fertilizers and Large Blooms

A Bolles Dahlia Booklet

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Fertilizers and Large Blooms

by

CHARLTON BURGESS BOLLES

Media, Pennsylvania

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FERTILIZERS and LARGE BLOOMS

FORTUNATELY, for practical and altogether satisfactory results, the fertilizing problem of the dahlia is very simple. This is not true of all plants. A good grass lawn is often difficult to secure. Fifteen years of experiments with elaborate chemical fertilizers, used with manure, failed utterly to produce a lawn around the Tampa, Florida, post office, in the clear sand. Finally, three months' use of soft phosphate and cow manure was found to be just right, and a beautiful grass lawn was the result. Lime is poison to rhododendrons and azaleas, but is required as an aid in turning starch into sugar, in the structure of most plants, and its use means fruits and vegetables of better flavor.

The use of lime is a broad subject, and applications cannot be suggested without knowledge of the particular soil to be treated, for the ground may be heavy, light, sandy, or clay, and lime may or may not have been recently applied. Lime has been used in agriculture for more than two thousand years, and its necessity and its value has been fully proven. If your soil is light excessive use of lime will cause trouble. On heavy soils reasonable and moderate applications of lime, either burned or slaked, will make the ground friable; but will compact light soils. Use lime thoughtfully, for if strong in magnesia damage will follow too

frequent use. Lime sweetens acid soils by neutralizing the sourness, and renders plant foods soluble, so the plant can absorb them. It may be applied to the surface at any time, summer or winter, but the best results follow when it is mixed with the soil by plow, harrow, or spade and rake. Do not use at the same time with animal manures, as too much nitrogen will pass from the manure into the air. Ground lime is milder in action than burned or slaked lime, although most florists prefer slaked lime, and apply it once every three years, using between two and three thousand pounds per acre. For the home gardener the powdered lime that is sold in large sealed paper bags is admirable, because easy to apply evenly, and in its finely divided form quickly available when well mixed in the soil.

Speaking in general, see that your soil is limed every three years. If your ground is newly acquired testing for sourness is an easy matter. Mix half a cup of soil with water until it is like thick porridge. Any drug store can supply blue litmus paper. Push a piece of the litmus paper into the mud, taking care not to handle the portion of paper that is put into contact with the mixture. After soaking two hours rinse off the mud without wetting the upper half of the paper. If the paper has been intensely reddened by the mud, lime is called for. If pink, your soil contains a good deal of acid vegetable matter. If the paper is only brick-red, the soil is not acid, and lime is only required to improve

its mechanical qualities, and assist soil bacteria in preparing food for the plants. If litmus paper is not conveniently near, you can test the soil by adding a teaspoonful of dilute ammonia water to a tablespoonful of soil in half a glass of water. Let the mixture stand four hours. If it turns intensely brown it is probable the soil contains acid vegetable matter. If the mixture turns black you can be even more certain that lime is needed to neutralize sourness.

Fertilizing and cultivating are vitally connected. Success with dahlias depends far more upon cultivation than upon the application of fertilizers. Cultivation will produce fine dahlias in almost any soil, the lack of it means failure though all else be supplied.

Fertilizer is only another name for plant food, nourishment. The dahlia is a hard worker, and a hard drinker, "a thirsty fellow." Like peonies they are gross feeders, and they need to be. It is not surprising that the feeding of such a hard working individual ought to be carefully considered and adequately, yet wisely, done. Excessive food is more harmful than not enough. Consider what the dahlia plant sets out to accomplish. The labor of the excessive flower production is tremendous. Fifty blooms open at one time may be seen on a single plant of the beautiful Countess of Lonsdale; forty large, exquisite flowers, with stems a foot and a half long may be the season's output of one plant of Break O'Day. Besides flowers there are the

tubers, and the foliage. It is believed that leaf and tuber growth exhausts the plant more than even the amazing prodigality of blooming.

As far back as 1839, in England, when Paxton wrote upon the dahlia, it had been discovered that the soil could be too rich. He says: "It is a most fatal error to imagine that the flowers of Dahlias will be improved, or rendered larger, by being planted in a rich and highly nutritive soil; for instead of this being the case, they will expend all their strength in producing shoots and leaves, and the flowers will be few in number, and much impoverished; or they will be so rank and coarse, as to lose all that beauty of form which is so much desired in the Dahlia."

In the autumn of 1921 a Maryland gardener was moved to write: "I have been well acquainted with the fact that dahlias should not be planted in heavily manured soil, but this season I planted a row between the peonies, and though they were staked and tied, the stakes were entirely insufficient, for the plants grew over six feet tall, and fell over on the ground. Nothing but a six-foot stake would have held them. Hereafter the dahlias will go into poorer soil."

There seems to be unanimous agreement that barnyard and stable manure is the best fertilizer for dahlias of all the animal manures. Of commercial fertilizers bone meal is far ahead of every other kind, and in a soil of good natural fertility bone meal is the only addi-

tional help needed, except some soot, or wood ashes — potash in some form or other, to intensify the color of the flowers, and ensure plump, strong tubers.

Besides containing nitrogen for stem and foliage, and phosphoric acid for flower production, stable manure, particularly "long manure," (well mixed with the straw or hay used in bedding down the animals) is exceedingly valuable for the humus (decayed vegetable matter) it adds to the soil. Heavy soils need this to lighten them, light soils and sandy soils need it to hold the moisture supplied by rain or irrigation. This stable manure should be old, not fresh, of course, when the roots of the plants reach it. On heavy soils it should be plowed under in the autumn, or just before the winter freeze-up occurs. On light, and extremely sandy soils, it is better to compost the manure in a pile in the autumn, or during the winter, and plow it in when spring comes. Composting will advance its decomposition, and prevent its "burning" the plants, and it will be immediately available. If turned under light soils in the autumn the poor retaining qualities of the soil will permit some of the plant food elements to be washed away by winter rains and lost. On heavy soils plow the manure in at the beginning of winter; on light soils in the spring.

Some commercial growers who raise dahlias exclusively for the sale of the tubers, paying no attention to the cutting of the blooms, use no animal manures,

but try to grow a cover crop of rye after the harvesting of the roots. The rye is plowed under, making an excellent "green manure" supplying a great deal of humus. Dahlias are grown on the same fields year after year with no other fertilizing.

It is very easy to make the soil too rich for dahlias. In fact, any good garden or farm soil is just right for dahlias as it is, without the addition of any fertilizer except bone meal. The stimulation of manures or commercial fertilizers may be given after the plants have begun their tremendous labor of profuse flower production, but not before. Inasmuch as bone meal is not immediately available as plant food, requiring at least thirteen weeks to decompose in contact with the soil, and since it does not unduly stimulate foliage and rankness of growth, it is advisable to put in into the soil when the tubers are planted, or in the autumn. Excess of plant food rich in nitrogen promotes a vigorous, but soft and leafy growth in any plant, with but few flowers. This is specially true of dahlias. With a vegetable organism as susceptible to variation as the dahlia some change of flower form and color is likely to occur, when too strongly stimulated with fertilizers.

Bone meal is the ideal dahlia fertilizer. It seems impossible to use too much of it, or to do harm with it. It can be broadcast upon the soil, 1000 pounds to the acre being only a moderate quantity, and plowed under in autumn, or spring. Decomposing slowly, many

claim that bone meal helps the plants more the second season than the first, which makes its liberal use expensive unless the same land can be used for dahlias year after year.

The writer's practice, when planting dahlias in holes, is to dig a hole fifteen inches across, and not less than eighteen inches deep. When there is time enough the hard pan of the last six inches is removed and rich top soil added to the top of the hole to completely fill it. When the hole has been half filled, with the poorer earth, half a pint of bone meal is added as the richer soil is being shoveled back, and mixed thoroughly with the soil by lifting and turning the soil the depth of the shovel again and again. A hole six inches deep in this pulverized earth is then made and the tuber planted, flat, of course, the sprout or eye side uppermost. The tuber is thus surrounded by the well distributed bone meal. The feeding roots, striking downwards or horizontally, find it, the later August roots, that are hardly two inches below the surface find it, and as the bone decomposes the rains dissolve it and carry it over the roots. Not less than half a pint of bone meal is used for each tuber. Not all of it will become available for the plant during the first season. No harm has ever been done, and dahlia blooms are always profuse and of good form and substance.

A little potash is necessary if brilliant color is desired, as of course it is, with dahlias. Scotch soot, about

a pint to a plant, or a handful of wood ashes, will supply sufficient potash. Scatter the soot or the ashes about the plant and work it into the soil about flower-budding time. Commercial muriate of potash will probably have to be used by many, for soot and wood ashes are not so easily obtained nowadays.

Plants need a balanced ration as much as animals do. What is excellent for a plant when mature is sometimes quite unsuitable in its extreme youth. Plants do not have the same composition at different stages of growth. The plant increases in weight up to maturity. During the earlier life of the plant nitrogenous material is taken up more rapidly. Before the formation of fruit the reserve material produced is stored up in leaves, stem, roots, or tubers. At the time of fruiting this reserve passes into flower and seed production. Experiments with corn have proven that it needs the largest amount of plant food just as the ear is forming. If an adverse season has stunted corn the crop can be most substantially helped if fertilizer is applied during the second, or the third cultivation, just as the ears commence to form.

Nitrate of soda is a stimulant, and can be literally "fire-water" that intoxicates and hurts a plant just as whiskey does a man. The amateur gardener should never forget that the commercial fertilizers are much more concentrated than natural manures, and must be used very carefully, and in comparatively small quan-

THE DAHLIA'S VARIABILITY

Excess of food is one of the chief reasons for variation with any plant

SELECT FINEST POSSIBLE STOCK FOR EXHIBITION BLOOMS

Only well wintered tubers should be used when growing for exhibition. Experts use cuttings from such fine stock.

ties, as compared with the bulky natural manures. In the South a generation and a half ago cotton seed meal, which is very rich in nitrogen, was mixed with a high grade of phosphate and was almost the only fertilizer used by market gardeners around Charleston and Savannah. Florists today find this combination a "trade secret" for heightening the color of geranium blooms.

The advantages of a soil well supplied with bulky plant food are many. Manure, and compost in the form of leaf mold, rotted sods, fibrous loam, and generous additions of bone meal, meet all plant requirements, and what is very important, keep the soil in an open, friable condition and hold moisture. The so-necessary admittance of air to the soil is also made possible.

One hundred pounds of leaves from hard wood trees are worth fifty-six cents as fertilizer. If burned, the ashes would contain some fertilizing material but in a form that would wash out of the soil, while the immensely important humus of decayed leaves (leaf mould) would be lost. This leaf-mold humus is almost as valuable as the mineral elements (potash etc.) contained in the leaves.

The more freely blooms are produced, by nature, or through forcing, the smaller the tubers will be. This is why some of the "latest creations" in dahlias, superb and wonderful in bloom, can hardly be carried through

the winter storage. Some of these root masses are hardly tubers at all, and dry out to the point of death before spring. Plants forced severely for the production of immense exhibition blooms often have only exhausted tubers left, that should never be sold, as they are more or less, sometimes entirely, unfit for planting the next year.

Blooms that are one-sided, only half developed, are on plants that have "flowered out" and are nearing the end of their seasonal growth, or are in soil that has had all its plant food used up, and the plant and the blooms are actually starving to death. Top dressing, if applied soon enough, will revive the drooping energies of the plant and profuse flowering will result.

With dahlias fertilizer requirements vary with the variety, and practice has proven that blooms are greatly improved by judicious applications of manure or commercial preparations after the flower buds have formed. The low growing, bushy Kaiserin A. Victoria, and the taller John Wanamaker, exceptionally profuse bloomers, must have a liberally fertilized soil, or the plants will become exhausted by their wonderful flower production. Countess of Lonsdale, that readily shows more than fifty open blooms on a single plant, naturally requires plenty of food. Pompons should never receive fertilizer, except bone meal for flower production, and a little potash for strength of tuber. The charm of these little beauties is in their diminutiveness. They are naturally profuse bloomers.

Luther Burbank's conviction that the first few weeks of a plant's life determines its destiny is an excellent guide to dahlia growing. In a soil light enough by nature, or made right by mechanical means, such as sand, humus, or cinders, if it is of good fertility planting dahlia roots without the addition of any fertilizer except liberal amounts of bone meal appears to be safe, and results are excellent. Where the soil is decidedly infertile well-rotted, old stable manure is needed. If not to be had a very little sheep manure well mixed with the soil near each tuber will give the vigorous start the first few weeks of growth seem to demand.

Bone meal is the dahlia fertilizer par excellence. Apparently there is nothing that can fully take its place, nothing that is anywhere near as good. It gives stockier growth, greater vigor, and more flowers. Bone meal is rich in phosphoric acid and affords the plants a long, slow, safe supply. Seed cannot be produced without this substance. Fertilizers containing it always stimulate and increase flower production.

Every 300 square feet of dahlia plot can have 100 pounds of bone meal. There is no loss in raking or plowing it in during the fall. It does not wash away, as a potash fertilizer would, and as it only slowly decomposes it will be immediately available for the plants the following spring. One need not hesitate to plow bone meal in deeply. Your soil may have once supported

plants with long tap roots. If so the probability is that the subsoil has had all its phosphoric acid exhausted, and it must be remembered that dahlias are planted deeply. They should be down not less than six inches, and with many horse drawn plows soil penetration is hardly that, and the tubers are formed right on, or even in, the subsoil. Deeply plowed in bone meal will restore to the lower soil the phosphoric acid so necessary to plant welfare. It penetrates the soil, and remains in it, a vital reserve for vegetable life.

Manure from the poultry house is the richest of all animal manures. The next in value is sheep manure, then hog, horse, and last of all and least of these in fertilizer value, cow manure. In phosphoric acid and potash hen manure is three times richer than hog manure, seven times better than cow manure, five times better than sheep manure, twice as valuable as horse manure. Besides their good work as insect killers, it would seem worth while to let poultry have the run of the dahlia garden.

The use of liquid manure from supplies in tubs or barrels is apt to be offensive in the small suburban garden area. A clean and convenient method is to apply the manure directly to the plant. Draw the earth away from each plant, or draw up an outer ridge, to form a crater or hollow from a foot to eighteen inches in diameter. Scatter around the crater half a teacupful (not more) of sheep or poultry manure. Then slowly

Ready to be disbudded

After disbudding

AURORA

Exceedingly profuse with 7 and 8 inch Exhibition Blooms of rich red apricot
Tubers are low-priced

pour into the crater a large bucketful of water (three and a half to four gallons). When the water has soaked away fill up the hollow as a mulch, to lessen evaporation. Repeat the manure and the water in a fortnight if the plant seems backward; in three weeks if the plant is doing well. All this to be done, of course, after the flower buds have started, not before.

Nitrate of soda will greatly stimulate the entire plant's growth, foliage as well as blooms. As a liquid manure use one tablespoonful to a gallon of water, and do not let the solution fall on the foliage.

Liquid manures used with the intention of increasing blooms must be applied with discretion. When the flower buds have expanded enough to "show color," the liquid applications must be reduced, or the flowers will grow too fast, will be "soft" and their keeping qualities will be poor.

Never apply liquid manures when the ground is dry or the plants will be "burned." If it is a dry spell irrigate the garden and allow the water to soak in until the soil is moistened quite deeply. When the soil is full of moisture (not sodden with water, but moist), it is a filter, stopping and holding the plant food elements of the liquid manure. The water, which has held the plant food in suspension or solution, settling down into the subsoil.

Another convenient way of using manure water is to sink three flower pots flush with the earth, or nearly

so, at equal distances around a plant, using pots small enough not to go down and interfere with the growing tubers, and placing them six inches from the stem. Fill the pots twice with weak manure water at each application. A teacupful of dry sheep manure can be stirred into a large bucket of water and used at once, in that strength. Keep the water stirred as it is poured that the mixture may be equally rich; it will answer for two plants.

Commercial fertilizers can be used as top dressings, well raked into the soil, as the flower buds begin to form. Mixtures should vary with soils. One veteran grower recommends one part, by bulk, of nitrate of soda, one part muriate of potash, two parts bone meal. The soda is for foliage and stem, the potash for brilliancy of color, and strong tuber growth; the bone meal for profusion of bloom. A handful for each plant is ample. Another grower uses one part, by bulk, nitrate of soda, four parts bone meal, as a top dressing for a sandy soil. For the home garden use one ounce of this mixture for each square yard, one pound for each fifty feet of row, scattering each side of the plants. Note that this formula is for sandy soils. It contains too much nitrogen for a heavy soil, into which stable and other animal manures have been worked previous to planting. For a heavy soil, thus previously manured, use one part, bulk, bone black, one part acid phosphate. One successful grower finds that average soils, not too heavy,

and not particularly enriched by animal manures, are treated right when one part, by bulk, of nitrate of soda, two parts sulphate of potash, and four parts of bone meal are used. The potash, of course, is for heightening color, and for tuber production.

Apart from fertilizers it must be remembered that location and soil affect color. A position where there is always light, and never shade, gives different color effects than a position where trees or buildings, or even fences, cut off the direct light part of the day. Heavy soils always give less high, brilliant color, than light soils; and the more sunlight the plants have, the better and more intense is the color.

Careful and scientific experiments at the various State agricultural colleges have established the fact that sulphur is an important element of fertilizer. Cabbage removes 39.2 pounds of sulphur per acre from the land; turnips 36.9 pounds, alfalfa 26 pounds. Dusting dahlia tubers with dry sulphur after cutting in the spring prevents decay and mold, and adds a fertilizer. The dry sulphur can be sprinkled lightly in the holes, or furrows and its action in the soil produces sulphuric acid, which in turn provides phosphoric acid out of materials in the soil. Sulphur can also be supplied by iron pyrites, gypsum, and superphosphates. It has been definitely established that no plant growth is possible without sulphur. But ordinary pulverized "flowers of sulphur" is more likely than otherwise

to remain inert, inactive, in most soils. Only a comparatively few soils contain the specific organisms known as sulfofying bacteria, that oxidize the sulphur and render it available for plant uses. Fortunately it does not cost much to inoculate sulphur with the bacteria. Rains convey from seven to ten pounds of sulphur per acre, and in localities where a great deal of soft coal is burned, more than forty pounds of sulphur per acre will be deposited on the land by rains. Unluckily, more sulphur is carried off from drainage than is supplied by the skies. This is proven by marked increase in crops where sulphur is added to the soil by the farmer. Used in large enough quantities sulphur will render a soil so acid that certain kinds of worms and insects are killed, and weeds in paths and tennis courts destroyed. The acidity can afterwards be entirely neutralized by the use of lime.

Competent and veteran growers, experts, differ in their convictions and practices with fertilizers. This is inevitable, for climate, soil, location, length of growing season, all enter into the problem. But anywhere, any time, there is nothing better than bone meal, adding potash enough for color and tubers. Bone meal never "burns"; never washes out of the soil; never hurts when used exceedingly liberally; never disappoints; always promotes stockiness of growth, health of plant, and profusion of blooms; giving good results the first year, is apt to prove more profitable

GEISHA

Brilliant yellow and red 7-inch blossoms

No variety more richly repays deep digging and top dressings

IMMENSE BLOOMS

Can be grown by anyone from any dahlia except those by nature diminutive.

the second season; is not expensive when this is considered; and is altogether convenient in the handling and application. Half a ton to the acre is none too much; five hundred pounds, broadcast, or in the furrow, will make itself felt positively. The home gardener can scatter a pound to each square foot of soil; or stir in a coffee cupful about each tuber.

Inasmuch as dahlias are a root crop, some growers use a commercial complete potato fertilizer, adding to it, bulk for bulk, an equal amount of bone meal. Such a combination will bring excellent results.

A mixture rich in phosphoric acid, and sufficient for an acre, is 150 pounds nitrate, 200 pounds tankage, 400 pounds acid phosphate, 200 pounds bone meal, and 80 pounds potash salts. This combination is very rich in phosphoric acid, and is the equal of 1000 pounds of 4-8-4 fertilizer. But even so, 1000 pounds of bone meal, with the 80 pounds of potash salts added, is better.

Among commercial fertilizers for top dressing after blooming has begun dried blood (blood meal) is excellent. A small handful raked into the top soil every three weeks will improve color of flowers and foliage. Nitrate of soda is recommended by almost every one, perhaps because it is convenient in form, highly concentrated, and inoffensive as to odor, and exceedingly stimulating. In fact, it is almost too much of a stimulant. Some growers are convinced that its use weak-

ens the vitality of the tubers, which is robbing the future, and that the tubers are very likely to decay in winter storage as an after effect of the use of nitrate. Since the main effect of nitrate is because it supplies nitrogen, and inasmuch as nitrogen can be obtained in forms that have no evil after results, cautious growers of valuable stock will use stable and poultry manure instead, if the soil is not already sufficiently well supplied with stem and foliage making food. It cannot be repeated too often that any good average soil, good enough for corn and potatoes is rich enough for dahlias. The plants in such ground will make all the growth that is good for them. Generous applications of bone meal at planting, and quick acting top dressings as the blooming period is well advanced, with a little potash (which all root crops require), will increase profuseness of bloom, secure symmetrically formed, fully developed flowers, heighten color of blooms, and cause better tuber growth.

Commercial fertilizers are usually more readily obtained by the city gardener than any others. Remember, however, that the soil must also have additions of humus (decayed vegetable matter) in considerable quantity. Forty per cent. additions of leaf mould, or of old sod and vegetable refuse compost, is none too much for many city lots, the ground there being apt to be exceedingly sterile and lacking in fibrous matter. For liquid manure use, of the dry fertilizers, half an ounce of sulphate of ammonia per gallon of water; or

half an ounce nitrate soda per gallon; or one ounce dried blood per gallon; or one ounce acid phosphate per gallon. Apply every ten days. Use first one, then the other.

Fertilizers should always be used with caution and discretion. Besides regarding the natural condition of the soil weather wisdom would be altogether helpful. Should a long rainy season follow unusual liberality in the use of fertilizers dahlia blooms would be hurt beyond remedy. The flowers, following such conditions, would be large, it is true, but they would be soft and flabby. Two hours after such flowers are cut they would be too wilted and drooping to be attractive. Amateurs are sometimes puzzled over the poor keeping qualities of their flowers. The application of water day after day upon a very rich soil, or too much water plus too much stimulating fertilizer, is an adequate explanation.

The use of tobacco as fertilizer and insecticide for dahlias deserves careful experimental study. That it apparently heightens the color of strawberries seems certain. Perhaps it may be found that it is a specific for wonderfully intensifying dahlia colors. The claim has been made that it improves the color as well as the growth of golf greens. It is certain that tobacco in the form of dust and chopped stems is valuable as plant food and is obnoxious to insects. It will not burn the plants, it is easily handled, it contains no weed seeds,

it has no unpleasant manure odor. As a mulch the chopped stems seem to drive away ants, cut worms, moles and snails. Tests by the U. S. Department of Agriculture show that tobacco contains from five to twelve per cent potash, two to four per cent nitrogen, and from a quarter to one per cent phosphoric acid. As a mulch one hundred pounds of chopped stems will cover ten square feet, at a cost of two dollars. Coarse ground tobacco dust, and fine ground, may be had for three dollars per hundred, and is for sale by the Lancaster Tobacco Products Co., Lancaster, Pa., and by the Nicotine Manufacturing Co., 117 North Main St., St. Louis, Mo.

A dahlia can be killed with kindness. Beginners and amateurs frequently destroy their plants by too much water, over fertilizing and neglecting cultivation. After the flower buds form, cultivation is more important than ever; particularly is this true if flower forcing is being done with dry or liquid manures. If the soil dries out the growth and expansion of the bloom is hurt. Never-ceasing cultivation, or irrigation, as required, must be practiced. The soil must never be allowed to dry out at blooming time.

Excess of water destroys the roots of plants. Oxygen is absolutely necessary to the life of roots. With a water-soaked soil, the small amount of oxygen in the water is soon exhausted, and smothering and decay of the roots inevitably follows. Such a soil is known to

TUBERS NEARLY KILLED BY FAULTY STORAGE THROUGH THE WINTER
Do not expect prize-winning blooms from such damaged roots.

FIRST PRIZE EXHIBITION BLOOMS

Grown and shown by Albert T. Stewart (Stewart & Fisher), Trenton, N. J.
Arranged by Mrs. Frieda H. Fisher

gardeners as waterlogged. Water your garden only when it is exceedingly dry. Thorough soakings, say a week apart, are much better than "sprinklings" every day or so. In one case the plants "get all there is, in t'other, only part." Just wetting the surface of the ground always does a great deal more harm than good. "The human side of plants" exhibits the very common trait of laziness. When you merely sprinkle your garden the roots emulate the example of their caretaker and follow the line of least resistance. They grow near the surface where "the water is fine." But this surface water flies away with one day's hot sun, the roots become dry and are nearly killed, sometimes quite destroyed, with the very first day that your "sprinkling" is omitted. Let the roots hustle for their living. If the soil has been dug or plowed deep enough, and you keep the dust mulch up with hoe or rake, your dahlias will be aboundingly successful in any normal season.

Of course too-little water causes the dahlia to become "woody." It hardens itself as a self-protection measure, to better withstand the drouth. This invariably means loss of blooms, and dahlias are grown for flowers, hence the great importance of a proper water supply. Dahlias only flower on soft, succulent growth, which vigorous, well-nourished plants growing in moist soil make. Lacking sufficient water there is a reduced tension of cell walls, the food supply from the soil is

lessened, and the plant begins to starve to death. In time it may be said to be a living skeleton; a bony (woody) skinny specimen, lacking the attractive grace and form of properly nourished well-being, and without the "bloom of youth," namely-and-to-wit, flowers.

Dahlias and other plants growing in a deeply cultivated soil in a region of normal annual rainfall hardly ever suffer from lack of moisture. There is usually ample moisture in soils. Deeply plowed or spaded, the surface always well pulverized by cultivation, the roots grow downwards where they find coolness and moisture. The surface evaporates the soil's water content but slowly, because capillary attraction has been broken up by cultivation. The water cannot readily escape.

Just as the best child training begins before the child is born, a generation ahead none too early, so with growing exhibition dahlia blooms. Attend as many dahlia shows as possible. The annual Show of the American Dahlia Society in New York is an amazing, marvellous spectacle of horticultural miracles, and is worth a day's journey. At this show, September 27-30, 1921, the dahlias in practically every competitive exhibit were Pierrot, Tom Lundy, John Lewis Childs, F. W. Fellows, Millionaire, Judge, President Wilson, Dr. Tevis, George Walters, and William Slocombe. Dahlias having the largest flowers on long stems were

Uncle Sam, Emperor, Copper King, Sherwood, and President Wilson. The blooms that were in best condition upon the second day of the show were Golden West, Mrs. Edna Spencer, Mrs. Carl Salbach, F. W. Fellows, Purity, Louise Finer, Sunkiss, and Edith Slocombe.

Visit the dahlia fields of amateurs and commercial growers. Choose the varieties you plan to exhibit next year from this year's blooms and from the plants if possible. If your selection is from cut flowers decide only upon those that show long stems. It is not safe to add to one's collection from blooms that are exhibited with short stems, for there is a likelihood that the plant does not produce long stems, and a short-stemmed bloom will not win exhibition prizes. The selection of varieties that really produce exhibition blooms, with fine full flowers, upon long, strong, straight stems is half of the success you crave. Planting, cultivating, fertilizing, disbudding, and cutting the blooms at the right time and caring for them afterwards is the other half of prize taking. Those who win plan a long time in advance, and order the day by day life of their plants to that one end.

Prize winning, gigantic, exhibition blooms are produced by plants growing in deeply cultivated ground. Your competitors are certain to dig their dahlia plots to a depth of two feet: if you will trench three feet you will beat them, provided you equal your rivals in all other

particulars of growing. Perhaps there are no dahlia shows within hundreds of miles of your garden. Grow your plants exactly as if absolutely bent upon capturing all the first prizes at an exhibition where competitors are many and competent, and you will cause your entire community to sit up and not only take notice, but buy your wonderful roots. The deep bottom soil can be mixed with well-rotted compost, sods, and fibrous loam. One quarter bulk of such additions will work wonders. If you have unlimited supply of good loam fill the entire depth of your trenching with it, mixing fertilizers and any soil that is better than the rest in the upper twelve inches. Remember that it is "Pike's peak or bust" with your rivals. You can capture prizes if you are willing to take pains enough. Apply one hundred pounds of bone meal to every three hundred square feet, mixing it thoroughly with the soil, and if you can do this in the autumn, just before freezing weather, your chances of success are ever so much better. If you cannot do this it will pay well to compost the bone meal in a pile, leaving it to the rains and frosts of winter. At planting time it will be instantly available for the plant roots. One of the most famous and successful gardeners of the United States added to every bushel of bone meal three of leaf mould, or of loamy soil, and proved that this increased fertilizing values about twenty per cent.

Where frosts are not likely until after the dahlia shows, which are usually held about the 25th of Sep-

tember, exhibitors do not like to plant until July first, in order to have their blooms come along at exactly the right time. Inquiry of local growers will secure information as to the best planting time for exhibition purposes. Place the tubers three, four or five feet apart, according to the space you have. Five feet each way is preferable, if you can manage it. Enjoyment in cultivation, as well as generous light, air, and plant food supplies are all secured by the wider spacing. For exhibition blooms only one stalk is allowed each position, and you commence tying to stakes when a foot or less of growth has been made. No plant is allowed more than ten branches, or more than three or four flowers in bud or bloom at a time.

One experienced exhibitor, who only grows exhibition blooms, and no other sorts, does not allow branches to form nearer than a foot to the ground, in order to have freest possible air circulation, and perfect cultivation of the soil. This is not a good practice except for exhibition blooms, for low growing foliage keeps the ground cooler and moister. As the grower of show flowers "sits up nights" with his pets no harm is done.

Flower buds will sometimes appear in July upon these specially grown plants, and should be removed at once. The first buds usually produce inferior flowers, besides drawing upon the vigor of the plant too soon. Many experts use sheep manure every other

week alternately with any other kind of fertilizer that promotes rapid growth, beginning applications one month in advance of the exhibitions. If the plants grow rankly with no signs of flower buds dust mulching with hoe or rake acts as a kind of root pruning, and is likely to check the rampant growth, and induce the plant to set flower buds.

Disbudding for long stems must be done. The terminal flower bud is left, and all other buds and leaf shoots are removed from the branches, except, if the grower wishes, the two most promising shoots of the branch nearest to the main stalk of the plant. When the buds are half an inch across soot or wood ashes is applied as a top dressing. This will make the foliage green and lustrous, and will intensify the color of the blooms. The plants should be looked over every day, for twenty-four hours is often time enough for extra flower buds to start, and they must be nipped off as fast as they appear.

As the blooms mature and are ready to open a more beautiful texture and an exquisite delicacy of color in the flowers can be secured with many varieties by shading the flowers with cheese cloth or lath lattices, protecting them from the fading action of direct sunshine. The shade must be high enough not to interfere with free circulation of air, otherwise the plants will become suffocatingly hot, and the blooms spoiled. The cheese cloth would also protect the gigantic blooms from

an untimely rain just previous to the exhibition. Adequate protection from an autumn deluge ought also be conveniently ready as an emergency measure, or all your prize-taking ambitions may be wrecked in a single hour and the happy work of a summer come to nought.

Cutting the blooms for the exhibition is a matter for discriminating judgment. If the flowers are to travel many miles it is sometimes wise to cut just before they are most fully matured. If the dahlia show is nearby the flowers can be grown up to almost the last moment of their best, and some varieties require five to seven days for the fully grown flower to unfold and reveal its utmost of beauty and perfection of form.

Mrs. Jessie L. Seal, a prominent California grower of unusual dahlias, says regarding the preparation of dahlias for exhibition: "Select the dahlias suitable for display purposes and give these plants special care. Water liberally; and disbud thoroughly so that flowers will not only have greater size when exhibited in bottles, but also have longer and stronger stems for vase and basket display. Gather the flowers the evening before exhibiting, cutting the most perfect blooms with the required length of stem; discard all imperfectly formed, wind-whipped, sunburned flowers, as well as those withered on the back. Exhibitors who show larger flowers by allowing them to become over ripe lose prizes, as the judges examine the back as well as the front of the blooms. Be careful not to have the pollen too well

developed in classes that require the open center, showing a golden disk, such as the Peony, Collarette, and the Single dahlia; for if too old the petals fall quickly, and ruin your chances of winning prizes. The Cactus, Hybrid Cactus, Decoratives, Show, Hybrid Show, and Pompon Dahlias must have perfectly closed centers. After cutting the flowers burn the ends of the stems on a gas flame; or dip the ends in boiling water for twelve or fifteen seconds, and immediately plunge in fresh cold water almost to the blossom, up to the leaves at the upper end of the stem. The less foliage used the better for keeping. In the morning pack in cardboard boxes, and the blooms will be in good condition for the exhibition table and will last well. In competing for a certain class be sure and have your blooms as uniform as possible in size; the exact number called for; and the different colors well arranged."

One thing is certain, you cannot grow exhibition blooms without water. George L. Stillman, the famous Westerly, R. I., grower says: "Watering is one of the most essential things in producing perfect blooms on your dahlias. Ninety per cent. of the failures in growing dahlias is due to lack of water when the hot days of summer come. Did you ever notice that the stalk of the dahlia is about all water except the outer shell, and that where sufficient water is supplied the hole in the center of the main stalk is nearly full of water? The dahlia, as soon as it begins to bloom, will absorb the

moisture from the soil for a distance of two or three feet. Dig deeply among the roots of a dahlia, and also four or five feet from the plant and observe the difference. Dry, hot days come earlier some years than others, but when the buds begin to open it is time to begin watering. The best way is to heap up a basin-shaped mound of earth around the plant, about two feet in diameter, and into this basin empty three or four pails of water as often as every three or four days. Fertilizer is used to obtain size, water to make richness of color and perfection."

Dahlia Shows "class" exhibitors, and this is fair and just. Commercial growers, gardeners, nurserymen, florists, and persons who have a gardener regularly in their employ are classed as "Professionals." The possession of a business card, or a letter head also generally classes a dahlia raiser as a professional. "Semi-Professionals" are those who do not regularly employ a gardener, and who do not gain their livelihood from dahlia growing, but who do sell or trade dahlias for profit. "Amateurs" are those who grow dahlias for pleasure and do not sell or trade for profit.

No one is so fortunate as the amateur, and one is tempted to say that the beginner is the happiest. Concern for profits is not among the worries of the grower for joy alone. His fresh, unbiased outlook, enthusiasm, the amazing wealth of horticultural knowledge, the recorded experience of thousands of gardeners, that is

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his in books and periodicals, the possibilities of his making new and revolutionary discoveries and "new creations," a heart-warming welcome into the goodly company of gardeners, and particularly of dahlia growers, a miraculous, almost myriad, assortment of dahlias from which to select for his own growing and experiments, and many other privileges and delights are all his. The joys and possibilities of dahlia growing are literally endless. The plant is one of the most variable in all the floral world. Historically and experimentally, measured by the century-slow processes of evolution, we are only upon the threshold of the treasure-house of dahlia wonders.