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ROUT *the* WEEDS!

WHY, WHEN AND HOW

R. TEHON
BOTANIST

ILLINOIS NATURAL HISTORY SURVEY

CIRCULAR 28

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URBANA, ILLINOIS

AUGUST 1937

Natural History Survey

Rout the Weeds!

WHY *certain weeds are classed as pernicious.
widespread control measures are needed.*

WHEN *these weeds do the most damage.
control measures are most effective.*

HOW *these weeds cause injury.
to control them.*

L. R. TEHON
BOTANIST

Printed by authority of the State of Illinois
DEPARTMENT OF REGISTRATION AND EDUCATION
NATURAL HISTORY SURVEY DIVISION

Theodore H. Frison, Chief

E SNAKEROOT

Courtesy New York State Museum, Albany

Eupatorium urticaefolium Reich.

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This paper is a contribution from the Section of Applied Botany and Plant Pathology

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WHEREAS, The wide distribution and prolific growth of weeds have become an economic loss to Illinois agriculture imposing a burden thereon estimated at about two dollars per acre and have become one of the serious problems of agriculture, not only of Illinois but of the nation; and

WHEREAS, Certain weeds and shrubs, through their irritating pollens and plant juices contribute directly to "Hay Fever" and plant poisoning causing discomfort and ill health to thousands of our citizens; and

WHEREAS, Some weeds are unsightly, spoiling somewhat the beauty of Illinois landscapes and nullifying to a great extent the program of highway beautification; therefore, be it

RESOLVED, by the House of Representatives of the Sixtieth General Assembly of the State of Illinois, the Senate concurring herein, That the Governor of Illinois is hereby requested to designate August 8 to August 22 inclusive, as "Weed Destruction Days" and by public proclamation to enlist the citizens of Illinois to assist in making Illinois healthful, clean and beautiful; and, be it further

RESOLVED, That the Director of the State Department of Agriculture is hereby instructed to consider the establishment of a comprehensive weed control program; specifically to encourage the destruction of ragweed, horseweed, poison ivy, poison sumac, wild parsnip, white snakeroot, pokeberry and burdocks on all public and private lands, highways and right of ways, and to report to the Governor of Illinois on or before the 31st day of December 1937, the proposed and initiated features of such a program.

Adopted May 5, 1937.

Acknowledgments

★

IN the preparation of this circular we have had the cordial cooperation of Dr. J. J. Pieper, Professor of Crop Production in the University of Illinois College of Agriculture, Urbana, who has prepared the text on weeds as economic factors, and on control methods; of Dr. A. C. Baxter, Assistant Director of the State Department of Public Health, Springfield, who has furnished the text on the relationship of weeds to public health; of W. P. Flint, Chief Entomologist of the State NATURAL HISTORY SURVEY DIVISION, Urbana, who has prepared the text on weeds as harborers of insects; and of Dr. Carl O. Mohr, also of the NATURAL HISTORY SURVEY, who made the drawings for the illustrations of the eight pernicious weeds which this circular specifically discusses.

ROUT the WEEDS!

ILLINOIS NATURAL
HISTORY SURVEY
CIRCULAR 28
AUGUST 1937

L. R. TEHON
Botanist

8 *Pernicious Weeds of Illinois,
pictured and described for your
participation in a statewide cam-
paign of eradication.*

WHY • WHEN • HOW

The Importance of Weeds

EVERY person who deals with plants sooner or later makes his own definition of a weed. When civilization was young, a weed undoubtedly was any plant that could invade man's crudely cultivated fields, increase faster than his own none too energetic efforts at cultivation could keep it down, and endanger his existence by threatening his harvest. With time much has been learned about plants, and the meaning of the term has been extended to include plants with other evil effects. Today any plant that, for any reason whatever, is a nuisance to mankind may be called a weed. Plants that do not grow in cultivated fields but which harbor insects or diseases destructive to crops are regarded as weeds. Plants that carry the menace of ill health to individuals because of their ability to cause mild or severe kinds of poisoning are commonly looked upon as weeds. And still other plants that threaten, during short or long seasons, the health of individuals or communities because of their pollen or because of poison transmitted in milk are considered very dangerous weeds. There are, also, plants whose greatest crime is that they merely inconvenience man in his daily life, and these likewise are weeds.

Usefulness of Weeds.—The fact that in some respect a plant may be enough of a nuisance to humanity to be classed as a weed does not mean that the plant is without usefulness. It has been said that the greatest usefulness weeds have is that they are weeds. Their universal presence and their habit of springing up year after year necessitates tilling the soil, and tillage con-

tributes to profitable yields. The cover of weeds and wild plants that springs up on land after a crop has been harvested in midsummer gives protection against blowing of the soil by winds and washing by floods, and the green material, plowed under again as green humus, returns fertility to the soil.

Among the weeds described in the following pages, Common Ragweed stands preeminent in this respect, for its universal abundance in harvested grain fields during late summer gives it title to the description, "most abundant weed in the state." Both it and Giant Ragweed furnish cover and food for game birds in late fall and winter, at a time when other food is scarce, and the survival of natural game such as prairie chickens and quail in certain parts of our state is very possibly due to the food furnished at critical times by these plants. Pokeweed, notwithstanding that it harbors and provides a means of overwintering for the very destructive mosaic disease of cucumbers and muskmelons and that its berries and roots contain a poison, furnishes a drug which has been used extensively in alleviating certain human pains. Moreover, young Pokeweed shoots may be cooked and eaten like asparagus. Even Great Burdock and its much more abundant relative, Common Burdock, ugliest plants, as many think, of the countryside, furnish roots and seeds of medicinal value, and in Japan the Great Burdock is cultivated for its roots, which are eaten as a vegetable.

Sentiment for Weed Control.—Because today weeds intrude into so many of man's affairs, their importance is more thoroughly appreciated than ever before. This appreciation has made itself evident both in the recent revision of the Illinois weed law to include European Bindweed as a noxious weed along with Canada Thistle and Perennial Sow Thistle, and in Joint Resolution No. 25 of the Illinois House and Senate which requests the Governor to designate a period of the year as "Weed Destruction Days" and instructs the Director of the State Department of Agriculture specifically to encourage destruction of the weeds described in the following pages.

This pamphlet has been designed and printed as a contribution both to the general problem of weed control and to the specific task imposed by the legislative resolution, which appears facing page 1. The pictures and descriptions which follow are intended to aid in identifying these weeds, and the accounts of their distribution and habitat, their blossoming and seeding

times, their biological interest, and methods of control are intended to make available to the people of this state information which will enable them to protect themselves against the dangers, both direct and indirect, that these weeds present.

Noxious Weeds.—Canada Thistle, Perennial Sow Thistle and European Bindweed are noxious weeds, the destruction of which is required by law. Because of their great importance in agriculture, the Illinois Agricultural Experiment Station and Extension Service has undertaken investigations bearing upon their life history and control, maintains projects for their control in rural areas in cooperation with farm bureaus and the State Department of Agriculture, and intends to issue a comprehensive publication concerning them.

Weeds as Economic Factors

The actual loss from weeds is not known. There are but few experiments which give a basis for an intelligent estimate. An experiment which was completed a few years ago at the Illinois Agricultural Experiment Station shows that the yield of corn was reduced about 80 per cent by omitting cultivation and permitting the weeds to grow. The Michigan Agricultural Experiment Station came to the conclusion that they cultivate sugar beets primarily because of weeds. In the case of potatoes they found that quack grass cut the yields of potatoes from one-half to two-thirds. At one of the Canadian experiment fields Russian thistle seed was sowed with wheat and observed to cut the yield 40 per cent.

A common but conservative estimate of the loss to agricultural products by weeds is 10 per cent. At times this has reached a billion dollars for the United States.

Loss to the United States.—The Agricultural Service Department of the U. S. Chamber of Commerce, in a report submitted to the Federal Farm Board, estimated the weed loss to agriculture at 3 billion dollars. At that time this would have been equivalent to about 30 per cent of the value of all agricultural products.

Loss per Farm.—In 1930 Indiana estimated the weed loss per farm at \$210 and Wisconsin in 1927 put the figure at \$244 per farm.

While actual figures, as a basis for an intelligent estimate of weed loss, are scarce, yet they are sufficient to show that the amount

is enormous. Because of the rapid spread of weeds, one close to the subject would conclude that weed damage is increasing.

How Weeds Cause Loss.—The major ways in which weeds cause loss are (1) reduction in crop yields, (2) increase in expense of growing the crop, (3) decrease in quality of the product, (4) reduction in the value of the land, (5) poisoning livestock, and (6) their relation to public health.

POORER YIELDS.—Weeds reduce crop yields by utilizing plant food materials and moisture in the soil, and by shading the plants. A weedlike dodder reduces crop yields by being parasitic upon the host plant from which it draws its nourishment.

EXPENSE OF GROWING.—It is all too evident that weedy lands require extra cultivation and considerable hand work to keep the weed loss to a minimum. Weeds such as vines interfere with tillage and harvesting operations, while often weedy seeds and grain must be cleaned before they can be put on the market.

POORER QUALITY CROPS.—The quality of many agricultural products is on the downward trend because of weeds. For example, the loss to small grain in dockage alone in four spring wheat states has about doubled in 25 years and is now estimated at more than 8 million dollars. The loss to winter wheat from wild onions and garlic is increasing and is estimated at one-third of a million dollars in southern Illinois. When we consider, in addition to these, the lower grades in hay, wool, milk and other animal products, we can see that weeds lower very definitely the quality of our agricultural products.

REDUCED LAND VALUES.—That the value of land is being materially affected by noxious weed infestations is noted from reports of loan companies who reduce the appraised value of the land from one-third to one-half because of weeds. The reduction is often equivalent to the cost of eradication. No one wants a weedy farm, and in some cases weeds have forced abandonment of the land for agricultural purposes. The enormous rate at which agricultural land is becoming infested with noxious weeds has lead to definite weed projects by many agricultural experimental stations.

LIVESTOCK POISONING.—In the United States the loss of animals from poisonous plants is estimated at 15 million dollars annually and for Illinois one million dollars. A few animals dying here and there go almost unnoticed, but the total for any one state or region mounts to a sizeable sum.

INJURY TO HEALTH.—The effect of weeds on public health is definite and in many cases serious. Discussion of this injury is given on page 7.

Weeds as Harbors of Insects

The eight weeds described in this circular—Common Ragweed, *Ambrosia elatior*; Giant Ragweed or Horseweed, *Ambrosia trifida*; Wild Parsnip, *Pastinaca sativa*; White Snakeroot, *Eupatorium urticaefolium*; Pokeweed, *Phytolacca decandra*; Poison Ivy, *Rhus radicans*, Poison Sumac, *Rhus Vernix*; Common Burdock, *Arctium minus*—have some effect on the abundance of injurious insect species.

Hosts to Injurious Insects.—Probably the most important way in which these weeds influence the abundance of injurious insects is by acting as hosts for certain of these insect pests. Wild Parsnip is apparently relished by the worms of the carrot swallowtail just as much as are carrots and parsnips in the gardens. It is certain that this weed does aid in maintaining an abundance of these caterpillars. Poison Ivy in orchards acts as a host for certain leafhoppers that also attack apple. A distinct connection has been noted between the abundance of poison ivy under the apple trees and the number of leafhoppers found on the trees. Leafhoppers are generally more abundant in apple orchards where poison ivy is common. Burdock is a highly favored food of young grasshoppers, and also acts to some extent as an alternate host for the rhubarb curculio. Ragweed, particularly the Horseweed or Giant Ragweed, is one of the most highly favored hosts of the common stalk borer. This weed certainly acts as a reservoir for the stalk borer, and more of these borers are produced in the Giant Ragweed than in cultivated crops. However, the borer will work in so many other hosts that the ragweed cannot be considered particularly important in maintaining this species.

Shelter for Injurious Insects.—Another way in which weeds act as protection for insects is by affording winter shelter for them. None of the weeds mentioned is of particular importance in this respect. Adults of the southern corn rootworm are very common on Wild Parsnip in late September and October, and probably some of the adults of this beetle hibernate in the Wild Parsnip leaves. Poison Ivy affords hibernation shelter to a considerable number of insects, including leafhoppers, chinch bugs and flea

beetles. The eggs of the common stalk borer are frequently carried over the winter on the stems of ragweed.

Hosts to Beneficial Parasites.—Another relationship between weeds and insects is, on the whole, beneficial to the farmer. In it, insects that normally live entirely in weeds, such as certain borers in ragweed, act as alternate hosts to parasites which also prey on injurious insect species. A borer in ragweed acts as an alternate host to parasites of the Oriental fruit moth. This is a rather important relationship and in several cases important parasites can only be maintained in areas where an insect normally infesting weeds serves as the alternate host. In this respect, weeds are a decided aid in keeping down injurious insect species.

Weeds as Harborers of Plant Diseases

From time beyond memory weedy fields have symbolized the poverty that is the result of idleness and neglect. And sanitation, foremost among measures advocated to maintain the public health, has been symbolized by the trim neatness of homes and fields free of weeds.

Weed eradication is as important in the protection of valuable plants from attack by disease as it is to public health. And not infrequently it happens that in the eradication of a weed for the protection of human health, the same purpose is served for plants of economic value.

Bacteria capable of causing serious diseases of certain crop plants are harbored by weeds that grow in the fields or on adjacent land. Parasitic fungi, by which the majority of plant diseases are caused, very often are capable of attacking weeds as well as valuable plants, and weeds or other native plants are necessary, as alternate hosts, to the persistence of certain fungi. The viruses that cause mosaic diseases of plants often have wide host ranges and are able to attack many wild and weedy plants as well as important crop plants.

Of the weeds described in the following pages, Wild Parsnip is subject to attack by a fungus that is parasitic also on cultivated parsnip and celery and often does much damage in celery beds. Pokeweed is one of the wild hosts of the virus that causes the destructive mosaic disease of cucumbers, and the virus finds in the large roots of Pokeweed an excellent place in which to overwinter.

Bacterial and fungous diseases are transmitted from weeds

to cultivated plants by winds, by splashing and running water, and by insects. In the case of virus diseases, transmission by insects is especially common. Weed eradication becomes the more important because, in addition to the damage weeds themselves do, they present the interrelated problems of disease control and insect control.

Relation of Weeds to Public Health

Weeds constitute a public health problem as well as an agricultural one. Many weeds contain poisons which if ingested by man cause severe illness and sometimes death; others may cause external injury to certain individuals, while still others produce pollens which are responsible for hay fever and similar asthmatic conditions.

Weed Poisons Ingested.—A number of cases of accidental poisoning due to the substitution of poisonous plants for similar plant foods have been reported. Water hemlock has been mistaken for its harmless relative sweet cicely, or for artichokes or parsnips in the early spring, the tubers being especially tempting to children because of the sweetish taste. Wild parsnip, likewise, has produced death because of its similarity to garden parsnips. Fool's parsley, an acridly poisonous plant, is sometimes confused with true parsley. Children sometimes mistake the poisonous narrow-leaved laurel for young wintergreens. Also they may chew the fruit of black nightshade and pokeweed or the seeds and flowers of jimson weeds. Severe illness may be caused by the ingestion of corn cockle seeds which have been ground with wheat flour.

Cases of milk sickness occur practically every year in Illinois and have been attributed to the use of meat and milk products from animals which have been eating white snakeroot. The substance believed to be responsible, trematol, is destroyed only very slowly by boiling; therefore pasteurization of milk is of little value in safeguarding against it. Milk sickness appears to result from the continued use of products from affected cows rather than from the occasional consumption of a small amount. This fact probably explains the occurrence of the disease in rural families and its absence in cities. The progress of the disease is rapid and the mortality high, for at the present time there is no satisfactory treatment. Extermination of white snakeroot and avoidance of the use of milk from affected cows are the only means of combating the malady.

Weed Poisoning by Contact.—A number of plants cause distressing symptoms when they come into contact with the human skin. Poison ivy and poison sumac are the most frequent offenders. Even the slightest trace of the poisonous principle, toxicodendrol, in these plants will produce blotching of the skin and itching and burning sensations which may be followed by the appearance of small vesicles that run together and form blisters. Complete immunity to ivy poisoning probably does not exist. Many persons who have believed themselves to be immune have had serious cases of poisoning after handling the plants carelessly. Some persons, however, are much more susceptible than others and occasionally a fatal case has been reported. Actual contact with the plant is not always necessary for a case of poisoning—shoes, clothing, utensils and even animals may carry the poison to an exceedingly sensitive person.

After exposure to the plant attempts to remove the poison should be made immediately. Three to four thorough scrubblings with alkali soap and repeated rinsing in running water may be sufficient to protect the skin from irritation. Special attention should be given to finger nails and the skin between the fingers, for careless washing serves only to spread the poison. Space will not permit a list of the various remedies which have been recommended for ivy poisoning, but if a case is severe one should consult a physician rather than spread the infection by using a trial and error method with home remedies.

Juice of the leaves of Snow-on-the-mountain, Painted Leaf and several other members of the spurge family as well as that of Smartweed and the roots of Cow Parsnip are also capable of causing irritation and blistering of the skin.

Weed Poisoning by Spread of Pollen.—The weeds which cause the greatest amount of misery, however, are those which produce pollen causing hay fever. It has been estimated that 1 to 4 per cent of the population of the United States suffers annually from some form of this disease.

Hay fever is characterized by catarrhal attacks of the mucous membranes of the upper respiratory tract and conjunctiva, due to a special sensitiveness to pollen from one or more plants. It may range in severity from mild attacks similar to a cold to severe and persistent asthmatic attacks. Some sufferers feel so wretched that they are forced to leave their work and go to a region where plants causing their illness do not exist.

There appears to be a tendency for hay fever to become hereditary. If both mother and father have hay fever their children are apt to be afflicted early in life. About one third of all hay fever sufferers show their first evidence of this ailment before 10 years of age and two thirds before 25 years of age. In other words, the great bulk of these people will be burdened throughout the most important years of their lives with a serious handicap.

Formerly it was believed that plants producing the most showy flowers were responsible for hay fever, but H. M. Hall, California, has pointed out that this is seldom the case, for pollen produced by large or showy blossoms is almost always insect carried and is

therefore, relatively heavy and not produced in great abundance. On the other hand, most plants with small inconspicuous flowers are wind pollinated; their pollen is therefore light and produced in great abundance, and it is this voluminous, light-weight pollen that reaches the nostrils of susceptible people and causes the trouble. The patient, noticing the showy flowers of a neighbor's orchard trees or ornamental shrubbery, is likely to hold these responsible for his hay fever, whereas the cause is more likely to be the homely, neglected weeds of the roadside or of his own back yard.

There are three principal hay fever periods. The first occurs from April to June when the chief pollens are those from trees, such as oak, elm, birch, hickory and maple. The second overlaps the first, beginning about the end of May and extending to the middle of July; the chief pollens during the period are those from grasses, such as timothy, redbud, June grass, bluegrass and orchard grass. The third period is the most important and extends from the middle of August to frost. It is during this period that the injurious weeds, such as ragweed and its near relatives, pollinate. Approximately 85 per cent of cases are susceptible to ragweed, therefore the majority of cases occur in the late summer and autumn.

Pollen may be carried long distances by air currents. After storms pollens have been found 400 miles from their source. O. C. Durham, of North Chicago, has made a survey of ragweed pollen incidence in 22 cities in the United States. Of these cities, Oklahoma City, Okla., was represented as having the highest average daily ragweed pollen concentration, 814 pollen granules per cubic yard of air, while Ann Arbor, Mich., was second highest with an average of 590 granules. Chicago's average was given

as 115. Since only 25 granules per cubic yard of air are necessary to produce symptoms of hay fever in susceptible persons, one ragweed plant, which may throw out into the air as many as a million million pollen grains in one season, may cause a great deal of distress.

Skin tests are valuable in determining which pollens are toxic to an individual. An extract of the suspected pollen is either placed on a scarified area of the skin or injected between the layers of the skin. A marked reddening surrounding the point of inoculation indicates sensitivity to the pollen which was used for the test.

Relief for Hay Fever Sufferers.—In many cases immunization may be accomplished by repeated subcutaneous injections of extracts of the offending pollens in increasing doses. This treatment must be started at least six weeks before the onset of the disease if good results are to be obtained.

Filtration of the air of homes and workrooms and air conditioning will remove pollens and afford relief for hay fever sufferers but obviously people cannot live for weeks within the protection of these rooms. *The only means of affording permanent relief for these victims is the eradication of all varieties of weeds which are common causes of hay fever*—a stupendous task which would require the combined efforts of city, state and federal organizations, but one which would be well worth undertaking. Not only would physical relief be given to thousands of hay fever sufferers, but also many of the farmer's worst enemies would be destroyed, vacant lots and roadways be cleared of unsightly areas and a number of cases of poisoning would be prevented. Schools, clubs and other local organizations would be of enormous value in educating people to cut or otherwise destroy weeds before they produce pollen.

Control Methods

Practices involved in good husbandry are those for the most part which contribute to weed control and eradication. After noxious weeds have once been introduced to the farm then a knowledge of the character and habits of growth of the individual species is important in effective control and eradication.

Need to Know Biology of Weeds.—It is necessary that one know the life history of a species, namely whether it is annual, winter annual, biennial or perennial; also its means of reproduction,

whether it be by seed alone or seed and some vegetative means, such as stolons, rhizomes, bulbs and cuttings or by vegetative means alone. Knowledge of the natural requirements of the plant is also essential. Some weeds, for example, are characteristic of wet lands, sandy soils, cool climates or humid climates. Likewise certain weeds seem to be very definitely associated with certain crops. For example, Corn Cockle and Cheat are associated with winter wheat; Wild Mustard and Pennycress with oats; Red Sorrel and Ironweed with pasture lands; Oxeye Daisy and Whitetop with grass meadows; Buckhorn and Curled Dock with red clover; and Lamb's Quarter and Buttonweed with corn.

Weak Stages Best Control Periods.—All weeds have weak stages in their life history at which time they are most effectively controlled or eradicated. Most plants are weak in the seedling and reproductive stages. The farmer takes advantage of this knowledge and tries to eradicate as many weeds as possible in the seedling stage during seed bed preparation and the early cultivation of the crop. Mowing pastures and waste places when weeds are blooming is another example of man taking advantage of this weak stage in the life cycle of the weed plant.

Suit Control Methods to Biology.—Methods of eradication of weeds may be put into two classes depending upon the means of propagation. Weeds which propagate by means of seeds as do annuals, winter annuals and biennials, are best controlled by preventing seed production. This is accomplished easily by killing the weeds in the weak germination and seedling stages through cultivation, by mowing when the plants are in bloom but before seed are produced, by plowing shortly after the crop has been removed, and by use of cheap chemical sprays on untilled land.

Weeds which depend in part or entirely upon vegetative reproduction can be controlled only by preventing top growth from making its appearance above ground. This may be accomplished by destroying the entire plant either with chemicals or some cultural practice, or it may be accomplished by starving the roots by cutting top growth and thus preventing manufacture of plant food in the leaves.

The means employed to bring about satisfactory control or eradication of weeds are (1) the chemical method, (2) the fallow method, (3) smother crops, (4) use of livestock, (5)

covering of the plants, (6) burning, (7) practice of a good rotation and (8) fertilization of the land.

CHEMICAL METHOD.—There are three classes of chemicals which may be used: (a) those which burn down top growth, (b) those which sterilize the soil for long periods, thus killing all plant growth, and finally (c) those which sterilize the soil temporarily.

Iron sulfate, copper sulfate, sodium arsenite and sulfuric acid are examples of top burners. Iron sulfate and copper sulfate are used to kill broad-leaved weeds in lawns, pastures and grain fields. These chemicals do very little injury to grasslike plants but will kill legumes and broad-leaved weeds. Sodium arsenite and sulfuric acid will kill all top growth. The former is used by railroads and highway departments to burn down top growth and thus kill the weeds which propagate by means of seeds. None of these chemicals will kill perennial weeds unless it is applied often enough to starve out the roots by preventing food to be manufactured in the leaves.

In the second group of chemicals are salt and heavy oils. When these are applied to the soil in large enough quantities the soil is rendered sterile. They should not be used on agricultural land or where one wishes to grow plants in the future. Such chemicals find their best use on drives, walks, tennis courts, and about lumber yards and manufacturing plants.

Chlorates, such as sodium chlorate, calcium chlorate and magnesium chlorate, represent the third group of chemicals. When these are applied to the soil they render it sterile for six months or a year but during this time the chemical disintegrates and finally leaves the soil fertile as before. Chlorates not only kill top growth but penetrate the soil and kill root growth. This group of chemicals is the most satisfactory for the eradication of perennial weeds which propagate vegetatively either entirely or in part.

FALLOW METHOD.—The fallow method is used in the main to eradicate noxious perennial weeds which propagate vegetatively. The method consists of plowing the land followed by thorough discing so as to cut up the root stalks in pieces as fine as possible and at the same time to prepare a good seedbed. As often as the weeds begin to show growth above ground, they are cut off underground by means of a weed cultivator or some other implement which will do a good job. These cultural operations are repeated every week or 10 days or as often as new growth

shows itself. If at any time cultivation will not kill all top growth, the land should be plowed again somewhat deeper than the first time, followed by the weed cultivator as before. Late in the fall the land should be plowed deep. The next spring the cultivation should be renewed and continued until late spring or early summer, at which time a rank growing crop should be seeded. Most of the weeds should be killed but if this should not prove to be true, the land should be plowed and the cultivation continued.

The object of the fallow method is to starve the roots by drawing upon their food supply to produce new shoots and at the same time prevent leaf formation and the manufacture of food. The fallow method is most effective upon shallow-rooted perennials where one is able to plow up the root-stalks and cut these into small pieces. For each small piece to live, it must send up a new shoot. The food supply in small pieces is soon exhausted and the root compelled to die.

Deep-rooted perennials require a much longer period of fallowing since their food storage cannot be divided into small pieces by disking.

SMOTHER CROPS.—There are very few weeds which are eradicated by smother crops. Canada thistles may be eradicated by seeding alfalfa on the land after it has been well fertilized and prepared. Most perennial weeds are weakened by smother crops, thus making the fallow method easier. Hemp and soybeans are other good smother crops.

USE OF LIVESTOCK.—Livestock such as goats and sheep is often used to graze weedy land in the hope that the animals will keep the weeds eaten off close to the ground and thus starve out the roots. This method is effective providing the animals can be induced to eat the weeds and providing they are grazed over a period of years. Most weeds are not relished by grazing animals. Grazing is most helpful when used in combination with other methods.

COVERING THE PLANTS.—Small areas of weeds may be eradicated most cheaply by covering with a heavy paper so as to shut out all light to prevent growth. Tar paper or heavy building paper will be satisfactory. The paper must be lapped sufficiently, and weighted down so that the plant will not grow between the sheets. Straw has been used as a temporary covering and then burned off as soon as the plants make their appearance

through the straw. Straw stacks and sawdust have also been used to cover weed patches with varying degrees of success.

BURNING.—While it is not good farm practice to burn organic matter in the form of crop residues on agricultural land, yet occasionally one must choose between the destruction of organic matter and the eradication of some weed pest. There is less objection to burning waste places for the destruction of weeds. Where a noxious weed exists and mowing and burning will destroy seed production and the resultant spread of the plant, it is to be recommended until more definite eradication methods can be put into practice. Several kinds of weed burners are manufactured to be used for fence rows and other places not accessible for other means.

CROP ROTATION.—A well-designed crop rotation will go a long way to control and eradicate weeds. The one or two-crop system is most conducive to the weedy farm. Cornfield weeds, for example, thrive and spread best by continuous growing of corn or some similar crop on the same piece of land. On the other hand grain-field weeds are kept under control by putting the land to a cultivated crop like corn, soybeans or potatoes. Even pasture has its place in a well-designed rotation as far as weed control is concerned. When pastures become highly infested with their characteristic weeds nothing is more practical in their control than to put the pasture land to a cultivated crop.

FERTILIZATION.—The fertilization of pastures and meadows is an accepted method of weed control. Where the turf is heavy annual weeds cannot become established. A dense growth of any grain or forage crop makes it difficult or almost impossible for most weeds to become established. Poor stands and poor growth are almost sure to be associated with an abundance of weeds. Where legumes are successfully grown limestone and phosphorus are necessary and without these we end with a weed patch. Marked reduction in the amount of weeds in clover and alfalfa fields has been recorded as a result of applying different fertilizers.

The weed-free farm or garden does not exist, so that the best that one can hope to do is to eradicate the most noxious weeds and control the others to such an extent as to reduce the loss from weeds to a minimum.

Three Steps in Weed Control.—Only pure weed-free seeds should be sown, since nearly 75 per cent of our worst weeds are not native

in the United States but have been introduced in impure seed. Weedy hay and commercial feed often introduce new weeds to the farm. We should stop traffic in weed seeds to and from the farm.

Preventing weed seed production on the farm by every method adaptable to the situation at hand is the second most important step in reducing the weed loss.

The third step is to design some program of eradication for the most noxious weeds and to carry it out in every detail.

Eight Pernicious Weeds of Illinois

COMMON RAGWEED
GIANT RAGWEED. HORSEWEED
POISON IVY
POISON SUMAC
WILD PARSNIP
WHITE SNAKEROOT
POKEWEED
COMMON BURDOCK

Ambrosia elatior L.
Ambrosia trifida L.
Rhus radicans L.
Rhus Vernix L.
Pastinaca sativa L.
Eupatorium urticaefolium Reich.
Phytolacca decandra L.
Arctium minus Bernh.

COMMON RAGWEED

Ambrosia elatior L.

Appearance.—Common Ragweed, less frequently known as Bitterweed, Roman Wormwood and Wild Tansy, is a freely-branching herb that grows 1 to 3, or sometimes 5, feet high. Its hairy green stems and branches bear many finely divided, feathery, thin leaves, deep green on the upper surface and pale beneath, and in late summer end in long spikes of green flowers dusted with yellow pollen. There is, however, a second kind of flower. It produces seed and occurs singly or in clusters nearly hidden in the angles between upper leaves and the stem. The tiny seeds, which are seldom seen, are encased in hard fruits. These fruits, only about an eighth of an inch long, are grain-like, somewhat top shaped, beaked at the tip, and crowned with 4 to 6 spiny points. Common Ragweed is an annual plant which springs up each year from seed.

COMMON RAGWEED

Ambrosia elatior L.

Distribution.—Common Ragweed is an American plant with a natural range that extends across Canada and throughout most of the United States. It grows everywhere in Illinois and is one of the commonest weeds in the state. Its importance is due chiefly to its pollen, which is the main cause of hay fever in late summer. After harvest it springs up in stubble, often in stands as pure as though it had been planted. In meadows and pastures it often is a pest, and in cities, towns and villages every area of land not thoroughly sodded with grass or cleanly cultivated is certain to harbor a number of plants. Cattle, lacking better food, will eat it, and if it is mixed with clover, alfalfa or hay the bitterness of its juice causes a bitter taste in milk.

Biology.—The flowering period of Common Ragweed usually begins about the first of July in the southern part of Illinois and about the first of August in the northern part. But pollen does not become abundant enough to cause severe hay fever for two to three weeks after blossoming starts. The blossoming period continues until September or later, but after August pollen production usually is not sufficiently heavy to cause severe hay fever. Seeding time ranges from about the first of August in southern Illinois and the middle of August in northern Illinois until frost. Ragweed spreads and reproduces entirely by means of its grainlike fruits. These are borne in great numbers and are very easily distributed with harvested grains and by wind. When buried in the soil, they retain their vitality for years.

Control.—Control measures for ragweed have two purposes: first, to prevent pollen production in and near populous areas so as to control hay fever, and second, to destroy the weed in agricultural regions because of its pernicious habits. When the plants are young, the thin widespreading foilage is easily killed by copper sulfate or iron sulfate solutions. These solutions are not harmful to grasses and may be used both on farms and in cities. Enforcement of laws requiring cutting of weeds on vacant and neglected lots, if done when the plants start blossoming, tends to control the pollen nuisance. Cultivating stubble immediately after harvest kills plants already up and encourages germination of seeds in the soil, which may be killed later with the harrow, although this is contrary to good farm practice. Mowing pastures, grain fields, and clover fields to prevent Ragweed from blossoming and setting fruit is especially important, and eventually accomplishes the same purpose.

GIANT RAGWEED. HORSEWEED

Ambrosia trifida L.

GIANT RAGWEED. HORSEWEED

Ambrosia trifida L.

Appearance.—Giant Ragweed, frequently known also as King-head and Horseweed, is a huge, coarse herb that grows 4 to 6 feet high and not uncommonly to 10 or 15 feet. Its upright, stout woody stem, covered with rough and bristly hairs, branches widely and bears oppositely placed leaves that often are a foot long or more, rough and hairy like the stem, 3-nerved, commonly divided into 3 large lobes, and coarsely toothed. Flowers are of two kinds. Those that bear the pollen are closely crowded on the straight or branched leafless tips of the main stem and branches, forming pollen-dusted green spikes sometimes more than a foot in length. The seed-bearing flowers, their clusters hidden between leaf stalk and stem in the upper part of the plant, are not often noticed. The brownish, top-shaped, ribbed, seedlike fruits, about three-eighths of an inch long, end in a short beak and are crowned just below this with a ring of 5 or 6 short spines. Giant Ragweed is an annual and is propagated only by seed.

Distribution.—Giant Ragweed is native, ranging from Nova Scotia across Canada to Manitoba and southward to Florida and Mexico. In Illinois, it ranges throughout the state. Although naturally a plant of stream banks and shores, it has adapted itself successfully as a weed and has become established in the country, in towns, and in cities wherever moist soil is available. It is abundant along streams, ditches, fence rows and neglected roads.

Biology.—Blossom time for Giant Ragweed begins about the middle of June in southern Illinois and early in July in northern Illinois and extends into September. The terminal shoots that bear the pollen-bearing flowers are so numerous, so long, and so thickly covered with flower heads that this plant adds materially to the ragweed pollen content of the air during hay fever time. Where it grows as a weed, its growth is so rank above ground and so extensive below ground that other plants are completely crowded out or starved. Its hard, light fruits, in which its seeds are borne, are produced in great abundance and are distributed with agricultural seeds, blown about on frozen soil and snow in winter, and carried long distances by streams. From October through December its fruits are an important part of the food of game birds. The seeds in buried fruits remain alive for several years.

POISON IVY

Rhus radicans L.

Control.—In the case of Giant Ragweed, control measures should aim to reduce the amount of ragweed pollen, prevent seed production, and to destroy the plant as a weed. In either case, efforts should be directed chiefly toward killing while the plants are still young. The hard, woody stems of tall, mature plants are difficult to cut. Young plants in fields and gardens are readily killed by cultivation and hoeing. In waste places, mowing as the weeds come into flower but before pollen is produced will kill them. In fallow land, grassy plots and elsewhere they can be killed easily by spraying with copper sulfate or iron sulfate. Enforcement of weed-cutting laws in cities and towns and the cutting of weeds on vacant land is important in reducing the amount of pollen.

POISON IVY

Rhus radicans L.

Appearance.—Poison Ivy grows both as a vine and as a shrub. Its outstanding characteristic is that each leaf is made up of 3 large separate leaflets, and because of this it often is called Three-leaved Ivy. As a shrub Poison Ivy may grow 3 or 4 feet high but usually is much smaller. It often is called Poison Oak because of the resemblance of its leaflets to young oak leaves. As a vine Poison Ivy climbs high on tree trunks, and on fence posts and other supports. Its woody stem can be recognized always by the short roots sent out in great numbers along its sides, which attach it to the support. The stems bear alternately placed, long-stalked leaves with irregularly lobed, toothed, or sinuate margins. The end leaflet stands on a long stalk, and the two side leaflets, the blades of which are unequal at the base, stand on very short stalks. Clusters of small, greenish white flowers are borne on stems 1 to 3 inches long that grow out from the angles between leaves and stem. The fruit is a greenish white, smooth, waxy, dry berry containing 1 small hard seed. A fruit cluster resembles a small currant cluster. Both shrub and vine are perennial. They spread by creeping rootstocks and are scattered extensively by multitudes of seeds.

Distribution.—Poison Ivy is an American plant with a range that extends across the continent from Nova Scotia to British Columbia and southward to Florida and the desert regions of the southwest. It grows throughout Illinois, being especially abundant along fence rows and roadsides, where it generally

POISON SUMAC

Rhus Vernix L.

is seen as a shrub. But frequently in the borders of woods and sometimes along fences it grows as a vine. It seldom persists on cultivated ground, hence it does not often contaminate agricultural seed.

Biology.—Blossom time for Poison Ivy in Illinois begins the latter part of May and extends well into July. The berries enlarge and ripen slowly, maturing from mid August to October. They remain on the vines until late winter. Birds, especially crows, eat them without harm and carry the seeds long distances. Poison Ivy is important chiefly because all parts of it, but especially the leaves and bark, produce an oleo-resin, toxicodendrol, which causes ivy poisoning. The plant is, quite justly, feared by many persons, and little effort is made to eradicate it. A few people apparently are immune, however, and it is possible that many people poisoned by other plants blame Poison Ivy.

Control.—The only satisfactory control for Poison Ivy is eradication. Grubbing is sometimes necessary close to shrubbery or trees too valuable to endanger by other treatment. Plowing and cultivating fields and gardens keeps it under complete control. Elsewhere chemical treatment gives most satisfaction with least danger. Common salt solution, prepared by dissolving 3 pounds in 1 gallon of water and poured on the ground around the plant kills the foliage. Or salt may be applied dry. The first application should be made in early summer, and later applications as new foliage appears, until the rootstocks and roots have been starved to death. On agricultural lands sodium chlorate is more satisfactory.

For ivy poisoning, the best advice that can be given is to take all possible precautions to prevent poisoning. If poisoning is suspected, immediate washing of all exposed parts of the body with soap and water, followed by thorough rinsing with clean water, is the best thing to do. After the rash appears, several materials can be used to hasten recovery. But persons severely poisoned should consult a physician and remain under his observation until the poisoning has abated.

POISON SUMAC

Rhus Vernix L.

Appearance.—Poison Sumac, often also called Swamp Sumac and Poison Elder, is a shrub or small tree that grows usually 10 to 12, but rarely 25, feet high. Its stems are normally 2 to

3 inches in diameter, but on large specimens the trunk may be as much as 6 inches in diameter. What are commonly called leaves are but leaflets, and the 7 to 13 of them on one stalk form a single leaf 6 to 12 inches long. The leaves occur alternately on the twigs. The leaflet at the end of each leaf stands on a distinct stalk, but the other leaflets are in pairs along the leaf stem and are nearly stalkless. The leaflets are oval but they vary considerably in shape and size, even on the same leaf. They are green on both sides, pointed at both ends, and even or somewhat wavy along the margin. The leaf stalk is somewhat swollen at the base where it attaches to the stem. Clusters of greenish white, very small flowers are borne on the current year's twigs on much branched stalks 3 to 8 inches long, which arise in the angles between leaves and twigs. The fruit that develops from these flowers is a small, greenish white, smooth, shiny, waxy berry. Each fruit contains a single much wrinkled or ridged seed. Poison Sumac is perennial and reproduces entirely by seed.

Distribution.—Poison Sumac is a native American shrub. Its natural range extends from Maine westward through Ontario to Minnesota and south to Florida, Mississippi and Texas. Throughout this region it is found only in bogs or boggy areas. In the northern part of its range it is typically an inhabitant of tamarack bogs. In Illinois it maintains this habit and consequently occurs only in the northeastern corner of the state, where it is abundant in the old tamarack bogs of Lake county.

Biology.—The blossoms of Poison Sumac open in June. The fruit ripens slowly, becoming mature in September, and clings to the shrubs until winter. Of all the plants that grow in this state, there is none so poisonous to the touch as Poison Sumac. It is even more poisonous than its close relative, Poison Ivy. Poisoning is due to a plant oil, known as toxicodendrol, which is produced by the shrub in all its parts, but especially in the bark and leaves. Exceedingly severe cases of ivy poisoning develop on susceptible individuals who come in contact with this shrub, but as with poison ivy there are some who apparently are immune to poisoning.

Control.—Control of Poison Sumac demands eradication, since all parts of the shrub produce the poisonous oil that is responsible for ivy poisoning. The only satisfactory eradication is to chop down and destroy the stems or to poison the plant with chemi-

cals. Although no experiments have been performed to show the effect of chemicals on this shrub, undoubtedly it would be possible to kill it with common salt by applying dry salt on the soil around the crown of the shrub. Sodium arsenite could be used also, probably with safety except where animals are pastured, but sodium chlorate and calcium chlorate are to be preferred because they are less poisonous to animals.

WILD PARSNIP

Pastinaca sativa L.

Appearance.—Wild Parsnip, in reality the cultivated or garden parsnip escaped from cultivation, is a large coarse plant that grows 2 to 5 feet high. Generally, its smooth, grooved and ridged, coarse stem bears along its length a number of greatly divided smooth leaves which have a distinct clasping arrangement at the base. The stem ends in great heads of small yellow flowers. Wild Parsnip is a biennial and the first year from seed produces a very short stem, from which a rosette of leaves spreads out on or near the surface of the ground. These leaves are often 1½ feet long, with long, grooved, flat leaf stalks and blades very much cut up, closely and sharply toothed, and often lobed. After the flowers wither, the fruit develops in the flower heads at the top of the plant. Each fruit is composed of two broadly oval, smooth, flattened halves, or seeds, about a quarter of an inch long. Each seed is surrounded by a thin corky ridge. Wild Parsnip reproduces entirely by seeds.

Distribution.—Wild Parsnip has been naturalized from Europe. Apparently it has found this continent exceptionally favorable, for it is now distributed to all parts of the United States and southern Canada. The earliest known record of its occurrence in Illinois is 1861, but undoubtedly it was here prior to that time. It grows throughout the state and is an exceedingly common weed everywhere, except in the extreme southern part. Along roadsides, railroads, fence rows and on neglected lands it is abundant, but is seldom seen on consistently cultivated land.

Biology.—As a weed Wild Parsnip has some importance as an inhabitant of meadows and pastures. It is of interest, also, because some people, after coming in contact with it, develop a skin poisoning quite similar to that received from poison ivy and perhaps often confused with it. Although the root of the

WILD PARSNIP

Pastinaca sativa L.

cultivated parsnip is not poisonous, that of the Wild Parsnip, even though belonging to the same botanical species, is poisonous, even after it is cooked. The flowering period for Wild Parsnip extends from very late May through late August in Illinois, and seeding time from the last of July into October. Seeds, produced in exceedingly large numbers, are widely distributed by wind and water, but they are rarely contaminants of agricultural seeds.

Control.—Although Wild Parsnip has found American environment suitable to its persistent spread, control and even eradication is not hard. Because it is a biennial, this weed is readily destroyed by persistent cultivation and is therefore seldom seen on continuously cultivated land. For use in the relatively neglected places where it persists, a number of simple control methods are available. Chemicals such as iron sulfate, sodium arsenite, and sodium manganate, are effective in the eradication of this plant. Chlorates also may be used. Hand pulling, early in the spring when the ground is soft, will bring the roots out to such an extent that they do not reproduce. Hoe cutting, so as to remove the leaves from the root crown, if done in late autumn or early spring, is generally sufficient to keep the plants from sending up flowering stalks. For plants that send up flowering stalks, cutting while they are in blossom will prevent the formation of seed and cause the plant's death.

WHITE SNAKEROOT

Eupatorium urticaefolium Reich.

Appearance.—White Snakeroot, in some places known also as White Sanicle and Deerwort Boneset, commonly grows 1 to 4 feet high. Its erect, slender and much branched stem bears numerous nettlelike sharply toothed leaves, and ends in loosely branched clusters of small bright white flower heads. The large thin leaves, which are set in pairs on the stem and branches, are smooth and pointed and have 3 main nerves that spread out from the tips of the long slender leaf stalks. In the upper part of the plant, the clusters of flower heads are borne also on stalks which arise in the angles between leaves and stem. The clusters generally are large, with branched and rebranched flower stalks ending in heads of flowers about one-quarter inch broad, and the tiny pointed flowers give the heads a fringed appearance. The very small slender black seeds are 5-angled and topped with a crown of fine white bristles. White Snakeroot, though it dies

WHITE SNAKEROOT

Eupatorium urticaefolium Reich.

to the ground each winter, is perennial and comes up each year from the wandering underground root for which it is named.

Distribution.—White Snakeroot is a native plant. It ranges naturally from Ontario southwestward to Nebraska and southward to Georgia, Louisiana, and Oklahoma. Although it originally inhabited rich woods, as a result of settlement and the destruction of woods it now is found chiefly in moist fertile soils in thickets and ravines, in open woods along stream banks, and in wooded pastures. Infrequently it grows on hillsides and on cleared but unbroken land, seldom in open sunlight. There is no part of Illinois in which the plant is not found, although it is rare in regions which originally were prairie.

Biology.—Blossoming time of White Snakeroot in Illinois extends from about the middle of June well into October. Seeds ripen the latter part of July and continue to ripen until frost kills the plant. White Snakeroot is of no importance in cultivated fields but may be a dangerous plant in woodlands used for pasture. Both cattle and horses, after feeding on this plant, are affected with a disease known as "trembles." Persons who drink the milk of cattle that have fed on it are apt to contract "milk sickness," because of a poisonous material in the plant known as trematol. Stock poisoning is most apt to occur when pasturage is short or when a weed-infested pasture is overgrazed. Toxicity of White Snakeroot plants varies in different localities. Milk cows that feed on the plant show no symptoms, because the poison is absorbed by the milk and discharged with it, but when a cow goes dry it immediately becomes susceptible to poisoning. White Snakeroot reproduces entirely by seeds. One small flower head produces 10 to 30 seeds, and the number that can be ripened on a single plant is very large.

Control.—Measures directed against White Snakeroot are primarily for prevention of trembles and milk sickness. This should involve eradication of the weed from all areas where stock feed. Practically, the number of plants must be kept as small as possible in pastures and woods where cattle and horses graze. It is especially important not to permit these animals to graze on infested land after about the first of July, since it has been determined that the weed will kill stock that eat it when it is about ready to blossom. Where White Snakeroot thrives there will be little forage, and good timberland management requires that such land should not be pastured. Milk from cows feeding in infested pastures should not be drunk directly, but

POKEWEED

Phytolacca decandra L.

there is little danger of milk sickness if such milk is sold to dairies, so that it is mixed with large quantities of trematol-free milk. Persistent use of scythes or cutting hooks keeps the plant from going to seed, and this, repeated for several years, will reduce White Snakeroot infestation on any land. In timber tracts and ravines, where the soil generally is moist, it is possible to pull up the plant, along with its entire shallow root system.

POKEWEED

Phytolacca decandra L.

Appearance.—Pokeweed, very commonly known simply as Poke and less frequently as Inkberry, stands at maturity 4 to 10 feet tall. Its red or purple tinted, stout, smooth and sometimes branched stem bears smooth deep green lance-shaped leaves 6 to 12 inches long and ends in long upright shoots of greenish white flowers. The alternately placed leaves stand on short stalks, are pointed at both ends, and have no teeth on their margins. The flower clusters, which at first are terminal, become lateral because of continued growth of the stem and are transformed into drooping shoots covered with short-stalked dark purple berries. Each of the juicy berries bears about 10 seeds. Pokeweed, although it dies to the ground every year, is perennial and lives over winter as a large underground root.

Distribution.—Pokeweed is a native American plant with a natural range extending from Maine westward to Minnesota and southward to Florida and Texas. In Illinois it occurs in every part of the state. It prefers fence rows, thickets and waste ground in the country, and is a common plant of domestic gardens and disturbed soil of all kinds in towns, cities and villages. Although in America it is a dangerous weed, Poke has been transported to Europe, where it is considered an ornamental plant and is grown in gardens.

Biology.—Blossoming time for Pokeweed begins during the last of June in southern Illinois and in the early half of July in northern counties. From this time on blossoms continue to appear until the early part of September. Berries begin to ripen 3 to 4 weeks after the blossoms first appear and continue to ripen until late in November, when the above ground parts of the plant are killed by frost. Pokeweed is relatively unimportant as a weed as far as cultivated fields and gardens are concerned, and its seeds are not a common contamination in

COMMON BURDOCK

Arctium minus Bernh.

agricultural seeds. Very young shoots from this plant are sometimes cut and eaten like asparagus. Both roots and berries contain a drug, phytolaccin, and the berries, when eaten in any quantity, cause severe nausea, and the roots are poisonous. The mosaic disease of cucumbers and canteloupe attacks pokeweed, causing a mottling of its leaves, and overwinters in its roots. The berries are eaten to some extent by birds by which the seeds are distributed widely.

Control.—Since Pokeweed is perennial, to gain complete eradication it is necessary to kill the root. If the plants are numerous, the roots can be grubbed out, dried, and sold to drug companies. However, hoeing so as to cut the stem off below the crown gives satisfactory control in gardens. Cultivation nearly always disposes of the plant within a short time in fields, and the danger from berries, which exists chiefly on neglected land, can be greatly reduced by keeping the tops of plants cut down so that berries do not ripen. For destruction of the roots in the soil, which is particularly necessary near cucumber and canteloupe patches, the tops of plants should be cut off with a hoe or spudding instrument, and then a chemical should be used. Either common salt or sodium chlorate is very good for this purpose. When Pokeweed occurs among other, more dangerous weeds, the more drastic methods used on them control it readily.

COMMON BURDOCK

Arctium minus Bernh.

Appearance.—Common Burdock, generally confused with the larger but rarer Great Burdock, seldom exceeds 5 feet when flower stalks are present. Its roughly hairy, stout ridged stem, which springs from a great mass of very large wavy margined strong-veined leaves, branches extensively near the top and each small branch carries a cluster of moderate-sized purplish or rarely white flower heads. Both the large leaves in the basal clump and the smaller ones on the stem stand on stout hollow leaf stalks, and are more or less heart shaped, light green above and woolly beneath. The flower heads are globular and the green part of the head below the purplish flowers is armed with hooked spines, so that the flower head, later the seed head, forms a prickly burr. The flat, oblong seeds are dull brown, often curved, and have several lengthwise ribs. Common Burdock is biennial. The first year it produces a large rosette

of leaves near the ground, and the second year sends up its tall stem and flowers. It reproduces entirely by seeds.

Distribution.—Common Burdock, like its near relative Great Burdock, is a native of Europe that has become naturalized in America. Since its introduction it has spread practically throughout the United States and is, of course, found in every part of Illinois. Records of its occurrence in this state antedate the Civil War. Although rarely persistent in cultivated ground, it is common in neglected soil, along roadsides, in farm yards and in pastures.

Biology.—The flowering period for Common Burdock begins in late June in the southern part of Illinois and early July in the northern part, and continues well into November, when frost kills the upper parts of the plant. Seeding time begins in September, when the flower burrs, which ripen late, begin to produce ripe seeds. The ripened burrs remain closed on the stalks throughout the winter. Both roots and seeds are used to some extent in medicine; the roots, which are often 3 inches thick and extend for more than a foot into the soil before branching, are collected in the autumn of their first year. Cows sometimes feed on the plant, and if they eat it in quantity they yield bitter milk. Burdock seed, not a common contaminant in agricultural seeds, generally is distributed in the burrs, which catch on clothing or the fur or hair of animals or are transported in late-cut hay. The two Burdocks, both weeds, are very similar but can be distinguished readily since the leaf stalk of Common Burdock is hollow, while that of Great Burdock is solid.

Control.—Since the Common Burdock has such a long and fleshy taproot that it cannot be uprooted after it has passed the seedling stage, effort should be made to destroy seedlings as they appear in the spring. Cultivating fields, hoeing small gardens, and spudding out young plants in lawns and vacant areas does this satisfactorily. In autumn, cutting the large rosettes with a hoe or cutting off the second-year flower stalks below the crown prevents seeding. Since the roots sprout readily at the crown when plants are cut off at the soil line, it is important to hoe deeply and also, whenever possible, to treat each root with salt, waste tractor oil, or some effective chemical.

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