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The Green Thumb

Vol. 8 August, 1951 No. 8

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Picture on front cover taken near Ward, Colo., by Chas. J. Ott. Picture on rear cover of Perennial Phlox, taken by Bruce Korfage.

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August 19, Sunday. A repeat trip to the Ghost Town of Corona from West Portal. Marjorie Shepard, leader. Leave Horticulture House at 7:45 A. M.

August 25-26. Open date. A trip will be scheduled upon request.


ANNUAL PICNIC

The annual picnic of the Association will be held this year at Elitch Gardens on September 1st. Announcements will be mailed later when the committee has decided on details of program. This should be a good place to get together among beautiful surroundings.

Look and Learn Garden Tours

August is a wonderful garden month if we ever saw one, and so we want to remind you to be sure to take advantage of the last LOOK and LEARN garden visit, which will be on Wednesday, August 15. If you don't have a season ticket, you can get a ticket for just this visit at Horticulture House or at any of the gardens scheduled for the day. The single admission price of 75c entitles you to see and hear about all of the gardens listed below. All of the gardens on this tour are in southeast Denver and in Englewood. They will be open from ten in the morning until six o'clock. Drop in and see them at any time during these hours. And don't hesitate to go just because you are alone or unacquainted, for your ticket is your invitation, and the garden owners and landscape experts will be more than happy to see you and to point out the whyfors and wherefors.

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"To preserve the natural beauty of Colorado; to protect the forests; to encourage proper maintenance and additional planting of trees, shrubs and gardens; to make available correct information regarding forestry, horticultural practices and plants best suited to the climate; and to coordinate the knowledge and experience of foresters, horticulturists and gardeners for their mutual benefit."

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COLORADO CACTI

By M. Walter Pesman

"The Cacti are a snooty clan," according to the clever jingle that many a cactus lover likes to quote. Perhaps they have a right to be, since they are one hundred percent American and are certainly among the first unapproachable families. Only one genus of the cactus family, while of tropical American origin, has close relatives in tropical Africa and in Ceylon; it is Rhipsalis, which as an epiphyte, after all, does not have its roots in any soil and thus has a perfect right to world citizenship.

The cactus charm, on the other hand, has spread rapidly in all directions and it is nothing unusual to find cactus fans growing their beloved plants in an attic from the precious seeds introduced from other regions more adapted to the growing of these succulents. Most of them prefer almost desert conditions.

Just as Coloradoans will go to infinite trouble to grow exotic orchids, so a gardener in Holland or England, for instance, will boast of a Prickly Pear, grown under special conditions and with unlimited care. How well I remember the jubilant cry by Henri Corrévon of Swiss Alpsines fame, when I brought him some of our choice ball cacti.

In Colorado cacti are practically all adapted to dry weather; Echinocactus or Pediocactus simpsonii, however, as the name Mountain Cactus indicates, likes moisture as much as twice that of the plains. Occasion ally its variety "minor" may be found in swampy ground even on our highest mountains. In this little treatise is to present our Colorado tribe in such a way as to make their recognition easy. About two dozen species have been assigned to Colorado, but less than a dozen are commonly found. And a number of these are confined to certain specific regions only.

Roughly speaking most of our cacti fall in four groups each of which is easy to tell. Exceptions are Devil’s Claw and Snowball or Mountain cactus which are less easily placed in any of these four groups.

1. The Cane Cactus group to which the Tree Cactus belongs, with cylindrical joints and barbed spines. (Cylindropuntia.)
2. The Prickly Pear type, with fleshy joints, generally flat, and again with barbed spines. (Platyopuntia.)
3. The typical small Ball Cactus (Mammillaria or Coryphantha) is seldom over two inches in any direction; flowers develop on top, between the little knobs or tubercles from which the spines radiate.
4. Ribbed Cactus with usually lateral flowers is called Echinocereus, roughly meaning "wax candles on a hedgehog." In this group belong the very striking mound cactus like King’s Crown and Turkshead, as well as the interesting yellow Hen and Chickens (Echinocereus viridiflorus). All have the ribbed formation.

Now for the non-conformists. Devil’s Claw Cactus is a beautiful yellow or purple ribbed cactus in southwest Colorado, differing from the other ribbed cacti in having the blossoms borne on top in its center. (Echinocactus whipplei.) Its hook-spike is indicative.

Snowball Cactus might be taken for a regular Ball Cactus, except that the pink flowers develop from the nipple like tubercles instead of between them. Mountain Cactus is its other name (Echinocactus simpsonii). It is properly named for its location in mountains or foothills, as high as 10,000 feet, as on Monarch Pass. In diameter it reaches six inches. Its variety minor has shorter spines, and in rough flower blossom, it is found on both eastern and western slopes of the Rockies. Since it occurs commonly on Pikes Peak, it has been named also Pikes Peak cactus. Its delicately scented pink flowers and the fact that it can stand both rainfall and cold make it a welcome garden plant.

Now if you came to Colorado to make a "bowing acquaintance" with its cacti (according to the warning in the jingle, you should not shake hands)—where would you go to meet them? A number of them are quite particular as to location.

The Tree Cactus, for instance, long before the Korean Episode, seems to have developed a feeling about the 38th parallel, and seldom goes more than twenty or twenty-five miles farther north; it follows the Arkansas River rather closely in this mystical boundary, being plentiful in the southwest part of Colorado, but bounded by this 10-mile strip north of the river and by the Rockies to the west. With its purple or pink flowers in June, followed by yellow fruits, the Tree Cactus (Opuntia arborescens or clair-minded) is a beautiful sight, even in Colorado where it does not grow much beyond six feet tall. It does develop into a tree in Mexico, where it is known as Coyote Candles (Velas de coyote) or Focosnoite. Many tourists like to carry home one of its decorative mesh-work branches, showing a woody lacework skeleton, after the pulpy material has decayed. Curio dealers sell them for candlesticks.

Only in the southwestern corner of Colorado can you find the little brother of Tree Cactus Opuntia davisi, usually called Rattlesnake Cactus, a low spreading shrub from 4 to 12 inches. It has yellow flowers and long brownish spines, covered with a strawcolored sheath. A still smaller relative, Opuntia clavata, also with yellow blossoms, is a New Mexico species. It is an ideal plant for May or May or may not occur in Colorado.

It is fun to initiate a new-comer to the delight of eating prickly pear fruit; it seems such a risky business, and in reality is so simple and pleasant. All you need to do is rub off the spines (not forgetting the tiny ones), or peel the skin of the juicy fruit, and you have a cool delicacy quite unlike any other fruit. If you object to the large number of seeds inside, let me remind you of your experience with pomegranates. Yuma fruits, another name for prickly pear, are equally common in some markets of the southwest.

Incidentally, the beginner is very apt to make blunders on identifying Prickly Pear; about six species look very much alike in general. Two of these only have juicy fruit. The others have similar flowers and similar flat pads, differing, however, in producing dry fruit, more spines and green stigmas instead of yellow (or at most greenish yellow) stigmas. The question arises whether all these species have evolved rather recently, or may even be results of hybridization on a large scale. More scientific investigation is necessary.

The two species with juicy fruit are found in different locations. The common Prickly Pear of the eastern plains of Colorado, Opuntia humifusa or rafinesquei, Eng. covers miles and miles of territory. Its yellow, orange or even pink blossoms in June and July never fail to draw admiration for their beauty; some natives call them prairie rose. Purple-red fruit carries
on its beauty in fall. Opuntia vulgar of the eastern plains may be really the same plant or a close relative. Other species have been separated from it on the basis of differences in spines, shape of joints and such. Interestingly enough, it never is found west of the Continental Divide.

There, and in southeastern Colorado, another juicy-fruited Opuntia takes over, the New Mexico Prickly Pear, Opuntia phaeacantha, Engel. It is larger than its northeastern relative, and more decorative. Pink flowers are not unusual in this species. Its joints are generally over four inches long and wide, those of *O. rafinesquei* much less.

Of the dry-fruited Opuntias the so-called Dwarf Cactus, *Opuntia Schweriniana*, of Northwestern Colorado, is easily told by its small joints (2 by 2½ inches) and greenish yellow blossoms. It was named after the Count von Schwerin, as being “small, elegant but very painfully stinging.”

Hunger Cactus, *Opuntia polyacantha*, so called because its dry fruit provides no food for beast or man, is strikingly beautiful. It is found in mountains and on the western slope. Flowers range from yellow to purple, spines from white or brown to variegated. A favorite in collections, and unsurpassed for beauty, with the possible exception of its longspined relative the Porcupine Cactus, *Opuntia hystrix*, found in Southwest Colorado. The name is indicative, since the spines bristle in all directions.

Even more shaggy is the Grizzly Bear Cactus, or Wooly Cactus, *Opuntia trichophora*; its hairy white spines may grow to over four inches in length. It is found in the Wet Mountain Valley and in the far western strip of our state: Montrose, Cortez, Yampa Canyon.

Restricted to Western Colorado only is the Wide Cactus, *Opuntia rhodantha*, often but not always with rose-purple blossoms, and sometimes with yellow stamens. It takes careful scrutiny of ovary and areoles to identify it; and not mistake it for *O. polyacantha*.

And still we have not covered all opuntias. Brittle Cactus, *Opuntia fragilis*, is however different in that its joints are sometimes rounded and always loose-jointed. Any of these broken joints may hitch a ride by its barbed spines, and start a new colony in many an unwanted place. Pale yellow flowers do not help to make friends. A typical inhabitant of prairies and plains, that most of us feel we might very well do without. Whether *Opuntia rutila* will be accepted as a separate species, time will tell; it has triangular joints. So much for the flatjointed cacti, with either juicy or dry fruit.

Now for some “ribbing”.

**HUNGER CACTUS, Opuntia polyacantha** provides no food for man or beast, but is strikingly beautiful.

**PRICKLY PEAR, Opuntia humifusa** or *O. rafinesquei*, covers miles and miles of territory (yellow, orange, or pink).

**DEVIL’S CLAW CACTUS, Echinocactus or Sclerocactus whipplei**, is a handsome purple ribbed cactus of Southwestern Colorado.

Even a seasoned westerner who has witnessed the miracles of an uninteresting mesy cactus suddenly transformed into ethereal beauty, even he is overwhelmed by his first sight of a clump of Ribbed Cactus in full bloom. Dozens of scarlet or orange-red blossoms (depending on whether we see *Echinocereus triglochidiatus* or *E. coccineus*) light up a mound of ribbed cylinders, to be followed by red, juicy fruit. The time? Early June. The place? Both western slope and southwestern Colorado south of the same mystic line that stops the Tree Cactus ten miles north of the Arkansas river.

Common names for the scarlet *E. triglochidiatus* are Strawberry Cactus, King’s Crown Cactus, or by SPN, Claretecup. *Echinocereus coccineus* goes by the name Turk’s Head, Heart Twister or Bunch-Ball Cactus; its longer spined relative E. Roemerri is often called Beehive Cactus.

There is a purple-flowered *Echinocereus in Southeastern Colorado, named* Purple Candle (E. reichenbachii or caespitosus), and one close to the New Mexico border E. fendleri, much less conspicuous.

Few people pay much attention to the poor relative of all these gorgeous flowers, except the botanists. They point out that *E. viridiflorus* is found in abundance on plains and foothills of Eastern Colorado, that it is a quite inconspicuous and small plant (two inches) and that it hides its yellowish-green flowers half way under its sides. That is why it is called commonly Hen-and-Chickens.

All of this shows that a botanist is apt to look at plants from a different angle than the casual amateur. And so we need not be disturbed by the fact that he places two ribbed cacti in a group outside of the *Echinocereus*, because their flowers are borne on top of the plant.
Devil's Claw or Braided Arrow (Echinocactus or sclerocactus whipplei) is one of them. It is a smallish cylindrical ribbed cactus, only found in the southwestern corner of the state; it has purple flowers and a mean hooked spine.

In the same restricted area, near Cortez, Dr. Charles H. Boissevain found his new introduction, which he calls *Coralocereus mesae-verdae*, "a small round cactus, pale gray-green in color, with yellow blossoms, pleasantly fragrant." Dr. H. D. Harrington, in his new flora, leaves it in Echinocactus, calling it *E. mesae-verdae* (Boiss. & David).

From here on our survey of the Colorado cacti represents an anti-climax. Our ball cacti are decidedly of the non-glamorous type.

Snowball cactus (Echinocactus or Pediocactus simpsoni) and its variety minor was mentioned above for its unusual mountain location (pink flowers).

Two kinds of ball cactus with pink to pale purple flowers are plentifully found in Colorado; one for each slope. Abundant on the plains and foothills of eastern Colorado is *Spiny Stars, Mamillaria* or *Coryphantha vivipara*, described as early as 1813 by Nuttall (and a fantastic description).

*The pink SNOWBALL CACTUS, Pincushion Cactus, or Mountain Cactus (Echinocactus or Pediocactus simpsoni) is the heaviest drinker of the Colorado tribe.*

Sour Cactus (Coryphantha radiosa), so called for the taste of the fruit, is more spiny and more upright, otherwise it is much like its eastern brother, so is often just classified as *C. vivipara*.

The Missouri Cactus (Coryphantha or *Mammillaria* or Neobesseya missouriensis) is a proper representative with which to close this list,—if our aim is to "fade away"—as recently advocated by some. Widely distributed in the foothills on both east and west slope, but nowhere abundant, with a yellow blossom fragrant but inconspicuous, and a 2 to 3 inch ballshaped plant, partly covered with rather untidy spines,—there is nothing very outstanding about this Missouri Cactus. Its scarlet berry popping up in April after previous year's blossom, will help to redeem it from utter "innocuity."

Let us not, however, end this on a negative note. The proper account of what has been called the "fantastic clan", the clan to which such unbelievable characters belong as the life-saving *Traveler's Compass* (Ferocactus cvilloi), the Nightblooming *Cereus* (Hylocereus undatus), the living fences, such as the *Organacactus* (Myrtillocactus geometrizans), and above all, the towering, dignified *Saguaro* (Cereus giganteus),—the account of even a minor portion of this clan might well end with an appeal to your most vivid imagination and to your subconscious emotion of wonder and awe of Life itself.

If you have experienced the desert, and if you have marveled at the glory of a cactus blossom, you will have caught something of the lure of this seductive and fantastic clan. As Madge Morris wrote in "Lure of the Desert":

"If you have not, then I could not tell, For you could not understand."

The idea of growing plants without soils has fired almost everyone's imagination. Regardless of the name hydroponics, nutriculture, water culture, gravel culture or soiless culture, the fact remains that there are many false impressions as to its possibilities.

Garden enthusiasts range from the organiculturist to the chemiculturist. The extreme organiculturist may follow bio-dynamic methods and condemn the use of inorganic chemicals which supply plant food. The nutriculturist may vision food production on a practical commercial basis to the extent that our land may eventually be used for parks, recreation, preserves and super highways.

The truth is that the practical gardener will follow the intermediate path. Woodward in 1699 concluded "That earth, and not water, is the matter that constitutes vegetables." Plants require space, they require support, they require sunlight and they require the necessary elements with which through photosynthesis they can manufacture the food they need. The most practical method of gardening will continue to be the method by which all of these essentials can be supplied for the most efficient production.

Hydroponics has been and continues to be a valuable technical tool to help research find out what kinds and amounts of food plants need. It has commercial possibilities in greenhouses on ornamental crops where difficulties are encountered in maintaining large quantities of soil and manure or where specific problems of sterilizing, watering, weeding or fertilizing may exist.

There was another use of hydroponics during World War II when our Air Forces used soiless culture at several isolated islands particularly at Ascension Island to produce fresh vegetables. This was because fresh vegetables could not be practically obtained by any other method and it was not safe to use the available soil or natural water supply because of pollution.

People interested in nutriculture must remember that the method is costly and needs expert supervision. The lack of horticultural skill cannot be substituted for nutriculture. Nutriculture demands knowledge of all factors of plant growth.

What results can be expected? Nutriculture does not solve problems of sanitation and it is rarely superior to soil culture. Plants cannot be spaced closer, their growth habits are not changed, they require just as much water and the nutritional quality of the product remains the same.

Where folks have small benches or only a few plants there are available for them many commercial nutrient solutions or mixtures which serve as stock solutions. From this stock solution the necessary quantity of nutrient solution can be made up every two weeks so that the solution the plants are growing in can be changed.

Several books and many papers have been written on nutriculture but with the exception of the scientist, and some commercial greenhouse growers, of ornamental crops, the method has little practical value.
LOW BORDER AND EDGING PLANTS

By Mrs. Sue Johnson

Low, border, dwarf and edging plants are really something to fill one with delight. They are so satisfying and yet so very easy to use that one should be eager to try them all, but of course, not all at the same time. For early bloom have you tried Arabis or rock cress, which blooms in April—grows six inches high and is a delightful edging plant. Iris, dwarf varieties, bloom April and May and are tiny and wonderful spots of color. Phlox subulata is another good ground cover and wonderful in the rock garden. The geums, of sprawling habit in red and orange are also a bright note in the spring garden. Alyssum saxatile or Basket of Gold has a beautiful gray foliage and clouds of yellow bloom in May. It is certainly a must for any garden and if cut back may give a little bloom in the fall. Armeria or sea pink has a small compact bloom. Cerastium tomentosum, which you may know as Snow-in-Summer is another prolific bloomer and gives clouds of white bloom in late May and early June. And, of course, the violets and violas—these are truly the easiest and most satisfactory of all to me, for I have tiny violas in bloom the year ‘round and it’s fun to go out in mid-December and January and find a tiny face looking up at you from some protected spot!

For mid-season bloom, try the Erigeron or daisy which blooms in July and is only eight inches high. Iberis or candytuft is another favorite as are

Huechera or coral bells, dainty red and pink blooms on long graceful stems, but the plants themselves are low on the ground. These give you the airiness and grace needed. There are the pansies, also, which are biennials but they sometimes act as perennials here. Dianthus—pinks or hardy carnations—bloom early and late if you keep the old bloom cut and they are so very fragrant, that I am sure you will want them for that reason alone. Then by all means, try the miniature roses. These are really something, when planted as specimen plants or in mass effects. I’m sure you all know them. Have you ever tried them in pots around the patio, or planted in masses around your outdoor living rooms?

For fall, of course, the chrysanthemums are the best known and possibly the best liked of all. The colors are breath-taking and all are easily grown. There is also, Campanula carpatica which grown in masses is very lovely—a cloud of blue and white. Possibly you know them as harebells. And don’t forget the mints, thymes, and chives near the edges for if these are bruised or brushed against there is an immediate burst of fragrance all about, which is delightful. If you have a hot, dry, difficult place to keep anything in bloom and want something really different try the Sedums. There are dozens of varieties, colors and sizes. They change color in all seasons, and they all bloom profusely. I have them on a hot, sandy, dry wall on the north side of our place which faces south and gets full sun, summer and winter, and they are truly lovely. There are the Trailing Sedums—Ewers, which has rosy bloom in August. For spots of color, Sieboldii has coral edged leaves which turn smoky purple in the fall. The tallest of the common Sedums is Showy Stonecrop—which is good for filling blank spaces when the tulips are through. All sedums are shallow rooted and won’t compete with your bulbs. Try potting some for around your terrace. Elacombe makes a leafy green spread which turns a gypsy red in cold weather and has orange yellow blossoms. Leafy Stonecrop has smoky pink blossoms on short stems. Spanish Stonecrop is another fast-growing sedum with brilliant green stems and tiny yellow starry blossoms, which are a delight.

These are but a few, but if you try them I’ll guarantee that you’ll love them and want every new variety you can find. Try them in arrangements and dish gardens.

With the successes and failures of the past season fresh in your mind, now start to plan for needed additions and improvements for next season. Put these ideas down on paper so that you will not forget them when spring comes around. Planning is part of the pleasure of gardening.

* * * * *

A garden may be beautiful because of its good plan, its good plants, its good maintenance, or better yet because of all three of these things. Neatness is the one thing that costs little and makes a great deal of difference. Take off the old bloom stalks and the plants that are entirely thru for the year. Trim back the rampant things that are lopping over the walks, but do not cut off green, growing stems unless you are willing to ‘orego bloom the next year. Many plants, especially the bulbs like tulips, must store up energy for the next season’s bloom by their growth after this year’s bloom.
PLANTS FOR THE BACK OF THE PERENNIAL BORDER

By Mrs. Harracena Newman

These plants which I am suggesting are nice for the tall background of your perennial border. Of course, these are only suggestions and not all should be used, nor are these all that can be used. Remember always to plant in groups for mass color effects and to prevent “spottiness.”

For Spring the climbing roses and silver lace vine are nice, if you have a high fence, trellis or lattice work support. Try a grape vine also. When not in bloom the foliage of these are very attractive.

For a tall spike formation you might use delphinium. The range of color is rather wide; from dark blue to the very light blues, white, art shades to almost red. These may require a little more care than some plants; but repay in beauty. They may have to be staked if not protected from the wind. If the first bloom is cut to the ground, they will give a second bloom later in the fall, but not as tall as the first growth. Foxglove or digitalis, which is a biennial, is very beautiful, about four feet high. Monkshood or aconitum comes in several shades of blue and blooms in July and August, as does Tritoma, or red hot poker as you may know it, which also combines nicely with the day lilies or hermerocallis.

For lacy mass effects the white daisy-like boltonia blooms late in August, as does the spireas, white astilbe, Japonica or pink astilbe, Davidii. These latter have plume-like flowers. These die back in the fall and make new growth each year. Their height is about five feet. Rich moist soil is best for these. For lovely foliage as well as for plume-like bloom, try meadow rue or thalictrum. It comes in light yellow or purple colors. Another is lythrum, which is almost a “must” in every garden for its lovely spire of gay flowers. The tall white ageratum, Valeriana, is another in this group. Transplant the increase either in the fall or spring. I would recommend spring for this locality.

Don’t overlook the tall lilies—white regal and the centifolium, which is a hybrid of the regal. Also, yellow Henri, or the orange red tiger lily. All lilies are best planted in groups of three, five or more.

If you have room for the coarse foliage plants, such as the intense blue Chinese forget-me-not, anchusa, helianthus (one of the highly developed sunflowers) with their color range from yellow to almost red, the yellow yarrow, achillea and the steel blue globe thistle, echinops. All of these are excellent cut flowers and for drying for winter bouquets, the lovely steel blue and yellow combination together with the cone of the cone flower, rudbeckia, are unexcelled.

For late fall bloom, the tall fall asters, Michaelmas daisy, and the tall chrysanthemums will give you a riot of color until snow. If you have a spot you wish to hide, either in your own or your neighbor’s garden, plant some of the new hollyhocks. Althea is a beauty, and goldenrod or golden glow. Don’t be afraid of hay fever, for they are not the guilty parties; the pollen from the rag weed can settle on any flower.

From your catalogues and garden books, select the colors and plants for the background that fit into the plan you have made. They should complement your home inside and out, and you.

SHINYLEAF YELLOWHORN

Xanthoceras sorbifolium

This large shrub is not well known in the area, yet it apparently is very hardy and easy to grow. The leaves, as the name indicates, are similar to mountainash or sumac. It develops a rather coarse open growth a little like sumac. The flowers, as the picture shows, are rather nice and they are followed by chestnut-like fruits which give the plant its common name of “Chinese Chestnut.”

Few nurserymen handle the plant so they are difficult to obtain. Specimens have been growing in City Park, Washington Park and Sunken Gardens for many years. When our new Botanic Garden gets going this is one of the sort of plants that will be made available for growers.
CHLOROSIS OF ORNAMENTAL TREES

By L. C. Chadwick,
Ohio State University, Columbus, Ohio
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* This is a very timely topic for our area. While it is written for the East it applies, with little modification, to our conditions. Dr. Chadwick is one of the leading tree experts of this county.—Ed.

ON SEVERAL occasions in the past, the results of experiments for the control of chlorosis have been reported. There has been a demand for the current recommendations for soil treatment. These recommendations are given below.

Chlorosis first appears as a yellowing of the leaves between the veins, gradually includes the whole leaf and finally causes a curling and dying of the margins. Further stages of decline cause a deformed and die-back condition of the branches. Chlorosis occurs more often in pin oak than other ornamentals, but it is not unusual to find it on sweet gum, some maples, azaleas and rhododendrons. (In Colorado it is often noticeable on Flowering Quince, Ninebark and Barberry. Ed.)

The cause of chlorosis is generally considered to be due to lack of available iron to the chlorotic parts of the plant. Several investigators have indicated that plants chlorotic from lack of available iron contain as much or more total iron per weight of tissue than do non-chlorotic plants. This statement points to the fact that certain internal conditions render unavailable to the chlorotic parts the iron already present in the plant. Iron may be present in the soil but unavailable to the plant because of unfavorable soil reaction. For the iron to remain available the soil must be quite acid.

Various methods of treating chlorosis of trees and shrubs have been recommended. One of the methods that has been found to be satisfactory is soil treatment.

Recommended Method of Control

MATERIAL TO APPLY: A mixture of equal parts of Iron sulfate (Ferrous sulfate), finely ground sulfur, Aluminum sulfate, Ammonium sulfate.

RATE OF APPLICATION:
Trees—2 1/2-3 lbs. per inch in diameter of tree trunk. Use the heavier application for trees over 6 inches in trunk diameter and on high alkaline soils.

Shrubs—Applications based on pH of the soil. Apply 1-1 1/2 lbs. of the mixture for each half pH above pH 6.0 per 100 square feet of bed area. The heavier applications can be used in silty or clay soils.

TIME OF APPLICATION: Early in the spring or as soon as the symptoms appear in late spring or summer.

FREQUENCY OF APPLICATION: Repeat the application in three or four weeks if improvement does not result from the initial application. Repeat again the following spring if chlorotic foliage develops. In high alkaline soils one or more applications may be necessary each year.

METHOD OF APPLICATION:
Follow the usual methods of tree and shrub fertilization.

Broadcast: This method can be used for shrubs and small trees where the soil can be worked. The chemical mixture should be hoed and watered in.

Punch-bar: The use of a punch-bar or an electric or compressed air driven soil auger or drill is a common and economical method of tree fertilization and is usable for treating trees for chlorosis. The chemical mixture should be applied in holes distributed evenly beneath the spread of the branches. Start the holes relatively close to the trunk of the tree and space them evenly, 15-18 inches apart.

ROADSIDE BUSINESSES MAY BE BEAUTIFUL

The above picture shows a very attractive roadside stop on the west side of Rabbit-Ears Pass. They have made use of their natural setting looking out over the beautiful Yampa Valley and designed this station to fit into the landscape instead of making an ugly blot on the roadside. I am sure that this consideration for attractiveness and beauty will also be profitable to the owners and to the whole community.
A GOOD SHADE GARDEN
By Helen Fowler

With one of the few that knows the value of shade in a garden and with such a limited space to grow shade-loving plants, there is a hope that someday there will be more room for growing the fine Aconitum, Dicentra eximia, Lobelia cardinalis, Polygonatum (Solomon’s Seal), Thalictrum (low meadowrue), Trillium and so many others. Look out for the creeping buttercup, whose name quite inadequately describes its activities.

This small spot is watered carefully, but watering, anyhow, simple as it seems, is really one of the subtlest and most vital secrets of success in all gardening.

Although devoting eight to ten hours per day to his business, Mr. Ferretti still finds time to maintain one of the beautiful gardens of Denver.

Fingers in the Soil
From a story of The Children’s Garden of the Brooklyn Botanic Garden.
By Frances M. Miner

Often the idea has been expressed that every child should have a puppy. Every child should also have a garden, for only in the garden can he learn to evaluate the true importance of plant life. A puppy is a living thing, so is a plant. It is necessary to know something of both.

The challenge of successfully growing beets, onions, corn and tomatoes carries with it the deep satisfaction of individual accomplishment. This is more lasting than soup greens and salad. The ability to work hard either together or alone, to respect the rights and property of others and to have a good time on the job—these too, are part of the harvest.

DO YOU KNOW THE TWINFLOWER?
If you happen to have an acid-humus area (pH 5), and damp, this lovely Linnaea is ideal. It is a fast creeper, only a few inches high, with Azalea-like pink flowers. It is more or less evergreen and requires partial shade. You hear of this plant sometimes as deervine and also twin sisters. Named for Linnaeus. H. F.
WATER AS A GROWTH FACTOR
From Rotary Tillage Talks by Milwaukee Equipment Mfg. Co.
As Written by Alex Klose.

Of all the things which are part of our marvelous universe, nothing serves a wider range of usefulness than water in its varied forms. Because of its value and need, water covers more than two-thirds of the Earth's surface. This rather elementary fact, familiar to every grade school student, takes on an added importance and interest when considered in its application to gardening.

The large percentage of water—the river of life, in its everchanging forms, is an example of what might be called an over-worked miracle—so common, in fact, that often the miraculous in it is not seen. Actually, water is the vehicle upon which and whereby all physiological processes are dependent and made possible. This is just another way of saying that all life is dependent upon water and cannot function properly unless the correct amount is present at the required time.

Although water does not always have the same general influence as some of the other growth factors, it can be placed near the head of the list in importance. This is illustrated by the structural modification and adaptation of plants in their distribution, adjustment, and response to variations in the moisture supply. The difference in general appearance between the cacti of the desert and water lilies near or far is as great as that which is found between temperate or tropic zone species. Therefore, the cacti will not survive under swampy conditions, nor the water lily in the desert. This may at first seem so obvious as to appear ridiculous, and yet, a large number of growers actually provide almost desert-like conditions for the water-loving plants and a swamp-like environment for those, who in the language of the gardener, will not tolerate "wet feet."

To help understand how a lack or over-supply of water can become a limiting growth factor, it is necessary for the grower to have some knowledge of the basic plant life. Water is both an important plant constituent and a universal one, because there are no water-free plant tissues. The amount of water contained in the plant will vary with the species, the environment in which it is growing, and the season of the year. Usually, the harder the wood—the less moisture it contains. Oakwood, therefore, contains less moisture than willow—heartwood less than sap wood, and, as the dormant season approaches, or as the plant reaches maturity, the moisture content of wood and other tissues decreases. As a result, the moisture content of an apple twig in winter may be as low as 45%, while in summer it may contain 60 to 65%.

Early in spring the moisture content of the stem of a young rapidly growing tomato plant may be as high as 90% while two weeks later, after having been properly hardened for transplanting, it may be only 70%. Too often a consideration of the importance of moisture is limited only to the part it plays as a carrier of soil nutrients, with no thought being given to the absorption reactions which it brings about in the minute tomato openings in the leaf.

Most of the insect and disease control programs are carried on primarily to protect the leaf of the plant, upon which 90% of the final growth development is dependent. Therefore, the idea of this leaf protection program can be still further extended to include the thought that the grower is actually guarding the tomato, or breathers, which are part of every leaf structure. These breathers, or small openings, are designed to expose minute quantities of moisture to the atmosphere, from which they absorb carbon dioxide. This carbon dioxide cannot be absorbed unless moisture is present in large amounts and in a steady and constant supply.

Almost 50 gallons of water are needed to produce 1 pound of dry matter in corn. This suggests that unless 50 gallons are available to each corn plant, it cannot manufacture a normal amount of dry weight material, consisting of the nutrients brought up from the soil, and the carbon absorbed from the atmosphere. A normal moisture content of the soil is usually associated with steady rapid growth, tenderness and crispness in texture of the produce.

The hearts of celery, for example, are crisp because they contain more water than the fibrous leaf stalks of the same plants. String beans with a normal moisture content snap apart with a clean break under slight pressure. As a rule, home grown vegetables which are prepared for table use as soon as harvested are of higher quality, both in flavor and in food value, than those which are consumed several hours or days after picking. The difference in quality and flavor is very pronounced in such vegetables as sweet corn and peas, whose sugar content changes to starch almost immediately after picking.

The reduction in quality is due to moisture loss which sets off a series of chemical reactions affecting the flavor, the fiber, and the food value of the fruits. This suggests that care be exercised to maintain a maximum food value. Some thought given to the selection of varieties will result in higher quality. Many types of small fruit, in spite of their favorable growth habits, might not be too desirable for canning or freezing purposes because of their high moisture content. This is especially true when ripening occurs during a prolonged rainy spell which has been preceded by a drought-like condition. Likewise, some varieties of potatoes do not become mealy when cooked or baked because of the influence that moisture has on their starch content.

The winter hardiness of plants is very often erroneously associated with only the growth factor—temperature. This somewhat mistaken idea is perhaps the result of their catalogue description. Such listings represent the hardiness of a plant by stating that it is native to some far northern country where the winter temperatures may go as low as forty degrees below zero. As a result, gardeners conclude that they can grow an area where winter temperatures drop only to the zero point, or slightly below. Such plants will survive under their conditions.

A selection of plant material based on such a conclusion is done without considering the relationships which exist between all growth factors. In this particular instance, moisture is largely the determining hardness factor. This means, that in addition to temperature, all the processes which occur in the plant as a result of the type of soil, its moisture-holding and nutrient capacity, help to determine whether or not it will withstand even moderate winters. Therefore, the amount of water in the soil late in the season will have a bearing on the maturing or hardening of the tissues of the plants. Thus, the shoots of a raspberry plant, the twig of an apple, or the cane of a rose may contain 55% water in late summer and early fall, at which time they are very ten...
The huge supply of water required by a plant is related to its absorption of carbon found in the carbon dioxide of the air. After removing the carbon from the compound, it sets free the oxygen, a vital life-sustaining element. When this process takes place, a certain amount of energy is immediately released or stored for future use. All fuels are basically carbon products, made when green plants absorb the energy from the sun if moisture is present in the leaf cells. Thus begins the carbon-oxygen cycle, which points out and emphasizes that nothing on this earth is self-sufficient, but is dependent upon an endless number of cooperative helps established in a well-balanced process.

One of the important contributing constituents of this process is soil and its physical structure which determines its moisture-holding capacity. The physical structure of soil is based on the percentage of gravel, sand, silt, and clay which makes up its framework. An examination of three broad classes of soil—a sand, a loam, and a clay—will show how its physical structure is related to its moisture-holding capacities.

Spread out in the surface of four feet of an acre of moist, sandy, coarse soil there are more than forty-five square miles of water from which the root hairs of plants draw their requirements. A good loam presents 270 square miles, while the finest clay soils carry 1200 square miles of water per acre of field. From this wide range of surface it is easy to understand why there is such a broad difference in the production capacities of various soils. This variation is due to physical or surface area only, even when the chemical natures are similar. A further examination of the soil surfaces helps to determine the productive capacity of a garden. The thickness of water layer left behind in a sandy coarse soil twenty-four hours after a rain is only four to six pounds per cubic foot. The loam soils having a higher internal surface are able to retain from 24 to 50 pounds per cubic foot, while the clay soils can hold as much as 35 to 40 pounds per cubic foot.

Much of the available plant nutrient of soils is in a soluble form. This suggests that soils of good physical structure when supplied with amounts of moisture equal to their maximum holding capacity will be the most productive. By the same token, much of this valuable plant nutrient material is lost from sand in the drainage water which carries it to the ocean, or to underground storage beds, where future generations will discover it as fertilizer deposits.

The size of the soil particles is therefore related to the power of its retention of the water film which reduces loss of nutrients by leaching. Here again, the importance of proper physical soil structure is apparent, because it is structure which determines the amount of water which will remain. Any water which remains after the holding-capacity of the soil is reached permits the leaching of plant nutrients and upsets a normal biological activity. Although appearing contradictory, soils which drain poorly or slowly lose more of the soluble plant nutrients through under-drainage than those which drain normally.

The growth factor, moisture, assumes an added importance when a plant is compared to a complicated water works system which is continuously transporting water. The roots of the plant might be considered as small conveying tubes which are centered in the stem and trunk of the plant, and the leaves as tiny nozzles which are constantly ejecting moisture into the air. An average size apple tree has hundreds of thousands of minute spray openings in its leaves. The
amount of water which is transpired from the tomato openings totals an unbelievable volume. For example, if the corn patch growing in the vegetable garden would accumulate all of the moisture thrown into the air by the leaves, a five-foot deep lake of water would be formed at the end of a one-hundred-day growing season. Because water is such an important growth factor, 340 cubic miles of it fall every day on the planet Earth. This is equal to 16 million tons of water in the form of rain per second.

Because of the important functions of water in all stages of plant growth, it becomes necessary for the gardener to apply every available soil conserving principle. Among these are the use of mulching materials such as hay, straw, peat moss, wood boards, or stones. All these materials are beneficial not only because they lessen soil evaporation losses, but also because of their ability to condense moisture from the air. This condensation occurs because the same physical principles are involved as those which are associated with the dripping of cold water conducting pipes in a basement.

The moisture conserving program for next year’s garden can be started this fall by incorporating compost manures and other organic material with the soil.

HAVE A DISH OF ALGAE, PLEASE!

Scientists claim — some, that is — that the time will come when there will be so many people on this earth that it won’t be the efficient thing to grow beef for food. As a substitute in the future our great-grandchildren may have learned to relish algae, and deep-sea fishes. Both are found to be almost inexhaustible, and with pepper, chili sauce or tomato catsup, I suppose, most anything can be made palatable. Spinach, move over!

The Union of South Africa is already developing an algae industry along its coast. So far it is extracting alginic acid, a substance used in the textile industry for strengthening wool so that the fibers will not break on tight weaving. Alginic acid is also used for soaps, lotions, toothpaste, plastics and films.

M. W. P.

Sit down now and make a record of the successes and failures of your plants up to date. This will be invaluable when planning next January.

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THE CONTEMPLATIVE GARDENER
By JASON HILL

A NEW BOOK just received at Horticulture House, with 22 pages of drawings by that supreme artist of black and white, John Nash.

With such a visionary name, still this is strictly a practical book about gardening. It is a distillation of experience in the art of getting the most out of a one-acre pleasure garden. If you like to think and not follow some model of elementary instruction, you will enjoy this book, to open at any chapter; it could have been called THE ECONOMICAL GARDENER, for it is a labor, space and money saver, dealing with miniature wild gardens, miniature herbaceous borders, home-made plants, the technique of making rock gardens without rocks and of gardening without a garden to garden in. The author thinks he could have appropriately called his book THE WAR-TIME GARDENER, also, for the art of making a little money go a long way seems to be his concern.

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In the two chapters, “Something to Look at in Winter” and “The Evening Garden,” both contemplative and comforting, you might gain some peace of mind, which is gardening’s chief gift to man—a gift made infinitely significant in these times of war.

HELEN FOWLER

CONTRACTOR’S SOIL

TAKE NOTE. With all these houses springing up everywhere, new gardens are being constantly made. It is very important to watch out for the blunders some builders often make. The good top of the original soil is often buried under a layer of solid clay or sand or gravel, dug from the foundations. Even garden builders are not always blameless in this respect; they will use any soil that looks good to surface the beds while better soil is let unused, or, more often, buried under debris. A little digging will reveal these things and if it does take a little extra time to bring the rich, dark soil to the top, it will pay. I would never think it too much work to go down eighteen inches, or even two feet to find the right soil.

H. F.

BLUE FLAX

Have you forgotten the blue flax (Linum perenne) for your garden? I keep looking for it but scarcely ever see it. It is of particular value in the perennial border because of its light grace, its azure blue flowers, and its delicate pale-green foliage. The flowers bloom only until noon in brilliant sunshine, but in cloudy weather remain open all day. You need not be afraid to transplant it now in clumps with soil on the roots.

H. F.
DIFFICULT growing conditions have often acted as challenging stimulation to gardeners; as a result they have created a very individual type of garden. A definite type of Spanish garden has developed from such conditions; a garden that is distinguished by its use of brick and stone for form and practicability, and by bright colored plants that are entirely in keeping with the landscape, and reveal also the Spanish love for privacy and color. Water is used in a score of different ways to add coolness and lightness in welcome contrast.

I shall remember for a long time a small Spanish garden I saw in Pennsylvania. It was a garden within the larger garden belonging to Mrs. Randall Morgan of Chestnut Hill, Philadelphia. Apart from its extraordinarily restful atmosphere it attracted my attention by the small space it covered, and the ideas it gave for small city gardens.

I cannot now remember its length, but it was certainly not more than 60 feet, but I do know its width because I paced it there, when I came on it one summer afternoon, and tried to linger as long as possible.

I stepped out of a small conservatory, through the glass door and the attractive iron gateway beyond, and looked down, past the small jet fountain at my feet, to the stone seat backed by evergreens at the garden's end. On either side of this central brick path, four feet wide, was a line of evergreens trained into arches, and close behind them was a low wall on which stood Spanish earthenware vases and pots full of pansies and multicolored calcelarias. From the brick path to the wall on either side it was but eight feet, so that the entire width of the garden was no more than 20 feet, two 8-foot borders of wall and evergreens and the 4-foot brick path.

Here was a garden that had been designed by an artist. Exact in every detail it was yet utterly simple, and had the great advantage of being of easy maintenance. Within that framework I could think of many other materials that could be used to suit different localities. In Virginia it might be box—in Colorado it might be juniper or pinion pine and pots of white petunias and geraniums. It was in fact an outdoor room, and within its framework or walls might be furnished with whatever material an owner might choose. There are few small gardens that I have seen so well furnished, so well designed and so easy of maintenance.
EDWARD P. NEIMAN, IN MEMORIAM

"Ere the parting hour go by
Quick, thy tablets memory.


Coming West in 1906, as a health seer, he and Mrs. Neiman went to a ranch near Albuquerque, New Mexico. Here, undaunted by his illness, he faced the vicissitudes of ranching with the same spirit of whimsical courage we came to know so well.

Greeted with the problem of milking a cow for the first time, his comment was, "I'm doing fine, but she won't cooperate." Faced with a flock of turkeys which, on a particular morning, reeled about his farm yard, he knew adobe for the first time. The turkeys had ventured into the moist clay till their feet became so balled that they could not stand up.

After four months of such adventures, however, he became convinced of two things; first, that ranching was not to his taste and second, that the West was giving him back his health.

He, therefore, left New Mexico and came to Denver where he resumed the work with which he was familiar and joined the staff of the Park Floral Co. when its greenhouses were at York and Colfax.

It is interesting to note that his entire life was given to one endeavor, so that his work, as the years went by, became both vocation and avocation, for, while carrying on a successful commercial business, he continued his production of new varieties of carnations, azaleas, and hydrangeas with notable success, and with consuming interest and pleasure.

In 1918 he and Mr. Gillis purchased the Park Floral Co. and a memorable association of 35 years began.

Through the observant eyes of a young confrere, we catch a glimpse of a man of varied capacity and resourcefulness. Here was the "Senorita," a carnation of outstanding color, size and beauty, but with a particularly undesirable habit. She grew always with a split calyx. Discard Senorita? No. Mr. Seiman made a clever little device which was clipped to calyx while the flower was in bud, then was removed and, with fitting economy, used again on another blossom.

The newest discoveries were tried and adventured with for good or ill. The first use of 2, 4-D to kill weeds resulted in an expensive lesson. The Cathedral lawn was flawless, but a crop of chrysanthemums was lost; for the sprayer was washed, but not neutralized with the proper solution before using again. Not a word of complaint, but an experience gained.

At 72, his spirit was as venture some as that of his young associate, at whose suggestion he built a new and revolutionary bulb cellar. Again an untoward accident. Before it was scarcely completed, it was destroyed by a pyromaniac. Never a word of recrimination or complaint.

It was this spirit of initiative and courage, coupled with kindness, which solved organizational difficulties and created opportunity for growth with a growing industry.

Thus came the merger of Park Floral Wholesale Co., Elitch Gardens Wholesale Co., and Colo. Flower Market, to become Park-Elitch, the organization of which Mr. Neiman was president for 13 years.

Hybridizing continued with outstanding successes and Colorado's carnations, among them his splendid deep pink, Phyllis G., became widely known.

In the words of his young associate, "He had a good spirit, he was fair, honest and upright. He had an active mind and a youthful receptiveness to new ideas."

Edward Neiman conquered many obstacles in the course of his 72 years, but, having dominated the vicissitudes of ill health many times in his life, he met, at the last, great duress.

"If in the paths of the world Stones might have wounded thy feet, Toll or dejection have tried Thy spirit, of that we saw Nothing; to us thou wast still Cheerful, and helpful, and firm."

And so this, with all the rest, we remembered, as we sat in the quiet of the Cathedral of St. John in the Wilderness, on June 4th, 1951, with the friends of so many years, and, together, bade a last farewell.

ANNA R. GARREY.
AMERICAN educators face the problems of developing citizens able to get along with one another; and citizens who will utilize their natural environment so that it will furnish an ample sustenance for the present generation and continue to provide for generations yet to come. The first problem demands immediate and constant attention whether it be in a home, in a community, or in relations which involve nations. My primary concern is the problem of training citizens to get along with their environment and to use it in wise fashion. I am concerned with the problem of teacher training.

The student of nature study, the ecologist, is conscious that human life, like other forms of life, is limited by environmental factors. We are “bound” to the soil. The central valley of California where I am located is limited in its development, agriculturally and otherwise, by the water which may be supplied through irrigation. The future population will depend in large measure on the extent to which an adequate supply of good water may be provided. Water is an essential component of protoplasm. Protoplasm is the basic substance of which living things are composed.

We have seen increasing evidence of natural science instruction in public schools; but recently there has been a trend towards emphasis on generalizations. Many of these are supplied in textbook form and they are being parroted throughout our public schools. Is this sound instruction? I think not!

We cannot attack the problem of conservation education solely through the printed page. Children need specific, primary, sensory experiences more than they need vicarious experiences and generalizations. Generalizations are in the majority of cases partial truths. To provide children with numerous specific, primary experiences we must concern ourselves with training teachers to explore and interpret the immediate environment with their pupils.

Alert, well-informed, skillful teachers are a prime requisite for effective public education. But they must also have a desirable point of view as emphasized by Liberty Hyde Bailey in "The Nature Study Idea." Their skills must include teaching the fundamentals but they will ease their tasks and increase their effectiveness if they approach these through studies of their immediate environment. Teachers need to become acquainted with resource persons as well as areas. They need an adequate supply of instructional materials pertinent to local areas. Soil conservation problems in northeastern Pennsylvania may be very different from soil conservation problems on alkaline lands of portions of the San Joaquin Valley. In cooperation with resource people teachers may develop practical educational materials which will be useful in the hands of children.
AUGUST GARDENING

August is usually hot and dry. Plants which have been properly trained by careful and thorough watering will survive this critical period, but those which have been pampered with daily, shallow watering are sure to suffer. Toward the last of the month it would be proper to begin to hold off the water a little on the woody plants so that they might begin to ripen up their wood ready for the frosts next month.

* * * * *

Do not let down in your war on garden insects and diseases. The large red aphids are likely to be on your Goldenglow and Goldenrod. Perennial Phlox may be losing their lower leaves. Dust with sulphur to control both rust and red spiders. Aphids may be sucking the life out of your Delphinium, Columbine or Spirea bushes.

* * * * *

Any necessary trimming to trees or shrubs may be done now as well as any time.

* * * * *

Your tulips are completely dormant now. Some of the old top may still be present to show where they were. If they bloomed well this spring they should be left alone. If they are weak and appear to have divided into many small bulbs, it is time to dig and divide them. They do not need to be kept out of the ground until fall, but may be replanted at once. Put them in about 10 inches deep in a partly shaded place, for best results.

* * * * *

Weeding should not be such a problem this month. Most of the weeds should have been cleaned out weeks ago. We should be able to let down a little on our continual round of "weed and water, weed and water". The greatest danger now is that we will let a few weeds go to seed and spread seeds for next spring. Later in the month some gardeners advocate letting a few low weeds creep in to help dry up the soil and ripen the plants around them.

* * * * *

Now is the time to move Oriental Poppies, if that should be desirable. They are dormant now, but will begin new growth in September. Even a small piece of root will often start a new plant. Plant them in large masses where they may be seen at a distance.

* * * * *

With the routine garden work letting up a little, now is the time to do those things that were neglected earlier—level up the flagstone walk, nail back that loose panel on the fence, patch the crack in the pool, paint the trellis, trim the dead out of that old Lilac or edge the borders.

* * * * *

This is the time that your garden looks empty and colorless unless you have planned in advance for the heat loving things to fill in the gap between the early and late flowers. Even the best planned perennial border needs a few of the summer annuals to fill in at this difficult time. Petunias, Zinnias, Calendulas, Marigolds and Four-o’Clocks are all common flowers, but they enjoy this heat and require little care.

SUN-DRIED CANADIAN

Although long known to garden authorities, the amazing soil-conditioning properties of Sphagnum Peat Moss are only now being generally recognized. It seems too good to be true that a product so low in cost can accomplish so much! Peat Moss improves the moisture-holding capacity of sandy soils; makes stiff clay soils light and friable; retains fertilizers longer; aerates the soil; protects tender plants against cold; and performs scores of other garden functions.

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