

ARBORETUM BULLETIN

MARCH, 1943

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The Arboretum Bulletin



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SEATTLE, WASHINGTON

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EditorDR. JOHN H. HANLEY
Manager.....MRS. ROY PAGE BALLARD

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ONE OF THE prominent members of the Arboretum Foundation spoke prophetic words in a recent conversation with us when he proposed that the Arboretum "may have reached an important turning point" in this spring of 1943. His words were uttered in reference to the Arboretum's request for financial support for the ensuing biennium from the state legislature. At this writing there appears some likelihood that an appropriation will be granted. If we are successful in this attempt it will be because of the untiring efforts of many people in all parts of the state—efforts which have left favorable opinions and impressions in the minds of a great many more from all walks of life, who see in our work an important potential asset to Washington's economy as well as to its general fame and renown.

We who faced the questioning of the legislative committees came away with the impression that those men and women are far less interested in the development of beautiful plantings of outstanding ornamentals than they are in subsidizing that type of plant research from which the business of the state can derive additional income. Experimental and developmental work leading to the expansion of the industries that depend upon plants and plant products *must* be intensified. Plant breeding studies, from which can be derived the superior races, strains, and varieties of both ornamental and economic species, will become much more important to us.

We cannot afford to overlook the tremendous potential value of scientific studies leading to these ends.

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Among Our Contributors

Rounding out our series of articles on grapes we are glad to present the excellent paper by Walter J. Clore and William B. Bridgman on "Grape Culture in Irrigated Eastern Washington." To be sure, the approach is from the standpoint of the commercial grower but every detail is applicable to small plantings in the home garden as well as to the more extensive acreages. Also, whereas the information is for eastern Washington, much of it can be used west of the Cascades.

Mrs. Else M. Frye has given us a good background article on rhododendrons, drawing upon her wealth of intelligent experience with many kinds.

Miss Jennie I. Rowntree, Professor of Home Economics at the University of Washington, has presented a most valuable compilation which is worthy of study by anyone who wants to grow the most nutritive types of vegetables in the 1943 victory garden.

While visiting in Ellensburg, Washington, recently we had the pleasure of meeting with the very active garden club. Among the members present was Reverend H. H. Wiech-

mann, an enthusiastic gardener who graciously consented to prepare an article on his specialty, the iris. The climatic and soil conditions at Ellensburg are ideal for iris culture and it is not surprising that so many are grown in the gardens there. Many of the large iris growers have large acreages under culture.

A new note that is developing in agriculture and horticulture is discussed interestingly by Mr. Lee Van Derlinden of the research department of the Charles H. Lilly Company.

Seattle has had a well-organized and enthusiastic Cactus Society for a number of years. Those who saw the marvelous accomplishments of the members in the outstanding desert garden that they constructed at the flower show last spring were agreeably surprised at the quality of the plants and at the excellence of the arrangement. The individual who was largely responsible was Mr. Bert Williams, the president of the society. In this issue Mr. Williams discusses the care and culture of cacti.

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5532 White-Henry-Stuart Bldg.,
Seattle, Washington.

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name

Address

All memberships are non-assessable.

Miss Grace E. Read, former executive secretary of the Arboretum Foundation, whose loss was a great blow to us, has recently been advanced to the rank of sergeant in the WAAC. She is stationed at the Geneva Hotel, Daytona Beach, Florida.

IMPORTANT NOTICE TO ARBORETUM MEMBERS!

The enlarged Arboretum bulletin issues, begun under the direction of Mrs. Roy Page Ballard's committee just one year ago, have become so successful and so thoroughly satisfactory that the Foundation Board has voted to continue them as quarterly features. Hereafter your copies will reach you in March, July, September, and December, and the former four-page sheet will be dropped entirely. Because of the increased expenditures involved in publishing the larger bulletin, it will be necessary for all members to keep their payment of dues up to date.

In his capacity as chief of the Seattle office of the Federal Bureau of Entomology and Plant Quarantine, Mr. L. M. Scott has sincerely cooperated with the Arboretum on many pleasant past occasions. Now he does it again by permitting us to publish his notes on tuberous rooted begonias. Those of us who have had the pleasure of seeing his beautiful begonias in full bloom know that he writes with authority.

Fertilizers, watering, control of diseases, and control of insects will largely determine the degree of success attained by victory vegetable gardeners. In order to present the best available information on the last-named of these four important categories (insects) we asked Dr. E. P. Breakey, entomologist at the Western Washington Agricultural Experiment Station at Puyallup, to prepare an important last-minute summary of what you should prepare for in combating pests. We feel fortunate in having such a well-known authority give us the benefits of his long experience.

Camellia Research

Anyone knowing of the existence of ANY OLD LARGE Camellia bush, communicate with the Arboretum Foundation office. Information is wanted for research which is being carried on by Col. Vanderbilt of San Rafael, California.

The Arboretum In War Time

By HERBERT IHRIG

LAST YEAR many organizations and individuals responded to our request for aid in maintaining the Arboretum during war time when the usual sources of income were curtailed or completely suspended. This is a report of what has been done with the funds received.

Your contributions made possible the purchase of a large Rototiller and enabled us to cultivate and maintain a much larger area than would have been possible by man power alone. This has been a very important factor in caring for many valuable plants in the nursery as well as in Rhododendron Glen and elsewhere and emphasizes the necessity of continuing this effort.

We want you to know that everyone interested in the Arboretum owes you a real debt of gratitude, and the garden clubs whose membership contributed one hundred per cent have a place high on the roll of honor.

The new year is before us and if we may refer to our statement of a year ago we would remind you of the value of the present plant collections, which represent not only a considerable money investment but long periods of effort in gathering them from all over the world and the subsequent growth toward maturity. Money alone could not replace many of these choice plants but only money will enable us to maintain them. The cost is not great—a minimum of one dollar a year from each garden lover and other civic minded individuals will do the job. Is it not worth two cents a week to you and to each member of your organization? Is it not worth the effort of carrying this word to your friends and fellow club members to prevent such losses at the Arboretum as occurred during the first World War in Great Britain when so many of their horticultural advances were irretrievably lost?

Let us repeat: "We are facing a war emergency. Every effort is being made to preserve our country and our liberty. Shall we not at the same time preserve those esthetic values which contribute so largely to the enjoyment of those liberties and leave

a heritage to our children which would be a worthy companion to our war effort?"

If you wish to contribute to this fund please make your check payable to the Arboretum Maintenance Fund and mail to your Club President or to the Arboretum Foundation, White Building, Seattle.

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Large Flowering Tuberous Begonias

By L. M. SCOTT*

THERE are very few annuals which an amateur like myself can grow that will repay one in so much beauty and all summer bloom as the tuberous begonias. They also have an additional attraction at this time when so many are using their flower beds for victory gardens. Tuberous begonias require shade, in fact, thrive in locations not suitable for vegetables. Many have the idea this plant with flowers of so many types and colors is difficult to grow. However, if one keeps in mind a few essentials it's really very easy. The following general suggestions are based on personal experience. No doubt many could give better and more expert advice.

Location of Bed

Begonias may be grown in pots which can be moved from time to time until the right location is found. I have grown them this way but prefer planting the tubers in a large bed. While some types will stand more sun than others they all do well in a location which receives no direct sunlight. However, the shady location must have plenty of air drainage. My original bed was shaded by two large trees which were later cut down, leaving me without any shade. I built a frame over the bed and covered it with bamboo shades which proved satisfactory. This year I am going to grow tomatoes in my begonia bed but am making another one in a part of the yard which is too shady for vegetables.

Soil

One of the most essential factors in growing begonias is a proper soil condition. A light soil with plenty of humus is necessary. The soil should have enough vegetable matter in it to hold the moisture as the tuberous begonia requires more water than ordinary

*Chief of the Seattle office, Bureau of Entomology and Plant Quarantine.

plants. On the other hand, there should be sufficient drainage to prevent the water from standing in the bed, thereby causing the soil to sour. Such a condition would eventually cause the tubers to rot. The soil should be worked thoroughly before planting time. I turn over my bed at least six to eight times during the spring. This not only puts the soil in fine condition but eliminates the weeds, which is important.

Fertilizing

It is not necessary to fertilize the soil heavily. Prepare it as you would for any other annual flower bed, but omit adding any lime as begonias like a slightly acid soil. At planting time I work into the bed a small amount of cottonseed meal. While it is necessary to provide plenty of plant food, over-feeding can do a great deal of harm.

Preparing Tubers for Planting

Be careful in handling the tubers. They bruise easily. Once bruised they rot quickly. I lost a fine tuber by dropping it on the cellar floor. It is possible to plant the tubers directly into your permanent bed, but if the weather is cold and wet the tubers are very apt to rot. It is much more satisfactory to start them inside. I take my tubers out of storage about the last week in March and place them in open flats in the basement and sprinkle a little water on them. In about a week or ten days, when the tubers start showing life by producing small buds or sprouts, I place them in flats filled with a mixture of half sand and half peat moss. The tubers should be placed from four to five inches apart and just slightly below or even with the surface of the mixture. The flats should be watered sparingly until the tubers start to produce roots, after which the peat moss and sand mixture should be kept continuously moist. I place the flats in the coolest part of the basement so the shoots will develop steadily but not too fast. If forced by too much warmth the shoots will be weak and spindly. Some tubers will produce several buds or shoots. I restrict tubers up to three inches in diameter to one shoot, tubers from three to five inches to two shoots. Tubers from five to seven inches in diameter will produce a sturdy plant of three main stems. It is necessary to pinch off the buds several times during the starting period. I

Four

have found one gets a much sturdier plant which produces larger blossoms if the extra shoots are pinched off as they put in their appearance.

By the time the plants produce three to four fully developed leaves the root system is developed sufficiently and the plant is sturdy enough to transplant outside. If it is possible to do so the flats should be taken out of doors for a week before the plants are transplanted so they may become hardened to outside conditions.

I plant the tubers from eighteen to twenty inches apart each way, in my permanent bed. I also stake the plants, because as the season advances the stems get so big they fall over and break. If the stem breaks near the base it is very apt to rot back into the tuber. After putting in the stake I plant the tuber next to it, about two inches below the surface of the ground, being careful not to disturb the root system any more than necessary. When removing the plants from the flats press the earth around the tuber gently. If you press hard you will break off a good many of the roots.

After planting, work in about a teaspoon of cottonseed meal around each tuber. There is a front and back to the tuberous begonia plant. The front of the plant is always where the tips of the leaves are pointing. The blossoms show to the best advantage on the front of the plant so it is important to keep this in mind. Water should be used sparingly until the plants are well established.

After the plants become established your work is over. In a comparatively short time the blossom buds will form and the plants will continue to bloom until late fall. I remove the first blossom buds to let the strength go into producing a more sturdy plant.

Care Through the Summer

Very little cultivation of the bed should be attempted. The roots are very shallow and can be easily injured. If weeds appear they should be pulled up by hand.

Begonias require a great deal of moisture. The bed should never be permitted to dry out as the roots which are near the surface will soon be affected and normal growth of the plants set back.

(Continued on Page Twenty-Seven)

The Iris and Its Culture in Eastern Washington

By REVEREND H. H. WIECHMANN
Ellensburg, Washington

EDITOR'S NOTE: In keeping with our policy of publishing authoritative articles on subjects of interest to the people of Eastern Washington, as well as to those of the western side, we are happy to present this excellent article by Reverend Wiechmann.

ALL OF US have stood in awe to admire the brilliant colors of the beautiful rainbow. Somehow we have always felt that the rainbow is one of nature's rarest gifts of beauty.

Yet, the same glow of color may be observed as we stand in the garden of the amateur or professional Iris grower. At times the eye falls upon the more daring brilliant color; or it may fall upon the more subdued color which emanates a warmth and familiarity which finds its counterpart in our own soul. Or we see the grand mixture of color joined in combinations too numerous to mention. Even the uninitiated cannot help being impressed! And the amateur flower lover soon finds himself looking into the heart of the flower with a spark of affection showing in the eye. The tall bearded Iris with its manly stature and its womanly grace and beauty has called for a niche in the much-occupied heart.

Historically Speaking

The historical background of the tall bearded Iris (with which we are concerned in this article) is almost as elusive as the proverbial pot of gold at the end of the rainbow.

Iris was known and valued many years ago on the shores of the Mediterranean, the cradle of present-day civilization as we of the western world know it. Iris was not loved only for its garden beauty and color, but its roots were used also for real or fancied medicinal purposes. Then, too, a delicate perfume was made as an accessory of milady's toilet.

Many a sunny hillside in Italy was covered with the fleshy rootstocks from which were prepared the orris root of commerce. To most of us, however, such scenes would suggest a riot of color and beauty, rather than a pocket-

ful of money gained through the commercial channels.

Likewise northern Africa, the southern slopes of Europe, and parts of Asia Minor have brought historical evidence of the beauties of Iris lore. The exact periods in which Iris was popular in these countries must be left to the well-versed historian. We might add, however, that Iris had made an especial appeal to the Mohammedans of early days. Whether these people gave to the Iris some form of sacred character, or whether they used it simply for ornamentation is not clear. It is known that the Mohammedans used Iris freely upon the graves of their dead, thus helping to spread the root wherever the roving followers of Mohammed lived and died. No doubt this accounts for the spread of Iris westward from Asia Minor to Spain, and thence to the New World. Iris was found very early, uncultivated, in the regions of the Sierra Madre in Mexico.

Most of the varieties of Iris which have added to the present intense interest in this flower date back about a century. Yet one variety is known to have been cultivated prior to 1600. This is the variety known as Dalmatica, more recently called Princess Beatrice.

In France, the culture of Iris was fathered by a nurseryman named Lemon. He was the most prolific producer of modern Iris at the close of the last century. Michael Foster, an English physician, spent his leisure moments following his chosen hobby of Iris culture and hybridization. Foster did not possess the botanical knowledge of Lemon, but he made up for it with a great gift of enthusiasm, and he soon infected many others with the desire to cultivate. Leaders in our own country were Farr, Miss Grace Sturtevant, and William Mohr. The last named was a native of our Pacific Coast.

In the past quarter century, and especially in the last 10 years, a great many have taken lively interest in propagation of Iris, with notable results. Many amateurs have learned the thrill of helping nature to "create" something new. Most of our efforts are not rewarded with a marketable plant, yet we receive the thrill of having helped to produce something which we can call our own.

Iris Culture

One does not need to be a wizard at growing things to have a lovely Iris bed. Iris is the kind of flower which will continue to grow and parade its beauty even though it receives extremely poor treatment. By that we do not mean to imply that the Iris clumps should be neglected, but, in comparison to many other plants in our gardens, the Iris needs very little care.

Usually, the ground that will produce good corn will also produce good Iris. That means that the plant is unusually hardy, and will thrive under even extreme conditions. You might pick a rhizome from the trash heap after many months of cruel exposure, yet, if planted in an average soil, it will revive and repay your kindness bountifully. In poorer soils, the Iris will grow slower, but will naturally lack certain qualities which every gardener desires in his plants. On the other hand, an extremely rich soil may not be the best either.

The soil conditions east of the mountains in Washington state, and more particularly in the community around Ellensburg are ideal for Iris growth. The soil is neither extremely acid nor alkaline. The climate is dry. The winters, as this one, may be extremely cold or they may be quite mild. Usually a soft layer of snow acts as a perfect mulch for the plants during cold weather.

Since Iris does not like to be drenched with too much water, it has responded especially well in our community. Too much watering or poor drainage may retard the growth or may permit disease to enter the rhizome. A local commercial grower used only one artificial watering for a bountiful growth in the past season. But he took great care to keep the ground well cultivated. Because of these well-nigh perfect growing conditions, the increase of rhizomes is also very heavy. At least two large commercial concerns have much of their Iris grown in Ellensburg.

The Iris should be transplanted each year for commercial purposes. The gardener who wants larger clumps with a showy display of bloom, will leave his clumps for four years or so. If clumps are allowed to stay in one spot too long, they will become root-bound and will not retain their abundant beauty.

You will notice that each bloom-stalk will die back, and will cause an empty spot in the clump. Unless moved after a few years, these spots will begin to look ugly and the Iris clump will not serve its purpose in the landscape plans. If desired, one might carefully cut out the roots covering this empty spot and fill with new soil. Soon the spot will have grown over with new rhizomes.

Iris roots may be separated any time after blooming season has passed. July, August and September are ideal months. If transplanting is done in the springtime it will stunt the bloom, since Iris sets its bloom in the fall.

The rhizomes should be trimmed of any rot, the tops cut back to within six or eight inches of the root, and thus planted in the prepared soil. Some one has advised to set the rhizomes "duck" fashion, rather than dropping the roots into a deep hole. Experience east of the mountains has borne out this suggestion. Roots ought not be covered more than one or two inches, and the soil should be well packed. Much rot is caused by air pockets which remain in the soil around the root system. With a good watering to keep the plant firmly in place, one may sit back and await the sign of new growth.

If fertilizer is used, care should be taken not to place it directly upon the roots. This holds especially for manure. Too often well-meaning gardeners wish to show their choice plant especial care, and by placing raw manure too near the plant, burn it. If good commercial fertilizer is used, especially bone-meal or the like, and it is well stirred into the soil, the Iris plant will show its gratitude by a prolific bloom and growth.

A mulch over the Iris during the cold winter is not necessary. Usually on this side of the mountains, we have a mulch of snow. But even when that is lacking Iris roots usually remain unharmed. Some loss is experienced in the milder winters when there is frequent thawing and freezing. This process tends to lift the plant or raise the soil and permit exposed and injured roots to decay.

If you notice your rhizomes rot, and see the tops become yellow in color, it is best to remove the soil from the rhizome and dig

(Continued on Page Twenty-Six)

Introduction to *Rhododendrons*

By ELSE M. FRYE

RHODODENDRONS belong to the Ericaceae, which includes a cast clan of about 70 genera and 1,500 species. In general, the members of the family prefer the cool, temperate zones as well as the high, cool mountains of the tropics in both the eastern and western hemisphere.

The general characteristics of the family are as follows: They are usually shrubs or small trees. They are usually evergreen although the *Azalea* series of rhododendrons is not and there are other exceptions. The leaves are usually alternate, but sometimes they are opposite as in some wintergreens. The flowers are perfect; that is, each flower contains the necessary reproductive organs—stamens and pistil. The flowers are sometimes regular but often irregular; that is, the petals are not exactly alike. The flowers occur singly or in small or large clusters of various forms. The corolla is usually gamopetalous; that is, the petals are more or less united, forming a tube. The calyx and petals are 4-5 parted; that is, the united calyx and united corolla may have 4-5 lobes on the margin. The fruit is often a dry capsule but sometimes a berry as in the huckleberries, wintergreens and pernettyas.

Some of the common genera of the Ericaceae are as follows: *Ledum*—Labrador tea; *Leiophyllum*—sand myrtle; *Erica*, *Calluna*, *Cassiope*, *Phyllodoce*, *Bruckenthalia*—the heaths and heathers; *Kalmia*—calico bush; *Andromeda*—bog rosemary; *Oxydendron*—sourwood; *Epigaea*—trailing arbutus; *Gaultheria*—salal or wintergreen; *Pernettya*; *Vaccinium*—huckleberry; *Arctostaphylos*—bearberry and manzanita and of course *Rhododendron*.

The word rhododendron comes from two Greek words—*rhodon*, rose, and *dendron*, tree. It was the ancient Greek name of *Nerium Oleander*. It probably came to be applied to our genus because so many of the flowers are rose-colored which in the old sense is red. Merely for the sake of classification and study this great aggregation has been divided into large groups called series.

I have been interested to notice that collectors who come to my garden are often

able to tell by the appearance of a plant and especially of the leaves exactly to what series a rhododendron belongs. This is more often true of men than women. Men collectors also like to choose a series and gather together all the species belonging to it. Women usually select a specimen regardless of series.

The series of rhododendrons are then further subdivided into species, as are all other plants. The rhododendron genus includes at least 700 species, many varieties, and untold numbers of hybrids.

We cannot point to any spot on the globe and say this is where such and such a series grows. The plants in themselves are not very helpful in making generalities easy for us. There are about 26 species in North America. Of these there are three on the west coast; three in Alaska; one in the mountains of New England and the rest in the southeastern part of the United States. There are about three species in Europe and a few in Australia. There are none in Africa and none in Mexico. Most of the species, and by far the handsomest, occur in Asia, throughout the Himalaya Mountains, where they range from altitudes of 6,000 to 15,000 feet in the regions of heavy fog and great annual rainfall (100-140 inches). Rhododendrons are seldom found in either extremely hot, or extremely cold, countries. In high regions they are exposed to full sun but they are moist at the roots from the continuous stream of water percolating down from the melting snows. In winter they are sheltered from great cold by the thick blankets of snow which cover them. In the Himalayas rhododendrons are so common that their wood is used for fuel and for making various utensils.

It is in the last hundred years that plant explorers have brought back the great mass of rhododendron species. Linnaeus (1764) knew only ten species. CanDolle (1839) knew thirty-two.

The specific rhododendron characteristics are as follows: They are mostly evergreen, though not always. The flowers are solitary or few to many in enormous clusters. The corolla may be rotate (flat, saucer-shaped), campanulate (bell-shaped) with a broad base, or funnel-form with a narrow base, or occasionally narrowly cylindrical. The corolla is five-lobed and usually very slightly irregular.

The fruit is a dry capsule containing hundreds of small seeds.

There are the most fascinating variations among rhododendrons—sizes from tall trees to the tiniest creeping and ground covering shrubs. The leaves vary from very small to blades twelve inches long and over. They may be smooth and glossy or roughly puckered; they may be punctate with small pellucid glands or covered with stalked and sticky glands, tiny overlapping scales, or long gleaming hairs, or with a thick felty indumentum varying in color from soft cream to cinnamon brown. Many of them are aromatic and emit a spicy fragrance when touched or when the hose is turned upon them.

And the flowers! No words of mine could be adequate. There is the greatest variation in size, shape, texture and color. In selecting a plant for myself I choose first beautiful foliage and good form because I see, and by that I mean a wilful act, them every day. In the flower I look for elegance of form and beautiful texture, usually thick and waxy rather than thin and silky. The color is important too, for I do not want any one color to predominate in my rhododendron garden. I want some magenta which the great artist Auguste con Geert says is the finest color in the world; it is a color one often sees in the high mountains and therefore to me it lends a wild and uncultivated atmosphere. Yellow I want, and pink and white and blue and scarlet—all clear and shining. The size of the flower is less important to me. Species appeal to me more than hybrids; waiting for their later bloom does not irk me. "In size of flower and bulk of truss the hybrid beats the species every time; but it is just here that from an esthetic point of view the hybridizer oversteps the work. As a general rule the natural flowers and trusses are quite big enough. There must be some limit beyond which mere size of flower and truss ceases to have artistic value"—so says Kingdom Ward. He should be a judge of no mean ability as he has seen them singly and in mass on his explorations which have taken him far and wide.

In my own garden, I am assembling a wide border of hybrid rhododendrons, choosing only those that have the highest ratings,

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some attraction as to foliage, and the color variations that I like.

Once planted, rhododendrons require less care than most shrubs. Most of them may be moved at any time without injury, except during frost. It is said that moving them retards the production of flowers for one year. I do not feel that this is the case in my garden. But the preparation of the soil in the first place is important. Since they are natives of swamps, woods, mountain sides and alpine pastures where the soil is decomposed vegetable matter mixed with stone and grit with moisture always present but never stagnant, we must try to provide as well for them. The soil must be deeply dug and trenched. In planting I like to have the individual hole deep enough and wide enough so I can set the plant on a cushion of damp peat and also surround the plant with a collar of this material before covering with dirt. The roots strike out for this peat immediately. The soil and substratum must be lime-free. Such soils as heavy loam, clayey shales, pure peat, if drained, and pure sand can be prepared for rhododendrons if mixed with sand and peat judiciously. A surface compost of leaf mold, completely rotted cow manure or peat moss is beneficial. In England they use 10 to 12 inch coatings of withered leaves. That does not seem advisable in regions where an endless battle needs to be waged against slugs.

The climate in every garden is different. Air-currents, draughts, overhead shelter, elevation, atmospheric moisture, composition and condition of the soil, whether it is retentive of moisture or not, are factors to be considered.

The upkeep of rhododendrons in comparison with the pleasure they afford is very slight. By judicious selection it is possible to have a rhododendron in bloom every month of the year. In my garden the season is begun in January with a group of *R. mucronulatum* planted against the dark green of *Photinia serrulata*. In other gardens *R. Christmas Cheer*, *R. Nobleanum* or *R. Rosa Mundi* may offer the first bloom.

Perpetual draughts, early morning or mid-day sun are conditions to be avoided. But plants can be sheltered from cutting winds

(Continued on Page Twenty-Eight)

From a Garden Notebook

By JOHN H. HANLEY

Planning an Efficient Garden

KEEP the garden soil working at all times. When one crop is harvested, another should be planted to follow it as soon as the soil can be worked again. For your assistance the following simple guide can be used:

1. *Beans, bush.* In western Washington you can make at least four plantings so as to give fresh beans right up to frost. The dates will be approximately May 1, June 1, July 1, and August 1.

2. *Beets.* At least two plantings and possibly three, if you are canning them in quantity. Dates: April 1, May 25, and July 15.

3. *Broccoli, cabbage and cauliflower.* It is definitely a mistake to make just one planting of any of these three. Divide them up to make at least two, and, if possible, three plantings. Suppose, on the basis of size of your family, that you should have sixty early cabbages available for use during the season. Instead of planting all of them at once, put one-third in the ground on April 1, one-third on May 1, and one-third on June 1. Buy twenty new, healthy plants for each date.

4. *Carrots.* Try for two crops and be satisfied if you are able to get good ones both times. For the first crop sow seeds about April 1, after having fertilized the soil heavily, and working it up deeply on or about March 15. The second planting should be seeded between July 1 and 15, following another heavy fertilization and thorough spading.

5. *Chard.* This plant is of easy culture. Make a first sowing on or about April 1, and a second about July 1. From the late sowing

you should get plenty of leafy greens for fall and early winter menus.

6. *Leaf Lettuce.* Grow three crops at least: April 1, June 1 and August 1.

7. *Onions.* Plant the sets during the period from March 15 to April 1, and make a first sowing of seeds about April 1. Many people will want to sow another lot between July 1, and July 15. From these you should get green onions for the table during fall and early winter. Plenty of sets for the following spring can also be produced in this way.

8. *Peas.* It is alleged that three crops of peas can be grown in the Puget Sound region, but if you can get two you will have done well. The first crop will be seeded between March 1 and April 1. We tried a late crop last season, planted August 1, and although growth and production did not equal that of the early sowings, it was quite satisfactory. Plenty of water and a lot of protection from the hot summer's sun are necessary. If you try it, use a fast-maturing bush pea and get the seeds into the ground not later than July 15.

9. *Potatoes.* Make two plantings; an early variety should go in about April 1 to 15, so that it can be harvested by July 15, to make way for other crops such as bush beans. The late potatoes, upon which you will rely for the main crop, should *not* be planted until June 20. Use a part of the space for an early crop of peas which will be gone by that date.

10. *Spinach.* If you insist upon inflicting this vegetable upon your family you might as well do a thorough job of it. Make a first sowing about March 15. Fertilize the soil heavily, give the plants plenty of water, and locate them in the coolest part of the garden. A late seeding, about August 1, should yield satisfactorily during the cool weather of fall and early winter.

Vegetable	Planted	Harvested	To Be Followed By
Beans, pole	May 1	August 1	Lettuce, radishes, turnips, bush beans.
Beans, bush	May 1	July 15	Sweet corn, turnips, beets.
Beets	April 1	June 10	Carrots, bush beans, sweet corn.
Carrots	April 1	July 1	Beets, chard, bush beans.
Cauliflower	April 1	August 1	Bush beans, late peas, beets, or turnips.
Onion sets	April 1	July 1	Beets, carrots, bush beans, or corn.
Peas, early	March 15	June 15	Late potatoes.
Peas, late	March 15	July 15	Rutabagas, turnips, chard, bush beans, onions, or carrots.
Potatoes, early	April 1	July 15	Sweet corn, bush beans, beets, or carrots.
Spinach	March 15	June 15	Carrots, sweet corn, bush beans, chard, or late potatoes.
Sweet Corn	May 1	August 1	Bush beans, onions, chard, turnips, beets, or rutabagas.

11. *Sweet Corn*. It is unwise to make a single planting of all your family will need. Sow one-third on May 1, one-third June 1, and one-third July 1.

The above series of comments was drawn up for the purpose of enabling the gardener to avoid the feast-famine principle upon which most gardens are based. In order to follow the suggestions it is of course necessary to have some rather definite plan for your area. To be sure, it does complicate the normal procedures, but it is eminently worthwhile. From it you can develop a table like the following but modeled after your own tastes and your own garden conditions.

Saving Vegetable Seeds for 1944

Because of a lack of detailed knowledge of seed production methods on the part of the average gardener, it is generally not wise to save one's own seed. That is especially true where one grows several varieties of a given vegetable, as of corn, or cucumbers, or radishes. Cross-pollination between the varieties will usually result in inferior plants the next year.

But it may be found profitable during the war period, if a single variety of a vegetable is being grown, to select a few fruits on the strongest plants, allow them to mature, and extract the seeds for the next season's sowing.

Here are a few comments which, although they represent over-simplification of an operation which should be followed in greater detail for the best results, will at least *assist* the novice in procuring better seeds:

1. Beans (pole, bush, lima). Many legumes, such as beans, have a type of flower structure which discourages cross-pollination. Hence ordinarily, and for the purposes of the lay gardener, it is only necessary to select one or a few plants which produce the best quality fruits in the largest quantities. Allow enough pods to mature to satisfy seeding requirements for the next spring. After the pods are dry they are picked, stored in a shallow layer out-of-doors, if harvested during the summer, or indoors if harvested late. Let them dry thus for two weeks, clean them, place them in jars which can be tightly sealed, and treat with carbon disulphide to kill any weevils which may be present.

2. Beets are biennials. In order to harvest seeds it is necessary to store the roots during

the winter. Of course only those which exhibit good size and form should be saved. Keep in mind that the best ones are not always the largest, however. Plant the roots out during the spring of the second year. A flower stalk will arise and seeds will be formed on it. Since the seeds will be formed as a result of cross-pollination, it is important that only the best plants should be allowed to flower.

3. Cabbage is also a biennial. Certain varieties can be seeded late (June or July) and left right in the ground for the winter. The next season they will send up a flower stalk which will bear seeds. Because of the possibility of severe winter weather killing plants of most varieties it is safest for the average gardener to rely only on the Savoy type.

4. Chard. Most gardeners will grow the variety Lucullus. Plant the seed early, select the strongest plants, and allow them to run up to flower. Cut the flower stalks away from all the inferior plants so that cross-pollination will be affected only among the best individual plants.

5. Cucumber, squash, and pumpkin. Select the best plant or plants and place cellophane bags (or small grocery bags will suffice) over several flowers *before* the petals have expanded. Repeat one week later on another series of flowers. When the stigmas in the flowers of the first series have become sticky, they (the stigmas) should be pollinated using pollen from the flowers which were bagged later. Replace the bag for another two weeks to protect against cross-pollination from inferior plants.

6. Onions will produce seeds if large sets are planted. An onion set which is larger than three-fourths of an inch should be used. As the seed stocks develop the gardener can cut them away from the weak, inferior plants so as to get cross-pollination among the best ones only.

7. Peas are legumes and are normally self-pollinated. It is only necessary to select the best plants and to spray them assiduously against attacks by the pea weevil.

8. Radishes will be difficult to handle unless a single variety is grown. If more than one type has been planted there will be too much cross-pollination which probably will result in very inferior seeds. The best method to follow is to cut the flower stalks away

(Continued on Page Thirty)

Insect Control In the Victory Garden

By E. P. BREAKEY*

POINT rationing has created what appears to be an unprecedented interest in the growing of vegetables. As a result, many persons are planning to plant a Victory Garden. Such an undertaking will doubtless be a new experience for many of you, and it is only fair to remind you that the returns will not all be pleasure and profit. Of the many problems which will confront you, that of insect control may be both vexing and costly. It is timely, therefore, to consider some of those problems, for to be forewarned is to be forearmed. It is impossible in an article such as this to cover the whole field of insect control in the vegetable garden so we will limit ourselves to a consideration of the commonest and most destructive pests which occur in this region.

Classes of Insect Pests

The insects which attack our plants can usually be divided into two general classes according to their feeding habits. Those belonging to the first class have biting mouth parts and feed by consuming parts of the plants on which they live, such as leaves or portions of them. Those that belong to the second class have sucking mouth parts and feed by piercing the tissues of the plants with their beaks, drawing away the plant juices. The use of a poisonous substance on the plant in such a manner that it will be eaten along with the parts being consumed as food by those insects with biting mouth parts suggests itself at once as a means for bringing about their extermination. The well-known arsenical sprays and their substitutes have been developed to supply this need. The feeding habits of those insects belonging to the second group eliminate the possibility of poisoning them in this manner. As a consequence, there has been developed a class of insecticides which kill by contact. The well known nicotine sprays belong to this group, as do the oils and those based on Derris, Cube and Pyrethrum extractives. In order to obtain satisfactory results from the use of these they must be applied in such a manner that the spray actually comes in contact with the insects.

Contact Insecticides

We will begin our discussion by considering the second group of insect pests first, namely, those that have sucking mouth parts and feed by inserting their beaks into the plant tissues and sucking the juices. To this group belong the plant lice, scale insects and red spiders. Since the use of contact insecticides has been suggested for the control of these insects it is desirable that we consider some of these materials in detail.

The *nicotine* sprays are the oldest and best known of the contact insecticides available. Such sprays can be prepared by adding one pint of nicotine sulphate 40 per cent or of nicotine alkaloid 40 per cent, to each 100 gallons of water. This is equivalent to one teaspoonful per gallon of spray. Four or five pounds of soap should be added to complete the spray mixture. On the basis of one gallon, this is about three or four tablespoonfuls. The soap serves in a dual capacity since it acts as a spreading and wetting agent and the free alkali liberates and activates the nicotine. Dilutions greater than 1/800 may give satisfactory control of plant lice or aphids but greater concentrations are seldom necessary. Prepared dusts containing nicotine are available and are often more conveniently applied than is the liquid spray. Be sure the dust is freshly mixed. Best results are obtained from the use of nicotine dusts and sprays when the temperature is above 70° Fahrenheit.

Rotenone is another contact insecticide. Unfortunately, WPB order M-133 restricts its use in such a manner that it is available to the Victory Gardener only in the form of dust for the control of pea weevils. It is usually obtainable in the form of prepared concentrates, which include rotenone and other extractives from Derris and Cube, plus solvents, activators and wetting agents. These concentrates should be used according to the manufacturers' directions. Rotenone is comparatively slow in its killing action, but quite effective against many insects and red spiders. It is both a contact and stomach poison and is safe to use on fruits and vegetables which are intended for our tables.

The third contact insecticide which we will consider is *Pyrethrum*. It is also obtainable in the form of dusts and prepared spray concentrates, which include the pyrethrins and other extractives from Pyrethrum, solvents,

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activators and wetting agents. These concentrates should be used according to the manufacturers' directions. Pyrethrum acts much more rapidly than rotenone, but it is not so lasting in its effects. Pyrethrum and rotenone are often combined in the same concentrate. Pyrethrum is especially effective against aphids, or plant lice, and leaf hoppers, or white flies. Its effectiveness is not influenced by temperature as is that of nicotine.

Stomach Poisons

Let us now consider the control of the first group of insects to which we referred. Namely those insects that have biting mouth parts and feed by consuming portions of the plants upon which they live. To this group belong caterpillars, beetles, and other leaf-eating or chewing insects. You should be guided in the choice of insecticides for the control of these by the following considerations: First, where a poisonous residue is not objectionable you might use either *lead arsenate* or *cryolite*. Such a spray would contain two or three pounds of either to each 100 gallons plus a suitable spreader or sticker in certain cases. Reduced to the basis of one gallon, this would be about 2 tablespoonsful of the lead arsenate or cryolite. The use of spreaders or stickers is seldom necessary in the home garden. Avoid the use of lime or other alkaline materials with cryolite, and keep the mixture agitated for the cryolite tends to settle. One quart of summer oil emulsion to each 100 gallons of spray makes a rather satisfactory spreader or sticker. This would be about two teaspoonfuls per gallon of spray. The arsenicals and cryolite are also available as prepared dusts.

Where a poisonous residue is objectionable, we would normally use either rotenone or pyrethrum. Rotenone dusts or sprays are especially effective against such pests as the asparagus beetle and the raspberry and loganberry fruit worm. Both are usually obtainable as prepared concentrates, or as dusts ready to apply. Use according to the manufacturers' directions.

Control of Specific Pests

So much for general considerations. It is also desirable at this time for us to consider certain specific insects and suggestions for their control. The first of these is the ever troublesome and destructive *flea beetle*. These

small black beetles infest potatoes, tomatoes, egg plants and cabbage, eating round holes in the foliage and depositing their eggs in the soil around the bases of the plants. Many of you have dug potatoes which had a scabby appearance, and when you peeled them you found there were numerous small black tunnels near the surface. These were made by larvae of the potato flea beetle. The control for this pest is to dust the potatoes with calcium arsenate dust as soon as the beetles appear on the foliage, and repeat the dusting at 10-day intervals until harvest. Such a dust can be prepared by thoroughly mixing one part of calcium arsenate and three parts of hydrated lime. It is also obtainable as a prepared dust.

Considerable damage can be avoided by harvesting early potatoes before July first and planting late potatoes after June first. It is also desirable to harvest late potatoes by September first, for it is known that the damage caused by the flea beetle larvae increases with the length of time the potatoes are permitted to remain in the soil after maturity.

Flea beetles on cabbage, egg plants and tomatoes can be controlled by dusting with a rotenone dust as soon as the beetles appear, provided such dusts are available. Dust again whenever necessary. Note that a poisonous residue would be objectionable on such plants. However, if such dusts are unobtainable, use the calcium arsenate dust, concentrating on obtaining control of the pests early in the season. Note also, that in this instance it is the portion of the plant above the ground which we wish to protect.

Another insect against which we need protection is the *carrot rust fly*. The larvae of this fly mine the roots of carrots and parsnips. We have found it possible to protect these crops by the use of a repellent. The most effective repellent available is crude naphthalene (the material of which moth balls are made) which is obtainable as dark-colored flakes. These should be scattered among the plants or along the rows at the rate of 250 pounds to the acre, or 1½ pounds per 100 linear feet of row. Make two or three applications at weekly intervals beginning about May 10 on early carrots and about July 20 on late carrots. Plant early carrots so they will be harvested by July 15 and plant late carrots after June 1. By observing

these planting dates it is possible to avoid considerable difficulty which we might otherwise have in controlling this pest. Other protective devices, such as laying a string which has been soaked in creosote along close to the row of carrots, have been reported as affording protection.

Many of you who will grow such crops as cabbages, radishes and onions are almost certain to experience some difficulty with *root infesting maggots*. The following suggestions should prove helpful in protecting these crops against such pests. Tar paper disks are used extensively by market gardeners to protect their cabbages against infestation by the cabbage maggot. These disks are about three inches in diameter and are cut from tar paper, not asphalt paper, with a small hole in the center of each and with a cut from this hole to the edge of the disk. One of these disks is placed about each cabbage plant as it is set in the field. Each disk is pressed down closely against the soil and weighted down with a handful of soil or clods.

Corrosive sublimate solution is also used for the control of these pests. This solution is prepared by dissolving one ounce of corrosive sublimate in two or three quarts of hot water, using a stone or woodenware container. Cold water is then added to make ten gallons of solution. One-half pint of this solution is poured about each plant as it is set in the garden. This operation is repeated two or three times at weekly intervals. Radishes can be protected by pouring the solution along the row at the rate of one gallon to 20 to 25 feet of row, making the first application as soon as the leaves appear. The same treatment will control the onion maggot. Caution should be exercised in the use of this drug. Corrosive sublimate is a violent poison. Care should be taken to guard against small children, poultry and other animals obtaining the crystals or drinking the solution.

Control of the *pea weevil* has become quite a problem in western Washington due primarily to carelessness on the part of the market gardeners. Be sure to destroy all old vines and pods as soon as you have made your last picking. Dust with rotenone dust as soon as the first blossoms appear and repeat in a week or ten days. Rotenone dust has been allotted for the control of this pest.

The *bean weevil* is destructive to dry beans in storage and since many are planning to

grow beans to put away dry, some suggestions regarding the control of this pest are in order. Harvest and shell the beans as soon as they are ready. Remember they are exposed to infestation at this time. Fumigate with carbon bisulphide, one ounce to each bushel of beans. Place the beans in a tight container, pour the carbon bisulphide in a saucer which contains a bit of waste or cotton cloth and set the saucer on the beans. Close the container and let stand for 24 to 36 hours. Open and spread the beans out to air. As soon as the odor of carbon bisulphide has disappeared place in storage where they will be safe from infestation.

Another class of insects from which the victory gardener must be prepared to protect his crops includes those which can be controlled by the use of poison baits, namely, *cutworms*, *root weevils*, *earwigs* and *slugs*. Slugs, it is true, are not insects, but it falls to the lot of the entomologist to suggest measures for their control. Prepared baits are obtainable from dealers for the control of these pests and some of the so-called all-purpose baits are quite satisfactory. Experience has taught us that no one formula will give equally satisfactory control of all.

For further details on the control of these and similar insects consult your county agent.

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Vitamins and Vim from Victory Garden Vegetables

By JENNIE I. ROWNTREE

Why Priorities in Planting are Properly Placed on These "Protective Foods"

(EDITOR'S NOTE: The proper selection of vegetables for your victory garden should be based upon the nutritive values of each type. Choose those types which are the most efficient producers of vital nutrients. As Miss Rowntree recently wrote us, "There is likely to be a little difficulty getting enough of some nutrients even with victory gardens." It will repay you to study the following tabulation and base your decisions as to what to grow on the information there revealed.)

Vitamins and Minerals Provided By a Serving of Each

	Vit. A I. U.	Vit. B ₁ mg.	Vit. C mg.	Calcium gm.	Ribof. mg.	Niacin mg.
Asparagus	700	0.11	20	0.02	0.12	0.05
Beans, Navy	0	.25	0	.07	.04	1.5
Beans, String	1,500	.07	15	.04	.10	.6
Beets	100	.07	3	.03	.02	.6
Beet Greens	10,000	.13	30	.13*	.08	1.5
Broccoli	9,000	.10	120	.11	.21	1.2
Cabbage	300	.10	40	.04	.05	.3
Carrots	6,000	.10	4	.03	....	.5
Cauliflower	70	....	40	.02	....	.6
Leaf Lettuce	5,000	.13	15	.05	.08	.6
Onions	0	.02	10	.03	.06	.1
Parsnips	40	....	20	.05	....	....
Peas	1,200	.40	22	.02	.05	.7
Potatoes, 1/3 lb.	40	.15	20	.02	.06	1.2
Radishes	0	.02	15	.04	.01	.05
Squash	3,000	.05	3	.015	.05	1.0
Spinach	8,000	.13	45	....	.15	.7
Tomatoes	700	.10	25	.01	.05	.6
Turnips	40	.07	25	.05	.04	....
Turnip Greens	10,000	.10	40	.20	....	....
Blackberries	200	.02	3	.03	....	1.6
Rhubarb	100	....	5	.05	....	....
Strawberries	80	.02	40	.02	.18	1.6

Nutritive Value Low:

Celery						
Head Lettuce						
Average Daily Requirement	4,000-6,000	1.3-2	60-100	0.6-1.0	1.5-3.0	12-20

Contributions of Different Types of Foods to War-Time Diets

	Vit. A I. U.	Vit. B ₁ mg.	Vit. C mg.	Calcium gm.	Ribof. mg.	Niacin mg.
Meat or fish, cooked, 3 oz. daily .....	....	0.20	....	....	0.20	3.5
Bread and Cereals, 8 oz. (half, whole gr.) .....	....	.50	....	.05	.10	1.5
Vegetables, 2 servings, 1 green or yellow	5,000	.20	30	.05	.10	.8
Potatoes, 1/2 lb.	40	.15	18	.01	.10	2.0
Fruits, 2 servings	500	.20	40	.01	.05	....
Milk, 2 cups	900	.10	0	.56	.70	.6
Eggs, 5 weekly	400	.07	....	.02	.15	.4
Butter, 1/2 oz.	400
Meat Substitute	200	.0206	.15	.7
Totals	7,440	1.45	88	.78	1.65	10-12

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Who Puts Iron, Copper and Vitamins In Your Spinach

By LEE VAN DERLINDEN

IN THESE days when most of us talk with so much assurance about hygienic food and balanced diets, it must be startling to be told that we cannot provide these necessities for our families by merely writing out a menu or a grocery list, and that we must begin to inquire about the land on which our food-stuffs are produced. Yet that is exactly what scientists tell us we must do if we are to avoid anemia and other deficiency diseases, in our animals, our poultry, or ourselves.

You or I may be slowly starving for want of certain health-giving elements in our diets, even if we eat at each meal enough to crowd our stomachs with the same types of foods as maintained the magnificent health of our grandfathers and grandmothers. The fruit and vegetables we eat, and the grass and grain fed to our cattle, are grown on weakened or depleted soils. If we want to recreate the blood-making, body-building, bone-forming, vitalizing and mineral-containing foods which were originally grown on our soils, we shall have to replace those precious elements of life, both plant and animal, which have been taken from our soils by a long system of agricultural practice not designed to replace elements other than nitrogen, phosphate and potash. Consider, if you will, that the human body contains more than 35 elements, some of which are as follows: aluminum, arsenic, boron, bromine, calcium, carbon, chlorine, chromium, cobalt, copper, fluorine, germanium, gold, hydrogen, iodine, iron, lead, lithium, magnesium, manganese, mercury, nickel, nitrogen, oxygen, phosphorus, potash, rubidium, silicon, silver, sodium, strontium, sulphur, tin, titanium, zinc, and compare this with the minerals of life shown by a complete analysis of beans, for example, which are as follows:

Aluminum, arsenic, barium, boron, chromium, copper, fluorine, iodine, iron, lithium, magnesium, manganese, rubidium, silicon, strontium, sulfur, titanium, vanadium, zinc, nitrogen, carbon, hydrogen, oxygen, sodium, potash, chlorine, calcium, phosphorus.

And tomatoes, which contain aluminum, barium, boron, cobalt, copper, iodine, fluorine, iron, lithium, magnesium, manganese, nickel, rubidium, silicon, strontium, sulfur,

titanium, zinc, nitrogen, carbon, hydrogen, oxygen, sodium, potash, chlorine, calcium, and phosphorus.

Many years of fairly intensive cultivation of our soils have robbed them of the elements which I have enumerated, and the only way for us to revitalize our soils is to begin to replace these elements, and the only agency available to us is through the application of properly made commercial fertilizers. At present this practice is not followed and is even frowned upon by some of those upon whom we depend for the newer agricultural information.

While the soil can be rebuilt by means known to specialists and agronomists, it is people like you and me who must take some necessary steps to create a demand for the adoption by the fertilizer industry, of some of these newer discoveries, and the inclusion in our commercial fertilizers or victory fertilizers of elements other than the nitrogen, phosphate and potash so publicized by commercial fertilizer manufacturers, at the present time. At present everyone is talking about vitamins and minerals without exactly knowing what they mean and how they are created. Few people seem to understand that the tomato, for example, cannot create vitamins and store up minerals in its fruit unless the soil is filled with the many elements of plant life which the plant must use in the creation of vitamins and the storage of minerals.

Professional people, who ought to know better, are accustomed to talk about the virtues of green vegetables or of citrus fruits, or of meat or milk, as if the same ingredients (minerals and vitamins) are always present year after year in these foods, in the same proportion.

In general, it is estimated that a crop, requiring copper, iron, or any other mineral, for its healthy development, will extract perhaps 4 per cent of such mineral present in assimilable form, from the top soil on which the crop is grown, and this process is presumed to be followed year after year. This cannot be true because in many instances our soils have become wholly devoid of these elements, which, in many cases is the main reason for plant diseases, and plant mineral and vitamin deficiencies, which result in human and animal nutritional ills.

Our fertilizer manufacturers seem firmly convinced that nitrogen, phosphate and potash are the three principal limiting factors in plant production. To an extent this is true. However, other elements, which are always found in the composition of a healthy plant are not generally considered essential, and many authorities claim their presence, in the tomato, for example, is accidental. This is why we have what are called "balanced fertilizers," so much nitrogen, so much phosphorus, and so much potash. There seems to be plenty of proof that this theory is incorrect, and the resulting fertilizer formulas for soil maintenance are far from complete.

As mentioned before, more than 35 mineral elements are found in the human and animal body, and of these, our doctors preach that 16 or more are indispensable for health, and the rest have considerable importance. Iron, lime and phosphorus won recognition as necessary elements long ago, and iodine, copper and manganese, are added to this trio, but no authority admits they complete the list. For the most part, these elements can be appropriated by the body only as constituents of our food. Our ability to assimilate them in drugs is strictly limited. Zinc, for example, may, when taken in the form of a drug, be dangerous, and this is true of many others.

Powdered lime, or iron, is of little or no value to the human system, but the microscopically fine particles of these minerals in combinations mysteriously prepared by the living processes of plants can be utilized by bodily functions and by the animals which supply us with meat and milk. Between us and the mineral kingdom of our old school books, the vegetable kingdom is a bordered country, without whose aid we could not exist.

From the soil to the plant, to the human body, or to the animal's body, on which human life depends to a great extent, this is the order, and it can be successfully maintained only if we have good soils to begin with, and if we supply to these soils those vital elements or minerals of life.

It is not only the simple elements, such as iron, copper, iodine, etc., which we must secure from the soil, but very complex organic substances which cannot be made by any synthetic methods, and which are natural

products of the functional growth in plants and animals. Even more, we need vital substances in mysterious combinations which we cannot analyze or create, which we call enzymes, or vitamins.

The plant, wonderful as it is, cannot bring forth healthy foods from half dead or impoverished soils. The sun itself, whose rays activate everything alive, cannot instill life into anything which lacks life. The soil must contain living bacteria and a liberal proportion of organic matter from dead plant and animal remains, if air and moisture are to circulate and the sun's rays function in nature's mysterious chemical laboratory.

It is known that soils cannot supply all these minerals, and all organic compounds, and all these bacterial aids within itself, without replenishment at frequent intervals. Unless materials are applied which will replenish these foods, the lands become starved, plant food deficiencies are created, and our health, which depends upon healthy plants, deteriorates.

Much of our American farm land has already been so depleted that it perhaps never can be restored to its former productivity without heavy cost. Ordinary commercial fertilizers, as made in the past, will not, by themselves, furnish the answer. Stable and barnyard manure would, perhaps, supply much of what is necessary, if there was enough of it. Manures help maintain the health of the soil, but supplies are not great enough. And so scientists throughout the United States and the world, are engaged in creating an industry to conserve a national resource with which we heretofore have had little interest, and that is, human bodily waste. It is a fact, demonstrated by experimental work in a hospital, that approximately the following quantities of material, or elements, are poured into the oceans and rivers each year in the United States: 20,000 tons of copper; 55,000 tons of calcium; 21,000 tons of magnesium; 85,000 tons of sulfur; 12,000 tons of chromium; 6,000 manganese; 6,000 lead; 1,000 arsenic; 6,000 aluminum; 1,000 zinc; 6,000 titanium; 15,000 miscellaneous elements. It is not assumed that these figures are correct, for at the time they were made, analytical methods were not as well developed as they are today, and perhaps this total of 244,000 tons per year only shows one-half of the loss the nation's soils suffer each year, for

every pound, every ounce, and every ton of these minerals originally came from the soil. In many states there are laws which compel the producer of commercial fertilizers to include in a ton of fertilizers at least 1 per cent of any element shown on the tag. The futility of this can be best explained by saying that while arsenic is a definite plant food element, and a definite necessity to animal and human life, yet, if we were to include 1 per cent of arsenic in any ton of commercial fertilizer and apply it, for example, to potatoes, the crop would be poisoned, for the truth is, arsenic is required in the soil solution by most any plant in the strength of not more than one part per million.

If we put these elements in our fertilizers and make it possible for the soil to draw on the fertilizer for its deficiencies it will be possible for us to have as much iron and iodine in our milk as is needed and as much manganese in our cabbage, tomatoes, or other crops as human nutrition requires, and with our knowledge of plant breeding and other agricultural arts, we can produce even lustier and more beneficial foods than our forefathers enjoyed. But whereas they obtained their

bounteous yields from wild native soils, we must secure our from tamed, domesticated, and underfed soils. And whereas they for the most part filled their bins and barrels from their own fields and gardens, we must have ours filled in systematic fashion, from lands farmed by others. The time shall come when we shall buy our canned fruit or vegetables according to the rated values of the content, and even our fresh foods with some guarantee of vital food values they should supply. The time has come when producers, canners and merchants can perform a national service by inquiring into the health values of the foods which they offer, and the public will do well to show at least some curiosity in the subject. For the subject is the health of each and every one of us—life itself.

✓ ✓ ✓

One of the most beautiful native shrubs to bloom at this season is *Ribes sanguineum*, the flowering currant. If you encounter particularly good ones, please make note of the location and report it to Dr. Hanley's office at the University.

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Grape Culture in Irrigated Eastern Washington

By WALTER J. CLORE¹
AND WM. B. BRIDGMAN²

GRAPE production in Washington has doubled in the past few years. The average annual yield for the state for the period from 1929-38 was 5,030 tons and in 1940 was 10,600 tons. The counties of Yakima, Benton and Franklin in eastern Washington are responsible for the greater part of this production. In these counties approximately 3,500 acres of grapes are being grown. They have been cultivated in this section almost from the time the land was first placed under irrigation. The varieties that are used consist of two species, or they are hybrids of these two species. The American grape, *Vitis Labrusca*, or its hybrids (*V. Labrusca* x *V. vinifera*), occupies about 3,000 acres while the European grape, *Vitis vinifera*, occupies approximately 500 acres. Although European grapes have been planted in this state since about 1900, especially in the Kennewick area, they have become of considerable commercial importance only recently. The increased interest in them has been created chiefly through the development of the wine industry in this state.

Grapes grown in eastern Washington are of three general classes according to the purpose for which they are used: (1) Fresh grapes; (2) Juice grapes; and (3) Wine grapes.

Fresh Market Grapes

The grapes that are marketed fresh are usually packaged in baskets and occasionally in lugs. They are eaten as fresh fruit but are used more commonly by the housewife for making juice or jellies. Most of those that are shipped from the state of Washington are American or American hybrids and do not possess the shipping, storage, or table qualities of European types. Because of the great distances to large markets, the marketing of fresh grapes has been limited.

There are some European grapes grown for the fresh market, but the total is negligible since our Washington growers are not

able to compete (in the matter of price) with those of California, nor will the later varieties mature properly in this latitude. The more desirable European table varieties, such as Muscat and Flame Tokay, are so tender as to require protection in the winter, which adds greatly to the cost of production. The bunches of Flame Tokay are so compact that they will not ripen well unless part of the berries are removed. This can be done after the grapes first set on the bunch by shearing off the fruits on one side of the stem. Such varieties as Malvoisie and Thompson Seedless make desirable table grapes for the home vineyard.

Juice Grapes

The grape juice industry has expanded rapidly in the past 10 years and one of the largest single plantings of Concord grapes in America is located near Kennewick. In 1942 approximately one-tenth of the national production of juice from the Concord variety originated in the state of Washington. In the preparation of such juice, grapes are used that retain their natural fresh fruit flavor throughout the processing period. Certain American varieties are better adapted for such a product than European varieties because they possess more acid and a more marked and characteristic flavor and aroma. Concord possesses these qualities and is the only variety used for this purpose in eastern Washington. In fact, Concord juice is the most popular bottled grape juice sold in the United States.

There undoubtedly is quite a future in the growing of juice grapes and in the making of grape juice in eastern Washington. The Concord and similar varieties attain a high sugar content and a heavy yield, producing an excellent juice when fully ripe. Besides the Concord, there are several other promising juice varieties planted in the state, such as the Diamond and Delaware for white juice and Fredonia and Worden for red juice. As a food, the grape is valuable for its sugars and its mineral content, notably iron.

Wine Grapes

European varieties are generally more satisfactory for making wines than American grapes on account of their flavor and their high sugar content. These characteristics not

1. Horticulturist, Irrigation Branch Experiment Station of the State College of Washington, Prosser, Washington.

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only depend upon the variety but also on the environment, the better dry-wine grapes being produced in the cooler districts (such as the north coast region of California), and the best sweet-wine grapes in the warmer areas. Most high quality wine grapes are of medium or small size as compared with the European table grape varieties.

Climatic Requirements

America (*Labrusca* or hybrids) grapes are grown over a wide range of territory and do exceptionally well in eastern Washington. The American *Labrusca* grapes are considered to be as hardy as the apple, while the American hybrids, though usually not as hardy as *Labrusca*, are more so than European varieties.

Most wine grapes require long, warm to hot, dry summers and cool winters for their best development. Most *vinifera* types do not withstand winter temperatures much below 0° Fahrenheit without protection, but many varieties from the northern grape growing regions of Europe, such as the *Csaba*, will stand a greater degree of cold. A long, dry growing season is needed to mature the fruit. The earliest maturing European varieties require approximately 1,600 degree-days and the latest 3,500. Degree-days (effective heat) are calculated for the time elapsing from blooming to ripening for each variety for a given place, by subtracting 50° Fahrenheit from the average temperature for each day during this period and adding together the quantities thus obtained. Degree-days calculated for eastern Washington show that there is an ample supply of heat units for the growing of *Labrusca* grapes and their hybrids and a sufficient supply of heat for many European grapes, especially in the earlier areas.

Soils

Grapes are adapted to a wide range of soils, ranging from sandy loams to heavy clay. European varieties in this respect are suited to a wider range than the American sorts. Many of the sandy loam and silt loam soils of eastern Washington are ideal for grape growing as they are deep, mellow, well drained and aerated, and are very productive if good fertility is maintained. These soils are neutral to basic in reaction. Alkaline and

sub-irrigated lands should be avoided. Stony land on which general farming is impracticable often will give fair returns from grapes if the soil is loose and sufficiently deep and if plenty of fertilizer and humus are added. Grapes, however, respond as well to good soil and good treatment as do any other fruits grown.

Preparation of the soil is best done before the vineyard is planted. Old orchard land or new land may be deficient in organic matter which should be supplied to improve soil condition and fertility. A word of warning might be given with regard to planting grapes in soil heavily sprayed with lead arsenate when the land was in apple or pear orchards. It is generally difficult to get a stand of grapes on such toxic soils except by applying very large quantities of manure or growing cover crops for several years so as to reduce the toxic conditions. In some instances successful plantings have been made by placing virgin or arsenic-free soil in the hole around the roots of the grape vines.

Establishing the Vineyard

Location. The establishment and success of a vineyard involves the best judgment of the grower as to whether his location is suitable with regard to climate, topography of the soil, the availability and cost of water for irrigation, roads to point of shipping or utilization, and sources of labor and materials.

In selecting locations for a vineyard, it should be borne in mind that the grape, like other fruits, is susceptible to early and late frosts, hence the frost-free locations are more desirable. Such situations also give more warmth during the growing season and hence produce fruit of a higher sugar content. However, the American grape will succeed in more frosty locations than some of our soft fruits, such as cherries and peaches. But the more tender varieties of European grapes, which also are the late-ripening varieties, require a very frost-free location and a long growing season. The eastern part of the Yakima Valley and the adjoining Columbia and Snake Valleys are well adapted to these late-maturing European varieties. Also there are some early locations in the upper Yakima Valley where these varieties will succeed.

Vines for planting. Grape vines are grown

from cuttings, and, generally speaking, healthy one-year-old plants of European varieties are used and either one or two-year-old plants of the American varieties, which are not of such heavy growth as the Europeans. State and U. S. D. A. bulletins are available describing the practice of growing cuttings. Great care must be used in growing one's own cuttings, but it has generally not been found profitable to do this, as heretofore large commercial vineyards and nurseries have supplied good vines at reasonable prices.

Grape vines can be grown from seeds, but as nearly all grapes are hybrids, though of very ancient origin, the vines grown from seed revert to many different types as do seedling fruit trees.

No grafted vines are used in this state because the phylloxera is not present in our Washington soils, as yet, and the expense of grafting appears wholly unnecessary.

Planting distances. The planting plan calls for the location of the roads, irrigation ditches, and the spacing of vines. Distances between the vines depends on the soil, climate, variety, and methods of pruning and cultivation. For planting distances, 7 or 8 x 9 feet is commonly used for American grapes while an 8 or 10 x 10 feet spacing is often used for the European types, allowing more space for cultivating and spreading fertilizer.

Trellising. Since supports for the vines are not necessary the first year, installation can be postponed until the second year. The most common trellis used consists of two wires stretched tightly on firmly-set posts well anchored at the row ends. Posts may be set 18 to 24 feet apart with wires stapled 26 and 52 inches above the ground. For European grapes, the wires may be placed higher or a third wire may be used. Many growers are now using an eight-foot trellis post, instead of seven-foot, so as to give a wider spread of vines. In such cases, of course, the wires are placed higher from the ground. Also, for the same reason, the cross-arm trellis is being used to some extent, and where such is used, a distance of ten feet between the rows is advisable. Cross-arm trellises are coming into favor with some growers of the European varieties, and in such cases, three or more wires are being used.

Pruning

The grower prunes so as to obtain the highest production of good-quality grapes and still maintain vigorous cane growth for fruit production the following year. Pruning is usually done in late winter and early spring so as to lessen danger of winter injury.

Two systems of pruning are generally used in eastern Washington for training American grapes; namely the Kniffin and the spur systems.

The single-stem, four-cane, Kniffin system consists of a single trunk with usually four fruiting canes, 8 to 10 buds long, two extending in opposite directions from the trunk on the top wires and two on the lower wire. Spurs are left just below each fruiting cane in order to produce canes for next year's crop.

The spur method of pruning utilizes a similar training system as is used in the Kniffin system but differs mainly in that the canes extending from the trunk on the two wires become more or less permanent arms, and that the fruiting canes growing out from these arms each year are pruned back to two or three buds.

Since winter protection is necessary for consistent annual production of many of the European grapes grown in Washington, the pruning is handled accordingly. European grapes are of two general types as regards pruning; namely, those that need to be laid down and covered with soil in the winter and those more hardy varieties which may be left upright like American grapes. The more tender varieties, such as Muscat of Alexandria and Alicante, to be successfully laid down, need to be grown with a slanting trunk or cane that will reach the lower wire. Just previous to severe freezing weather in the fall, the greater part of the pruning is done, the vines laid down and covered. After the winter weather is past, the vines are uncovered, the pruning job is completed and canes are placed on the lower wire. The length of fruiting canes left on the slanting trunk-arms depends upon the variety and the vigor of the vines. The new shoots, when long enough, are tied to the upper wires. When the trunk becomes too rigid for laying down, new trunks must be developed from basal shoots.

The more hardy European varieties, such as the Csaba and the Rieslings, are grown without laying down, though an occasional hard winter may damage some of these varieties. When the chance of winter killing is remote, it is more profitable, however, to let the vines grow upright. Pruning of the more hardy European grapes would be similar to that employed for the American varieties, either the long cane or spur method, depending upon whether or not the basal buds of the fruiting canes are sterile. Details of pruning can best be studied in vineyards where these different systems are being used. The time of pruning is not of very great importance on locations that are relatively free from frost, although if time permits, it is best to do it in the late winter or early spring rather than in the fall or early winter. In more frosty locations, late pruning is desirable as it holds back the swelling of the buds which are to be used for the new canes. The first movement of sap goes to the ends of the canes which are later pruned off, and thus damage from spring frosts to the young shoots is reduced to a minimum.

Fertilization

Strong vine growth and healthy dark green foliage is necessary for continuous heavy production. Nitrogen apparently has given the best and most consistent response of all fertilizers, applied either in the organic or

inorganic form. Since some crops show response from additions of phosphorus, especially on those soils cropped heavily to alfalfa, this element may be needed in such cases.

The most common fertilizer applied is barnyard manure. Besides adding nitrogen, phosphorus, and potassium to the soil, it supplies organic matter. Manure is usually applied in winter at the rate of 8-10 tons per acre or every second season at a heavier rate. Austrian winter peas or vetch have been used as green manure crops. Rye is used alone and in combination with these legumes. These crops are seeded in the fall and turned under before the blooming period occurs. When rye is grown alone, commercial nitrogen in the form of ammonium sulphate may be applied in late winter or just previous to the disking under of the green manure crop of rye.

Irrigation

The irrigation of vineyards differs little from that of fruit orchards. The amount and frequency are largely determined by texture and depth of soil, climatic conditions, variety of grapes grown, and cultural methods. The soil is usually filled to field capacity, to the depth the roots of the vines penetrate, by the time growth starts and is irrigated thereafter whenever needed until the

(Continued on Page Thirty-One)

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Points on Cactus Culture

By BERT E. WILLIAMS

THERE are a number of things toward which we strive in the successful cultivation of cacti. Surely a variety of plant life that is so greatly varied in form and so unique as a plant family is deserving of our attention and is a challenge to our growing abilities. Cacti respond readily to proper treatment. In their beauty they cause us to strive toward greater success in our gardening efforts.

In cactus culture it is essential that normal growing conditions be reproduced as nearly as possible. Cacti grow native in nearly all of North and South America under a wide range of conditions. The answer to the problem of bringing them from varied localities into the confines of one room lies in the fact that they adapt themselves rather readily to new habits of living if given half the chance. Let's acknowledge that no one rule will apply to all forms and that we can only be general in this discussion.

The methods of growing cacti, employed by collectors, differ as greatly as do the plants themselves. All methods, however, contain certain essential features that are varied with the circumstances prevailing in each particular instance, the plants and materials that are available and the information in the possession of the grower. Cacti will thrive under an assortment of treatments if given the opportunity and time to adjust themselves to a new set of conditions.

Before we become discouraged, let us remember that all cacti do have some fundamental characteristics in common and that they are sufficiently rugged to withstand the shock of change. First of all, most cacti live in regions where, at some time during the year, they are deprived of moisture for a period of usually a few months. During this dry period they survive by consuming the water they have stored. More than that, it is during the "rest" period that cacti set their buds. It is, then, often true that over-treatment of cacti under cultivation frequently culminates in less successful results than does seeming neglect.

The points of importance in cactus culture that should be given principal consideration are: soil, watering, light, temperature and pest control, coupled with seasonal treatment. Our objective will be a discussion of

these items in order that we may produce and maintain healthy, well-grown plants, that are not only ornamental in themselves but that will bloom in all of their beauty.

Soil

When you were in school did your geography teacher ever tell you that the soil of the desert is so rich that if you planted a twig and watered it, it would grow? Perhaps that's a stretch of the imagination, but why wouldn't the soil of the desert be rich with food elements; very little or no vegetation has grown there to consume the nourishing properties of the soil. The earth of the desert looks like sand but usually only because it is powder dry. The point illustrated here is that cacti often grow in very rich soils. The idea that pure sand will support cacti is in error. They prefer, they need, good soil.

Here is a good soil mixture that is suitable for general cactus culture:

- 40% leaf mold
- 40% compost soil
- 10% sand, to insure drainage
- 10% charcoal, lime and decayed granite varied with types of plants being grown.

It is in the last items mentioned that the greatest variation in the soil mixture is made. White spined cacti require a greater amount of lime while those plants with highly colored spines appreciate the mineral content of well decayed granite.

You will observe that the recommended soil mixture possesses two essential features: richness in food properties and a porosity that permits ample drainage. Let us not forget drainage for it is most important. There should always be holes in the bottom of cactus containers for this purpose. Here are a couple of good "don'ts." Don't grow cacti in containers without holes and don't plant them in clay pots. Used glazed pots or cans that have been dipped in hot tar.

When establishing cacti the soil should not be too rich at first or abnormal growth and sometimes splitting will result. Make the soil richer by adding fertilizer the second or third year when repotting. Some growers repot their plants every year but it has been found better if it can be done every second or third year in containers of adequate size to allow for growth. This procedure will provide ample food for the plant and will prevent

damage to root structure, thus retarding the appearance of the flowers. All repotting should be done in the spring.

Watering

There are just as many mistaken ideas on watering cacti as there are conceptions on soils. The following procedure may be used with good results. Beginning with March or the first of April, when cacti start to grow, they may be watered freely provided the containers are equipped with drainage holes. Starting about the first of October the amount of water should be gradually diminished during the following two months. By December the plants will be dormant and should be stored at a temperature around 50 degrees when they will require little or no water until March. In the event that circumstances do not allow for storage at a cool temperature a small amount of water once a week for the winter months will be sufficient.

Since mention was made of the seasons it is well to suggest here that cacti are sun lovers and will be greatly improved if placed out-of-doors during the summer months. Provision should be made for protection of good specimens against possible weather damage. A small glass house is considered ideal. Only a few cacti grown under cultivation can withstand full sun when first placed out-of-doors. For that reason they should be exposed to only partial sun until they become hardened. The climate in this region does not permit outdoor growing of cacti the year around so plan to return them to shelter when the rainy season begins. You will be well repaid for this suggested summer treatment. The plants will be healthy and certainly more inclined to bloom the succeeding year.

Pest Control

Cacti are attacked by a number of more or less common plant diseases and insects. In most instances the elimination of diseases and pests is not difficult but it is far more satisfactory to prevent the infestation rather than to attempt to control it after it has gotten a foothold. Pests and diseases will either scar cacti or cause them to wither and die. It is for these reasons that care should be taken to prevent injury or loss of plants.

The most satisfactory method of pest control is elimination at the source. If at all possible, use sterilized soil. It may be obtained from green houses or you may do the job

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by baking the soil in the oven. Any effort made in this direction is certainly worth the trouble for it often eliminates a long, hard, battle with pests and plant diseases at some later date.

Red spiders often attack cacti. They usually appear in greatest abundance when the plants are dry. The treatment is fairly simple; keep the soil moist and spray frequently with a good garden spray.

Thrips are certainly a pest for they scar plants and disturb normal growth. They, too, may be controlled by an all around garden spray.

Scale is more difficult. It injures the plants and detracts from their appearance. Scientists have not discovered an entirely satisfactory method of eliminating scale but the best treatment is prevention in the use of disease-free soil and the occasional application of a good spray. It is sometimes possible to remove scale by lightly scrubbing with grain alcohol.

Mealy bugs are the worst of all cactus pests. They attach themselves to both the stems and the roots where they multiply rapidly. Unless eliminated a rather slow but certain death is the unhappy result of their action. Particular care should be used in making certain that the soil and containers used for cacti are free from infestations. Sterilize the soil, wash the containers.

It is a simple matter to identify mealy bugs for they are covered with a white cocoon-like web that makes them easily seen but difficult to eliminate. An ordinary garden spray is of no value for it will not penetrate the cocoon. In recent years it has been discovered that dichlor-ethyl-ether, mixed with water and applied as a spray to both plants and soil, will destroy mealy bugs since it penetrates the cocoon and suffocates the insect. When adding new plants to a collection it is always better, especially with field-grown specimens, to keep them segregated for a few weeks in

order to determine the possible presence of mealy bugs.

Successful cactus culture, then, requires the use of a proper type of soil that is sterilized whenever possible, the resting of plants during the winter months to induce blooming, the reviving of growth in the spring with the aid of water and heat, the placing of plants out-of-doors during the summer months, proper watering and garden spray treatment at intervals. Since cacti thrive well under a variety of conditions you will find it necessary to comply with only these few requirements, varied in accordance with available facilities, in order to produce satisfactory growing plants. The results will keep you interested for the plants will be healthy and attractive. You will want to acquire new plants, learn more about them, and you will take pride in your collection. When a few of them bloom, why then, you are a cactus enthusiast.

1 1 1

Victory garden vegetables generally require ample amounts of water for the most rapid growth. Apply water during the morning hours so that the soil can become warm again during the heat of the day. Watering in the evening will keep the soil cold for too long a time.

1 1 1

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John Grant and his wife, Carol Grant, have rendered a real service to Northwest gardeners by writing and causing to be published the book "Trees and Shrubs for the Pacific Northwest."*

The Arboretum Foundation feels that it, too, is furthering the interests of gardening in the Northwest by sponsoring and undertaking the sale of Mr. and Mrs. Grant's book.

We who garden in this section of the U. S. have long been in need of just such a publication and it is indeed fortunate that the task was undertaken and so successfully carried out by two persons, thoroughly equipped in every way to perform it. As is well pointed out by the authors in the introduction of the book "the Pacific Northwest has a climate all its own and up to this time no comprehensive book has been written about garden plants for this region."

The main source of practical information for our gardeners has been, says the authors, the wealth of garden literature written for the British Isles "because the climate is so similar." However, to again quote the authors of this interesting and most valuable book, "the climatic conditions are not identical and some modification of information from this source is necessary, also there are marked local variations which need careful consideration."

Mr. and Mrs. Grant deal skillfully and intelligently with this as well as with other points which have a vital bearing on the subject of shrubs and trees for Pacific Northwest gardens. Their book is one which should and which will make a strong appeal to amateur as well as professional gardeners and a copy of it will add value to every garden library.

The book's title does not in any sense represent the many garden subjects which Mr. and Mrs. Grant cover in the more than three hundred pages. There are chapters on

* The book, "Trees and Shrubs for the Pacific Northwest" is now off the press and copies may be had by writing Arboretum Foundation, 5507 White Building, Seattle. The price, including mailing cost is \$3.70. (Price at Arboretum office \$3.65.) Please make checks payable to Arboretum Foundation. Copies for which orders have already been received will be mailed or otherwise delivered as promptly as possible.

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1 1 1

Every victory gardener should procure a copy of the Washington State College Bulletin No. 280, 1943 edition. It is one of the finest and most complete publications on vegetable gardening that we have seen. It will answer almost every question that will arise during your season's work.

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IRIS

(Continued from Page Six)

away the rot. The exposure to the sunshine may heal the wound and still give you a hardy plant. Should the tops turn brown and hang limp though not dry, it may be best to pull up the entire plant and burn it. To my knowledge, there is no cure for this leaf-burn or scorch. Many communities are troubled with what is called the Iris borer. This condition has never been known to exist in our community.

Your Iris clumps will be much more attractive if you will cut off the dry tips each spring and pull off the leaves which have dried. Also, after blooming season, one ought to cut off the blossom stems unless they are to be left with a precious seed-pod.

New and Old Varieties By Color

It would be impossible as well as impracticable to bring you a long list of Irises according to their color. There are many thousands of named varieties. And there are almost that many colors and color combinations. The wide range of color is one of the fascinating things about Iris.

A glance through your favorite Iris catalog will bring most of the names and a detailed description of the plants listed below. In passing we should like to remark that they will range in price from 25c per rhizome to perhaps \$20. The \$20 variety may not be more beautiful than the cheaper variety, but it is new and the rhizomes are few in number.

WHITE IRIS (Pure white selfs)*—Matterhorn, Snowking, Gudrun.

MAUVE—Wm. Mohr, Ormohr, Modiste.

LIGHT BLUES (Self)*—Shining Waters, Great Lakes, Gloriole.

MEDIUM BLUES (Self)*—Missouri, Sierra Blue.

PINKS—Noweta, China Maid, Morocco Rose.

VIOLETS—Sable, The Black Douglas, Brunhilde.

ROSE—Lighthouse, Mulberry Rose, Rosy Wings.

PURPLES—Red Dominion, Storm King, Directeur Pinelle.

BROWNS—Depute Nomblot, Louvois, Beowulf.

REDS—E. B. Williamson, Red Gleam, The Red Douglas.

YELLOWS—California Gold, Golden Hind, Spun Gold.

YELLOW BLENDS—Copper Lustre, Prairie Sunset, Jean Cayeaux.

CREAM COLOR—Golden Treasure, Snoqualmie, Old Parchment.

WHITE WITH BLUE AND LAVENDER MARKINGS—Los Angeles, Wasatch.

YELLOW WITH BROWN AND ROSE MARKINGS—Siegfried, Tiffany.

WHITE AND BLUE BI-COLORS—Marquita, Shah Jehan, Wabash.

* Selfs have standards and falls of same color.

Iris As A Hobby

Few flowers lend themselves to so much "hobby tinkering" as Iris. The wide range of color; the easy growing habits; the pretty green foliage which adds much to the landscape beauty; the thrill of hand-pollination with the waiting for seed and the anticipation for a new creation—these all help to make Iris an ideal hobby plant.

After the hybridizer has chosen his parent plants and has made the cross, he will watch anxiously for the sign of the forming seed-pod. When the pod has matured, the seed is gathered, dried, and planted in early fall. With good luck, a few seeds will germinate the next spring, and by the second or third spring the first flowers will break forth. Hybridizing is a lesson in patience, all right, but the waiting is worth the thrill of seeing the first flower open and stand proudly in the gleaming morning sun.

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BEGONIAS

(Continued from Page Four)

Digging and Storage

Late fall, when the blossoming period is over and the plants start to wither, is the time to dig up the tubers. Don't wait too long. If October is wet and warm the plants will remain green so the rule of not digging until the plants are withered can't be followed too literally. The wet fall weather will often cause the tubers to rot if you let them stay in the ground too long, especially if they have been bruised or injured in any way during the growing season.

I cut the stalk of the plants off to about five inches from the base of the tuber, wash off the dirt and store the tubers near the furnace for a week to ten days until they are thoroughly dried. Most of the stalks at the end of this period will drop off naturally. If the stalks have to be removed break them off until fresh healthy tissue is exposed. If all the stem is not removed it will decay and destroy the tuber. I cover all the freshly exposed tissues with a coating of powdered sulphur as a precautionary measure against rotting.

The tubers should be stored in a cool dry place. - I store mine in the garage.

Kind of Tuberos Begonias to Plant

One can raise tuberous begonias from seed but it is rather difficult unless you have proper facilities. For amateurs, such as myself, the most satisfactory way is to buy the tubers.

There are many types and colors of tuberous begonias. Some large producers are now offering named varieties. Perhaps the most satisfactory way to start a collection, however, is to get one or two tubers of the more common types. One can enlarge his collection with the various colors and specialize if he desires certain forms. Some of the more common types are Giant Single, Single Frilled (*Crispa*), Single Crested (*Cristata*), Double Camellia, Double Rosebud, Double Frilled or Carnation (*Fimbriata plena*). All of the various types are produced in from four to twelve color combinations.

I do not know of another annual which will give more satisfaction and enjoyment in raising.



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RHODODENDRONS

(Continued from Page Eight)

and shaded from a too hot sun by more robust shrubs.

In grouping rhododendrons heaviness should be avoided. Plantings made up of single plants of many species are apt to look lumpy and spotty. They do not like to be crowded for the branches must be given space to elongate. A very attractive planting and one that rhododendrons themselves like is made by stacking plants: first, the taller ones, giving them ample space; close to them the next taller, and so on, ending in prostrate forms till the area is well filled. Among the lowest ones gaultheris, vacciniums, shortias and such may be introduced with good effect.

Do not let your plants set seed unless you intend to harvest them. Remove the flowers as soon as they begin to wither; to leave them retards the next year's growth. All species do not ripen their seeds at the same time.

It takes from eighteen months to eighteen years for plants to come into bloom, depending upon the species. Wet or sunless seasons delay them. In some cases it takes five years for the plant to take on the adult character of its leaves.

In the Pacific Northwest, in general, seeds begin to ripen in early November and continue till the end of February. If the capsules are not brown and starting to open by that time pick the capsules with their stalks, put them in glass vials in the house. They will dry and open; their seeds are easily discharged.

Kew Gardens uses this method of planting rhododendron seeds: fill the container half full of drainage material; fill the rest with half sand and half peaty soil; press down; sow seeds thinly; sprinkle with sand, only half burying the seed; keep moist, not sodden, watering from below.

My own procedure is a little different: I use a box in which there are ample drainage slits and fill to within an inch of the top with two-thirds sandy leaf mold and one-third pulverized peat moss. This mixture is tamped well and the seeds scattered thinly; barely cover the seeds with peat moss which has been put through window screening. I

keep this moist by watering from above with a rose spray nozzle. When seeds are germinating they are again dusted with the peat moss powder. They are placed in a covered electric frame in which the temperature is kept from 65-70 degrees until the seedlings are well out of the ground and the two first leaves have expanded; at that time they are brought into the light.

Most of the species are variable, some better, some inferior to the type. By far the best way of increasing a good form of species or hybrid is by layering. First, half-way sever the branch by an upward cut, bend it and secure it firmly to the ground by a peg. I like to pile a little mound of peat mixed with sand on the branch. It is not a bad plan to weight it with a rock. Usually in one year roots will have formed and in two years the new plants may be removed. The succulent types of rhododendrons may be ready to take in one year; other more woody species may require three.

If I have a languishing shrub of any kind I can sometimes save it by planting the roots in a deeper hole and burying the branches in a diagonal trench, leaving the leafy shoots exposed at the top. This also serves to increase the stock.

Another excellent way of increasing stock is by taking cuttings from the current year's wood. These cuttings must not be too soft and herbaceous nor too old and woody. The exact time to take them depends on the character of the plant and the season. Since I have underground heat in the propagating bench I use it, keeping the temperature at 65-70 degrees. Lately I have been using as a rooting medium, a mixture of half peat moss and half unfil, which is a popped mica commonly used as insulating material. I firm this well and cut away enough foliage from the cuttings so that it (the remaining foliage) does not get wet and damp from the substratum. The time involved and the ease of rooting plants varies greatly.

If I did not have underground heat I would still try to propagate by cuttings. I would experiment with the following method: Cuttings may be put into sand, covered with a bell jar and set out of direct sunlight. The bell jar should not be lifted for a year and the plants should be kept wet at all times by watering from the outside.

Because of the great demand for plants and the speed with which they can be produced, grafting is a very common method of increasing numbers. Unless the union of the stock and scion is 100 per cent perfect a strong wind can snap off the head of a grafted plant. If suckers are allowed to grow on a grafted plant they will destroy its health. It is sometimes possible to bury the stem above the graft. The stem of the scion will then begin to produce its own root system. If this cannot be done at once, it is sometimes possible to do it by degrees. A flowering plant is produced at least twice as quickly from a layer as from a seed and three times as quickly by a graft.

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- "Trees and Shrubs Hardy in the British Isles."—W. J. Bean.

/ / /

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GARDEN NOTEBOOK

(Continued from Page Ten)

from all varieties save one and allow only the best plants of this one to produce flowers. After seed has set on the first variety the flower stalks can be permitted to develop on a second. When the seeding variety is in bloom keep all the flowers picked from the other varieties. Thus you will get seeds which have come from cross-pollination among only the best plants of a single variety. And this is just what you want.

9. Spinach will produce seed readily during the long days of summer. Grow only a single variety for satisfactory results and cut the flowers away from all but a few of the best plants. If more than one variety is grown remove the flowers completely from the second until seed has set on the first.

10. Sweet Corn may be easy, difficult or impossible depending upon the variety or varieties that are grown. If Golden Bantam is grown alone one can select seed ears from the best plants with fair results. If you are growing two varieties close together or if your neighbor has another variety planted nearby, it will not pay you to save your own seed because of cross-pollination between varieties. If your variety is one of the popular hybrids, such as Golden Cross Bantam, it will deteriorate too much from saved seed to warrant trying it. The hybrid varieties must be hybridized every year and you cannot effect the hybridization no matter how you try.

11. Tomatoes are considered to be naturally self-pollinated. The amount of cross-pollination is quite low; certain studies have indicated that not more than 5 per cent cross-pollination is encountered. As in the case of legumes, the explanation for this is found in the configuration and arrangement of the floral parts. Therefore, the gardener can safely expect reasonably good seed from the tomato provided he is careful to select only the best plants for seed production.

Storing Vegetable Seeds

A recent, authoritative report discloses that more garden seeds had been purchased during the first ten weeks of 1943 than had been bought during all of 1942. Undoubtedly most of them will be sown for this summer's crops. But it appears that many gardeners have been making purchases for July and August sowings and possibly even for use in the spring of 1944.

All should be sparing and careful in planting seeds. Do not waste them. If any remain they should be stored immediately and properly. They can be kept in healthy, viable condition for use later in the summer or even next spring. The unused packets (or the loose, bulk seeds) should be placed in vials or small jars which can be tightly sealed. Then put the sealed containers in the coolest, driest part of the basement. Avoid a place that is too hot, for there the seeds will dry and shrivel; avoid too much moisture for they will mold.

✓ ✓ ✓

When buying garden seeds, go to reliable seed houses and insist upon the best, disease-resistant varieties.

✓ ✓ ✓

If your garden is located in a low-lying area where the soil is moist and cool, you should pay particular attention to the depth at which your seeds are planted. This is especially true for those crops which are seeded in late winter and early spring. Keep them shallow or the seeds may decay.

✓ ✓ ✓

Most of us will be attempting to grow vegetables on comparatively light and infertile soils. Most often our success will be directly proportionate to the amount of fertilizer and water that we use.



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GRAPES

(Continued from Page Twenty-One)

grapes are nearly ripe. Good grape growers, however, time their applications so that irrigation is avoided while the vines are in bloom and during the latter part of the ripening period. The furrow system of irrigation is used.

Harvesting

The ripening of grapes consists largely of an increase in sugar, a decrease in acidity, and the development of characteristic color, texture and flavor. For shipping purposes, grapes are harvested so that they will ship well, be attractive to the consumer in appearance, and high in eating quality. For the fresh market, grapes are harvested directly into five-pound baskets. Grapes for juice or wine are harvested into apple boxes or lugs for transporting to the place of utilization. These grapes are usually allowed to hang on the vines as long as feasible to obtain a high sugar content. This sugar content is usually determined with a hydrometer and is reported in degrees Balling.

Grape Pests

Insects. The most common grape insect pest of this state is the *grape leafhopper*, which, if not controlled, builds up a considerable population and does great damage to the European varieties of grapes. In some places it has even damaged plantings of American varieties. It can be controlled by dusting with insecticide dusts, which are best applied with a power duster. In planting European grapes, the necessity for such dusting should be borne in mind.

The *grape root louse* or *phylloxera* is the worst pest of the European grapes and is not known to exist anywhere in the state of Washington. American varieties are resistant to the attacks of this insect to such an extent that it has not been necessary to graft these varieties on highly resistant rootstocks. European grapes, however, have soft root bark and are very liable to the attacks of *phylloxera* which, if it once gets established in the vineyard, will utterly destroy it in a few years. Many counties of California have become infested with the *phylloxera*, and in those areas all vines must be grafted on the resistant wild American grape roots. When European plantings began to be made in the

state of Washington following the repeal of prohibition, our state department established a quarantine law against *phylloxera*. At the present time, each shipment of grape vines or cuttings to the state of Washington must be inspected at the point of origin and certified that the vines or cuttings were grown and shipped from a *phylloxera*-free area or that these materials were given the standard hot water or oil and nicotine treatment for grapes at the point of origin or at the point of destination. This slight inconvenience to the planters of American grapes is necessary to protect the European grape industry of the state against this pest. It is of interest to note that about thirty-seven years ago infestations of the *phylloxera*, found in some small early European vineyards in Benton County, were of such serious proportions as to destroy those plantings. As no recent evidence of the *phylloxera* has since been found, it is assumed that the insect died out with the death of the vineyards in which it then had a foothold.

Disease. The *powdery mildew* (*oidium*), which is present in all parts of the country, will work great damage on European grapes unless controlled by the application of dusting sulphur. This can be done with either a hand duster or power duster but must be done with at least one application per year and best with two applications which could be combined with applications of insecticide dusts to control the grape leafhopper. Full directions for this should be obtained from state or government publications.

Grape Varieties of Washington

Approximately 6,000 to 8,000 varieties of grapes have been named and described. In the state of Washington, less than 30 are grown commercially. In California, not more than 40 or 50 varieties are considered as commercially important.

The testing of grape varieties was first started at the Irrigation Branch Experiment Station of the State College of Washington

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near Prosser, Washington, in 1937 and has been continuous since that time with new varieties being added each year, so that at the present time there are on trial 36 varieties of American grapes and 58 varieties of European grapes. Nearly all of the varieties discussed and described are being tested.

American

All varieties listed in this group belong to *Vitis Labrusca* or are hybrids (*Vitis Labrusca* x *Vitis vinifera*).

Labrusca submits well to vineyard culture, is fairly vigorous, and generally quite productive.

The principal varieties of American grapes that are commonly grown commercially or in home vineyards in eastern Washington in the approximate order of their present acreage are Concord, Campbell Early, Delaware, Diamond, Niagara, Fredonia, Moore Early, Worden, and Brighton.

A brief description of these varieties is listed as follows:

Concord is the most widely known of the grapes in the United States and is the most important variety grown in Washington. This black grape is of good flavor and is used as a table grape, for jellies, for juice, and for wine. It is very productive, of medium season, hardy, and withstands the ravages of insects and diseases to a high degree.

Campbell Early ranks second in commercial production in eastern Washington. It is known as the Island Belle in the Puget Sound area, is an early table grape, being very much in demand on account of its earliness and high wine-making qualities. In eastern Washington it attains a higher sugar content than in the cooler and more humid areas west of the Cascades. This blue-black American hybrid grape is very good in production and quality, colors up well before ripening, and is a good shipper. It is of early season but not quite as hardy as Concord.

Delaware is the standard gauge of high quality of American grapes. This small, aromatic,

high quality red grape is of medium early season. Even though the vines are only fairly vigorous, their productiveness in Washington is often many times that of eastern states. As the bunches are very small, this grape requires plenty of vine to produce a full crop. It is used chiefly for wine.

Diamond is an attractive green, American hybrid grape of high quality, having considerable hardiness, productiveness, and vigor of vine. This medium to large round berry is of mid-early season, is in demand, and highly suitable for making white wines.

Niagara is an American hybrid and is the leading green grape of its kind. This medium season variety produces medium to large berries in large to medium sized, compact clusters. The vines are very vigorous and very productive. It is chiefly used for white wines.

Fredonia is outstanding because of its ability to produce and its superior quality to other early black grapes. It is an excellent grape for shipping because of its thick skin. It is being shipped as an early-season grape.

Moore Early is similar to Concord, but is early in season. The large round berries, borne in loose clusters, are purplish-black to black in color, of slightly foxy flavor, and of fair dessert quality. The vines are moderately vigorous and only fairly productive. Reputed to be desirable for juice purposes.

Worden is a Concord seedling, the berries of which are large, black, thin skinned, and of excellent quality, ripening a week or two earlier than Concord. The vine is hardy, vigorous, and productive. The chief fault of the variety is that the fruit cracks badly.

Brighton is an American hybrid grape of medium season. Clusters are large to medium with berries of medium to large size, light to dark red in color, and is of very good quality. The fruit deteriorates in quality quickly after reaching maturity. It is self-sterile, thus requiring a pollenizer. The grapes from the few vineyards of this variety are marketed to wineries.

A brief description of some new and well-known (elsewhere) varieties that may have some promise for this section are listed as follows:

Agawam is a purplish-red American hybrid grape of medium to medium late season. Its outstanding qualities are large size of bunch and berry, sweet, aromatic flavor, attractive appearance, and excellent keeping qualities.

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Catawba is a red American hybrid grape that has been popular in the markets of eastern United States chiefly because of its keeping ability and high quality. This is a late-season grape of good vigor and productiveness.

Dunkirk appears similar to Delaware in fruit characteristics, except that the berries and bunches are slightly larger and the color a darker red. The clusters are very uniform in shape and size, compact, and well filled. The vine is vigorous, hardy and productive. It is considered a good shipper.

Early Giant is a highly productive, extra early, blue-black grape of very good flavor. The berries and bunches are large and ripen very unevenly. The vines are of excellent vigor. It is desirable for home plantings.

Golden Muscat is an American hybrid (Muscat Hamburg x Diamond) with very large, attractive clusters of green grapes of very high flavor and quality. The plant is vigorous, hardy and productive. It is of late season and promising for home use.

Iona is a dark red grape, small of bunch, moderately compact, medium to small in berry size, delicate and vinous in flavor and

of very good quality. The vine growth is weak, doubtfully hardy, and not very productive. It is an American hybrid.

Keuka is an American hybrid having a predominance of vinifera characteristics and is late in season. The berries are medium to small in size, sweet and delicately flavored and dark red when ripe and covered with a lilac bloom. It is outstanding because of its high quality, production and ability to keep well. It has been used to some extent in making wine. It is seriously damaged by birds.

Lucile is an early, dark red grape covered with a lilac bloom. The vines are moderately vigorous, hardy, and productive. The berries are of medium size and attractive with a foxy flavor and odor. Clusters sometimes are so compact that the fruit cracks.

Ontario is a good quality, medium to small sized, green grape. It is early in season, fairly vigorous in growth and moderately productive. It is susceptible to shriveling.

Portland produces large clusters of large sized, green grapes of good quality. The variety is early, very vigorous, hardy and productive. When picked fully matured, the berries tend to shatter.

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Seneca (American hybrid), is a yellowish-green grape, aromatic, of excellent eating quality and is relished for table use. The vine is vigorous and productive. Although it ripens early, it remains in excellent condition for a long period of time and obtains a fairly high sugar content when left on the vine. It is recommended for home plantings.

Sheridan is a late season grape, promising for extending the Concord season. The clusters are large and compact. The berries are large and black and the quality good. The vines are moderately vigorous and productive.

Vergennes is a large to medium sized, red grape, valuable for its certainty in bearing. The berries are attractive and of good quality. This medium-seasoned variety is productive. Vine growth is sprawling.

Yates is a medium red grape, which ripens about the same time as Concord. The berries are medium large, attractive, sweet and good. The vine is vigorous and productive.

European

European, *Vitis vinifera*, grapes generally are not as hardy as American (*Vitis Labrusca*) varieties. The full extent of their hardiness in the state of Washington, however, remains to be determined.

Importations of the more hardy European varieties direct from Europe were made by W. B. Bridgman, prior to the outbreak of the European war. Among these are the Csaba, Blue Portuguese and the Chasselas Rose. The Csaba, especially, appears hardy and is very early.

Fruit characteristics of *Vitis vinifera* not found in American species are: The skin, which is attached to the flesh, is never astringent, nor acid and can be eaten with the fruit; the flesh is firm, tender and uniform throughout; the flavor is sprightly or vinous; and the berry adheres firmly to the pedicel, the fruit seldom shattering or shelling from the cluster.

The principal varieties of European grapes commonly grown commercially in eastern

Washington in approximately the order of their present importance are as follows: Muscat of Alexandria, Csaba (Pearl of Csaba), Alicante (Alicante Bouschet), Zinfandel, Malvoisie, Franken Riesling, Chasselas Rose, Black Hamburg, Thompson Seedless, Flame Tokay, Carignane, Mataro, Johannisberger Riesling, and Ribier. When grown commercially, practically all of these varieties are utilized exclusively for making wine. Only the black grapes can be used to make red wine.

A brief descriptive list of varieties now being grown commercially and those that may have some promise for this section of the state follows:

Muscat of Alexandria is of delicious and characteristic flavor, desirable for both table use and wine making. The berries are dull green in color, large in size, and hang in medium sized, loose clusters. The vines are vigorous and productive. It is late season in ripening.

Csaba (Pearl of Csaba) is the earliest ripening European variety. Its fruit is yellow, sweet, with a slight muscat aroma and very good in quality. Csaba is a shy bearer but appears to be more hardy than other European grapes.

Alicante (Alicante Bouschet) is noted for its highly-colored juice, and is used for blending wines. Both vine growth and fruit production are good. It is medium late in season. It is a medium sized, black grape, susceptible to shriveling.

Zinfandel is an important grape for the making of red wines. The clusters are medium sized and very compact, requiring berry thinning in order to prevent severe cracking of the fruit. The berries are medium sized, sweet and reddish-black in color. It is medium late in season, vigorous and very productive.

Malvoisie is usually used for blending purposes in the manufacture of sweet wines. The clusters are medium sized, loose to compact, with medium to large, reddish-black to black berries. This medium season variety is vigorous and productive.

Franken Riesling (Sylvaner) is used for making wines. The berries are whitish yellow and are borne in compact clusters.

Chasselas Rose ripens shortly after Concord and is very prolific. The clusters and

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berries are medium in size. Its fruit is light red to violet red in color, juicy, sweet, vinous, and very good in quality.

Black Hamburg is a late, well-known European grape, large of bunch, very large berries, thick skinned, and dark purple to black in color. The flesh is firm, juicy, sweet, and of very good quality. It is a very attractive variety.

Thompson Seedless is grown mainly in home vineyards in eastern Washington. The fruit clusters of this variety are large, loose and produce small, sweet berries of very good quality when fully ripe. Plant growth is very vigorous and canes remain tender until rather late in the fall. Bird damage, shriveling and shattering are common with this variety. The variety is of early medium season.

Flame Tokay is an important table grape in California, primarily because of its brilliant red color, high production and excellent shipping qualities. The clusters and berries are of large size, red to dark red in color, very firm and sweet in flavor. The vine growth is vigorous. It is very late in season, often failing to ripen except in favored locations in the lower valleys.

Carignane is a late ripening, very vigorous and very productive grape. The berries are medium sized, black, and of good quality. It is used in making bulk red wines.

Mataro is used in bulk production of wines. The clusters are medium large, compact, with berries of medium size, black, and ripens late in the season. The vines are moderately vigorous and productive.

Johannesberger Riesling possesses a strong varietal flavor and bouquet. The clusters are small, well filled, with medium sized, greenish-yellow berries aromatic in flavor, and juicy. They are of medium season in ripening. The vines are vigorous and moderately productive.

Ribier is a commonly grown table grape in California. The clusters are of medium size, loose to compact, with black berries of excellent keeping quality. The vines are only moderately vigorous and productive, ripening in late season.

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Some soil minerals (through our foods) feed brain and nerves, build bones, teeth, hair, or supply reproductive energies. Other elements purge poisons from fluids and tissues, others promote plasticity, create heat, build muscular equipment, beautify the skin from within, supply red blood corpuscles, build enamel for the teeth and strengthen ligaments. These vital elements are like wheels in complex mechanism of the human body. Unless we have them in required variety, our health will suffer.

Many conditions control the vitamin and mineral content of foods we eat, or those fed livestock. But experiment and common sense teaches that a plant must be fed with a complete, carefully balanced plant food if it is to perform properly the function of building within itself vitamins and minerals which control health in human and animal life.

As growers study soil science and the selection and use of good fertilizers, better foods will be produced. For unless the correct type and quantity of fertilizer is used, the growing plant cannot build within itself these precious life-giving elements.

Growers, farmers, or Victory gardeners, who realize that constant cropping means impoverished soils, and that good crops, filled with life-giving elements, vitamins, phosphorus, calcium and many others, can only be produced by careful and intelligent fertilization, are using LILLY'S MORCROP fertilizers with success and satisfaction.

Those who have not yet tried LILLY'S MORCROP fertilizers may do so by calling on the nearest dealer, or writing us at Seattle.

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