 grains per pound.

3.

*Centaurea.**

When the following kinds have once been sowed

on beds, in a garden, they generally propagate themselves, and yield a great number of seeds. They form, in the fallows, thrifty, quickly-growing bunches of leaves, and yield, per pound, from 50,000 to 100,000 grains.

Blue Bottle, or Bachelors' Button, (*Centaurea Cyanus*. ☉)—Common in gardens; July; two to three feet high.

American Centaury, (*C. Americana*. ☉)—August to October; two to four feet high.

Sweet Sultan, (*C. Moshata*. ☉)—July to October; two to three feet high.

At the end of division F, of the plants used in stubble mixtures, the reader will find the manner in which to arrange and apply the plants herein described in families, in the cheapest way, and to the best advantage.

II.—THE ANNUAL THORNLESS FEATHER-SEED PLANTS.

1.

Dock Cresses. (*Lapsana Communis*. ☉)**

Found growing wild, in fields of light and heavy soils, along ditches and hedges, also in shady places; grows two to four feet high; blossoms yellow; from May to August. If we sow it in the spring, it blooms in August, and when sowed in the stubbles, it lives through the winter and blossoms in May. Where it does not grow wild, or is pastured off, it deserves cultivation in gardens, as it is of great use in the stubble and fallow manuring. Yields 600,000 grains per pound.

2.

Endive. (*Cichorium Endivia*. ☉)*

Will, in the fallows, on middle soils, make a fine middle plant, within six to eight weeks. It is a well known garden plant, and used as a wholesome salad. Per pound, 600,000 grains.

3.

The Annual Lettuce. (*Lactuca*.*)

The following species form a rich, low herb, in the fallows, within six to eight weeks. If sowed after harvest, in the stubble mixture, they will shoot up in time the following spring. They thrive on light soils, and average 600,000 grains per pound.

Garden Lettuce, (*L. Sativa*. ☉)—Well known.

The Wild Lettuce, (*L. Elongata*.)—Common in rich

damp soils, hedges and thickets; two to eight feet high; July to September.

The Poisonous Lettuce, (*L. Virosa*. ☉)—Four to six feet high; July, August; blossoms yellow, only in the morning.

4.

The Low Thistles. (*Sonchus*.)*

These plants grow both in the garden and wild in the fields; as a general thing, they are in abundance, and the seed collection can easily be made. The seeds do not all ripen at once, and, therefore, must be picked off by degrees, as the pods begin to get feathery, or downy.

The Common Low Thistle, (*S. Oleraceus*. ☉)—One of the worst weeds, but an excellent manuring plant in the fallow mixtures; found in waste places; two to four feet high; July to September; flowers yellow; 600,000 grains per pound.

The Spiny-Leafed Low Thistle, (*S. Asper*. ☉)—Fields and waste places; August, September; flowers yellow; about two feet high; per pound, 600,000 grains.

5.

Groundsels. (*Senecio*.)*

The following kinds are to be had in large quantities, very frequently, and are a very good juicy manuring plant.

The Common Groundsel, (*Senecio Vulgaris*. ☉)—Common in waste places; blossoms yellow from May to October; six to eighteen inches high; yields on an average 1,000,000 grains per pound.

Golden Senecio Squaw Weed, (*Saureus*. ☉)—Common everywhere in rocky places; May, June; one to two feet high.

6.

The annual kinds of Fleabones, of Cudweeds and of Cotton Rose.

I would here repeat as above, that when the seeds are not easily distinguished from the chaff and wool, we dare only rub the heads, and sow chaff and all together.

Horse Weed, Butter Weed, (*Erigeron Canadense*. ☉)—Very Common in fields and waste places; from July to November; small white flowers; one to five feet high.

The Acried Fleabone, (*E. Acre*. ☉)—On dry fields; blossoms reddish, in July, August; one foot high.

Daisy Fleabane, (E. Annuum. ☉)—Very common in fields and meadows; June to October; three to five feet high; average 2,000,000 seeds per pound.

Fragrant Life Everlasting, (Gnaphalium Polycephalum. ☉)—Common in old fields and woods; July to September; one to two feet high.

Low Cudweed, *Low Life Everlasting*, (G. Uliginosum. ☉)—Wet grounds, roadsides; common everywhere; July to September; four to six inches high.

Purple Life Everlasting, (G. Purpureum. ☉)—Gravelly soil; common on sandy fields and pastures; June; eight to twelve inches high.

German Cudweed, (Filago germanica. ☉)—Dry fields; July, August; four to eight inches high.

SELECTION FOR THE BEGINNING.

Cockle Burr, *Summer Thistle*, and *Dock Cresses*, are so general that their seeds can easily be procured. But also among the topseeds above mentioned, the *Fowler's Teasel* and *Field Thistles* produce in the fallow and stubble mixtures a rapidly growing herb.

SECTION LXVIII.

TENTH VEGETABLE FORM OF THE FALLOW MANURING.

The kinds of the Summer Wormwoods, and the annual Sunflower plant.

1.

The Summer Wormwoods. (Artemisia.)

The above described kinds of Wormwood in the tenth vegetable form of the Topseed mixture, viz: *The Common Wormwood*, the *Common Mugworts*, the *Roman Wormwood*, produce in the fallow mixture a good herb, and likewise in the stubble mixture; but in the latter they form only a middle plant, since they have not such large leaves. In the fallows they are very useful on account of their sharp, juicy quality in the extirpation of vermin. Under the protection of the larger plants, they help to increase the density of the mixture, and can be abundantly applied on account of their numerous seeds; average 6,000,000 seeds per lb.

2.

*The Chamomile plants and the Aster plants.**

Corn Chamomile, (Anthemis Arvensis. ☿)—Fields and cultivated grounds; June to August; nine to fifteen inches high. The seed, when sowed in stub-

bles, blossoms in May; if sowed in the spring, blooms in the summer. It manures well; 1,000,000 grains per pound.

Garden Chamomile, (A. Nobilis.)—Cultivated in gardens; one to two feet high; July, August; 800,000 grains

Showy Aster, (Chrysanthemum Coronarium. ☉)—Gardens; flowers large, of a deep yellow color; August; three feet high; 200,000 grains.

3.

Burr Marigold. (Bidens.) **

The following are strong herbs in the fallows, and, therefore, deserve especial cultivation. They generally thrive on somewhat moist soil. However, in the fallows, they do well on any middle soil; average about 100,000 grains per pound.

The Common Beggar Ticks, (B. Trondosa. ☉)—Moist waste places; July, September; two to four feet high.

Swamp Beggar Ticks, (B. Connata.)—Wet grounds, common; August; one to two feet high.

Nodding Burr Marigold, (B. Cernua, ☉)—Swamps and ditches; August, October; one to two feet high.

Spanish Needle, (B. Bipinnata. ☉)—Dry soil, waste places; July to September; two to four feet high.

Large Flowered Burr Marigold. ☉—Common in swamps and ditches; August, September; six to twenty inches high.

4.

Sunflower. (Helianthus.) **

Is a protection plant in fallow mixtures, but its seeds are too large to be applied too frequently. There are different kinds with smaller and larger seeds. The latter have from 10,000 to 15,000; the former 20,000 grains.

The Common Sunflower, (H. Annuus. ☉)—Is a well known garden plant; July to August; seven to twelve feet high.

5.

Marigolds Zinnia. (Tagetes Zinnia.)*

These are well known garden plants, which bear a great quantity of seeds, and make in the fallows an excellent herb; average about 200,000 grains.

French Marigold, (Tagetes Patula. ☉)—One to two feet high; August.

African Marigold, (Tagetes Erecta. ☉)—Two to three feet high; August.

Elegant Zinnia, (*Zinnia Elegans*. ☉)—July, August; two to three feet high.

Many-Flowered Zinnia, or *Youth and Old Age*, (*Zinnia Multiflora*. ☉)

6.

Marigold. (*Calendula*. ☉)

The first of the following is a field weed, but the rest are garden plants. They thrive well in the fallows, but the seeds are not very numerous, and fall out easily.

The Field Marigold, (*C. Arvensis*. ☉)—Grows sometimes in fields; blooms in August; yellow; one foot high.

Pot Marigold, (*C. Officinalis*. ☉)—A common showy garden plant; 30,000 grains per pound.

SELECTION FOR THE BEGINNING.

The *Summer Wormwoods*, or the *Common Wormwood*, the *Chamomiles*, and either of the *Burr Marigolds*, or some of the *Sunflower Plants*, are almost everywhere to be had for the first beginning.

SECTION LXIX.

THE KINDS OF GRASSES IN THE FALLOW MANURING.

There are grasses which grow very frequently, almost everywhere wild, and thus annual; for this reason they shoot up quickly into stems, and if the same summer the seed is sowed, it will yet blossom and bear seed. The proper place then for these will be in the fallow mixture, as they will form strong thrifty plants in six or eight weeks, and be ploughed under before they come into blossom. The *Winter Chess*, as already described, is of a rapid growth, and although it does not shoot up into stems, yet it forms a strong, thrifty grass, and is therefore one of the most important grasses in the fallow manuring. I have placed it, therefore, here, together with *Summer Chess*, (*Cheat*).

1.

Cheat. (*Bromus*.)**

This produces more grass in a few weeks than Oats. The most rapidly growing are the following.

Field Brome Grass, (*Bromus Arvensis*. ♂)

Cheat, *Chess*, (*Br. Secalinus*. ♂)

Soft Brome Grass, (*Br. Mollis*. ♂)

The Large Brome Grass, (*B. Gigantus*. ♂)

The Erect Brome Grass, (*B. Erectus*. ♂)

Broom Corn, (*Sorghum Saccharatum*. ☉)

The *Soft Brome Grass* is especially selected for the fallow manuring, because it shoots up the first year into stems. For this reason I have excluded it from the topseed Bromes. It grows in fields and pastures, is easily known by its velvet, soft leaves, stems and ears, and as it makes a spongy hay, it is not fit for fodder cultivation, but in the fallows it is excellent, for here it forms, in six to eight weeks, a large herb, and will be ploughed in before it blossoms; 100,000 grains per pound.

2.

Indian Corn. (*Zea Mais*. ☉)**

The corn is much too large grained, and like other plants, can only be applied in small quantities in the fallow mixture. It is a large, broad protection grass. The large corn has per pound 1,000 grains, and the small kind, at the highest, 5,000 grains.

3.

The Common Millet (*Panicum Miliaceum* ☉)** and the *Panic Grasses*.

The Common Millet forms in the fallow mixture, within six or eight weeks, a broad grass, one foot high. The soil, however, should be good, and not too dry. It is rather more applicable than *Corn* and *Oats*, as the seeds are much smaller, since it has 125,000 grains per pound.

The *Panic Grasses* are very important for fallow manuring. The following yield little, if any less, grass, in a few weeks, than the Millet; are in nearly all fields, moist and dry ones.

Barnyard Grass, (*Panicum Crusgalli*. ☉)—This grass grows the highest of the Panic Grasses, and forms a broad grass like the Millet; grows generally in barn yards; August, September; two to four feet high; 200,000 grains per pound.

Hair-stalked Panic Grass, (*P. Capillare*. ☉)—Common on sandy soils and cultivated fields; August to September; eight to twelve inches high.

Rough Bristle Grass, (*Setaria Verticillata*. ☉)—Naturally near dwellings; July; about two feet high; 300,000 grains per lb.

Green Fox Tail, (*Setaria Viridis*. ☉)—Common in cultivated grounds; July; two to three feet high.

Bottle Grass, (*S. Glauca*. ☉)—Very common in stubbles; July, August; two to three feet high.

Finger Grass, or Crab Grass, (P. Sanguinale. ☉)—Naturally everywhere in cultivated grounds; August to October; twelve to eighteen inches high.

Smooth Finger Grass, (P. Glaubrum. ☉)—Sandy fields; August, September; six to twelve inches high.

Slender Finger Grass, (P. Tiliforme. ☉)—Dry sandy soil; August; one to two feet high; average 500,000 grains per lb.

4.

The annual Agrostis. (Agrostis.)

The Common Agrostis, (Agrostis Spica Venti, ☉) is well known to the farmer, as it is found in large quantities in the grain. For the green manuring of the fallows, it is one of the most important grasses. It grows to a foot high in six or eight weeks, in the fallow mixture, with broad juicy leaves, like blades of *Barley*. It thrives on sandy and loamy soils; grows from two to four feet high, and blooms from June till August. We can use it freely, as it bears seeds so abundantly. It germinates well, grows fast, and forms a large grass in the *fallows*. It has, like the following, 3,000,000 per lb.

The Red Agrostis, (Agrostis Purpurea. ☉)—Grows on the poorest soils, and resembles strongly the former.

The Interrupted Agrostis, (Agrostis Interrupta. ☉)—Grows likewise on dry soils, from one to two feet high.

SECTION LXX.

Review of the most frequently growing Plant and Grass Seeds for the fallow manuring in general, and especially of the middle soils.

We will now select of all the mentioned fallow seeds, those that every farmer is acquainted with, because they are generally in his own neighborhood, fields or garden; and, therefore, convenient to be had in abundance. They are the following:

A.]—AS A LARGER SELECTION AND REVIEW.

Of the First Vegetable Form.

1 lb. Lamb's-quarter, field or garden,	500,000 **
1 " Goose Foot Seed, or Coxcomb,...	1,000,000 **
1 " Spinage Seed,.....	80,000 *
1 " Wild Hemp Seed,.....	40,000 *
1 " Amaranth, (Coxcomb,).....	1,000,000 **

Of the Second Vegetable Form.

1 lb. Jamestown Weed,.....	50,000 **
1 " Night Shade,.....	300,000 *

Of the Third Vegetable Form.

1 lb. Buckwheat,.....	30,000 **
1 " Spurry Seeds,.....	500,000 *
1 " Linseed,.....	100,000 *
1 " Poppy Seed,.....	1,000,000 *
1 " Corn Cockle,.....	500,000 *

Of the Fourth Vegetable Form.

1 lb. Chervil,.....	100,000 *
1 " Gardendill,.....	500,000 *

Of the Fifth Vegetable Form.

1 lb. Elsholzia, or other Summer mints,	2,000,000 **
1 " Toad Flax,.....	1,000,000 *

Of the Sixth Vegetable Form.

1 lb. Summer Turnips or Mustards,...	150,000 **
1 " Summer Hedge Mustards,.....	2,000,000 **
1 " Wall Cresses,.....	4,000,000 *
1 " Spring Cress,.....	6,000,000 *
1 " False Flax,.....	300,000 **
1 " Garden Cress,.....	300,000 *

Of the Seventh Vegetable Form.

1 lb. Summer Mallows,.....	50,000 **
1 " Summer Cranesbill,.....	50,000 *

Of the Eighth Vegetable Form.

1 lb. Beans and Peas,.....	2,000 **
1 " Vetches,.....	10,000 *
1 " Sweet Clover,.....	200,000 **
1 " Rabbit foot Clover,.....	1,000,000 *
1 " Lupines and Vetchlings,.....	3,000 *

Of the Ninth Vegetable Form.

1 lb. Cockle Burr and Summer Thistle,	20,000 **
1 " Dock Cress,.....	600,000 **
1 " Endive,.....	600,000 *

Of the Tenth Vegetable Form.

1 lb. Summer Wormwood,.....	6,000,000 *
1 " Chamomile,.....	1,000,000 *
1 " Burr Marigold Sunflower,.....	100,000 *

Of the Summer Grasses.

1 lb. Corn, smallest,.....	5,000 **
1 " Cheat,.....	100,000
1 " Millet,.....	125,000
1 " Barnyard Grass,	300,000
1 " Agrostis,.....	3,000,000

In this calculation, forty pounds contain 34,615,000

We have here over forty different kinds of seed, containing forty pounds weight, and over thirty-four millions of grains; consequently, enough for more than six acres, if we sow about five millions of seeds per acre, so that, *according to this calculation*, we require six pounds of seed *per acre*.

But if we count up the protection plants, they will produce some 8,000,000 of grains, as the plants sowed in the topseed mixture must shade the ground, before the summer heat. The more thrifty and strong the plants are, the better and more successful the first experiment will be to the farmer, and thus he will find that one-fourth, or even one-third, will not be too much.

As the plants in this review are not to be had everywhere, *and every year alike*, we will select a single one of each of the ten vegetable forms, and this one of the kind most frequently found, and easily obtained almost anywhere. In this way we may select some ten to twenty different plants and grass-seeds most likely to be obtained, and easily collected; for while some plants grow in the wildest profusion on some farms and in some neighborhoods, they are foreign to others.

B.—A SMALLER SELECTION AND REVIEW.

A.]—On Plants.

1 lb. White Goose foot, (Coxcomb,)...	1,000,000 **
1 " Jamestown weed, or Nightshade,	150,000 **
1 " Spurry,	500,000 *
1 " Amaranth,	1,000,000 **
1 " Elsholzia, (can easily be procured by seed merchants,).....	1,800,000 **
1 " Hedge or Treacle Mustard,.....	2,000,000 *
1 " Toad Flax, or Cresses,.....	300,000 *
1 " Summer Mallows,	50,000 **
1 " Sweet Clover,.....	200,000 **
1 " Dock Cress,.....	600,000 **

B.]—Of the Grasses.

1 lb. Cheat,.....	100,000
1 " Millet, or Barnyard Grass,.....	125,000
1 " Agrostis,.....	3,000,000

Thirteen pounds—amount,..... 10,775,000

Here we have 5,000,000 of grains per acre, for about two acres; thus one acre would only require about six and one-half pounds of these summer seeds. We see also, that the fallow mixtures are mostly composed of summer or annual plants, and can easily be made up of from ten to twenty different kinds of plants and grasses, so as to form a dense, vigorous, and shady mass. But we will also add to these the quickest growing *winter or topseeds*, which within four to six, and at the furthest, eight weeks, form herbs 1 foot high, with strong roots in the *fallows*, according to the weather; they gain the size above mentioned, in shorter or longer time.

C.]—The Winter Topseeds most useful in the Fallows are the following.

1. *Docks*, especially the Curled and Garden Dock.
2. The kinds of *Dyer's Weed*, and on fruitful soils, also the *Mullein* and the *Common Evening Primrose*.
3. *Meadow Rue* and *Burnet*, only on fruitful soils of the fallows.
4. *Parsnip* and *Cow Parsnip*.
5. *Catnips*.
6. *Rape* and *Winter Turnips*.
7. *Mallows*.
8. *Sweet Clover*.
9. *Fuller's Teasel*. *Field Thistle*.
10. *Common Mugwort* and *Wormwoods*.—On good soils of the fallows; also, several of the mentioned *Sunflower plants*. These are also important Topseeds for the fallow mixture on heavy soils.

SECTION LXXI.

SELECTION OF THE FALLOW MIXTURE FOR HEAVY SOILS.

The proper treatment of Fallows in this kind of soil, and especially poor clay soils, is to keep them well shaded, and to keep up the fermentation by the process of *Green Manuring*. The stubbles, when ploughed down in the fall, should in the following spring be ploughed again, and sowed with a shady

and quick growing plant mixture, before the soil has time to harden itself. This plant mixture should consist of the following *summer seeds* in connection with the *Winter* or *Topseeds* above named, which will render excellent service.

A.]—*Summer Plants.*

- 1. The Field and Garden Lamb's-quarter..... **
- 2. The Goosefoot Plants..... **
- 3. The Wild Hemp..... *
- 4. The Jamestown Weed..... **
- 5. The Black Nightshade..... *
- 6. Amaranth, (Coxcomb.)..... **
- 7. Mustards, Turnips, Radishes..... **
- 8. False Flax..... *
- 9. Horse Beans..... **
- 10. Vetch..... *
- 11. Rabbit Foot Clover..... *
- 12. Common Cockle Burr and Summer Thistle.. **
- 13. Dock Cress..... **
- 14. Field Chamomile..... *
- 15. Sunflower..... **
- 16. Burr Marigold..... **

B.]—*Summer Grasses.*

Corn, Cheat, Millet, Barnyard Grass, Agrostis. Including the Topseed named above, we have in all more than thirty kinds of the most shady and rapidly growing plants and Grasses for the fallow mixture of the *clay soils*. Of these, there are at least from ten to twenty different kinds, to be had almost everywhere, and, therefore, easily obtained, for collecting the seeds. Under the shade of such a mixture, the toughest clay soil cannot harden, if we sow it immediately in the spring, for where such fields lie exposed to the sun in a hot summer, they are the best to fallow.

SECTION LXXII.

SELECTION OF THE FALLOW MIXTURE FOR LIGHT SOILS.

For the very light soils it is not advisable to commence with a fallow mixture in the spring, but it is better to pass over a plant mixture of Topseeds in the fallows, which have been sowed in December; so as to bring a manure in the fallows, this is ploughed down in the spring, and sowed on a fallow mixture. But if the soil is very poor it should first have a half stable manuring, for the Green Manuring will then

grow more vigorously, double its strength, and be more apt to resist the dryness. I shall in the following review name only some plants adapted to very light soils, and which will form excellent plant masses.

A.]—*Plants.*

Ragweed, (or the Mexican Goosefoot,) The White Goosefoot, (or Coxcomb,) Buckwheat, Corn Spurry, Toad Flax, Elsholzia, Turnips, Hedge Mustards and Treacle Mustards, False Flax, White Stone Clover, and Rabbit Foot Clover.

B.]—*Grasses.*

Corn, Cheat, Barnyard Grass, and Agrostis. With this description and review we will end the instruction on fallow manuring. We have selected a number of plants and grasses adapted to the various applications and changes of Topseed manuring, so that the *produce* of the *soil* and the *interest* of the *Farmer* must be promoted by their effectual application.

EXPLANATION OF PLATE II.

SECTION LXXIII.

Plants of the Fallow Manuring.

The representation of the annual *Grasses* for the fallow manuring, stands in the upper row. They are found the most frequently—the richest in seed, and the most rapidly growing summer grasses. The representation of the fallow manuring are arranged as much as possible after the ten vegetable forms, as described—and in this order we will endeavor to explain them.

First Vegetable Form.

Of this form the Garden Lamb's-quarter is not represented, as every farmer knows it; and of the *Bright Lamb's-quarter*, only the *Atriplex Nitens* is represented. But the leaves of several wild Lamb's-quarter,—as the *A. Pastula*, *Hastata*, *Laciniata*, *Tatarica*, *Rosea*, *Sibirica*; and next each leaf I have the seed cover of each of the wild Lamb's-quarter represented to distinguish them from the Goosefoot. Then comes the "Goosefoot" family. The *Common White Goosefoot* I leave out, as they are so generally known; and next to the *Bright Lamb's-quarter* a small by-branch of the *Fig-leaved Goosefoot*, (*Chenopodium*

Ficifolium,) as this is less known and surpasses all the others in quick growth, in quality of manuring strength, and in seeds. Above the Fig-leaved Goosefoot, is placed the round seed cover, which is peculiar to the Goosefoot family; and under it a leaf of the *Wall Goosefoot*, (Chen. Murale,) and a leaf of the *Maple-leaved Goosefoot*, (Chen. Hybridum,) then the *Triangular-leaved Goosefoot*, (Chen. Urbicum,) and next stands a branch of the *Gigantic Goosefoot*, (Chen. Altissimum,) and below stand small branches of the *Broom Goosefoot*, (Kochia Scoparia,)—of the *Rose-seedy Salt Goosefoot*, (Salsola Rosarea.) The *Spinage*, is well known. The *Ragweeds*, (Ambrosia,) are also very useful, but being very common and generally known, I leave them out. Of the Amaranth, I only represent the wild *Green Amaranth*, (Amaranthus Viridis,) that the reader may remember the *Garden Amaranths* are important and useful for the fallow manuring. There is also a small bunch of *Garden Docks*, (Rumex Patientia,) below on the left corner; the seeds thrive, and do well in the fallow mixtures; it cannot be too highly recommended.

Second Vegetable Form.

Under the Green Amaranth is placed a parcel of narcotic plants, as represented. Below the frame is found the *Deadly Nightshade*, (Atropa Belladonna,) with leaves and blossoms, and a ripe black berry. At the left side is a leaf of the *White Henbane*, (Hyoscyamus albus,) but on this leaf the flower of the *Black Henbane*, (Hyoscyamus niger,) is represented, and close by, the ripe *Chalice* and three grains of the *Black Henbane*. Next to this narcotic plant is found a branch, in blossom, of the *Ground Cherry*, or *Yellow Henbane* (Physalis Viscosa,) with its fruit, and on the other side hang the leaves and blossoms of the *Common Jamestown Weed*, (Datura Stramonium.) Above this stands an umbel of the *Poison Hemlock*; and above the Ground Cherry lays a cluster of the *Black Nightshade*, (Solanum Nigrum.)

Third Vegetable Form.

The *Buckwheat* and *Knotweed*, and also the different kinds of *Spurry*, are well known. The *Wild Flax* resembles the common; but the *Yellow Summer Flax*, (Linum Flavum,) we represent here, as it makes a larger and richer herbage than the other flaxes; it stands under the Elsholzia. We also omit

the *Poppies*, *Pheasant's Eye*, (Adonis,) *Larkspur*, (Delphinium,) and the *Fennel Flowers*, (Nigella,) as they are all generally known; but we represent the *Corispermum*, as its different kinds thrive successfully even on the poorest soils. The seeds are the color and size of bed-bugs, and the half-ripe seeds of the *Corispermum Nitescens* are as transparent as a half-dead bed-bug. The one kind (C. Nitidum,) stands on the leaf of the Green Amaranth; and the other, (C. Canescens,) stands between the Common Toad Flax and the Stone Clover. The *Corncockle*, *Soap Plants*, *Sand Pinks*, &c., are not represented, for want of room, and because they do not belong to the most important. There is a branch of the *Bunchy Gypsum Plant*, (Gypsophylla Paniculata,) represented below the Bent Grass, so as to know by this the rest of the Gypsum plants. Close to these, on the right side, are the two common *Wild Corncockles*, (Lychnis,) and next, are three of the most seed-bearing *Catchflies*, (Silene Inflata, S. Noctiflora, S. Nutans,) so that the species of the Catchflies may be known. The Catchflies are important and necessary in the fallow manuring. The different *Sandworts* (Arenaria) have the same excellent qualities. We therefore represent here the earliest kind, so as to know all the others by them. A branch of the *Arenaria Verna*, is at the right side, and next to the Catchfly, the *Knapweed*, *American Centaury*, *Summer Plantain*, (Plantago Psyllium, Coronopus and Arenaria.) They are very important, but common and well known plants, and do not need to be represented.

Fourth Vegetable Form.

This vegetable form contains the summer umbelliferous plants, among which are the different kinds of *Chervil*, (Caucalis) too well known to require a representation. As we lack room for this plant, we will represent its seeds in the spaces under the Grasses in No. 1, as the ripe seed of the *Caucalis Dancoides*. Between the top of the *Linaria Vulgaris* and the *Elsholzia*, are the ripe seeds of *Caucalis Latifolia*; in No. 2, on the other side of the *Elsholzia*, are the ripe seeds of the *Caucalis Grandiflora*; in No. 3, above the *Arenaria Verna* are the ripe seeds of the *Caucalis Leptophylla*; in No. 4, above the *Nutans*, the kinds of *Tordylium*, which have a seed that resembles a Parsnip; and in No. 9, the *Tordylium Officinale*, at the right of the Green Amaranth. For

the distinction of the *Forilis*, I place in No. 5, below the *Apera Spicaventi*, the ripe seed of the Common (with yellow seeds) *Forilis Anthriscus*; under No. 6, the ripe seed of the Common *Scandix Anthriscus*; under No. 7, the seed of Knotty (Gray Grainy) *Scandix Nodosa*, and under No. 8, the seed of Knotty (and Yellow Grainy) *Forilis Nodosa*. All these umbelliferous summer plants are especially adapted to the stubble manuring, for they pass through the winter and come up early in the spring season. The *Dill*, *Coriander*, *Anise*, &c., are common and generally known. The rest of umbelliferous spice plants belong to the fallow mixtures, since they do not pass through the winter.

Fifth Vegetable Form.

This contains the "Labial Flower Plants." Of these only two of the most useful are represented—the *Elsholzia Cristata*, and the *Common Toad Flax*, (*Linaria Vulgaris*.) By these the rest can be easily known.

Sixth Vegetable Form.

The annual kinds of Cals and Radishes, and field plants of this class are generally known; but we will represent one of the richest and most suitable of the *Treacle Mustards*, (*Erysimum officinale*) which can be known by its dense laying shells; it stands under the *Silene noctiflora*, and next to it, shells are represented in natural size. This, with the other Mustards, is rich in seed, and easily gathered by pulling up the ripe stalks. They are represented in Plate I, and are easily known.

The *Hedge Mustards* also are rich in seed; of this class we represent but one—the Small-leaved *Hedge Mustard*, (*Sisymbrium Sophia*.) The family of Mustards all produce a great many seeds, but in gathering them, none but the ripe stalks must be taken. Of the *Wall Cresses*, (*Arabis*.) we represent one kind by which the others can be known. The *Arabis Arenosa* is placed next to the *Sisymbrium Sophia*. I represent the blossom in its natural size, (*a.*) and the natural size of its shell, (*b.*) On the other side of the *Erysimum officinale*, are the shell plants, with roundish shells. *Alyssum Calignum*, (*Madwort*), by which the rest of this species can be known; between it and the *officinale* its roundish shells in their natural size, and at the right side of the *Alyssum Calignum*, the thoroughly perforated

grown Pepper Grass, copious in seeds and very manuring.

Seventh Vegetable Form.

This contains the Annual Mallow Plants, and the Annual Crane's-bill. Common and generally known.

Eighth Vegetable Form.

This form contains the Summer Hull Plants, such as Beans, Peas, Vetches, etc., which need no representation. But among the Wild Hull Plants the common *White* and *Yellow Sweet Clover*, (*Melilotus Vulgaris*.) and the *Melilotus Officinalis*, the *Blue Melilotus*, (*Melilotus Cœrulea*.) are important in the fallow manuring, and are placed on the left side of the Plate. The common *Rabbit Clover* or *Stone Clover*, is preferable to any of the other *Head Clover*, (*Trifolium Arvense*.)—it stands above the *Blue Melilot* and the Garden Hull Plants described. It is unnecessary to present them on the Plate, since they are universally known.

Ninth Vegetable Form.

The "Cockle Burs," on account of their fast growth, are very necessary in the fallow manuring—although they have a large seed, they grow very rapidly and produce a large herbage.

The *Common Cockle Bur* or *Clot Weed*, (*Xanthium Strumarium*.) and the *Xanthium Orientale*, are close together below on the left side, near the *Rumex Patientia*. The *Summer Thistles*, *Saffrons* and *Knapweed*, being very common, we omit. Of the Stringless Feather Seed Plants, the *Lapsana Communis* is important for fallow manuring, and is represented next to the *Xanthium*; above the *Xanthium*, are two kinds of Lettuces—the *Poison Lettuce*, (*Lactuca Virosa*.) and the *Willow Leafed Lettuce*, (*Lactuca Saligna*.)—by them we can know the rest of the family.

Tenth Vegetable Form.

Of the biennial kinds of Wormwoods, I represent the *Artemisia Scoparia*, together with a root-leaf at the right hand below.

Of the *Summer Chamomiles* I represent only *Real Field Chamomile*, (*Matricaria Chamomilla*.) at the right hand, next to the *Artemisia Scoparia*, by which all the other kinds of this family may be known.

The Annual "Sunflower-like Plants," are placed at the right hand in the lower corner. The *Nodding*

Burr Marigold, (*Bidens Cernua*), by which the Wild Marigolds can be easily distinguished. They form in the fallow manuring a large and rich herbage.

SECTION LXXIV.

F.]—DESCRIPTION OF THE KINDS OF PLANTS OF THE STUBBLE MANURING.

The most serviceable plants of the stubble manuring are such as produce their seeds before the harvest of the winter grain, and others before the harvest of the summer grain. For this reason they thrive much quicker in stalks and leaves in the fall, than others, while in the following spring they shoot up again and blossom; such early plants belong as well to the topseed as to the fallow plants, and as they are described among them already, I will mention them only according to the kinds of soil on which they are native, viz: as selection for the stubble mixture of the *Middle Soils*, *Heavy Soils*, and *Light Soils*.

SECTION LXXV.

SELECTION OF THE STUBBLE MIXTURE FOR MIDDLE SOILS.

We will follow here the order of our vegetable forms, as it has for its purpose to show, that, at least, one kind of each of these vegetable forms can be collected on each farm at any time for the first sowing, so as to compose the mixture of from ten to twenty kinds of plants and grasses. For the middle soils, we have also here the largest selection.

Of the First Vegetable Form, or the early Dock and Goosefoot Plants.

The following kinds of Docks are those which come the earliest to maturity, and the most convenient in their collection, also grow on each soil, as *Yellow Dock*, *Broad-leaved Dock*, *Blood-veined Dock*, *Field Sorrel*, also the *Large Red Beet*, continue during the winter in not too cold climates in a vigorous state, produce, in the stubble, a very good herbage, and shoot up early in the spring. The various kinds of *Goosefoot*, however, ripen their seeds much later, but there can be obtained a sufficient quantity to be sowed upon stubble. *The Spinage* is ripe before harvest, if sowed in the spring on a small piece of ground (or garden) for seed, it also remains quite thrifty in not too cold climates. *The Hemp* can be sowed late in the fall, after the rest of

the stubble mixtures, and shoots up early in the spring. *The Wild Hemp* is of the same nature.

Of the Second Vegetable Form, or early Mullein and Narcotic Plants.

Of the *Mulleins* (*Verbascum*), some plants also will be ripe before harvest, and while they grow to a larger herbage, when sowed directly after harvest of the winter grain, it is advisable to save seeds of the previous year for the stubble mixture.

Of the Evening Primrose, (*Enothera*).—Especially the lower capsule will ripen early enough to be sowed with the first stubble mixtures, and by so doing acquire a much larger growth.

Viper's Bugloss, or the *Blue Weed*, (*Echium*).—Blossoms from May till August; the earliest seeds can be sowed with the stubble mixtures; and by having a bed of ground in the garden, sowed with the already mentioned *Bellflowers*, they will yield a great quantity of early seeds for the stubbles, and produce a fine herbage before winter.

The Hound's Tongue, (*Cynoglossum*).—Blossoms in May, the seeds will ripen before harvest, and like *Bugloss Ox-tongue*, is of large growth before winter, and excellent for the stubble mixture; also various kinds of *Dyer's Weed*, (*Reseda*), are ripe early enough to sow them soon after harvest—they bring a fine herbage in the mixture. The various kinds of *Speedwell* and *Larkspur* give likewise an excellent herbage for the density of the mixtures before winter, and shoot up directly in the spring, but they must be raised first in the garden before a sufficient amount of seeds can be obtained.

Of the *Narcotic Plants*, can be applied only the *Henbane*, the *Deadly Nightshades*, *Ground Cherry* or *Yellow Henbane*, *Common Polk*, while the rest of this species freeze during the winter; they must be sowed directly after harvest, as the late sowed remain too small.

The Third Vegetable Form, or early Meadow and Field Plants.

It would be very profitable to cultivate many different kinds of the *Meadow Rue*, for they grow to larger bushes or shrubs every year—yield, therefore, more seed, and make in the stubble mixture a fine herbage, like nearly all plants sowed in the fall, and remaining green during the winter; in the spring

they shoot up quickly into fine stalks and leaves. The same happens also with different kinds of the *St. John's Wort*, *Sheep Burnet*, *Plantain Leaves*, *Devil's-bit*, *Knotweed*, *Soapwort*, *Corncockle*, *Wild Pink*, *Catchflies*, *Sandworts*, *Flax*, &c., viz: Such plants whose blossoming time is the earliest in the spring which can be found and selected in the description of the topseed plants, also the annual kinds of this species which blossom in May and June, as I have described in the third vegetable form of the fallow manuring, become ripe before harvest; they sow themselves in their wild state the same year, and germinate before winter, and blossom directly in the spring again. To these belong the kinds of *Spurry*, the common *Poppies*, summer *Pink Plants*, the various kinds of *Corn Salad*, *Wood Sorrels*, *Gentian*, &c., also the annual *Devil's-bit* and *Field Plantain*.

Of the Fourth Vegetable Form, or the early Umbelliferous Plants.

The *Cow Parsnip* and *Wild Parsnip* are the most preferable; also the described kinds of *Angelica*, *Lovage*, *Imperial Master Wort* and *Poison Hemlock*. The latter, however, must be first cultivated before their seeds can be applied. Of the rest of Umbelliferous Plants, the *Wild Chervil* is the earliest, for already in March its herbage is a few inches high; after this come the *Wild Carrot*, *Anise* and *Parsley*, the most common and earliest, and all other Umbelliferous Plants; the earliest, at least, are also very valuable in the stubble mixture. Of the summer Umbelliferous Plants, as described in the Fourth Vegetable Form of the Fallow Manuring, are the kinds of *Chervil*, very early. Where the described kinds of *Thorough Wax* grow wild or in the garden, they are very useful in the stubble mixture, and the annual kinds of *Purge* shoot up also well before winter.

Of the Fifth Vegetable Form, or the Mint Family.

The seeds of the *Catnip* ripen soon after harvest, and are, therefore, very applicable to the stubble mixture; particularly important are the described kinds of *Sages* for their early and rapid growth; also all the rest of the Mint family, described in the Fallow and Topseed, are applicable to the stubble mixture, and blossom in May and June. All these plants, rich in seed, deserve cultivation, in order that

we may obtain the seed at little expense, and conveniently at hand.

Of the Sixth Vegetable Form, or the early Shell Plants.

Of the *Rapes* and *Turnips*, we can take as an example, that the stubble mixture must soon be sowed after harvest, so that the stalks may become large enough before winter; but when the soil, through frequent green manuring, has been made more fruitful and fermenting, the last sowed mixtures will shoot up quicker in stalks and leaves, and if they bring forth in the fall but small plants, the mixture will shoot up the more rapidly to a dense mass the following spring. Such early shell plants are especially described in the Sixth Vegetable Form of the Topseed and Fallows, as *Winter* and *Summer Mustards*, *Winter Cresses*, *False Flax*, *Hedge Mustard*, *Rockets*, *Rock Alyssum* or *Madwort*, *Wall Cresses*, *Woad*, *Horse Radish*, *Pepper Grass*, *Candy Tuft*, *Henesty*.

Of the Seventh Vegetable Form, or early Mallow Plants.

They are described in the topseed. *Winter Mallows*, *Holly Hocks*, *Marsh Holly Hocks* and *Crane's-bill* are all very early, and by sowing the seed after harvest, they will have a fine herbage before winter, and in the spring shoot up quickly to stalks and leaves.

Of the Eighth Vegetable Form, or the early Hull Plants.

Above all, the sweet *Clovers* (*Melilotus*), and especially the common *White* and *Yellow*, are highly important; also the *Wood Peas* and *Vetches* described in the Eighth Vegetable Form of the Topseed.

Of the Ninth Vegetable Form, or the early Thistles and Feather Seed Plants in general.

The *Common Burdock*, *Field Thistles*, especially the *Fuller's Teasel*, *Button Snake Roots*, and the early *Knapweeds* ripen all before harvest, and grow to a fine herbage before winter. Among the thornless feather seed plants, the kinds of *Hawkbit*, *Salsify* or the *Vegetable Oyster*, *Lettuces*, *Pipau*, *Hawkweeds*, should first be cultivated in the garden for the more convenient collection of seeds.

Of the Tenth Vegetable Form.

The *Common Mugwort*, the *Common Wormwood*,

Common Tansey, the *Chrysanthemum* or *Showy Aster*, the *Chamomiles*, and the *Common Yarrow* begin to grow very early and make a good under plant in the stubble mixture. Of the same nature are some of the species of *Sunflowers*, described in the Tenth Vegetable Form of the Topseed.

SECTION LXXVI.

OF THE SELECTION OF THE GRASSES FOR THE STUBBLE MIXTURE.

To the density of the stubble mixture by the grasses, the early *Winter Grasses* are also applicable, as well as the early *Summer Grasses*, which continue during the winter, and are described at the end of the Fallow Plants, for the reason, that while the mixture is ploughed under in the spring for summer grain, the summer grasses cannot come to seed.

SECTION LXXVII.

SELECTION OF THE STUBBLE MIXTURE FOR HEAVY SOILS.

The plants for heavy soils are to be selected of the topseed and fallow seed mixtures of heavy soils, and must be of early and rapidly growing plants and grasses.

SECTION LXXVIII.

SELECTION OF THE STUBBLE MIXTURE FOR LIGHT SOILS.

The plants for light soils, in the stubble, are selected from the topseed and fallow mixture used on light soils.

SECTION LXXIX.

ON THE APPLICATION TO THE STUBBLE MIXTURE.

If we carry on the green manuring of the topseed and the fallows, the strength of the soil will increase visibly, and with the larger produce of the fields the dung manuring will also be larger. The next consequence will be that the fallows will entirely cease, that they will be cultivated with manured crops. But the means whereby we have obtained this great strength, the collection and cultivation of the serviceable seeds will be continued, while the collection is once in vogue, and consequently will be only left yet for the green manuring of the *Topseed* and the *Stubble*, as it is difficult thus in the beginning to introduce the stubble manuring, since after harvest too many other employments accumulate on a farm, so that we might give the stubble, as soon as pastured off, a ploughing for sowing the stubble mixture, it

will, on the contrary, become easy to introduce it after a few years, while by the green manuring of the topseed and of the fallows, the produce of grain and of fodder and pasture will increase itself, whilst the plough work and produce of fallows will decrease by the mallowing of the soil, which we will receive by the green manuring. But the richer in dung, the more fermenting and warmer the soil will be made by the alternate plant and stable manurings, as the time in which the plant mixture grows to its full strength will be shorter, and consequently the stubble mixtures more applicable. They will finally take the place of the fallow mixtures, and can be cultivated by their change with topseed mixtures, and with the manuring of the clover and pasture mixtures, each following crop on a green manuring, so that the strength and the produce of the soil can be constantly increased.

SECTION LXXX.

A FEW REMARKS ON THE CULTIVATION OF THE DESCRIBED PLANTS AND GRASSES IN THE GARDEN.

We discover by the former treatise, that in the stubble mixtures, the seeds of the perennial and of the annual plants, consequently the plants of the topseed and of the fallows, which blossom in May or June, are naturally of a rapidly growing kind, and must be sowed together; it also will be clear, that after a few years the collection of the wild seeds will no longer be sufficient; for this purpose a garden (or piece of ground) would be the most suitable for the convenience and cheapness to obtain the seeds. But, in such a cultivation, there should prevail a certain order, whereby we may facilitate the matter. We can divide different families in *single shrubs or bushes*, others in *hedges, groups or in beds*. These four different modes of cultivation, I will more definitely describe; each plant family can be marked by a piece of board with the mark of its name.

SECTION LXXXI.

THE CULTIVATION OF SINGLE BUSHES.

These are such plants as have a spreading growth; for instance, the Umbelliferous Plants, or such as generally grow on bushes or sticks, like Peas, Beans and Vetches, of which we can conveniently pick seeds.

SECTION LXXXII.

THE CULTIVATION IN LINES OR HEDGES.

For this we take such perennial shrub plants, the seeds of which belong to the principal part of the topseed mixture, and which, at the same time, are of an erect and bushy kind, and remain green and fresh during the summer. On hedges we raise, for instance, the *Meadow Rue*, *St. John's Wort*, *Catnip*, *Balms* and *Horse Mint*, *Lucerne* or *Medick*, *Sainfoin*, the various kinds of *Trefoil* (Clover,) kinds of *Mugwort* and *Wormwood*, *Tansy*, *Showy Aster*, *Winter Sunflowers*, *Rudbeckia* or *Coneflower*, the various kinds of *Tickseed*, *Sunflower*, *Elecampane*, *Leaf Cups* and *Rosin Plants*, &c.

SECTION LXXXIII.

THE CULTIVATION IN GROUPS.

These are of the "Topseed Plants," the following: various kinds of *Large Docks*, *Mulleins*, *Evening Primroses*, *Viper's Bugloss* or *Blue Weed*, *Bellflowers*, *Dyer's Weed*, *Speedwell*, *Larkspur*, *Great Burnet*, *Devil's-bit*, *Morning Bride*, *Wild Pink Plants*, *Catchflies*, *Sandworts*, *Flax* and *Wild Flax*, *Wild Garlics*, *Stone Crop*, (Sedum) *Sages*, *Hedge Nettles*, *Germanders*, *Treacle Mustards*, *Hedge Mustards*, *Woads*, *Alyssum*, *Mal-low Plants*, *Crane's-bill*, the kind of *Melilotus*, *Fuller's Teasel*, *Knapweeds*, *Hawkweeds*, *Chamomiles*, *Yarrows*, etc. Of these plants we cannot form very dense plant hedges, and, therefore, it is better to raise them in groups.

Of the "Fallow Plants" are the following, which we raise in groups in order that their seeds may not be spread further, and that they may sow themselves again on the places where they stand; as for instance the *Lamb's-quarter*, the *Goosefoot*, *Amaranth*, *Jamestown Weed*, *Henbane*, *Knotweeds*, *Common Flax*, *Summer Pink Plants*, *Summer Catchflies*, *Summer Sandworts*, *Summer Devil's-bit*, *Summer Umbelliferous Plants*, *Elsholtzia*, *Toad Flax*, *Mustards*, *Hedge Mustard*, (annual) *Treacle Mustards*, *False Flax*, the different *Summer Cresses*, *Summer Mal-low Plants*, *Lupines*, *Cockle Burs*, *Saffrons*, *Batchelor's Buttons*, *Dock Cresses*, *Lettuces*, *Summer Chamomiles*, *Burr Marigolds*, *Sunflowers*, *Velvet-flowers*, *Strawflowers*, etc. Whether a farm be small or large, this order of cultivation of plants for the Green Manuring will always be useful. A farm of 150 to 200 acres, requires for their cultivation only square yards, and

farms of 1000 acres square roods. But these plants having a fixed place in the Garden, we can keep just as easily hundreds of them as 10 or 20 kinds. Plants of this kind, however, with copious seeds, and especially the annual and perennial, will impoverish the ground, at least where they stand; we need only manure such places, sometimes, with the plants of their own seeds, viz: dig them under and they will grow again as powerful as before; for they generally fill the ground with their own seed. Every farmer will also be convinced that by these modes of cultivation for the Green Manuring, he can arrange for himself the cheapest and most convenient management.

SECTION LXXXIV.

THE CULTIVATION IN BEDS.

This mode of cultivation is especially applicable to the *Grasses* which we need partly for the Green Manuring, and also for the Fodder and Pasture mixtures, inasmuch as the collection of the wild plants is no longer sufficient. For in the fields we must cultivate only such plants of which the seeds do not fall out, as for instance the *Clover*, *Lucerne*, *Hedysarum*, and *Timothy*; for these we keep a clean soil. Only the kinds of Grain and Hull crops fall out a little if we cut or mow them at the right time. The most of the Topseed and Fallow Manuring plants, loose their seeds very easily, so that we would pollute our fields forever, if we were to cultivate them in any other way than as I have just described. This especially is the case with the *Grasses*. For the quietly laying swaths of fodder and pasture grasses, let their seeds fall out by the mere change of dew and sunshine; and if we should rake these swaths together, and load them up like oats or barley, there will remain nearly nothing by the time we get them to the barn.

All these disadvantages we can avoid, by cultivating the most preferable grasses of the Green Manuring and fodder, and pasture, which are not frequent enough to collect from the wild plants, on four feet wide beds in rows; the large or the mow grasses in three rows, and the smaller or pasture grasses in four or five rows with two feet wide walks between these beds. By this each kind of grass receives its bed, and we can cut off the seeds, when ripe, under the ears. The grass itself can be applied for feed, after having mowed it and taken

off the seeds; the most kinds of these grasses will bring another crop of seeds in the same season. We can also keep clean the intervals of the grass lines, by hoeing and manuring them over. But this must not be done with stable manure, for it produces only herbage, and few and imperfect seeds. The best manuring, therefore, is to increase the seed production by equal parts of mould and lime; and to procure this cheaply, we make a pile of young green weeds that contain no seeds, mix the lime with them, and let them rot.

SECTION LXXXV.

RETROSPECTIVE VIEW OF THE SECOND PART.

What the *cultivation* in the gardens effects on a larger produce of such a surface, in cheapness, compensates the collection of the wild seeds, as we need only to gather them, so that the cost of seed per pound will not average over three cents. As I have fully shown the improved Green Manuring of the soil requires not more than five to ten pounds of seed per acre, consequently the cost is only from fifteen to thirty cents per acre. It is further proved that these seed mixtures produce a mass of green per acre of 5,000 pounds dry weight, consequently a strength of 10,000 pounds manure; and that this green mass is formed at the half of the ground, and air nourishment, what by all experience is ascertained. This green mass produces a real *increase* of the manure in the soil of 2,500 pounds dry weight of herbs, or the strength of 5,000 pounds of manure.

B.]—This manuring strength can be very easily doubled by the repeated application of this Green Manuring; consequently it will give them a real *increase* of the manure at 5,000 pounds dry weight, herbage, or the strength of 10,000 pounds of manure.

C.]—The strength of 1,000 pounds of manure, or a small load, is in the first case, from five to ten pounds of seeds, at three cents, or not more than six cents, including sowing. In the last case the strength of a load of manure costs no more than three cents, and it is sufficiently proved that such cheap manuring can be used between all field crops, and this without any interruption or alteration in the common way of farming, consequently a more rapid increase of produce, of grain and fodder can be effected, than could be done by any other mode of manuring. There remains yet to show the influence of this Green Manuring on the fodder and pasture cultivation. This consists in the mixtures of the improved Green Manuring, being constituted partly by the *collection* of the wild seeds of all kinds, and partly, also, by the *cultivation*; consequently, in all and every respect, it extends to the local *school* of the improved fodder and pasture cultivation; for it delivers to the farmer not only the “seeds” but also the greater “manuring strength” of the soil, and teaches him to select the composition of the most productive “plant mixtures,” whereby the fodder and pasture cultivation are to be improved, according to the laws of nature, and to the constant promotion of the farmer.

PART III.

ON THE IMPROVED FODDER CULTIVATION.

NATURAL SIZE OF A SQUARE HAND, DIVIDED INTO TWENTY-FIVE FODDER
CULTIVATION SEED INCHES.

MEASURE OF FOUR INCHES SQUARE.

SECTION LXXXVI.

How Nature nourishes the Animal.

A glance at the different pastures of our domestic animals, shows that they are not appointed on *single* kinds, but on a large variety, and on a *mixture* of plants. On the wild field and wood pastures we can count hundreds of plants which are eaten by the domestic animals; and if we would follow them in order to specify all these different plants, and the particulars under which they eat them, it would lead us to several useful disclosures. There is, however,

a difference between the roving animals in the wilderness, as they are compelled to pasture themselves, and those that are nourished, and kept on good healthy pastures. For the improvement of the fodder cultivation we have to take only for a specimen the richest natural pastures, which give the most milk and butter, or such which fatten the most rapidly, and the richest natural pastures for sheep which deliver the most and finest wool, consequently, by selecting the grasses and herbs of which they are mixed. For this it is also necessary to know the—

Proportion of the Kinds of Grasses and Herbs on the Meadows and Pastures.

SECTION LXXXVII.

If we examine the richest and most superior of the natural meadows and pastures, we will find that they consist of at least from twenty to thirty grasses and herbs; and that the poorer a meadow or pasture is, the smaller will be the number of kinds of plants. Among them are generally many weeds, and the number of the superior fodder-plants on the richest natural meadows and pastures amounts only to from twenty to thirty kinds of grasses and herbs. Of this each farmer can convince himself the best, if he will make a *Herbal* of his pastures and meadows; and if he then finds that the richest meadows and pastures contain also the most kinds of grasses and herbs, the natural reason will be, that in the single plants lie only *single* ingredients of the animal bodies; consequently, if the animal shall be well nourished, his food must consist of a mixture of many wholesome kinds of plants—for only such a mixture can contain all the necessary fodder materials that are necessary for the animal bodies. On the meadows and pastures of the middle kind we find often from five to ten kinds of grasses and herbs, which are superior fodder and pasture plants, but also a great quantity of weeds and injurious plants. On poor and sour pasture and meadows they are yet more numerous, and the good grasses are often not present at all, so that the animal is left to its own instinct to eat the best of the grasses. So it is with the proportion of the grasses and herbs one to another, for we find generally on the richest meadows and pastures that the clover is never absent, but that the grasses overpower the herbs, which evidently shows—that the grasses are more wholesome and advantageous than the fodder-plants; for otherwise the richest natural pastures would consist of the greater part of fodder-plants, and the reason of this is, that in the grasses more sugar and starch are contained. On an average, we will find on the best and first-rate meadows and pastures, the proportion of the grasses to the herbs to be ten to one; but the poorer the natural meadows and pastures are, the more the weeds and the sour-grasses overpower the sweet grasses, and so it is

on poor, impoverished fields which we intend for pasture. In the commencement we find among ten weed plants scarcely one grass plant, until finally the grasses increase themselves. But the agricultural fodder cultivation is generally yet only sowed of herbs, for instance—Clover, Lucerne, Medysarum, etc. The only reason of this is, that the soil is too impoverished, and not kept in sufficient fermentation; and by the different matters in the crops we raise, the grasses cannot prosper, and consequently this can only be remedied by the improved green manuring.

SECTION LXXXVIII.

The number of Plants on one square foot of the Meadows and Pastures.

The richest meadows and pastures are so densely covered with grasses that we cannot count the number of their plants on a square foot, otherwise than by carefully dissolving in water a square foot of sod, so as to separate the plants with their roots. We can generally find on one square foot at least 1000 single plants; consequently on one square hand 100 plants; and to give the reader a representation, the figure and the division of the square hand before the fourth part will serve; for here is the square hand divided into 100 parts, or into *pasture-seed inches*, so that if on each of these seed inches stands a plant, the density of the richest meadows and pasture is given. On inferior pastures or meadows, where we can only count, on one square foot of our acres, about 500 plants, and on the square hand about 50 plants, the reader can make himself acquainted with the density, by the figure and division of the square hand before the third part, as this figure is divided only into 25 parts, or *fodder-seed inches*, so that on each, *two* plants come to stand. But where we find on this space of the fodder-seed inch only one plant, there will be on the square foot 250 plants, or on the square hand 25 plants. The strength of the natural meadows and pastures is then so much weaker, and they are either sour or of inferior force and mixtures of the soil.

On the clover-fields, or on the sowed pastures, we can count the plants without trouble, if we measure a square foot, for they have only (after the general seeding of clover) on a square foot from 45 to 50 plants, and on a square hand from 4 to 5 plants.

SECTION LXXXIX.

Examples on the Pastures.

It is certain that cattle naturally feed upon good low, or upon the best mountain pasture, when placed on dry and sandy pastures they can be sustained, but are obliged to pass over a large tract of ground, to find the mixture of grasses and herbs which are necessary for their nourishment, while on good low pasture such a mixture is found on one spot. But if cattle are inclosed on any pasture where they do not find the right mixtures, they will become restless, and consequently endeavor to hunt fodder elsewhere.

The same happens with sheep. They will often rove over large spaces—such as fallows, stubbles, wood-pastures, etc.—in order to hunt mixtures of their grasses and herbs; for when they can not get a variety (or a natural pasture) they will yield less and inferior wool; and if they are kept too long on pastures which consist of too few of the prospering kinds of plants, for instance the white clover, they will get sick, take the diarrhœa, and even die, as the various kinds of clover contain too much gum, and therefore will be decomposed by the grasses, which generally contain more starch and sugar.

SECTION XC.

Example on the Fodder and Clover Pasture.

It is known that we can keep well cattle on green clover; but it is also known that straw fodder is necessary, and if not given them they will pull it out of the manure-hills and eat it; consequently as clover is too nourishing, it must be mitigated by straw; and who does not know the reason of the swelling up from clover fodder and pasture? This shows that the animal will be nourished by a *mixture* of fodder plants, and not by a single kind—not even clover. It is also known that good stable feeding does not yield as great a quantity of milk or butter as on good pasture, for the reason that the cows find on a good pasture the proper mixture, which we can not give them in the stable, for the mixtures of the richest pastures consist nearly all of the best *grasses*, and in the stable they generally receive only fodder plants. Thus a great difference exists between summer and winter butter, also between wool during the summer and the winter.

When the cows and sheep are poorly taken care of in the winter, which being longer than the summer, the farmer loses the greater part of the animal produce, if he is not sufficiently provided with various selections of fodder, equal to the mixture of good meadows and pastures, (or meadow hay,) and for sheep with fine hay from the best sheep pastures.

SECTION XCI.

Review of the Winter Feeding.

The straw on most farms becomes the greatest part of the winter feeding, but as it has very little strength, the animal production is also very little during the winter. To remedy this defect, some farmers will add fruits, as *potatoes*, all kinds of *turnips*, etc., whereby the straw will certainly be fed with more advantage, and be more nourishing, but such fruits are generally too expensive, if they be fed instead of hay, as they cost *three times* as much to produce as the hay, which cannot be replaced by them after all. *More hay* must consequently be cultivated. As this, however, would bring disturbance in the whole farm, and cause damages and losses in the income, should we make a change on our farms and give more land for fodder cultivation; we must therefore render the production of hay larger *from the same surface*—make the acre yield more loads.

SECTION XCII.

Reason for the Improved Fodder Cultivation.

The production of fodder per acre can be made *larger* and *cheaper* by two different modes, without any necessary change in the farming; first, by the improved green manuring, as it increases the strength of the soil, and these green manuring mixtures can be laid in between all crops; second, by the improved fodder cultivation the animals will be better nourished. But this reason is no other than the *producing*, that is, the matter-increasing vitality in the green plant, and as now in a *mixture* of many plants, used for the green manuring of the soil; and likewise in a mixture of many more advantageous for the nourishment of animals, the producing vitality is *greater* than in a “single” manuring or in a “single” fodder-plant; thus the mixture by itself is the original cause of the larger produce per acre, as each kind of plant has another appropriate condition, and another connection of matter from the

ground and air nourishment. But as this cannot be denied, the consequence is, that the fodder cultivation must give or produce so much more per acre, the more fodder-plants, suitable to the soil, are mixed together. Therefore, the reason of this improved fodder cultivation is no other than that of the *mixed plant cultivation*.

SECTION XCIII.

The Object of the Mixed Fodder Cultivation.

The object is to obtain more perfect nourishment for *animals*; this will be, indisputably, the better, the more the soil is manured by plant mixtures of a variety of different kinds, as it nourishes the plants of the field-crops and the fodder cultivation, and by these the animals; and thus promotes in every respect the advantages of the farmer.

The soil must be put in a good state before we can introduce an improved fodder cultivation, and therefore the improved green manuring must be first introduced; then the mixtures will also prosper the fodder cultivation much sooner and quicker; they nourish the animal more perfectly, and more conformably to nature, and produce also a better animal manure, and a mixed fodder cultivation by a variety of matters, (when ploughed under,) a better sod manuring to the soil. The process whereby nature thus nourishes the animal, by which the farmer can procure himself a far larger animal produce, especially on his winter *fodder*, consists, in one word, in the *mixed fodder cultivation*.

A mixed fodder cultivation is, however, in use among farmers, and is carried on in different modes; yet we must remark that our object is only the improved mixed fodder cultivation; and these different modes consist in the mixed fodder cultivation of one year—in the two and *three years*, or clover-grass cultivation—and in the artificial pasture cultivation of many years.

SECTION XCIV.

Of the Mixed Fodder Cultivation for One Year.

We sow all kinds of fodder grains, for instance, rye, with oats or barley, or peas, vetches, beans, sweet clover, turnips, buckwheat, corn, etc. But this kind of mixed fodder is too *expensive*—while its seeds are saleable, and while it produces only one swath. It is moreover very coarse, even when young; and if we allow it to get half or fully ripe,

it impoverishes the soil, and injures the following crop.

SECTION XCV.

The Plants of the Annual Mixed Fodder Cultivation.

The annual fodder mixtures are always the best, as they are generally of a rapid growth, and as some of them have been in use, but they generally are considered as shift fodder; while the two and three years' fodder mixtures are in all respects more agricultural. Where we wish to raise such a mixture of winter fodder, we mix all kinds of grain and shell-fruits with white sweet clover, (*Melilotus Vulgaris*,) by which it will be cheaper, denser, and more yielding; for the white sweet clover will grow at least a foot high the first year.

To give an example of an annual fodder mixture, the following will be of service, as it will yield the most. It is generally sowed as dense as a rye-field, and, on account of the heat of the summer, we give it a shady proportion of $\frac{2}{3}$ shell-plants and $\frac{1}{3}$ grasses, that is, 2 to 1.

Beans,	per lb.	1,000 grains,	62½ lbs.
Peas, (small,)	"	5,000 "	50 "
Vetches,	"	10,000 "	25 "
Buckwheat,	"	15,000 "	16½ "
Sweet Clover,	"	200,000 "	3 "
Summer Rye,	"	20,000 "	6½ "
Barley,	"	20,000 "	6½ "
Oats,	"	20,000 "	6½ "
Millet,	"	200,000 "	2½ "

An acre requires about 178 lbs.

For such an annual mixture we have the same expense as for a *grain-field*, and it is only yet a shift-fodder—which, however, does not equal a clover-grass mixture.

SECTION XCVI.

Of the Two and Three Years' Fodder Cultivation Mixture, or the Clover-grass Mixtures.

Where the clover is good, and remains from two to three years sufficiently thick to be cut, or for pasture, we would not recommend to mix it with grasses, but where it decreases in its produce, some farmers commence to mix it with grasses—one takes *timothy*, another orchard or soft grasses, etc., just as they are used to the one or the other. The advantage with

the clover-grass mixtures is, that we mix the clover with such fodder plants and wholesome grasses as grow on soils where the clover cannot. Secondly, as the clover grows thicker, and yields more pasture, it is thus very natural that we must mix it with more fodder plants and grasses, which will grow on such places where clover does not grow, (or but poorly); and such a mixture will yield the more in loads and pasture, the surface will be the more thickly covered to be ploughed down, the greater the variety of fodder plants we mix with the clover.

Some farmers might be willing to mix more fodder plants and grasses with clover, if they had the seeds conveniently at hand. To write to seed merchants, is much too expensive and uncertain. This is, however, only necessary for the commencement, where the fodder plants and grasses do not grow on his farm and neighborhood. We often receive seeds, which, by laying too long, will not germinate, but by procuring seed of our own collection or cultivation, we need have no fear that they will not grow, as I have described before the mode and cheapness of cultivation. There is also a difference between the clover grass mixture *before* and *after* the introduction of the green manuring; for the former, such kinds of plants must be selected which increase the produce immediately on the soils, weakened by too frequently cropping.

SECTION XCVII.

On Clover Grass Mixtures BEFORE the introduction of the improved Green Manuring.

The most preferable fodder plants are *Clover*, *Lucerne*, *Hedysarum*, and also such which we can collect wild, as the *Yellow Lucerne*, (*Medicago Falcata*), the *Sheep-burnet*, (*Poterium Sanguisorba*), *Anise*, (*Pimpinella Saxifrage* and *Magna*), the *White* and *Yellow Sweet Clover*, (*Melilotus Vulgaris* and *Officinalis*), etc. All these fodder plants will grow for two years on each soil, and the third year they decline like clover, but still they yield better the third year, than clover alone. To this mixture we should add some four or five of the fodder grasses, which I have described in the previous part. The yield of such an acre will be large. I will, however, in the following review, also specify the fodder plants and the most profitable wild, mow, or fodder grasses, which we can use for the mentioned clover grass mixture.

I will here give a list of the plants and number of grains in one pound.

SECTION XCVIII.

Review of the kinds of Plants of the Clover Mixture BEFORE the introduction of the improved green manuring.

A.]—*Mow Plants.*

	Number of Grains.
1 lb. Red Clover, (<i>Trifolium Pratense</i>),....	200,000
1 " Lucerne, (<i>Medicago Sativa</i>),.....	200,000
1 " Hedysarum, (<i>Hedysar. Onobrychis</i>),..	25,000
1 " Yellow Lucerne, (<i>Medicago Falcata</i>),	300,000
1 " White Sweet Clover, (<i>Melilot. Vulg.</i>),	200,000

B.]—*Mow Grasses on inferior soils.*

1 lb. Wheat Grass, (<i>Triticum Caninum</i>),...	100,000
1 " Orchard Grass, (<i>Dactylis Glomerata</i>),	400,000
1 " Meadow Fescue Grass, (<i>F. Pratense</i>),	200,000
1 " Soft Grass, (<i>Holcus Avenaceus</i>),.....	200,000
1 " Hairy Oats Grass, (<i>Avena Pubescens</i>),	500,000
1 " Meadow Oats Grass, (<i>A. Pratensis</i>),..	500,000
1 " White Timothy, (<i>Holcus Lanatus</i>),	
Velvet Grass,.....	3,000,000

C.]—*Mow Grasses on superior soils.*

1 " Timothy Grass, (<i>Phleum Pratense</i>),...	800,000
1 " Tall Fescue Grass, (<i>Festuca Elation</i>),..	200,000
1 " Ribban Grass, or Reed Canary Grass, (<i>Phalaris Arund.</i>).....	500,000
1 " Cheat, (<i>Bromus Gigantus</i>),.....	100,000
1 " Spear Grass, (<i>Poa Trivialis</i>),.....	1,000,000

The one or the other of these fodder and pasture plants grow wild almost everywhere, and, if in the commencement, we have only two or three of the fodder plants and the same number of kinds of grass seeds at hand, they yield far more hay than the clover alone.

SECTION XCIX.

Of the density of the Clover mixture and the agricultural measures of its estimation and seed calculation.

There can certainly grow more fodder plants on the square foot, where they consist of many different kinds of plants, than of a single one; but they do not grow so compact on poor as on rich soil, as the nourishment on the former is not sufficient; they may grow denser on a poor soil under certain cir-

cumstances, viz: if they are to remain only small, as for pasture or green manuring, but they will not answer for mow fodder or grain crop, as they have to grow higher, and require consequently more nourishment of the soil, than a pasture or a green manuring mixture. Of the middle soil, we can conclude from the poor and the rich soils, and, therefore, it is necessary to know how many grains of clover we generally sow on the square foot.

A.]—Density of the usual seeding of Clover.

It is generally known, that we sow, at the highest rate, eight pounds of red clover to the acre, and under favorable circumstances on rich soils, only four to six pounds; as 1 pound contains 200,000, and the six pounds 1,200,000 grains per acre, or on the square hand, from forty to fifty grains, which is the usual sowing of clover on a middle soil, on an average; to this some farmers mix a small quantity of timothy seed, so that the quantity of seed at the highest rate may reach from sixty to eighty grains per square foot.

B.]—Density of the Clover Mixture.

To mix the clover with different mow grasses and mow plants, we can sow it thicker; but if it is too thick on an inferior soil, it will not be fit to be mowed, and will remain small, like pasture. For before the introduction of the green manuring, the soil being too much impoverished by the grain crops which are wanted to the nourishment of the fodder plants, and besides, not sufficiently mallow and fermenting, even on the richest soils, we dare not sow the fodder mixtures thicker than the green manuring, viz: at 200 grains on one square foot, and on inferior, yet thinner, while the clover mixtures otherwise, will not be mowable. The gradation for the density of the seeding is, therefore, the following, viz:

Inferior soils	at 10	grains to the square hand, or	100	grains to the square foot.
Middle soils	" 15	" " " " "	150	" " " "
Rich soils	" 20	" " " " "	200	" " " "

The greater the strength of the soil is, the more grasses we can mix to the clover, while the vigorous soil, the more grasses it contains, the larger the yield; the inferior soil, consequently, requires more herbs, so as to make the yield larger, and, therefore,

the gradation of the mixture *before* the introduction of the green manuring, is as follows:

On inferior soils 1 grain of the fodder plants to 1 grain of the Mow Grasses.										
Middle soil	1	"	"	"	"	2	"	"	"	"
Rich soil	1	"	"	"	"	4	"	"	"	"

Thus, we sow on the square hand of the inferior soil, five grains of fodder plants and five grains mow grasses, and on the middle, five grains of fodder plants and ten grains of the mow grasses, and on the rich soils, five grains of fodder plants and fifteen of the mow grasses.

C.]—On the Produce.

For the usual clover seeding, at the rate of from four to five grains are needed on the square hand of the middle soil, about three times more seed for this mow mixture, and on the inferior soil *before* the introduction of the green manuring, from eight to ten grains; on the middle soil, twelve to fifteen grains, on rich productive soil, sixteen to twenty grains; and *after* the introduction of the green manuring, gradually with the increase of the strength of the soil, to the highest, forty to fifty grains on the square foot are mowable. But therewith, if all is rightly managed, a large increase of produce will be the issue. It is quite a correct calculation, that the acre produces more hay, the more grains are mowable on the square hand.

But this rests on three reasons: First, on the strength of the soil; second, on the mixture; and third, on the density of the plants. When these three things are correct, the yield will be 500 grains on one square foot, which are mixed by the above position founded upon experience, *ten times* more hay per acre, as 50 grains on a square foot of the clover alone at the usual seeding.

SECTION C.

Example of a Hedysarum Mixture on gravelly dry soil.

As the clover does not prosper so well on gravelly and dry soil, and the Hedysarum does so much better, we can use it as the main quantity in the mixture, according to the following mixture, at the rate of 10 lbs. per acre.

Hedysarum,	40	lbs. containing per lb.	25,000	grains.
White Sweet Clover, ..	1½	" " "	200,000	"
Lucerne,	1½	" " "	200,000	"
Yellow Lucerne,	5/6	" " "	300,000	"

Sum of lbs.43½

Mow Grasses.

Wheat Grass, (<i>Triticum Caninum</i>),.....	1½ lb.	3 lb.	100,000 grs.
Brome Grass, (<i>Bromus Erectus</i>),.....	1½ “	“	100,000 “
Meadow Oat Grass, (<i>Avena Pratensis</i>),.....	1 “	“	500,000 “
Meadow Fescue Grass, (<i>Festuca Pratensis</i>),.....	§ “	“	200,000 “
Soft Grass, (<i>Holcus Avenaceus</i>),.....	1½ “	“	200,000 “
Orchard Grass, (<i>Dactylis Glomerata</i>),.....	§ “	“	400,000 “
White Timothy, (<i>Holcus Lanatus</i>),.....	1½ “	“	3,000,000 “
Sum of lbs.....	5½		

This mixture yields only a short but very dense hay, and can be mowed twice before blossoming. Towards the Hedysarum alone it gives one swath and will produce three times more, and will give also a better pasture after it. For the commencement we can procure such fodder grasses and herbs which grow along the field borders, etc., to any height, tall or low, and mix it with the Clover or Hedysarum; and the other kinds which do not grow wild on such or other places, we can write for and increase them on the garden bed.

SECTION CI.

Example of a Clover Grass Mixture on the middle soil.

Here is the Clover, the main quantity of the mixture, and the following mixture at the rate of 5 lb. per acre.

Clover,	5 lb.,	containing per lb.	200,000 grains.
Lucerne,.....	1½ “	“	200,000 “
Stone Clover,.....	1½ “	“	200,000 “
Yellow Lucerne,.....	5 “	“	300,000 “
Hedysarum,.....	10 “	“	25,000 “

Sum of lbs.....18½

Fodder plants on the middle soils will be already mowable; also, the *Timothy*, *Tall Fescue Grass*, *Ribbon Grass*, *Field Brome Grass* and *Spear Grass*. If they are sowed with the clover in the barley or oats, but especially if the mixture is sowed on the winter grain, and if we can bring together of the wild collection and of the cultivation even only the half, viz: five mow grasses, which make quite a dense swath, the soil improves and the more grasses we can add. The grasses grow up between the clover and fodder plants, without hurting the produce of them; while these fodder plants mostly root down in the depth, but the grasses only in the surface of the soil, and so we have the produce of the grasses

almost as an addition. If we, therefore, on a clover soil of a common good produce add a mixture of good mow grasses, the acre will produce *double* the loads, and if to the clover the mentioned fodder plants are added, the yield will be still larger. But if the soil is not vigorous enough, we can only sow an equal number of grasses, as follows:

Wheat Grass, (<i>Triticum Caninum</i>),.....	2½ lb. or	100,000 grs.
Soft Grass, (<i>Holcus Avenaceus</i>),	1½ “	200,000 “
Meadow Fescue Grass, (<i>Festuca Pratensis</i>),.....	1½ “	200,000 “
Orchard Grass, (<i>Dactylis Glomer</i>),.....	§ “	400,000 “
Ribbon Grass, (<i>Phalaris Arundinacea</i>),.....	½ “	500,000 “
Timothy Grass, (<i>Phleum Pratensis</i>),.....	5 “	800,000 “
Spear Grass, (<i>Poa Trivialis</i>),.....	1 “	1,000,000 “
White Timothy, (<i>Holcus Lanatus</i>),.....	1½ “	5,000,000 “

Sum of the Fodder Grasses,..... 6½ lbs.

Sum of the Fodder Plants,.....18½ “

Amount in full,.....25½ “

Without the 10 lbs. of Hedysarum,....15½ “

By the collection or by the cultivation of the grass seeds, especially the larger grasses, that grow wild along the borders of his fields and other places, every attentive farmer will see what on his soil is inclined to grow, and he can, therefore, very easily increase the produce of his clover mixture. But I repeat it again, if we mix even only three fodder plants and three good mow grasses, the production will be three times larger than the clover alone.

SECTION CII.

Example of Lucerne Mixtures on warm, dry middle soils.

In warmer climates the *Clover* often does not yield so well, more than can be made use of. The *Lucerne* is used instead of the clover, to the two and three years fodder cultivation of the rotation crops; but the more inferior the soil, the larger it leaves vacant places, and even on deep rich soils it will not stand closed; but if we mix it with Clover and Hedysarum and several mow grasses that grow along field borders, etc. wild, where the Lucerne shall be cultivated, then the result will be that this Lucerne mixture directly in the first year, sowed as topseed in the grain, that it grows a far stronger fall pasture, and in the second year to rich swaths, whilst the common Lucerne remains yet small; but in the third year it will be still stronger. Towards the

mere *Lucerne*, will be therefore that difference, more than three times larger, a far better hay, and a stronger manure by ploughing it finely under. The *Lucerne* makes here the main quantity in the mixture, but sowed only from four to six grains to the square hand.

SECTION CIII.

Examples of Clover Grass and Lucerne Mixtures on rich soils.

Farmers having rich soils are generally satisfied with the production of their clover-fields, and even proud of the yield, that they do not believe of a greater yield per acre. But I wish them only to try it once, to mix the clover with good grasses. The reasons why the clover cultivation of the rich soils should be mixed with different grasses, are the following: on rich soils the clover in growing season becomes too luxurious, and thereby lodges and becomes difficult to mow and cure, and in consequence, a great deal is left on the ground; and to mow it three times in succession, it becomes also too light, and to sow it thicker, as from five to six pounds to the acre, it will still become more inconvenient to mow and cure, as it will lay down the more.

A.]—A Rich Clover Mixture.

To avoid these disadvantages of an excessive luxurious soil, we must mix a larger variety of grasses to the clover: for instance, the following:

Clover,.....	at 4	grs. per square hand,	5	lbs. per lb.	200,000	grains.
Lucerne,.....	at 1	"	"	1½	"	200,000
Hedysarum,.....	at 1	"	"	10	"	25,000
		<hr/>				
6 grains,		16½		lbs.		

The sum of the fodder plants, six grains to a square hand, and sixteen and a quarter pounds.

The Mow Grasses to be mixed, are the following, viz:

Tall Fescue Grass,...	2	grs. per square hand equal	2½	lbs. or	200,000	Grs. per acre.
Meadow Fescue Grass, 2	"	"	"	2½	"	200,000
Soft Grass,.....	2	"	"	2½	"	200,000
Foxtail Grass,.....	2	"	"	1¾	"	350,000
Orchard Grass,.....	2	"	"	1½	"	400,000
Ribbon Grass,.....	2	"	"	1	"	500,000
Timothy Grass,.....	2	"	"	¾	"	800,000
Spear Grass,.....	2	"	"	¾	"	1,000,000
Red Top Grass,.....	2	"	"	¾	"	1,500,000
White Timothy,.....	2	"	"	¾	"	3,000,000

Fiarin Grass,.....	2	grs. per square hand equal	½	lb. or	4,000,000	Grs. per acre.
Tufted Hair Grass,...	2	"	"	"	1½	" 6,000,000
Sum of the Fodder Grasses	24	grs. per square hand and	12	lbs. per acre		
" " Fodder Plants, 6	"	"	"	16½	"	"
Making together 30 grains,				29½	lbs. per acre.	
Without the 10 lbs. of Hedysarum, thus only				19½	"	"
And by a larger application of the last six grasses only				10½	"	"

This mixture will produce luxuriant crops for years in succession.

B.]—A rich *Lucerne* Mixture in good soil and AFTER the introduction of the Green Manuring.

Here the *Lucerne* is the main quantity in the mixture, as will be seen in following:

Lucerne,.....	at 6	grs. per square hand	7½	lbs. per lb.	200,000	Grains.
Clover,.....	at 2	"	"	2½	"	200,000
Esparsetta,.....	at 1	"	"	10	"	25,000
Sum of the Mow Plants, 9				20	lbs. per acre.	

The mixture of the mow grasses is the same as in the former; but we take here four times as many grasses as mow plants, namely, 36 grains to the square hand, which will contain 20 pounds, making, together, 45 grains to the square hand, and 40 pounds.

The sowing of such mixtures in summer grain is like that of a green, vegetable, manuring mixture. First, the summer grain is to be sowed and once harrowed; after this, the large grained part of the mixture is sowed and harrowed the crossway; then the small grained part, and rolled in. But both parts must be mixed with sand, and it must be sowed crossways, broadcast. Such a dense mixture, although sowed on a rich soil, and on a green manuring which has been ploughed under, still does not grow up in the summer grain, as the mere clover does, but remains low while it stands so dense. After the harvest of the grain, it will give an excellent stubble pasture, and we can often count on the square foot from 350 to 400 plants. The next year the clover and the grasses in the mixture will replace that which the *Lucerne* generally remains back in the first mow year, while it completes its growth, first from the third to the fifth year, which is also the case with some of the mow grasses. For the variety of the mixture, we will receive at least three heavy swaths in one season, a rich after pasture, and the number of the plants will still increase by the sprouting of stalks. In the third year, we will receive four cuts,

which, however, must be mowed always before blossoming; the hay and the fodder are also of much more value than the Lucerne alone, in respect to their strength and nourishment, as the mixture will endure many years.

SECTION CIV.

The Clover Grass Mixtures, AFTER the introduction of the Improved Green Manuring.

The clover, and all the rest of the fodder plants and grasses, last not longer than from two to three years on our fields, which are yearly impoverished by our field crops, besides the year included in which they are sown. The reason of this is, that they find only for this length of time their nourishment in the soil; now, if their nourishment is not increased, they will never last longer.

By the mere stable manuring, this increase of strength is not at all possible, which the present system of agriculture entirely shows; but a combination and alternation of our green manuring with the large dung manuring, and the sod manuring of the clover grass mixture, are necessary, as we will explain here.

The stable manure has the following effects towards the green and the sod manuring: it falls lumpy, and not deeper than the plough lays it, remaining, therefore, only on the surface of the ground, which, by the crops, is soon again impoverished; it acts, also, too luxuriantly, and to apply it frequently is much too expensive, while it can arise only from the fodder, and is consequently only a producing manure, like the plant mixtures. But our plant *manuring mixtures* amend this defect, as they need no fodder, since they are produced by the seed grains, which enrich the soil for the half of its masses of that part, which they draw from the air nourishment. Besides, they grow through the soil, penetrate it with their roots, and manure it, also, with more different kinds and deeper than stable manure, as they consist of mixtures of all kinds of plants and their roots. They thus make the crumbs of the soil more fermenting, mellow and pure, and can be applied as frequently as we choose, without rendering the soil too rich. They penetrate and manure the soil only as deep as the roots of the field crops are growing, while they (for instance, as fallow manuring,) have only from six to eight weeks to grow, and as topseed manuring,

only one summer. Our clover grass mixtures, on the contrary, lay two or three years; they grow, therefore, through the ground much deeper than the green manuring mixtures. The more different kinds of fodder plants they are composed of, the more vigorous is the effect; they increase the nourishment of the field crops, not only on the surface of the soil, by the sod manuring, but also in the depths of its "root masses," and thus prepare the under ground for itself and for the field crops. They are, thereby, dependent on the green manuring mixtures, and on the larger stable manuring, which these produce.

From this we see that the clover grass mixtures, on the two and three yearly mixed fodder cultivation, are generally able to last longer *after* the introduction of the green manuring, for as soon as a field crop is cultivated on a green manuring mixture, and the clover grass mixtures sowed on this field crop, it will show much greater vigor. The clover grass mixtures will prosper more rapidly, and penetrate deeper into the soil. But the stable manure also will increase by the *green manuring*, as it directly increases the grain crop; the abundance of straw will enable the farmer to *over manure* the clover grass mixtures, and by which the yield will be heavier the third than the second year, while that of the clover alone would be to the contrary. The duration and composition of the plant and grass mixtures will be greatly improved by receiving a larger amount of nourishment, and this they receive by the over manuring, which is only possible through the green manuring. The more frequent the green manuring mixtures are applied after another, and changed with the sod manuring, the more mellow, fermenting and deeper, of different matters, they will grow through the soil, and the longer these clover grass mixtures will lay, so that they may be mowable from five to six years.

SECTION CV.

Of the Fodder Cultivation, for many years mixed, or the Artificial Meadow Mixtures.

Some farmers, perhaps, believe it impossible when they hear of a fodder cultivation of six years pastures, whereby these mixtures may be mowable for such a time, but to prove this, it depends only upon the quality of the *soil*, whereby the two and three yearly clover cultivation at the end, will be mowable for

six years, as the clover and most of other fodder plants and grasses cannot last longer than three years in the impoverished soils of the present rotation crops, since they do not longer find nourishment in the soil; so in the soil, the six yearly fodder mixture to be mowable for six years, cannot last as long, as the soil is not enriched so deeply and strongly by the rotation of the green manuring mixture with the dung, and the sod manuring of the fodder and pasture cultivation, as to find for such a long time their nourishment. This degree of the strength and of the enrichment indicates the soil itself by these fodder mixtures, that they by this treatment will be mowable for several years, and experience will teach the farmer the following: Where the clover is mowable only one year, there will come forth the mere mixture of grasses and plants, which can be mown for *two* years; but if these clover mixtures are sowed on a grain field, where a green manuring was ploughed under, they will last *three* years; if we can overmanure it with stable manure, it will remain *four* years; and if we will cultivate it on a manuring mixture, and besides overmanure, or even only on its own sod manuring, whereby it had enriched the soil in the depth and in not too

long rotation crops, for instance, summer or winter grain, which was raised on a green manuring, it will last and can be mown, from five to *six* years.

To let it lay longer than six years, whether to be mown or as pasture mixture, is by no means profitable, for the reason, that we may need the soil for some other crop, and the production of the mixture does decline, for the soil is too penetrated, and like natural meadow or pasture, begins to sour, and also while the strength and fermenting ability of the sod manuring for a long time accumulated is so great, that it will be more advantageous to be changed to wheat or rye cultivation—for instance, one acre on an average for six years yields two tons of hay per acre yearly, so that it produces more than one half ton sod manuring yearly; consequently the mass of its sod manuring in the soil is in six years about three tons dry weight, equal to six tons manure, and thus the production is decreasing.

The instruction, how the farmer can promote himself by fodder cultivation, is now finished. In this third part, I have only shown how the rich production of the fodder cultivation does depend on the improved green manuring, and that it never can grow so luxuriantly by any other treatment.

PART IV.

ON THE IMPROVED PASTURE CULTIVATION.

NATURAL SIZE OF A SQUARE HAND, DIVIDED INTO ONE HUNDRED PASTURE
CULTIVATION SEED INCHES.

MEASURE OF FOUR INCHES SQUARE.

SECTION CVI.

How Pasture is to be Constituted.

By the former part we have seen, that pasture must be composed of a large mixture of healthy grasses and herbs, if it shall nourish the animals well, and yield a good production, and also grow more densely than the seed of a single kind of plant. But the density is also necessary for the profitableness of a pasture, since the latter need not grow higher than to fill the mouth of the animal;

consequently for cattle, not over four to five inches, and for sheep not more than from one to two inches; for when it becomes higher, it grows too old and hard if left standing, and hence it shoots up into seed. If, therefore, the plants of the pasture, do not stand very dense, the pasture is not productive, and we need too much land, to nourish the animals sufficiently, but the greater the amount of grasses and fodder plants in the mixture, the denser the pasture will grow.

SECTION CVII.

Proportions of the Grasses and Plants on the Pastures.

The density of the pasture mixtures is only possible through the grasses. They must, therefore, be applied in a larger proportion than the fodder mixtures, and as the grasses are more wholesome for the animals than the herbs, we gain on the production of the pasture and on the animal. Of the rich natural pastures we have already proved, in the former part, that the grasses are preferable to the herbs by ten to one; this is only possible through the strength of the rich soil, that the grasses and the plant mixtures in general can stand so dense, and as this strength in the present rotation crops is not sufficiently maintained through the green manuring, the pastures are sowed only on the impoverished soil, the grasses can prosper no longer, since the soil misses the fermenting and variable juices of the green manuring, for which reason, we generally sow only the kinds of clover and herbs; sometimes mixed with a few grasses, and we thus keep only the contrary proportion of the rich natural pastures, viz: the grasses to the herbs, one to ten.

SECTION CVIII.

Of the number of Pasture Plants on the square foot.

By the vigorousness of the soil and the larger number of grasses, is explained why on the rich natural pastures on the square foot there stand over 1000, consequently on the square hand about 100 plants. The weaker the soil becomes in strength, the less plants on the square foot the pastures have; they decrease on the square hand from 75 to 50 and to 25 plants. But the scarcity of plants on a square foot on fallow and stubble, and the sowed white clover pastures, comes from the impoverished soil and too thin seeding, after which they only have on the square foot from 40 to 50, consequently on the square hand only 4 to 5 plants.

SECTION CIX.

On the Disadvantages of Poor Pastures.

A pasture can be poor for two reasons: first, if it is unhealthy, and second, if it is of inferior production. In the first case, the animal suffers, and in the second, the farmer; but these two disadvantages

have, in a manner, their cause. In countries where the whole condition of agriculture is yet in too unproductive a condition, diseases and murrains of all kinds prevail; they certainly disappear, but come back again, spreading themselves, often, over whole regions, and carrying off thousands of domestic animals, of all kinds. The murrains of the cattle are the most destructive to animals almost the most necessary to the agriculturist. In such countries, the health of the cattle is neglected the most. But the murrains of the sheep, horses, and hogs are more local, and not less destructive. From this it is evident that, in such countries, the animal is ruined by the destructive pastures; experience teaches, thus, that where they have only destructive pastures, or none at all, the farmer must be ruined.

SECTION CX.

Of the Disadvantages of the Stable Feeding.

What the potatoe has done to prevent a famine, the clover and stable feeding have done against the destructive pastures and diseases of domestic animals. By the clover and the potatoes, indeed, these great agricultural evils are remedied, but they have produced another one; for they have only lowered the high price of bread, by increasing the price of the product. For who does not know, that pasture is much cheaper than stable feeding in the summer? and that hay is much cheaper to be produced, than potatoes and turnips, &c., of the winter fodder? This difference is large enough to ruin the farmer, for an equal food of the animals on the pasture, is five times cheaper to produce than the hay, and the hay three times cheaper than the potatoes, turnips, parsnips, &c.

SECTION CXI.

Review of the present Pastures.

The present pastures have not only the fault of giving too small a yield, and of needing too large a space of land, so as to pasture a cow sufficiently, but they are often at distance from home. The animal will be thus not only poorly nourished on such pastures, but lose also in milk, strength, and in manure, by driving it to and fro. But where we have the pasture field near the barn, it depends then only on the pasture to be made more productive on the same surface.

SECTION CXII.

The reason for the Improved Pasture Cultivation,

Is no other than the improved green manuring, for it grows through and manures the soil deeper and more fermenting than stable manure can do it, and is a manuring, *beside* the manure. But it is also the proper increasing manure, while it is not, like the manure, only a transformation of the fodder, but a procreation of the manuring matters of the soil by the green herbage. Every produce of the soil is, therefore, to increase, and also the produce of the *fodder and pasture cultivation*, wherever the farmer finds it necessary by his circumstances; and this so much the more, as it manures the soil with more variety of matter, as it consists of the various plant mixtures, and will remedy the cause why pasture cannot prosper in the impoverished soil of the field crops. Besides the many different manuring materials of the soil by the plant mixtures, as their fermentation increases, causes a larger produce of pasture cultivation on the *surface*. This is also the cause of the improved fodder and pasture cultivation, as it can consist of different *mixtures* of such plants and grasses, which are suitable to the soil and to the animal. Such mixtures are more yielding than when the pasture is sowed only of a single kind of plant. We can thus increase the produce of the pastures, merely by the mixtures; also, without the aid and change of the improved green manuring, it will last longer. And by thus following a process of cultivation, the pasture becomes more nourishing to animals, as it is composed of various materials, so that it brings the farmer more profit, and becomes a more suitable food.

SECTION CXIII.

The object of the Mixed Pasture Cultivation.

The profit of the farmer can in no manner increase more rapidly than by the pasture yielding a larger production per acre, since pasture is the cheapest fodder, on account of the small amount of labor and expense it requires. Pasture indeed is five per cent. cheaper than hay, ten per cent. than sheaf fodder, and fifteen per cent. than potatoes, turnips, or kale fodder. The farmer, therefore, will pay attention to the improvement of his pasture, by endeavoring to make it more productive on the same

surface. Without the improved green manuring, nevertheless, either the one or the other is possible, as we cannot enlarge without it, neither the produce of grain nor the pasture per acre, except at great expense.

With the green manuring, however, no expense is necessary; it increases the grain cultivation at first, and then also that of fodder. *Before* the introduction of the improved green manuring, the improvement of the pasture cultivation can consist only in its own mixtures, and these we have to consider by the present existing pastures, of one, two, three, and many years.

SECTION CXIV.

Of the Annual Mixed Pastures.

In places where the clover has not turned out well, we sow sometimes in the spring upon the fallow field, a summer pasture, being, however, an expensive pasture, since we can have its use but for one summer. We can, however, make a shift pasture cheaper, and more productive, by a mixture of plants, than by one or two kinds only.

SECTION CXIV.

The Plants of the same.

The plants of the pasture for one year must be certainly of the rapidly growing ones; they dare not, however, shoot up, and must be biennial, which the first year do not shoot up like annual plants, relished by animals which are constantly pastured off, and cannot, therefore, grow up. Such are among the following, and the farmer can obtain them almost anywhere.

A.]—Plants.

Rape, Cole, Mustards,	7 lb. 150,000 grains.
Parsnip,	" 150,000 "
Spurry,	" 500,000 "
Spinage,	" 80,000 "
Lamb Lettuce, (<i>Fedia Olitoria</i>),	" 300,000 "
Lamb's Quarter, (<i>Striplex Hortense</i>),	" 150,000 "
Common Woodsorrel, (<i>Oxalis Cornuta</i>),	" 500,000 "
Stone Clover, (<i>Melilotus Vulgaris</i>),	" 200,000 "
Sand Plantain, (<i>Plantago Arenaria</i>),	" 300,000 "
Lance Leaved Plantain, (<i>Plantago Lanceolata</i>),	" 300,000 "
Sheep Sorrel, (<i>Rumex Acetozella</i>),	" 500,000 "
Dock Cress, (<i>Lapsana Communis</i>),	" 300,000 "
Yarrow, (<i>Achillea Millefolium</i>),	" 1,000,000 "

B.]—*Grasses.*

Rye,.....	contains per lb.	20,000 grains.
Field Brome Grass, “ “	150,000 “	
Cheat,.....	“ “	150,000 “

SECTION CXVI.

Of the Pasture Mixtures for two and three years.

These are sowed, as is known, only in the summer grains, and mostly on the very impoverished soil, while on the more fertile fields we sow a greater quantity of clover. As we now give these pastures the poorest soil, we do not think it necessary to apply any other seeds upon it but the white clover.

There are, however, different kinds of wild grasses and plant seeds, by the mixture of which we can bring the pastures to a larger yield, if they are sowed densely enough, and if we do not apply them on the poorest soils. To purchase these seeds every year, would be too expensive and even too uncertain, as they are often too old; he who has experience in his own seed cultivation, will know that seeds when more than a year old, grow not half as quickly as fresh ones which have been well preserved and raised by himself. In the collection of the wild seeds for the green manuring mixtures, we can obtain them for the pasture mixtures in abundance, and thus we can make a commencement with them, to sow our pastures more densely before we yet have introduced the green manuring. For the perfection of the pasture mixture, the *seed cultivation* will be necessary. It is, therefore, necessary in the pasture mixtures, used *before* the introduction of the improved green manuring, to distinguish them from those used *after* the introduction of the same.

SECTION CXVII.

Of the Pasture Mixtures BEFORE the introduction of the Green Manuring.

Nothing is more certain to render pastures more productive, than sowing a mixture of different kinds of healthy pasture plants, and these we can only obtain from the collection. Some kinds of grasses and herbs will also terminate soon on the soils impoverished by the field crops, while they do not find their nutriment any longer; others again last longer, and by using a variety of kinds of herbs and grasses, it becomes more luxurious than a single one. To this the grasses, especially whilst they

grow the more densely, are helping. The grass seeds can be obtained anywhere for the commencement. I will give in the following review, only the most general pasture plants, with the number of grains in a pound.

SECTION CXVIII.

*A list of the Plants of the Pasture Mixtures BEFORE the introduction of the Improved Green Manuring.*A.]—*Pasture Plants.*

1 lb. White Clover, (Trifolium Repens,).....	3 lb. 600,000 gra.
1 “ Lance Leaved Plantain, (Plant. Lanceolata,) “	300,000 “
1 “ Pimpinella, (Anise,) (Pimpinella Saxifrago,) “	300,000 “
1 “ Sheep Burnet, (Potierum Sanguisorba,).....	300,000 “
1 “ Yarrow, (Achillea Millefolium,).....	1,000,000 “

B.]—*Pasture Grasses.*

1 lb. Common Darnel, (Lolium Perenne,).....	3 lb. 300,000 gra.
1 “ Meadow Oats, (Avena Flavescens or Pratensis) “	500,000 “
1 “ Pasture Fescue Grasses, (Festuca Duriuscula Ovina Rubra,).....	600,000 “
1 “ Common Quaking Grass, (Briza Media,).....	700,000 “
1 “ Spear Grasses, (Poa Pratense, etc,).....	1,000,000 “
1 “ Common Hair Grasses, (Aria Flexuosa,).....	3,000,000 “
1 “ Herd's Grass or Red Top, (Agrostis Vulg. etc.) “	4,000,000 “

But these are only plants and grasses of sheep pasture and dry soil; the mow plants and mow grasses are also applicable where the soil is better; and where the seeds are at hand, these mow plants yield a pasture serviceable for cows and sheep. Both kinds of seeds can be collected almost everywhere in such large quantity, that we can improve our pastures with them immediately.

SECTION CXIX.

Of the density of the Pasture Mixtures and of the Agricultural Measures, of its estimation and its seed calculation.

As the pasture must remain only very low, its plants can certainly stand and be sowed much more densely on the square foot than the mow plants, as the latter must grow at least eighteen inches high, whilst the low pasture only from three to four inches high. A mow plant, therefore, requires far more nutriment from the soil than a pasture plant, since it must grow five to six times higher; for this reason pasture plants can grow much more densely than mow plants. On poor soil, however, pasture does

not grow so densely as on a rich one, as the nutriment on the former is weaker.

A.]—Density of the present pasture seeding on middle soil.

On an acre generally is sowed about two pounds of white clover, containing about 1,200,000 grains, or on the square hand from four to five grains, and on the square foot from forty to fifty grains. If we add the same quantity of grass to the white clover, the seeding will be treble in density, since we generally use only one kind of grass—thus, about from eight to ten grains on the square hand, and on the square foot eighty to one hundred grains.

B.]—Density of the Pasture Mixture by the new system.

If we sow a pasture mixture of several kinds of herbs and grasses they will grow more densely, and while the pasture mixtures are to be only a few inches high, they must also, *before* the introduction of the green manuring, be sowed more densely than the clover mixtures. A too dense seeding, however, does not pay on an impoverished soil, and therefore the gradation amounts only to about the double density of the clover mixtures, as viz:

On the square hand.	On the square foot.
Inferior soil, 20 grains.	Inferior soil, 200 grains.
Middle “ 30 “	Middle “ 300 “
Rich “ 40 “	Rich “ 400 “

Concerning the proportion of the grasses to the herbs we will find that inferior soil wants more herbs, partly from the want to manure itself more strongly, and partly from the want of protection and shadiness, so that the grasses can grow better, and will also prosper better under the steps of animals than herbs. For this reason, we sow on the square hand of the inferior soil to seven grains pasture plants about ten grains pasture grasses; on the middle soil, from six to twenty-four; and on the rich soil, from five to forty within, in the following proportion:

Inferior soil to 1 grain Pasture plants, 2 grains Pasture grasses.
Middle “ 1 “ “ “ 4 “ “ “
Rich “ 1 “ “ “ 8 “ “ “

C.]—On the Producing.

It requires thus, for the improved pasture mixtures

before the introduction of green manuring, three times more seeds than the common seeding on the middle soil amounts to. Where we also sow a few grains of grasses with the white clover in the grain, for the best of the common seeding, on the square foot the highest number is about 100 grains; 300 grains on the square foot of the middle soil. If the pasture mixtures are well selected they will generally yield more than threefold the produce.

SECTION CXX.

Example of a Pasture Mixture on dry gravelly soil.

The white clover is here the main quantity of the mixture. We sow it, therefore, by the usual seeding, namely, on the square hand:

A mixture of Lance-leaved Plantain, 4 grs. or 1½ lb. ¾ lb. 600,000 grs.
“ Yellow Lucerne,..... } 2 “ “ 2½ “ “ 300,000 “
“ Pimpinella, } “ “ “ “ “ “
“ Sheep Burnet,..... } “ “ “ “ “ “
“ Common Yarrow,.....1 “ “ ¼ “ “ 1,000,000 “

In all,.....7 grs. or 4½ lb.

The grasses added to the above plant mixture, are the following:

Common Darnel,.....1 grain, ⅝ lb.
Meadow Oats Grass,1 “ ½ “
Pasture Fescue Grass,.....1 “ ⅓ “
Common Quaking Grass,.....1 “ ⅓ “
Spear Grasses,.....1 “ ¼ “
Common Hair Grass,.....1 “ ⅓ “
Herd's Grass,.....1 “ ⅓ “

7 grs. 2½ lbs.

If we sow of this grass mixture, for instance, on the square hand about 14 grs. it will amount to 5 lbs. And to this the men-

tioned herbs,..... 7 grs. “ “ 4½ “
21 grs. 9½ “

We then sow 21 grains on a square hand and 9½ pounds on an acre. This mixture can be sowed on oats or barley, is to be well rolled in, and will form a pasturage three times more luxurious and abundant than white clover alone; the sod manuring also when ploughed under will be four-fold stronger than the common white or red clover in manuring.

SECTION CXXI.

Example of a Pasture Mixture on middle soil.

On such soils we take the red and white clover as the main quantity of the mixture, viz: on the square hand:

Red Clover,.....	2 grs., or 2½ lbs.	200,000 grs.
White Clover,.....	2 “ 5/6 “ “	600,000 “
Lance-leaved Plantain,.....	2 grs., or 2 lbs.	250,000 grs.
Yellow Lucerne,.....		
Sheep Burnet,.....		
Pimpinella,.....		
Adlibidum, (Hedysarum,).....		
Common Yarrow,.....	1 gr., or ¼ lb.	1,000,000 grs.

Makes.....7 grs., or 5½ lbs. per acre.

The addition of the grasses is of the following kind, which do well in the pasture on such soils, are also easily collected, and for sheep and cattle very nourishing:

	Grains.
Meadow Fescue Grass,.....1 gr. to the sq. hand, or 1½ lbs.	200,000
Common Darnel,.....1 “ “ “ 5/8 “	300,000
Orchard Grass,.....1 “ “ “ 5/8 “	400,000
Hard Fescue Grass,.....1 “ “ “ ½ “	500,000
Sheep Fescue Grass,.....1 “ “ “ ½ “	600,000
Common Quaking Grass,.....1 “ “ “ ½ “	700,000
Comb Grass,.....1 “ “ “ ½ “	750,000
Sweet scented Vernal Grass.....1 “ “ “ ½ “	750,000
Timothy Grass,.....1 “ “ “ 5/8 “	800,000
Speargrass,.....1 “ “ “ ½ “	1,000,000
Common Hair Grass,.....1 “ “ “ ½ “	3,000,000
Herd's Grass,.....1 “ “ “ 1/6 “	4,000,000
12	5½ lbs. per acre.

And if we double these 5½ lbs. Grasses, it makes 11 lbs. per acre.

Add to these the mixtures of the herbs, “ 5½ “ “

Makes.....16½ lbs. per acre.

These grass seeds can be easily procured and some of them are found in abundance. If we mix the first three kinds of grasses with the seven kinds of herbs mentioned, and take 24 grains to the square hand, or 20 pounds to the acre, (for pasture this mixture, however, is too hard,) and if we add the three last kinds of grasses to the herbs, it requires only 24 grains to the square hand, or 5 pounds to the acre. But this mixture is too nourishing for sheep, consequently too scarce in the mixture, thus we add more of the large grained grasses, and take 10 pounds per acre. The design of this mixture is to increase the produce of the surface, which is the

most beneficial, since the more grasses and herbs we can mix so as to grow well, the mixture on this kind of soil will yield three times more than the single clover pasture, shade and nourish the soil much better, and if sowed on barley or oats in their various mixtures will do well, as the farmer can see from the growth of these plants, since they shoot up in their natural state, and by this he can judge to some extent how to form his mixtures.

SECTION CXXII.

Example of a Pasture Mixture on rich highlands for Sheep.

The former mixture is for sheep pasture of an excellent kind, and suited as an application for the beginning, *before* the introduction of the Improved Green Manuring. We can apply to these the most general wild growing grasses and herbs in the neighborhood. The following mixture consists of plants known on high pastures—the Meadow Fescue Grass alone is too nourishing for sheep and must not be put too largely in the mixture. The richer the soil is, the larger and stronger we can make the proportion of the grasses to the pasture plants, for the rich soil has more strength, can bear more grasses, and the stronger they are mixed the more animals can pasture on the same surface. In the commencement the soil is too raw or sour, else we could render the mixture still more dense. A soil having been treated by the green manuring, will support from 40 to 50 grains to the square hand—to 7 grains of grass 1 grain of pasture plants. It is thus possible to increase the density on the square foot to from 400 to 500 plants and grasses. We take for the fodder plants, of the former example on middle soils,

About 7 grs. per square hand, or 5½ lbs. per acre.	
and of Pasture Grasses, 42 “ “	19 “ “
49 grs.	24½ lbs. per acre.

But if we add the small grain seeds, it will render it two to three times stronger, and will require only 10 to 12 pounds per acre.

SECTION CXXIII.

Example of a Pasture Mixture on rich low soils, for Cattle.

For such pastures we sow the healthiest plants and grasses found in meadows and low lands. We take

the common red clover as the main quantity, viz: 4 grains to the square hand, or about 5 pounds per acre, and from the rest of the above-mentioned pasture plants of middle soils, we add two grains, making 2 pounds—making 7 pounds per acre. The selection of grasses we make as follows:

Oats Grass,.....	1 grain, or 1 $\frac{1}{4}$ lbs. per acre,	200,000
Tall Fescue Grass,.....	1 " 1 $\frac{1}{4}$ "	200,000
Meadow Fescue Grass,.....	1 " 1 $\frac{1}{4}$ "	200,000
Meadow Foxtail Grass,.....	1 " $\frac{5}{8}$ "	350,000
Orchard Grass,.....	1 " $\frac{7}{8}$ "	400,000
Hard Fescue Grass,.....	1 " $\frac{1}{2}$ "	500,000
Sheep Fescue Grass,.....	1 " $\frac{1}{2}$ "	600,000
Common Quaking Grass,.....	1 " $\frac{1}{2}$ "	750,000
Comb Grass,.....	1 " $\frac{1}{2}$ "	750,000
Sweet scented Vernal Grass,....	1 " $\frac{1}{2}$ "	750,000
Timothy Grass,.....	1 " $\frac{5}{8}$ "	800,000
Spear Grasses,.....	1 " $\frac{1}{4}$ "	1,000,000
Herd Grasses,.....	1 " $\frac{1}{4}$ "	4,000,000
Tufted Hair Grass,.....	1 " $\frac{2}{3}$ "	6,000,000
	<u>14</u> <u>7 $\frac{3}{4}$</u>	

Which makes 42 grs. per square hand, or 23 lbs. per acre.

Add of pasture plants, 7 " " "	7 " "
<u>49 grains.</u>	<u>30 lbs. per acre.</u>

If we sow only the four last grasses in the mixture, which form an extraordinary nutritious pasture for cattle, it will make 42 grains to the square hand, and 7 pounds instead of 23 pounds, to which we add 7 pounds pasture plants, and we have 14 pounds of seeds per acre. But we must use the other grasses also in the mixture, or we may not make our mixtures dense enough; for the small grasses, for instance, the Darnel, Comb Grass, Quaking Grass, Sheep Fescue Grass, Hard Fescue Grass, &c., are important in forming the density of the mixture of pasture grasses; so that we can add these five kinds, and the four last ones more frequently than the first five grasses, so as to make about from 12 to 15 pounds per acre of the seeds.

Some of the above are early, others are late grasses, and fill the pasture towards the fall, others shoot up constantly after pastured, which keep up a full and continued pasturage; hence the propriety of using a full variety of seeds in the mixture.

By using the ingredients mentioned above *before* a full course of the improved green manuring can be attained to, the farmer will realize much benefit and a handsome profit in rearing his stock. The greater care he uses in selecting the plants and grasses best

adapted to the soil, the more successful he will be to enrich his meadows and pasturages.

It is much easier to sow a mixture of grass and plant seeds, than to sow one kind alone, as clover, &c.; and after the application of the green manuring, its growth will be more vigorous, and can lie longer, which circumstance adds much to the productiveness and cheapness of the fodder, and gives it a decided advantage over the clover pasture.

SECTION CXXIV.

On the Pasture Mixtures AFTER the introduction of the Improved Green Manuring.

We might suppose that a pasture mixture would last and produce well, much longer than a mixture which is *mowed*, because the latter grows much higher and is mowed off, and, therefore leaves or renders the soil more exhausted and bare, but this is not the case, for although pasture grounds may seem as though they had the advantage of the *urine* and *dung* of the stock while feeding upon them, the constant tramping of sheep and cows beats the ground so hard that the dung is mostly wasted, and the ground becomes so hard that roots do not penetrate as deep as the mow mixtures. Therefore, without strong fermentation in the soil, in which the pasture mixture is sown, we must expect it soon to die away, except where the Improved Green Manuring has been introduced, and, for this reason, the mixed pastures do not last much longer than the single—not much over three years.

But the stronger and more frequently the soil has been grown through, by the process of green manuring, and two or three years of sod clover and pasture mixtures, the longer it will last, as *the soil* by the process above named will become more fermenting. There is another advantage connected with this, the mixture may be sown more densely, and it will root more deeply and consequently produce more. By this natural process, in the improvement of the soil, there will be more strength in it, and it will be applicable to denser seeding, and therefore, more profitable. Concerning the best mixtures, after the introduction of the improved Green Manuring, there cannot be a much better selection made for sheep than that of Section 121, and for cows that of Sec. 123. For the grass seeds are much cheaper, and, therefore, more easily obtained as they are also in greater

abundance when cultivated, than the plant seeds of the improved Fodder and Pasture cultivation, for as these are larger grained, they do not yield so many seeds. The grasses are better adapted to the health of animals, and are more general, and can be had almost everywhere with very little trouble or expense.

If, now, the better pasture mixtures meet with better soil, it is generally the case that the pastures on highlands will be so productive as to furnish a very abundant crop, so as to allow cows the first run and sheep the main pasture; in part, because the first crop is often too rank for sheep, and in this way we are like to secure the good of all and have it well pastured off. For cattle will mostly eat away the ranker plants, thus render the pasture more wholesome for sheep, and pastured more closely. From what has been stated, it is evident that we must realize an increase in the value of sheep and cows, in this way, to a considerable amount, and have, as it were, the increase of profit on good pasture and good stock, gratis. But we must bear in mind, that this is to be realized after a thorough course of green manuring of the soil, which tends to promote its strength and render it more vigorous and productive for pasture, year after year.

SECTION CXXV.

Of Pasture Mixtures designed to last for several years, or Artificial Pastures.

We will at present consider the advantages which pasture cultivation has over the present mode of keeping up pasture year by year. 1st. The green manuring system tends to strengthen the soil; 2d. The mixture of the plants continues to improve, and become better and better; 3d. By these means the plant masses become better and more dense. In places where you have bad pasture, just try it once, and sow it with the mentioned wild grasses and herbs, and it will yield a three-fold produce; and in one year longer you will find your stock so well supplied with pasture that you will be glad to let it lie two or three years. But as soon as we can cultivate these pasture mixtures, after a thorough green manuring, they will be sure to last for two or three years and produce well. But the pasture mixtures should be sowed more densely than the mow mixtures, for sowing either on winter or summer grain is liable to choke a great many fine seeds, and cause the

pasture to be too thin. We should, therefore, bear in mind, and sow the large grainy seeds first, and the small grained seeds afterwards on the top, and only in the winter; and if we over-manure this young pasture in the winter, on frost, the consequence is, that the pasture will be much more nourishing for stock, and the pasture itself will increase so much in strength as to last *four years*. But where a pasture returns in turn with a regular changing of sod manuring, and mow mixture, and crops continually cultivated by green manuring mixtures, the pasture will last over *five and six years*.

The instructions showing how the farmer may promote his interest and profits by his pasture cultivation, are now ended, but we have to give the description of the grasses and plants, by which the two and three years of the pasture cultivation can be brought to a larger produce of the surface.

Description of the Grasses and Plants of the Improved Fodder and Pasture cultivation.

The following families are the most serviceable and preferable grasses of the meadows and pastures:

1. *The Fox-tail family*, to which belong the Meadow Fox-tail, Timothy, Ribbon Grass, Comb Grass, &c.
2. *The Fescue family*, to which belong the species of the Fescue Grasses, Orchard Grasses, Brome Grasses, Spear Grasses, Quaking Grass, &c.
3. *Oats Grass family*, comprising the Oats Grasses, Velvet Grasses, Hair Grasses and Vernal Grasses.
4. *The Bent Grass family*, to which belong the species of the Herd Grasses, Fiarin Grasses, Reed Grasses, &c.
5. *Wheat and Barley Grass families*, to which belong the species of Wheat and Barley Grass, Lime Grasses, Darnel or Rye Grasses.

The most serviceable and preferable plants of the meadows and pastures, we will describe in the following families:

1. The lasting kinds of Clover, (Trifolium.)
2. The lasting kinds of Vetches, (Vicia.)
3. The Meadow Peas, (Lathyrus Lotus.)
4. The kinds of Lucerne and Hedysarum.
5. By-plants of the Meadows and Pastures.

A.]—The most preferable grasses of the meadows and pastures are represented on Plate III.

SECTION CXXVI.

The Fox-tail Family.

1.

The Meadow Fox-tail, (*Alopecurus Pratensis*. 2f)—This grass differs from the Timothy by its ear being pointed above and below, like a fox-tail, and soft and hairy, whilst the ear of the Timothy is a perfect cylinder. The Meadow Fox-tail grows on moist sweet soils; hence it is called a sweet (meadow and pasture) grass. We find it growing in moist ditches and along meadows, between the Timothy and Fescue Grass; blossoms in May; grows from three to four feet high, and ripens quickly after blossoming. The ears become brownish and can be stripped off, and if the seed is not collected as soon as ripe it will fall out; it is easily spoiled by dampness, hence the greatest care must be taken in its drying and saving; it is a rare grass and the collection, therefore, small. It is best to be cultivated in the garden, as it is an important grass, by which means a sufficiency can soon be had. The Fox-tail has the following virtues: It shoots up early, and after being mowed or pastured off, grows rapidly again, until fall, so that in good soils it will give a good swath nearly every month. It has many broad, short, juicy leaves and soft stems, and is a very delicious, sweet and nourishing grass, which gives a soft sweet hay. Sheep are fond of it, but it is too nourishing, and grows to a coarse wool. In the third or fourth year it forms stalks and roots perfectly matured. It is, therefore, more yielding in mixtures for many years than in the clover mixtures for two and three years. It is also more nutritious before it blossoms, of greater value, and is as good for hay as pasture, but better suited for cattle than horses. One pound of seed contains 350,000 grains.

2.

Timothy Grass, (*Phleum Pratense*. 2f)—This grass is well known. It is frequently mixed with clover, produces much seed, which does not easily fall out, like other seeds. It thrives also well on sweet lands, but, like fox-tail, soon runs out on sour meadows; it blossoms about a month later than the fox-tail, so that only the second growth ripens with the timothy. In collecting the seed, we should cut off the ears or heads when they are fully ripe, and then thresh out

the seed. If it stands out too long in the wet and dew it loses the seed. It is best to cut the seed and afterwards the hay. If it is cut before it is ripe, it loses much of its seed—is an excellent sweet pasture and mowing grass for stock and horses. It ripens too late to allow two profitable cuttings in a year. The second swath or cutting will not be more than one half as large as the first; hence, by itself, it does not yield as well as in the mixture—for to the mixture several cuttings are applied—and it thrives the faster the oftener it is cut. It contains per pound, 800,000 grains.

3.

Ribbon Grass, (*Phalaris Arundinacea*. 2f)—This grass grows wild on the banks of ponds and rivers, from three to six feet high; it has sometimes quite a contracted panicle, which resembles the ear of the fox-tail grass; blossoms in July and ripens in August. The best means to get a supply of this seed is to cultivate it on garden beds. On clay soils it thrives best and grows the strongest; but it also grows on middle soil from two to three feet high. It forms on such soils a broad panicle; in clover mixtures it makes a large hay produce, and deserves cultivation. It is a good yielding and long lasting mowing grass, but is not as good for pasture. It has per pound, 500,000 grains.

4.

The Comb Grass, (*Cynosurus Cristatus*. 2f)—Grows on good sweet meadows and pastures, from one to two feet high; blossoms in June; stands in single stems, which renders it tedious to gather the seed. It therefore must be cultivated in garden beds. It is important in forming good pastures, roots deep, lasts long, and resists drought. It covers the turf or soil with leaves, and after St. John's day, shoots to stems and leaves; which is the reason that the pasturage on fields, when it is in abundance, yields better after that time than before. Farmers who only think of mowing, entirely overlook this grass. Its value consists in its being an under grass, for it brings but few stems. It fattens sheep well, and renders the meat sweet and delicious. It, however, should not be sowed too thick in the mixture for sheep pasture, since it is too invigorating and renders the wool coarse; but for cattle it is an excellent pasture grass. There is in a pound 800,000 grains.

SECTION CXXVII.

The Fescue Family.

1.

Tall Fescue Grass, (*Festuca Elatior*. 21)—Between this and the following fescue grass much confusion prevails, for they are often exchanged and mixed. But the tall fescue grass blossoms about a month later than the following; it has a much stronger growth, being from five to six inches high; reed-like, broad, dark green and shining leaves, and the ear is heavy and hangs over, with strong roots and stalks; grows in moist ground and along bushes. In collecting the seed, the best way is to cut it off under the ear. The seed ripens in August. It is a scarce but important grass for mowing and pasture, and should be cultivated in garden beds in rows. The tall fescue grass on low soils produces from two to three times as much as clover. If pastured in the spring it shoots up as often as cropped off, and has a very rapid growth; is a long enduring plant, forms strong roots and stalks, and is very nourishing; hence, it is an essential grass in the mixture for mowing and cattle pasture. It has per pound, 200,000 grains.

2.

The Meadow Fescue Grass, (*Festuca Pratensis*. 21)—This grass is more general than the former and easier to be collected; it blossoms in May and June, grows three feet high, and the leaves are of a weaker and lighter green, but it makes a sweet and nourishing hay. It is important in forming a dense mixture of herbage, as a middle grass, and is of long duration, hence it is valuable as a mowing and pasture grass for cattle and horses. It contains per pound, 200,000 grains.

3.

The Hard Fescue Grass, (*Festuca Duriuscula*. 21)—We find this grass on dry meadows and pastures; it grows from one to two feet high; blossoms in May. Its cultivation on beds is exceedingly important, for it forms one of the most excellent sheep pastures; it is more productive than the following Pasture Fescue Grass, thrives early and resists the drought. It is, however, only a pasture grass, and especially for sheep, but on good soils, it is worth mowing, and gives, when connected with other proper plants, an excellent hay for sheep. It has per pound, 500,000 grains.

4.

Sheep Fescue Grass, (*Festuca Ovina*. 21)—This grass is much weaker and the leaves are more slim and hair-shaped than the former; it grows one foot high, and blossoms in June. We frequently find it on the borders of woods and on sandy soils, in such abundance that it is not necessary to cultivate it; but in sections where it does not grow, it is worth cultivation, for a sheep pasture without it is very imperfect. It is very enduring after shooting up to stems, but, if sowed in the mixture with other plants, the pasture can be strongly set in with it, otherwise it puts to ears and stems; it is only on very rich soils that it can be mowed; it is generally a pasturage; has 600,000 grains per pound.

5.

Red or Creeping Fescue Grass, (*Festuca Rubra*. 21)—This grass resembles the Sheep Fescue Grass, and distinguishes itself only by its reddish color, but it forms a stalk sooner and grows somewhat higher; is found growing on dry sandy soils, and also on inferior meadows. Its qualities are the same as the Sheep Fescue Grass—600,000 grains per pound.

6.

Orchard Grass, (*Dactylis Glomerata*. 21)—We often find it growing with the Meadow Fescue and Timothy Grass together in meadows, in large quantities. It grows from three to four feet high and blossoms from May till fall; after cutting, it grows up rapidly, has a strong deep root, and many long, broad pressed light green leaves, by which it is easily known, when it has not grown to stems. It is an early grass and very nourishing for stock of all kinds; also, an enduring grass, forms large stalks and ripens in July. The Orchard Grass is therefore a very profitable one, both for mowing and pasturage, for all kinds of stock, and is important in the mixture, and makes an excellent hay if cut before it comes to blossoms. It contains per pound, 400,000 grains.

7.

Large Brome Grass, (*Bromus Giganteus*. 21)—In a wild state this grows on moist and half-shady places, from three to six feet high; blossoms from June till September. It is used in the topseed mixtures, makes a very good but somewhat coarse hay; can be used

to good account as green fodder, and is also a tolerable good mowing grass.

8.

Erect Brome Grass, (*Bromus Erectus*. 21)—This grass is also described for the topseed manuring, and is especially, for the clover mixture of inferior soils, a good mowing grass.

9.

Small-leaved Spear Grass, (*Poa Angustifolia*. 21)—This grass resembles the common Spear Grass or the Meadow Grass, and has also a blunt panicle; it comes forth fourteen days earlier than the common Spear Grass, and has longer and smaller leaves, and also higher and thinner stems. It is the earliest grass in the collection, blossoms in the beginning of May and ripens about the end of the month, grows from two to three feet high along borders and bushes; when ripe it looks yellow and stands in crowded bunches, at which time it should be cut. It should be cultivated in garden beds for the seed, for it is a nourishing and wholesome grass for stock, either in hay or pasture; on good soils it grows to form a good swath, but on light soils it is only a pasture grass. It contains in the pound, 1,500,000 grains.

10.

Rough Meadow Grass, (*Poa Trivialis*. 21)—Is earlier than the following, and has a pointed panicle, blossoms in May or June, on all good grassy places, field borders, meadows, &c., and grows from two to three feet high; the stem and leaves are harsh to the touch; when ripe it has a remarkable crowd of seed bunches, when it should be cut off for seed. It is full as nourishing as the former, and forms an important mowing grass for soils, and an exceedingly fine pasture grass. Contains 1,000,000 grains per pound.

11.

Spear Grass or Meadow Grass, (*Poa Pratensis*. 21)—Has a smooth stem and leaves and a blunt panicle like the Small-leaved Spear Grass; the roots are somewhat creeping and thread-shaped; the ripe panicles stand single. It grows on light soils, is of a mild sweet taste, and is an excellent pasture grass for all kinds of stock. It has per pound 1,000,000 grains.

12.

Blue Grass or Wire Grass, (*Poa Compressa*. 21)—The stem feels flat to the touch when held between the fingers; it grows in fields and pastures from twelve to thirteen inches high, and blossoms in June and July, possesses excellent qualities for hay and pasturage, and contains 1,000,000 grains per pound.

REMARKS.—We can take these last four grasses for the principal part of the pastures, and where the seed cannot be gathered, it is highly important that they should be cultivated.

13.

Clustered Meadow Grass, (*Poa Conferta Nervata*. 21)—We must procure this important grass for cultivation, as its growth is scarce on meadows; it grows from two to three feet high, possesses the same good qualities of the former Spear Grasses, but in a greater degree, and affords a much larger produce, is highly important as a mowing grass, very enduring, suits well for meadows designed to continue for years, and contains 1,500,000 grains per pound.

14.

Red Top, (*Poa Serotina*. 21)—It shoots up to stems from spring till frost sets in the fall, from two to three feet high, grows on moist and mild soils, but thrives well on all green manured soils; is an excellent, productive and nourishing mowing grass and pasture, and contains 1,500,000 grains per pound.

15.

The Wood Spear Grass, (*Poa Nemoralis*. 21)—It possesses valuable qualities for hay and pasture, and, when cut off, shoots up again rapidly during the whole season, is of long duration, lasts well in meadows, is a good mowing grass, and has per pound 1,500,000 grains.

REMARKS.—The last three Poas mixed with the Orchard Grass, Tall Fescue Grass, Timothy, Meadow Fox-tail Grass, and Oats Grass, form a very early and highly productive mowing mixture, and these grasses mixed with clover will produce five times more than the clover alone, if sowed on a green manured soil.

16.

Common Quaking Grass, (*Priza Media*. 21)—This

grass is generally found on meadows and along creeks. It blossoms and ripens in June, and grows from three to four feet high; its seed is easily collected to cultivate it on a garden bed; it roots well and is very nourishing, mild and sweet, and an indispensable pasture grass for all animals. It contains per pound, 800,000 grains.

SECTION CXXVIII.

The Oats Grass Family.

1.

Oats Rye-Grass is the so-called French Rye-Grass, and as it belongs to the Oat Grass family, we call it the Oat Rye-Grass. Where it does not grow wild we can easily buy its seed. It resembles in strong and rapid growth the tall fescue grass, roots deeply, and is ripe about fourteen days earlier than clover. The stems are soft, juicy and large leafed, it grows in large sprout bunches five feet high, and, like the Lucerne, may be cut from four to five times in a season; but when sowed by itself is less productive and nourishing than in the mixture; it is better suited for mowing than pasture, and produces per pound, 200,000 grains.

2.

Velvet Grass or White Timothy, (*Holcus Lanatus*)—This grass grows on all kinds of soil—on sandy and swampy lands. It contains so much slime and sugar, that the extract (by putting in hot water) tastes like gum-arabic. Cattle love food that tastes somewhat sour and salty, for this reason, they do not eat it as pasture, and as hay, if cultivated alone, they soon get tired of it, but if cultivated in the mixture, it forms an important part of the winter fodder, is readily eaten, gives a large produce, if we sow it with the winter grain, must only be used as a mowing grass, and not in too large a quantity in the mixture. In cultivating the seed we must be very careful, for the wind will blow it off if not cut in time; if its seed is well rubbed and cleaned, it yields per lb. 3,000,000 grains.

3.

The Hairy Meadow Oats Grass, (*Avena Pubescens*. 21)—We find this plant on dry meadows and pastures; blossoms in May and June, and grows three feet high; on good soil it loses the hair from the leaves; on dry soils it is a good mowing grass,

but only affords one cutting, and thin pasture. It is somewhat bitter and not very nourishing, hence it must not be used too freely in the mixture, but it is suited to poor soils for a mowing and pasture grass, and contains 500,000 grains per pound.

4.

The Common Meadow Oats Grass, (*Avena Pratensis*. 21)—This grass resembles the former very much, and is often found growing with it, on sandy soils and in bushy pastures; blossoms in May and June, and grows from three to four feet high. It is an lasting grass, like all Oat grasses, and only matures in the third or fourth year; hence it can be used but as a meadow grass for inferior soils. It contains per pound, 500,000 grains.

5.

The Gold Oat Grass, (*Avena Lavescentis*. 21)—This grass is found on dry meadows and pastures, it has a yellowish color and shines in the sun. It grows from one to two feet high, and blossoms in June; the leaves are broad and somewhat rough; it has more nutriment than the Common Meadow Oat Grass. Sheep are very fond of it. It is, therefore, only a pasture grass of inferior soils, but important for all kinds of stock. It has per pound, 600,000 grains.

REMARKS.—These three Oat Grasses are well suited for the beginning on inferior soils, but, when applied in the mixture, they are valuable only when the soil is made more productive by green manuring. Other grasses can be used to a greater profit.

6.

Common Hair Grass, (*Aira Flexuosa*. 21)—This grass blossoms in June and grows 1½ feet high, and is found on dry pastures. It has thread-shaped leaves and forms bristle-like bunches like the bristle grass. This grass is liked by all kinds of stock, whilst the Bristle Grass is rejected by all animals. The Common Hair Grass is an important and excellent pasture grass.

7.

Early Hair Grass, (*Aira Canescens*. 21)—Sheep are very fond of this grass; it forms small bristly sod piles, and in such mixtures that are always pastured

off bare; it is an excellent grass, and contains per pound 4,000,000 grains.

8.

Tufted Hair Grass, (*Aira Arundinacea*. 4)—This grass is found growing along waters, from three to four feet high, but on fields from two to three feet; blossoms in May and June; it forms many stems and leaves, and is an excellent, sweet, nourishing and wholesome grass for cows. The cultivation of this seed is very important, for on soils not too dry it is of superior quality for cattle, as a mow and pasture grass. It contains per pound, 6,000,000 grains.

9.

Sweet Scented Vernal Grass, (*Anthoxanthum Odorum*. 4)—It is also called Melilote Grass, for its perfume is like that of the Melilote Clover, but stronger; is found on good meadow pastures, blossoms in May and grows from 1 to 1½ feet high. The virtues of this grass are that it is very early in growth, and after being cut off it shoots up rapidly, and has a strong and continuous late growth for fall pasture. It is an enduring or lasting grass, and animals are fond of it, but it must not be put too strong in the mixture, for it is too aromatic (bitter.) It has per pound, 800,000 grains.

SECTION CXXIX.

The Bent Grass Family.

1.

Red Top or Herd Grass, (*Agrostis Vulgaris*. 4)—This grass is found on all wild pastures as well on sandy as on clay soils; it is the earliest of the Bent Grasses, and produces, if we mix it with the Sheep Fescue, Red Fescue, Meadow, Spear Grass, and the Sweet Scented Vernal Grass, a very early pasture. It grows from two to three feet high, and blossoms in June; after cutting it grows well and fills the pastures in fall, is a wholesome and nourishing grass, and on good soils, good for mowing.

2.

Dog's Herd Grass, (*Agrostis Canina*. 4)—This grass possesses, like the former, excellent qualities for hay and pasture.

3.

Rough Thin Grass, (*Agrostis Scabrum*. 4)—Possesses very similar qualities to the former, but grows higher and is more nourishing.

4.

White Bent Grass, or Fiarin Grass, (*Agrostis Alba*. 4)—This valuable grass has among other preferences of the Bent Grasses that from St. John's Day till fall it grows from six to twelve inches high, with leaves and branches, which improve much the pasture in the after part of summer and fall. It grows on all kinds of soils, but still more luxuriantly blossoms in July, is an excellent pasture grass on all kinds of soil and for all kinds of animals, and on good soils an excellent mowing grass for hay. It has per pound, 5,000,000 grains.

SECTION CXXX.

The Wheat Grass and Barley Grass Family.

1.

Awed Wheat Grass, (*Triticum Caninum*. 4)—Found in woods and along banks, grows from two to three feet high, and blossoms in June; it is an early grass, very productive and nourishing, on inferior soils, a mowing grass, but it must be cut before it blossoms, for its awn or beard is offensive to animals. It forms a light after grass; it has per pound 100,000 grains.

2.

The Meadow Barley Grass, (*Hordeum Pratense*. 4)—Is found on meadows and pastures; sheep are very fond of it; it is a long-enduring, early and nourishing grass; blossoms in July and grows from two to three feet high; is only used as a pasture grass on account of its sharp awns or beard. It has per pound, 100,000 grains.

3.

Philadelphia Lime Grass, or Canada Lime Grass, (*Elymus Philadelphicus*. 4)—This grass grows from three to five feet high, and on clay soils, where other good grasses do not grow well, still higher; it blossoms in July, is of a gray green color, and has large, broad, reed-like and somewhat rough leaves. It is a very early and extraordinary productive and nourishing grass; it is not well suited for pasture, but excel-

lent, for hay, and on wet clay soils will yield three or four times as much as clover. It has 100,000 grains per pound.

4.

Common Darnel, or Rye Grass, (Lolium Perenne. 21)—It is also called English Rye Grass, since it has been cultivated in England for many years for the improvement of pastures. In this country, however, the Common Darnel is best suited to green manuring.

B.]—*The most preferable herbs of Meadows and Pastures.*

SECTION CXXXI.

The lasting kinds of Clover.

1.

The Red Clover, (Trifolium Pratense Sativum. 21 5)—It is believed that this clover is a variety of the lasting Red Clover, found often in good pastures, which is evident, as Common Red Clover grows wild in good meadows and fields, so that the former is likely the original kind of rotation crop clover. But the proper lasting Meadow Clover is quite different to the common red or rotation crop clover. The common red or rotation crop clover grows higher, has more stems, is less hairy, has larger pointed leaves, roundish leaf onsets, the heads are stemmed, often paired. It also blossoms as early as May. Its roots are spindly and divided into threads, shaped in the soil. It does not change by cultivation, will last only from two to three years in the rotation crop, but in soils which are kept in fermentation by the green manuring, it will last five years; per pound 200,000 grains.

2.

The genuine or original Meadow Clover, (Trifolium Pratense. 21)—This clover grows wild in good meadows and pastures. The roots are fibrous, stems hollow and somewhat inclined to the ground, the leaves are roundish, the leaf onsets of a longish shape, and the heads often like a double form. It blossoms from July till October. This clover although not frequently found in meadows and pastures is of a high value, very important for the first beginning of a meadow designed to remain for a series of years and for pasture, and ought to be cultivated by every farmer in separate lots, to have the seed at hand.

This important clover is an exceedingly fine mowing and pasture grass, it has rosy red seeds, and 200,000 grains to the pound.

3.

**The Bastard Clover, (Trifolium Hybridum. 21)*—This clover appears a hermaphrodite of the red and white clover, although it is a peculiar kind, apart from the other species, it grows in good meadows. The roots are white and turnip-like, the stems lying in the beginning of their growth, the lower part of the head is of rosy red and the upper of white color. It blossoms in July and August. This clover is also a mowing and pasture plant; per pound 200,000 grains.

4.

**Mountain Clover, (Trifolium Alpestre. 21)*—This clover grows on dryer pastures than the former, and is better suited for mixed pastures, viz: for cow and sheep pastures, it is an early kind and blossoms from May till August; the root is dark brown, thread-shaped and woody; grows oblique and very branchy in the soil; the heads are of purple red color. This clover yields a somewhat harder hay than the meadow clover, but in the mixture with the grasses it is soft, and will last for five or six years, hence it deserves a careful cultivation in the seed bed. It is an excellent mowing and pasture plant, and has yellowish seeds of 300,000 per pound.

5.

**The Middle Clover, (Trifolium Medium. 21)*—This clover grows on dry soils, and belongs, therefore, to the sheep pasture. It is easily known by its stems bending to and fro; blossoms in June and July; grows on dry pastures one to two feet high; the roots creep in the soil and are of a grayish brown; the heads are rosy red and scenting. This clover shoots up after being cut during the whole summer, and its draught is good. It deserves also a careful cultivation in the seed bed for cultivation, is an excellent pasture and mowing plant, has yellow seeds of 400,000 grains per pound.

6.

**The Yellow-White Clover, (Trifolium Ochroleucum. 21)*—This clover grows also on dry grounds, one foot high, and blossoms in July and August.

The heads are of a pale yellow, by which it is easily known; it is hardy, lasting, productive, and an excellent *pasture clover*, but its hay somewhat hard. It is a valuable addition to the pastures and deserves to be carefully cultivated for the mixtures. It has light brownish seeds of 300,000 grains per pound.

7.

* *The long-headed Clover*, (*Trifolium Rubens*. 21)—We find this clover on dry pastures, in bushes, &c. It blossoms in June and July, and grows from one to two feet high; the heads are of a fine purple red color, and from an inch to an-inch and a half long; the root grows deep in the ground. It is a good pasture clover, and if mowed makes good hay. It has greenish seeds of 300,000 grains per pound.

8.

* *The Pannonian or felt-like Clover*, (*Trifolium Pannonicum*. 21)—This clover grows in the Southern States, on meadows, from two to three feet high, and resembles the meadow clover, but is white felt-like, has brown stems and whitish heads, in the mixture it is an excellent mowing and pasture grass plant, with whitish seeds of 500,000 grains per pound.

9.

* *The Hill Clover*, (*Trifolium Montanum*. 21)—This clover grows on dry hills, borders, wood pastures, &c. It grows from twelve to eighteen inches high, blossoms from May till August, blossoms snow white, is a good pasture, and in the mixture a good mowing clover, and has 500,000 grains per pound.

10.

The White Clover, (*Trifolium Repens*. 21)—Every farmer knows this plant, and that, by itself, it makes a sparse or thin pasturage; but all farmers do not know that as sheep pasture (alone) it is the cause of many diseases among sheep, not on account of any poisonous property it possesses, but from the richness of the plant; it is too stimulating for sheep when it constitutes the whole feed; used in the mixture, however its stimulating effects are counteracted by other grasses, and it thus constitutes a wholesome and profitable pasturage. It has per pound 600,000 grains.

REMARKS.—These ten kinds of clover are the most important mowing and pasture plants in the mixtures. It requires, on a common farm, for their cultivation, only a small quantity of seed, and a small quantity of land, for we dare not add too much clover to the mixtures, as the different kinds of clover and vetches contain too much gum, which is opposed to the harmony of nature and agriculture. But these kinds of clover, added to the grass mixtures, make a far more productive and healthy hay and pasturage, which will support and raise animals of a finer stock and condition than single pastures possibly can do; and for the reasons mentioned every good farmer will keep on hand those different kinds of clover seeds.

SECTION CXXXII.

The Meadow Vetches, (*Vicia*).—These herbs are not less gummy than the mentioned kinds of clover, as experience and the examination of chemists have sufficiently proved; hence we dare not put too much of them in the mixtures as hay and pastures for cows and sheep, that are not kept for fattening; but for raising stock, the grass plants, which are richer in particles of starch and sugar, should by far predominate; for on the hay and pastures which contain the most particles of starch and sugar, the largest, healthiest and finest animals are raised.

1.

* *The Pea-like Vetch*, (*Vicia Piciformis*. 21)—This fodder vetch is one of the largest; it grows from five to seven feet, is found in wood pastures, blossoms in June and July; the root woody and lasting for many years, the stems are furnished with edges and a great number of leaves, the flowers are small and of a yellowish white color; the ripe hulls are of a light brown. Where we cannot plant them for seed cultivation on the outside of gardens, fences, or along bushes, we must keep some plants on garden beds and support them by dry bushes, so that they can grow up. This vetch is a very nourishing and early fodder plant, and yields well in hay mixtures; it is also a good pasture plant. It has from 3,000 to 5,000 grains per pound.

2.

* *The Forest Vetch*, (*Vicia Sylvatica*. 21)—We find this vetch in woods and hedges: it blossoms in June

and July, with a pale blue; the ripe hulls are dark brown, the root is branchy with many heads, and lasting long; the stem is very branchy and climbs four to five feet high, bushy, full of leaves, yields well as a mowing plant and for pasture. It has per pound 30,000 grains.

3.

* *The Bush Vetch*, (*Vicia Dumetorum*. 21)—We find this vetch in bushes and hedges, blossoms in June and July, flowers large and purple colored; it climbs from three to four feet high, and distinguishes itself by its leaves, which are standing single; the ripe hulls are of a greenish yellow. All kinds of stock are fond of it; it does excellently well in the mowing and pasture mixtures; per pound 10,000 grains.

4.

The Hedge Vetch, (*Vicia Sepia*. 21)—This kind of vetch grows along hedges, in meadows, gardens and woods; blossoms early in May; the root is thin; yellowish and lasting; the stem grows upward and is one to two feet long; the flowers are of reddish violet, seldom white color; the seeds globular and ash colored, dotted; the hulls spring open. This vetch shoots up early in the spring into greens, thrives well during the whole summer after being cut or eaten off, and remains green even in the winter. All animals are fond of it; it is a good mowing and pasture plant, and has per pound from 10,000 to 12,000 grains.

5.

Carolina Vetch, (*Vicia Caroliniana*. 21)—Grows on borders of woods and along fences, blossoms in May and June, stem two to four feet long, climbing, flowers small, white or pale blue; it is very full of leaves and is excellent in the mowing and pasture mixtures; animals are fond of it; it has per pound 30,000 grains.

6.

Tufted Vetch, (*Vicia Cracea*. 21)—Grows along the borders of fields, woods and meadows, blossoms in June and July, pale purple, stem two to three feet high. This vetch is also much liked by cattle, and also in the clover and pasture mixtures very yielding. It has per pound, 30,000 grains.

7.

* *The fine leaved Vetch*, (*Vicia Tenuifolia*. 21)—This

vetch grows on sandy pastures and dry hills, blossoms in May and June, the root is creeping and lasting; stem from one to two feet high, is bent to and fro, knotty and copious in leaves, flowers pale blue; per pound, 30,000 grains.

8.

* *The Hedysar-like Vetch*, (*Vicia Onobrychioides*. 21)—Is sometimes found in meadows and fields, and blossoms in May and June, dark blue, grows from one to two feet high. It is only a pasture plant; per pound, 50,000 grains.

9.

* *The Lathyrus Vetch*, (*Vicia Lathyroides*. 21)—Grows on sunny dry grass hills and sandy pastures, blossoms in April and May, and is one of the smallest vetches; the root woody, thin, yellowish and lasting; the stem grows from six to nine inches. The upper leaves are oblong, the lower heart-shaped, the flowers pale blue; sheep are very fond of it; is only a pasture plant; per pound 100,000 grains.

SECTION CXXXIII.

Meadow Peas.

1.

The large Meadow Peas.—The principal of the largest and most lasting meadow peas, we have noticed in the Green Manuring of Topseeds. But these we also use as two and three years fodder mixtures in the rotation crops; we can mix them with the following stiff erect herbs, and the strongest mowing grasses, which will prevent them from lying down.

1 lb. Knotty Meadow Pea, (*Lathyrus Tuberosus*.)

1 " Everlasting Pea, (*L. Latifolius*.)

1 " Two and four-leaved Pea, (*Lathyrus Heterophyllus*.)

1 " Wood Meadow Pea, (*L. Sylvestris*.)

1 " Goat's Rue, (*Galega Officinalis*.)

1 " White Stone Clover, (*Melilotus Vulgaris*.)

1 " Lucerne.

7 lbs. Fodder Plants.

1 lb. Philadelphia Lime Grass, (*Elymus Philadelphicus*.)

1 " Erect Brome Grass, (*Bromus Erectus*.)

1 " Large Brome Grass, (*Bromus Giganteus*.)

- 1 lb. Tall Fescue Grass, (*Festuca Elatior*.)
 1 " French Rye Grass, (*Avena Elatior*.)
 1 " Orchard Grass, (*Dactylis Glomerata*.)
 1 " Ribbon Grass, (*Phalaris Arundinacea*.)

7 lbs. Fodder Grasses.

This mixture will stand so dense that it cannot lie down, through the help of stone clover and the grasses. It will give three heavy crops in a season for three or four years.

2.

The Yellow Meadow Pea, (*Lathyrus Pratensis*. 21)—We find this on all good meadows; it has an abundance of small leaves, stands erect, grows very bushy from two to three feet high in the mixture, and blossoms in June and July, blossoms yellow. It is very lasting, does well in the clover and vetch mixtures, and is profitable as a mowing and pasture plant; it has per pound 12,000 grains.

3.

The Marsh Vetchling, (*Lathyrus Palustris*. 21)—In growth it is climbing; grows from two to three feet high in low grounds, wet meadows and thickets; blossoms in June and July, blossoms blue and purple. It possesses the qualities of the former, but is better suited to pasture than mowing; it contains 20,000 grains per pound.

4.

The Shell Clover or Clover Pea, (*Lotus Arvenis*. 21)—Grows on dry pastures and is well known by its constant yellow flowers; after it blossoms sheep will not feed on it, but will take it in the hay. It distinguishes itself from the following shell clover by its wrinkled stems; is only a pasture plant on strong vigorous pastures where it cannot come to blossom. We need not cultivate it, it is easily collected; per pound 10,000 grains.

5.

The large Shell Clover, (*Lotus Major*. 21)—Grows higher than the former, has smooth round and hollow stems, grows from one to two feet high and yields better than the former. It is also bitter, and useful in the mixtures of the clovers, vetches and grasses, but we must not take too much of it, on account of its large produce, it is a rare plant and must be cultivated, per pound 100,000 grains.

6.

The Wild Lupine, (*Lupinus Perennis*.)—Cows are very fond of this herb, it grows on sandy hills about one foot high, in the mixture still higher, blossoms in May and June of a purplish blue color; per pound 5,000 grains.

SECTION CXXXIV.

Lucerne, Hedysarum, Goat's Rue, Stone Clover.

1.

The Blue Lucerne, (*Medicago Sativa*. 21)—The peculiarity of this fodder plant consists in leaving many vacant places. We seldom find a soil in which it will produce, alone, a good crop; it is much better, therefore, to be cultivated in the mixtures, so that the open spaces may be filled by other grasses and plants. As it is an early and valuable fodder plant, it will, by this mode of treatment, produce well and last longer. Must be cultivated in the garden for seed—has 200,000 grains per pound.

2.

The Yellow Lucerne, (*Medicago Foliata*. 21)—This plant is for poor clay what the former is for rich—a good mowing plant; but if it is allowed to stand too long, it becomes hard and woody, when we do not cultivate it in the mixture. It is also a good pasture plant, and should be cultivated on every farm. It grows as early as the former, and blossoms from June till fall; stands erect in the mixture, but inclined when wild; grows from two to five feet high—300,000 grains per pound.

3.

The Hedysarum, (*Hedysarum Onobrychis*. 21)—This highly important, wholesome fodder and pasture plant is easily cultivated, and, like the blue and yellow Lucerne, has a beautiful appearance. By simply digging a small piece of upland and planting it in rows, we have a supply for several years, for the fodder and pasture cultivation, by gathering the seeds. The time will soon come when a single plant will not meet the wants of the fodder and pasture cultivation the world over. No small trouble will deter the farmer from using every care to prepare his agricultural mixtures; and as experience and local circumstances afford the facilities requisite, his lands will increase in fruitfulness, and amply repay for all the trouble and labor expended.

4.

The Goat's Rue, (Galega Officinalis. 24)—This is a fodder plant of an excellent character. It cannot be excelled when used in the mixture; but if used alone, it will not do so well, as it grows not dense enough, nor alone, on all kinds of land; but if we keep a few bushes in the hedge or garden, we can save or gather a sufficiency of seed, and thus form the most productive and durable mixtures, easily and at little expense. Blossoms from June till August, grows from three to five feet high, and has 100,000 grains per pound.

REMARKS.—Where a farmer has only a small piece of land or small lots, it would be well to set apart a small portion and plant Goat's Rue and blue Lucerne, (in good soil) Hedysarum and yellow Lucerne (on an inferior soil), for they will, if standing free—in such plant hedges—produce three or four times as much fodder as other grasses sowed broadcast. The seed will be a profitable investment, for the free standing plants are loaded with seeds. A yard wide is sufficient for such a row. It should not be sowed too thick.

5.

The White Melilote or Sweet Clover, (Melilotus Leucantha. 24)—In the mixture with other fodder plants and with the above mowing grasses, this plant renders the two and three years fodder cultivation much more certain and from four to five times more productive. Such fodder mixtures in hay and pasture will be eaten by milk cows and other stock with a greater relish; but for hay, it must be cut before it blossoms, for it grows faster afterwards; and in paying attention, it can be mowed three or four times in a season, producing strong, heavy swaths. The sweet clover thus used proves profitable, but he who rejects this mode, and sows it by itself, will lose his reward and miss his aim.

6.

The kinds of the Yellow Melilote or Sweet Clovers :—

1. Melilotus Officinalis. ♂; 2. Melilotus Dendata. ♂;
3. Melilotus Kochiana. ♂.

The nature of these three kinds is already given in the green manuring. We will only add that they are of the greatest importance for two and three year fodder mixtures, if we mow them before they come

to blossom. They will produce, in the mixtures, a swath of from three to four cuttings in a season, and from four to five times the amount of hay they would if sowed alone, whilst the hay and pasture is greatly relished by horses and cows.

REMARKS.—As these kinds of Melilotes or Sweet Clovers are so highly important, as well in green manuring as in fodder and pasture cultivation, I will state a simple mode of raising the seeds. We give each of these kinds a separate place, along hedges, or among the shrubbery of the garden or elsewhere; we have then no further trouble but to strip off the seeds when ripe.

SECTION CXXXV.

By-Plants of the Meadows and Pastures.

We find the following plants pleasant to cattle and other stock, and as they are convenient to be had and easily collected, we can add those which we find necessary, observing those eaten by the stock—and increasing such in the mixtures—and also lessening the quantity of those not eaten, but allowed to shoot into seed.

1.

Sheep Burnet, (Poterium Sanguisorba. 24)—We find the Sheep Burnet nearly everywhere on sandy woodlands. It is very lasting and should be kept for sheep pasture on every farm. It is much liked by sheep, and stands the drought well; has per lb. 300,000 grains.

2.

The small-leaved Plantain, (Plantago.)—This is mentioned for the topseed of green manuring, and is an excellent pasture plant for the mixtures of two and three years; per lb. 300,000 grains.

3.

Parsnip, (Pastinaca Sativa. 24)—This is also mentioned in the topseed mixtures for green manuring, and is a good pasture plant; but in mixtures intended for a continuation of several years, we must use less of it than in the mixtures of two and three years of the rotation crop,—for instead of the Parsnip there are given above, better grasses and herbs; per lb. 150,000 grains.

4.

Pimpinell, (Anise,) (Pimpinella.)—These are also

mentioned for the green manuring of the topseed. The two kinds, viz., (*Saxifraga* and *Magna*. 24) are excellent for sheep pastures; per lb. 300,000 grains.

5.

The Fodder Mallows, (*Malva*.)—Both kinds mentioned for the Green Manuring of the Topseed, the *Malva Rotundifolia* and *M. Sylvestris*, 24 are a pleasant pasture for sheep and cattle, and the high Mallow, (*M. Sylvestris*,) is also good to mow. Seeds per pound 100,000 grains.

6.

The common Succory, or Cichory, (*Cichorium Intybus*. 24)—It must be remembered and observed as a

general rule, that of those plants which sheep and cattle do not touch in the mixture, there should be sowed less in proportion to the other seeds. A small contribution of the Succory is very useful, for sheep and cows will not allow them to grow up, although the leaves have a bitter taste; but if there is too much of it sowed in the mixture, they will let it stand; seeds per pound 300,000 grains.

7.

The common Yarrow, (*Achillea Millefolium*. 24)—This is an important pasture plant, but it must be used very sparingly, and only for sheep pasture in the mixture; sheep are very fond of it, and it comes very early; seed per lb. 1,000,000 grains.

APPENDIX.

Experience shows that plants which belong to different families, will always prosper better in the mixture than if cultivated alone. We observe for instance the red Clover is protected against the influence of the weather by grasses. The grasses can endure more cold and wet weather than the clover; and the clover is more insensible to drought and heat. The mixture, however, may fail, but is not by far as liable to do so as a single seed of red clover, since the latter may die out entirely the first year, owing to severe cold or other noxious influences; and if there is no grass in the mixture, we are compelled to plow the field over and sow it anew.

For the seed mixtures, we will lay down the following rules particularly to be observed.

1. We dare sow only such plants in the mixture as will grow and harmonize with each other at the same time.

2. We must select the plants according to the purpose we have in view; that they develop themselves at the same time, or appear early or late. If the plants belong to the pasture, it will be well to select those which develop themselves early and late, as

the pasture then affords the animals abundant nourishment in every season. But, if on the contrary, we use the plants for stable fodder, it is best to sow such plants together as develop themselves at the same time, or else the earlier plants will choke entirely the late ones.

3. It is of great importance to take the correct proportion of the plants sowed together; for if we sow vigorous or bushy plants in a large quantity with a few weaker and more slowly growing plants, the former will, of course, suppress the latter, so that they cannot thrive.

4. We must always sow such plants together, as will mutually improve in value, of fodder.

A.]—*Seed mixtures, serving for Cattle, for stable fodder.*

1. *Mustard and Vetches* must be sowed so as to produce about *one* mustard plant to *three* vetch plants. This mixture may be sowed like either mustard alone, or vetches, at almost any time from April to June or July, and will generally turn out very certain, but we dare not allow the mustard to stand long enough to become too hard in the stems.

2. *Mustard and Spurry* should be sowed in the proportion of nineteen seeds of spurry to one of mustard. This mixture produces lower as well as upper fodder.

3. *Mustard and Buckwheat*, the number of grains to equal parts.

4. *Millet and Buckwheat*, in the proportion of four grains of buckwheat to one of millet.

5. *Spurry and Buckwheat*, in the proportion of one part buckwheat to eleven of spurry, especially adapted to light sandy soils.

6. A mixture of *Vetches, Beans, Peas, Barley and Oats*, in the proportion of three Vetches, to one Pea, one Bean, two Barley, and one grain of Oats. To this mixture we may also add some rye and buckwheat.

7. *Mixture of Clover, Grasses and Herbs*. The mixtures designed for stable feeding must be composed somewhat differently from *pasture*; be compiled and selected to suit the condition of the different soils, as one kind of soil will be better adapted to nourishing one kind of grass and herbs than another. The principal rule to be observed is, not to sow the mixture of the clover grasses too thinly, so that they stand densely and close in the beginning. For dry, loamy, sandy soils, the following plants will form a good mixture for mowing the first and second years, and the third year for pasture.

Lucerne,.....	2 lbs. per acre.
Red Clover,	2 "
Perennial Red Clover,.....	3 "
White Clover,	2 "
The small Hop Trifol,	1 "
Burnet,.....	2½ "
Caraway,.....	3 "
Plantain,	½ "
English or Italian Rye-grass,.....	4 "
Timothy Grass,.....	2 "
Meadow Fescue Grass,.....	1 "
Panic Grass,.....	2 "
Oats Grass,	1 "
Orchard Grass,.....	2 "
Comb Grass,.....	1 "

Sum of.....29 lbs.

Or for the same kind of soil designed for mowing

one or two years, and then for pasture from one to two years.

Red Clover,.....	3 lbs. per acre.
Perennial Red Clover,.....	2 "
White Clover,	2 "
Small Hop Trifol,.....	1 "
Caraway,	2 "
Burnet,.....	2 "
English Rye-Grass,	6 "
Meadow Foxtail Grass,.....	1 "
Orchard Grass,.....	3 "
Meadow Panic Grass,.....	2 "
Short Hairy Oats Grass,.....	2 "
Meadow Fescue Grass,.....	2 "
—	
	28 lbs.

For good Clay Soils, one to two years mowing.

Red Clover,.....	4 lbs. per acre.
Perennial Red Clover,.....	2 "
Large Hop Trifol,.....	2 "
White Clover,	1 "
Caraway,.....	3 "
Burnet,.....	2 "
Italian Rye-Grass,	6 "
Meadow Foxtail Grass,	1 "
Orchard Grass,.....	2 "
Timothy Grass,.....	2 "
Meadow Fescue Grass,.....	1 "
Meadow Panic Grass,.....	1 "
—	
	27 lbs.

For good Limestone Land, two to four years Mowing.

Perennial Red Clover,.....	2 lbs per acre.
White Clover,.....	3 "
Shell Clover,	2 "
Caraway,.....	3 "
Burnet,.....	2 "
Orchard Grass,.....	2 "
Timothy Grass,.....	2 "
Meadow Panic Grass,.....	2 "
Meadow Fescue Grass,.....	2 "
English Rye-Grass,.....	2 "
Meadow Foxtail Grass,.....	2 "
—	

24 lbs.

B.—Seed Mixture for Cattle Pasture.

It is undoubtedly the interest of the farmer to appropriate land for cattle pasture, which is so poor as not to insure or warrant a good swath of sowed plants; but he should always endeavor to sow for grass pasture such fields as have received a good manuring of masses of plants and herbs, for under such circumstances only can the growth of the pasture justify the use of the land. If the soil is very poor, several plants must be entirely excluded, (the red clover, for instance,) or sowed but in little quantities. On the contrary, we take the *Yarrow*, *White Clover*, and other grasses growing best on dry soils. The *Fescue Grasses*, *Soft Brome Grass*, *Timothy*, *Oats Grass*, and *English Rye-Grass*; but if the soil is rich, and we design mowing the seed mixture the first year, and pasturing the years following, we sow the *Red* and *Hop Trifol* in abundance, and also such grasses which spread themselves in roots and stalks, especially the *English Rye-Grass*, *Orchard Grass*, *Comb Grass*, *Panic Grasses*, etc. We dare not omit in the mixture the herbs, as *Burnet*, *Plantain*, *Yarrow*, etc., for the improvement of pasture. Cattle are not so fond of aromatic herbs as sheep, but in all cases dense mixtures are always more important for pastures than for hay making, or for green fodder in the stable. For light soil the following mixture is best suited.

Grass Mixture for Light Soil.

Red Clover,.....	1 lb. per acre.
Perennial Red Clover,.....	1 “
White Clover,.....	3 “
Small Hop Trifol,.....	1 “
Plantain,.....	1 “
Yarrow,.....	1 “
Burnet,.....	1 “
Caraway,.....	3 “
Soft Brome Grass,.....	2 “
Meadow Fescue Grass,.....	2 “
Oats Grass,.....	2 “
English Rye-Grass,	5 “
Timothy Grass,.....	2 “
Comb Grass,.....	1½ “
Quaking Grass,.....	1½ “

—
28 lbs.*For Rich Soil.*

Red Clover,.....	2 lbs. per acre.
White Clover,	3 “
Perennial Red Clover,.....	2 “
Small Hop Trifol,	1 “
Plantain,	½ “
Caraway,.....	2½ “
Yarrow,.....	½ “
Burnet,.....	1 “
Timothy Grass,.....	2 “
Orchard Grass,.....	2 “
Meadow Foxtail Grass,	3 “
Comb Grass,	½ “
Quaking Grass,.....	½ “
Meadow Panic Grass,	1 “
Meadow Fescue Grass,.....	1 “
English Rye Grass,.....	4 “
Dandelion,	½ “

27 lbs.

For Moor or Bog Land.

White Clover,.....	2 lbs. per acre.
Perennial Red Clover,.....	2 “
Caraway,	3 “
Burnet,.....	2 “
Panic Grasses,.....	3 “
Orchard Grass,.....	2 “
Meadow Foxtail Grass,.....	2 “
Meadow Fescue Grass,.....	2 “
Comb Grass,	1 “
Sweet-scented Vernal Grass,.....	1 “
Woolly Honey Grass,.....	1 “
Timothy Grass,.....	1 “
English Rye Grass,.....	2 “
White Bent, or Farm Grass,.....	1 “

25 lbs.

Seed Mixture for Sheep Pasture.

This seed mixture is not difficult to form in regard to quantity of soil, for sheep like to graze on grasses and herbs. The following selections for the different soils are most suitable.

For dry poor Sandy Soils.

Large Clover,.....	3 lbs. per acre.
Hard Fescue Grass,	6 “

Red or creeping Fescue Grass,...	6 lbs. per acre.
Sheep Fescue Grass,.....	2 "
Soft Bromus Grass,.....	3 "
Burnet,.....	2 "
Pimpinelle, (Anise,).....	$\frac{1}{2}$ "
Yarrow,.....	2 "
Soft Honey Grass,.....	2 "

26 $\frac{1}{2}$ lbs.

For loamy Sandy Soils.

Perennial Red Clover,.....	2 lbs. per acre.
White Clover,.....	2 "
Small Hop Trifol,.....	2 "
Caraway,.....	3 "
Yarrow,.....	1 "
Pimpinelle, (Anise,).....	1 "
Burnet,.....	2 "
Plantain,.....	1 "
Hard Fescue Grass,.....	3 "
English Rye Grass,.....	5 "
Creeping Panic Grass,.....	2 "
Timothy Grass,.....	1 "
Wheat Grass,.....	2 "

27 lbs.

For Limestone and Clay Soils.

Red Clover,.....	1 lb. per acre.
Perennial Red Clover,.....	2 "
White Clover,.....	2 "
Small Yellow Hop Trifol,.....	2 "
Caraway,.....	2 "
Yarrow,.....	1 "
Plantain,.....	$\frac{1}{2}$ "
Burnet,.....	2 "
Pimpinella,.....	$\frac{1}{2}$ "
English Rye Grass,.....	4 "
Creeping Panic Grass,.....	2 "
Hard Fescue Grass,.....	2 "
Quaking Grass,.....	1 "
Comb Grass,.....	2 "
Awned Wheat Grass,.....	1 "
Timothy Grass,.....	2 "

27 lbs.

foundation for gaining a respectable competence. In his first attempts he will do well to take lands which gives a ready growth to the seeds, until he is confident his seed is perfect, and he has acquired some practice in curing the seeds and applying them. The longer it stands in grasses, by a suitable attendance, the better he will understand their nature. The principal care which the seed mixtures of this kind require, is the top manuring with compost, containing animal and vegetable matter, and also mixed minerals, which we apply as top manuring in the fall and winter. We find that manuring these masses at this time, the sowed plants grow better and are more nourishing.

It is not impossible, by well selected over manuring, to make these pastures as nutritious as the marsh pastures along rivers and sea coasts, which are found so nutritious in supporting and fattening cattle, since they have the same herbs and grasses, which by the chemical qualities of the soil partake of those nutritious elements. On chemical examination they are found to contain much *salt, azotic gas, potash, soda, lime, phosphorus and sulphur*, which are required by animals in their growth and fattening process. Animal matter is a good ingredient mixed with vegetable substances, lime, marl, &c., and makes an excellent compost, and is of an incalculable benefit for enriching and fattening pastures, and will do much good in aiding the farmer, until he can have time to raise his soil by the invaluable process of Green Manuring.

We have, at our command, many things which though apparently small, when collected, are helping considerably—as bone dust, plaster, salt, potash or wood ashes, lime, soda, marl, mould and stable manure, all of which, when rightly applied, have good effects, under the influence of a proper moisture. If undue dryness occurs, over-manuring with stable manure, salt, &c., will rather tend to injure than to do good; but when applied with the green manuring of the grasses, herbs, &c., which keeps up a moisture in the soil, it will always produce good effects, even under the influence of very dry seasons. For this we can raise a compost of young vegetables, such as Polk, Sunflowers, Elder, Jamestown Weed, Mullein, Shumach, Artichokes, &c., to which apply slacked lime three parts, and one part plaster, which will soon decompose and make an excellent manure:

We have now given a selection of the mixtures for grasses, clovers, and herbs, by the use of which, the farmer may become prosperous, and lay a lasting

when it is perfectly rotten apply it to the land. Another matter which increases vegetation is good harrowing so as to pulverize and render the surface mellow, followed by a good rolling with a heavy roller.

1.

The best Meadow Plants for Moist, Wet, Moory, Flat Meadows, of which the water cannot be drained.

COMMON NAME.	BOTANICAL NAME.
Common Manna Grass,.....	Glyceria Fluitans.
Water Spear Grass,.....	Poa Aquatica.
White Bent Grass,.....	Agrostis Stolonifera.
Melic Grass,.....	Melica Nutans.
Timothy Grass,.....	Phleum Pratense.
Ribbon Grass,.....	Phalaris Arundinacea.
Hair Grass,.....	Aira Aquatica.
Marsh Trifol,.....	Menianthes Trifoliata.

2.

On moderate Moist Soils of which the water can be drained off.

Meadow Fox-tail Grass,.....	Alopecurus Pratensis.
Vernal Spear Grass,.....	Poa Trivialis.
Meadow Spear Grass,.....	Poa Pratensis.
Meadow Fescue Grass,.....	Festuca Pratensis.
Lying Fescue Grass,.....	Festuca Decumbens.
High Oats Grass,.....	Avena Elatior.
Tufted Hair Grass,.....	Aira Caespitosa.
Large Brome Grass,.....	Bromus Giganteus.
Sweet Scented Vernal Grass,.....	Anthoxanthum Odorum.
White Bent Grass,.....	Agrostis Stolonifera.
Velvet Grass or White Timothy,.....	Holcus Lanatus.
Orchard Grass,.....	Dactylis Glomerata.
Italian Rye Grass,.....	Lolium Perenne Italicum.
The Horned Shell Flower,.....	Lotus Corniculatus.
Marsh Trifol,.....	Menianthes Trifoliata.
Red Clover,.....	Trifolium Pratense.
White Clover,.....	Trifolium Repense.
Meadow Shell Clover,.....	Lotus Siliquosus.

3.

On Moist and Dry Meadows.

Meadow Oats Grass,.....	Avena Pratensis.
Gold Oats Grass,.....	Avena Flavescens.
High Oats Grass,.....	Avena Elatior.
Sheep Fescue Grass,.....	Festuca Ovina.
Red Fescue Grass,.....	Festuca Rubra.
Sweet Scented Vernal Grass,.....	Anthoxanthum Odorum.
Velvet Grass,.....	Holcus Lanatus.

Soft Velvet Grass,.....	Holcus Mollis.
Fringed Melic Grass,.....	Melico Ciliata.
Bulbous Spear Grass,.....	Poa Bulbosa.
Common Hair Grass,.....	Aira Flexuosa.
Black Medic,.....	Medicago Lupulina.
Mountain Clover,.....	Trifolium Montanum.
Great Burnet,.....	Pimpinella Magna.
Burnet Saxifrage,.....	Pimpinella Saxifrage.
Meadow Vetchling,.....	Lathyrus Pratensis.
Tufted Vetch,.....	Vicia Cracca.
Yarrow,.....	Achillea Millefolium.

4.

Best Grasses for raising Cattle.

Meadow Fox-tail Grass,.....	Alopecurus Pratensis.
High Oat Grass,.....	Avena Elatior.
Meadow Fescue Grass,.....	Festuca Pratensis.
Vernal Spear Grass,.....	Poa Trivialis.
Water Spear Grass,.....	Poa Aquatica.
Melic Grass,.....	Melica Nutans.
Hair Grass,.....	Aira Aquatica.
Sweet Scented Vernal Grass,.....	Anthoxanthum Odorum.
Brome Grass,.....	Bromus Giganteus.
Velvet Grass,.....	Holcus Lanatus.
Scented Velvet Grass,.....	Holcus Odoratus.
Soft Velvet Grass,.....	Holcus Mollis.
Italian Rye Grass,.....	Lolium Perenne Italicum.
Red Clover,.....	Trifolium Pratense.
The Horned Shell Clover,.....	Lotus Corniculatus.
Meadow Shell Clover,.....	Lotus Siliquosus.
Meadow Vetchling,.....	Lathyrus Pratensis.
Tufted Vetch,.....	Vicia Cracca.

5.

Best Grasses for raising Horses.

Timothy Grass,.....	Phleum Pratense.
Manna Grass,.....	Glyceria Fluitans.
Darnel or Rye Grass,.....	Lolium Perenne.
Fringed Melic Grass,.....	Melica Ciliata.
Orchard Grass,.....	Dactylis Glomerata.
Black Medic,.....	Medicago Lupulina.
Ribbon Grass,.....	Phalaris Arundinacea.

6.

Grasses best suited for raising Sheep.

Gold Oats,.....	Avena Flavescens.
Meadow Oats,.....	Avena Pratensis.
Lying Fescue Grass,.....	Festuca Decumbens.
Red Fescue Grass,.....	Festuca Rubra.
Sheep Fescue Grass,.....	Festuca Ovina.

Bulbous Spear Grass,.....	Poa Bulbosa.
Tufted Hair Grass,.....	Aira Caespitosa.
Common Hair Grass,.....	Aira Flexuosa.
Mountain Clover,.....	Trifolium Montanum.
Marsh Trifol,.....	Menianthes Trifoliata.
Great Burnet,.....	Pimpinella Magna.
Burnet Saxifrage,.....	Pimpinella Saxifrage.
Tuberous Vetchling,.....	Lathyrus Tuberousus.
Lance-leaved Plantain,.....	Plantago Lanceolata.
Caraway,.....	Carum Carvi.
Yarrow,.....	Achillea Millefolium.

7.

Meadow Plants blossoming early and ripening in May.

High Oats Grass,.....	Avena Elatior.
Meadow Fox-tail Grass,.....	Alopecurus Pratensis.
Sweet Scented Vernal Grass,.....	Anthoxanthum Odoratum.
Orchard Grass,.....	Dactylis Glomerata.
Melic Grass,.....	Melica Nutans.
Meadow Spear Grass,.....	Poa Pratensis.
Italian Rye Grass,.....	Lolium Perenne Italicum.
Bulbous Spear Grass,.....	Poa Bulbosa.
Mountain Clover,.....	Trifolium Montanum.
Meadow Shell Clover,.....	Lotus Siliquosus.
Faliated Medic,.....	Medicago Faliata.
Marsh Trifol,.....	Menianthes Trifoliata.
Verual Spear Grass,.....	Poa Trivialis.

8.

Meadow Plants blossoming and ripening (later) in June.

Meadow Oats,.....	Avena Pratensis.
Gold Oats,.....	Avena Flavescens.
Meadow Fescue Grass,.....	Festuca Pratensis.
Manna Grass,.....	Glyceria Fluitans.
Lying Fescue Grass,.....	Festuca Decumbens.
Sheep Fescue Grass,.....	Festuca Ovina.
Red Fescue Grass,.....	Festuca Rubra.
Velvet Grass,.....	Holcus Lanatus.
Scented Velvet Grass,.....	Holcus Odoratus.
Fringed Melic Grass,.....	Melico Ciliata.
Darnel,.....	Lolium Perenne.
Ribbon Grass,.....	Phalaris Arundinacea.
Red Clover,.....	Trifolium Pratense.
White Clover,.....	Trifolium Repense.
Black Medic,.....	Medicago Lupulina.
The Horned Shell Clover,.....	Lotus Corniculatus.
Meadow Vetchling,.....	Lathyrus Pratensis.
Tuberous Vetchling,.....	Lathyrus Tuberousus.
Lance-leaved Plantain,.....	Plantago Lanceolata.

Caraway,.....	Carum Carvi.
Yarrow,.....	Achillea Millefolium.

9.

Meadow Plants which blossom and ripen in July.

Timothy Grass,.....	Phleum Pratense.
Fiarin Grass,.....	Agrostis Atolomfera.
Soft Velvet Grass,.....	Holcus Mollis.
Water Spear Grass,.....	Poa Aquatica.
Water Hair Grass,.....	Aira Aquatica.
Tufted Hair Grass,.....	Aira Caespitosa.
Great Burnet,.....	Pimpinella Magna.
Burnet Saxifrage,.....	Pimpinella Saxifrage.
Tufted Vetch,.....	Vicia Cracca.

10.

Meadow Plants for Milch Cattle.

Meadow Fescue Grass,.....	Festuca Pratensis.
Tall Fescue Grass,.....	Festuca Elatior.
Timothy Grass,.....	Phleum Pratense.
Meadow Spear Grass,.....	Poa Pratensis.
Vernal Spear Grass,.....	Poa Trivialis.
Water Hair Grass,.....	Aira Aquatica.
Italian Rye Grass,.....	Lolium Perenne Italicum.
Fiarin Grass,.....	Agrotis Caespitosa.
Horned Shell Flower,.....	Lotus Corniculatus.
Red Clover,.....	Trifolium Pratense.
Caraway,.....	Carum Carvi.

11.

Meadow Plants which possess a particular ability for massing.

Meadow Fox-tail Grass,.....	Alopecurus Pratensis.
Italian Rye Grass,.....	Lolium Perenne Italicum.
Vernal Spear Grass,.....	Poa Trivialis.
Meadow Fescue Grass,.....	Festuca Pratensis.
Tall Fescue Grass,.....	Festuca Elatior.
Large Brome Grass,.....	Bromus Giganteus.
Red Clover,.....	Trifolium Pratense.
White Clover,.....	Trifolium Repense.
Meadow Shell Clover,.....	Lotus Siliquosus.
Horned Shell Flower,.....	Lotus Corniculatus.
Meadow Vetchling,.....	Lathyrus Pratensis.
Tuberous Vetchling,.....	Lathyrus Tuberousus.
Tufted Vetch,.....	Vicia Cracca.
Lance-leaved Plantain,.....	Plantago Lanceolata.
Great Burnet,.....	Pimpinella Magna.
Burnet Saxifrage,.....	Pimpinella Saxifrage.

ERRATA.

Page 14, first column, 1st line: when the grass—read: *where* the grass.

Page 14, second column, 18th line: the manured fallows are partly sod fallows—read: the manured fallows *and* partly sod fallows.

Page 16, second column, 19th line: *not* estimate—read: estimate.

Page 17, first column, 9th line from bottom: requires 67 tons—read: requires 77 tons.

Page 17, first column, 8th line from bottom: producing 26 tens—read: producing 38 tens.

Page 25, first column, 14th line: natural food or grasses—read: natural food *and* *grasses*.

Page 28, second column, Section XV, 1st line: in the use of vegetable manure on winter grain, on the poorest soil—read: in the use of vegetable manure on winter grain *we will be successful, even on* the poorest soil.

Page 29, second column, Section XVIII, 17th and 18th lines: immediately after the oats, etc., are harrowed in, or just before a rain—read: immediately *with* the oats, etc., *and* harrowed in, just before a rain.

Page 33, first column, 11th line from bottom: other plants which some soils—read: which *in* some soils.

Page 33, second column, Section XXXIII, 6th line: I have set at the head of each—read: I have set at the *end* of each. Two lines below these: plants and grasses, which the farmer—read: plants and grasses, *of* which the farmer.

Page 41, first column, 17th line: Mild Water Pepper—read: *Wild* Water Pepper.

Page 44, first column, 2d line: read—within six or eight weeks, *one foot high*.

Page 46, first column, 19th line: for common cement—read: *commencement*.

Page 65, first column, 16th line from bottom: for Section 51—read: Section 50.

Page 65, first column, 11th line from bottom: for Section 52—read: Section 51.

Page 79, first column, 15th line: suited to the topseed in the fallow mixture—read: suited to the topseed, *and* in the fallow mixture.

Page 79, first column, 4 lines below this: June Hull Plants—read: *Summer* Hull Plants.

Page 81, second column, 12th line from bottom: Fleabones—read: *Fleabanes*.

Page 81, second column, 2d line from bottom: Fleabone—read: *Fleabane*.

Page 82, first column, 1st line—read: *Fleabane*.

Page 91, second column, 5th line: whilst the plough-work and produce of fallows will decrease—read: whilst the plough-work and fallows will decrease.

Page 99, first column, 16th line: square hand—read: square *foot*.

Page 99, second column, 13th line—read: towards the usual clover seeding, at the rate of from four to five grains on the square hand, on the middle soil, we need about three times more seed for these mow mixtures, viz: on the inferior soil, etc.

Page 100, first column, 23d and 24th lines—read: here is the clover the main quantity of the mixtures, and it is sowed at the usual rate of 5 lbs. per acre, namely:

Clover,.....5 lbs.

Lucerne,.....1½ lbs. etc.

Page 100, first column, 7th line below the above—read: on the middle soils will be already mowable; also the Timothy, Tall Fescue Grass, ———, ———, and Spear Grass, if they are sowed with the clover.

Page 100, first column, 6th line from bottom—read: the more the soil improves, the more the grasses we can add.

Page 102, second column, Section CV—read: Of the mixed fodder cultivation for many years, or the artificial meadow mixtures.

Page 108, second column, 6th line—read: but by the new system, 300 grains on the square foot.

Page 108, second column, 14th line—read:

White Clover,.....4 grs. or 1⅔ lbs. ℥ lb. 600,000 grs.

Amixture of Lance-leaved Plantain,)

Yellow Lucerne,.....)

Pimpinella,)

Sheep Burnet,.....)

} 2 grs. 2½ lbs. ℥ lb. 300,000 grs.

ERRATA.

Page 14, first column, 1st line: when the grass—read: *where* the grass.

Page 14, second column, 18th line: the manured fallows are partly sod fallows—read: the manured fallows *and* partly sod fallows.

Page 16, second column, 19th line: *not* estimate—read: estimate.

Page 17, first column, 9th line from bottom: requires 67 tons—read: requires 77 tons.

Page 17, first column, 8th line from bottom: producing 26 tons—read: producing 38 tons.

Page 25, first column, 14th line: natural food or grasses—read: natural food *and* *gases*.

Page 28, second column, Section XV, 1st line: in the use of vegetable manure on winter grain, on the poorest soil—read: in the use of vegetable manure on winter grain *we will be successful, even* on the poorest soil.

Page 29, second column, Section XVIII, 17th and 18th lines: immediately after the oats, etc., are harrowed in, or just before a rain—read: immediately *with* the oats, etc., *and* harrowed in, just before a rain.

Page 33, first column, 11th line from bottom: other plants which some soils—read: which *in* some soils.

Page 33, second column, Section XXXIII, 6th line: I have set at the head of each—read: I have set at the *end* of each. Two lines below these: plants and grasses, which the farmer—read: plants and grasses, *of* which the farmer.

Page 41, first column, 17th line: Mild Water Pepper—read: *Wild* Water Pepper.

Page 44, first column, 2d line: read—within six or eight weeks, *one foot high*.

Page 46, first column, 19th line: for common cement—read: *commencement*.

Page 65, first column, 16th line from bottom: for Section 51—read: Section 50.

Page 65, first column, 11th line from bottom: for Section 52—read: Section 51.

Page 79, first column, 15th line: suited to the topseed in the fallow mixture—read: suited to the topseed, *and* in the fallow mixture.

Page 79, first column, 4 lines below this: June Hull Plants—read: *Summer* Hull Plants.

Page 81, second column, 12th line from bottom: Fleabones—read: *Fleabanes*.

Page 81, second column, 2d line from bottom: Fleabone—read: *Fleabane*.

Page 82, first column, 1st line—read: *Fleabane*.

Page 91, second column, 5th line: whilst the plough-work and produce of fallows will decrease—read: whilst the plough-work and fallows will decrease.

Page 99, first column, 16th line: square hand—read: square *foot*.

Page 99, second column, 13th line—read: towards the usual clover seeding, at the rate of from four to five grains on the square hand, on the middle soil, we need about three times more seed for these mow mixtures, viz: on the inferior soil, etc.

Page 100, first column, 23d and 24th lines—read: here is the clover the main quantity of the mixtures, and it is sowed at the usual rate of 5 lbs. per acre, namely:

Clover,.....5 lbs.

Lucerne,.....1½ lbs. etc.

Page 100, first column, 7th line below the above—read: on the middle soils will be already mowable; also the Timothy, Tall Fescue Grass, ———, ———, and Spear Grass, if they are sowed with the clover.

Page 100, first column, 6th line from bottom—read: the more the soil improves, the more the grasses we can add.

Page 102, second column, Section CV—read: Of the mixed fodder cultivation for many years, or the artificial meadow mixtures.

Page 108, second column, 6th line—read: but by the new system, 300 grains on the square foot.

Page 108, second column, 14th line—read:

White Clover,.....4 grs. or 1⅔ lbs. ¾ lb. 600,000 grs.

Amixture of Lance-leaved Plantain,)

Yellow Lucerne,.....)

Pimpinella,)

Sheep Burnet.....)

2 grs. 2½ lbs. ¾ lb. 300,000 grs.

THE

70

William Lloyd Garrison
1825-1879
N. E. C. R. 1879