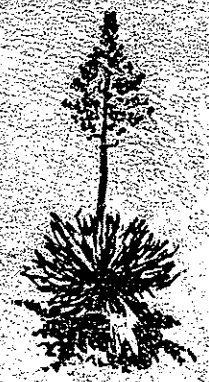
# PRACTICAL GARDENING

IN THE

# SALT RIVER VALLEY



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## FOREWORD

Happily, there is a great movement for flower-gardening gaining a foothold in this country. In the Valley of the Sun, the amateur gardener finds himself amidst many unusual conditions of soil and climate. The newcomers to our section are confronted by elements quite different from those of other parts of the continent.

It is desirable, therefore, that such information as has been acquired through actual experience, by the gardeners of the area, be placed at the disposal of those who are interested in beautiful gardens.

It is a source of great pleasure to the Valley Garden Center that the generous responses from the many people who have contributed herein have made it possible to collect these gardening hints. We do not however, present it as an absolute and infallible document and remind the reader that the various chapters are from many sources.

This little booklet, compiled through the cooperation of outstanding gardeners and garden clubs is therefore issued by the Valley Garden Center.

## A PRAYER FOR A GARDEN

Lord of all gardens, by Thy Grace
Illuminate this garden space,
Bless all the work of those, we pray,
Who labor here, and every day
Be with the sick and helpless near
Who find this place a joy
Of clustering blooms and blossoms bright.
Bless all the little pattering feet
That stray across the greensward sweet,
And every bird that wings its way
Into this garden day by day.
And grant new hope and pain's release
To those who come for rest and peace
Within its bounds. Bless all who share
Some part of willing labor there,
And over all let peace and love
Ever be showered from above.

(Taken in part from a poem by
Reginald Pelham Bolton)

# SOIL MANAGEMENT

"Scruple not to enrich the dried up soil with dung"
Virgil—The Georgics

For generations we in the United States have lived off the soil with little thought of balancing accounts with Nature. We have destroyed our forests, overcropped our lands and lowered our water tables to perilous levels.

Confronted with the problem of vastly increasing food requirements and a fast diminishing productivity, our scientists turned in deadly earnest to the necessity of restoring our soil to its former high fertility. Nature had taken 500 to 1000 years to build each inch of that soil by the slow process of the disintegration of the rocks and the decomposition of plants, animals and animal wastes. The questioning microscope and systematic experimentation has taught us more about soils in the last 25 years than had been learned before in all the history of agriculture.

We have learned that productive soil which looks dead and inert to us is a living thing, in which the eternal pattern of birth, growth, death, decay and rebirth operates. The microscope reveals that there are more kinds of plants and animals in the soil than there are on top of it. There are "more living organisims in a thimbleful of soil than there are people in the whole United States." And these teeming myriads of microscopic organisms, absolutely essential to both plant and animal life, are the very foundation of life itself.

By some strange alchemy all organic matter destined to become the food of a growing plant is first conditioned by these soil bacteria. These one-celled creatures, "fine as smoke," must be magnified 1000 times to become individually visible. They have no mouths or digestive tracts, but their entire body surface absorbs nutrition and exudes waste. They change organic materials into the simple substances which plant roots can absorb. And such materials must always be available to these invisible gourmands, else they will absorb whatever nitrogen is available to the plants, and the plants will suffer from nitrogen starvation. The bacteria multiply by division, or in the case of molds by budding. Dr. Waksman of Rutgers University claims that a single microbe will produce 16,000,000 descendents in 8 hours. It is our job then to keep these beneficient bacteria, fungi, and molds happy and well fed, and they will literally replenish the earth.

In our semi-arid lands a sparse plant cover existed while the soils were being formed, and a modicum of fauna were here to deposit their wastes and finally their bodies in the earth.

The causes which in regions of normal rainfall stored the soil with NITROGEN and the other elements of fertility in abundance, operated here only in part. The average stock of nitrogen in Arizona soils is meager indeed. Our effort at soil improvement then should include Nature's time-honored pattern of supplying organic materials, animal wastes and decomposed vegetable matter. Barnyard manure will help to furnish nitrogen and should be applied at approximately 10 tons per acre, or in terms for the flower bed, 1 pound per square foot. Poultry, rabbit and goat manure should be at ½ the rate of cow manure. A nitrogen lack in the soil shows in stunted, yellow plants, small flowers and little fruit. An overdose however, is harmful and produces weak stems, large leaves and late maturity. Where sufficient humus is not procurable, commercial nitrogen should be used as a substitute, applied in small, regular amounts—ammonia sulphate, ammonia phosphate or other phosphate nitrogen combinations.

Of the other important soil elements POTASSIUM exists in southern Arizona in larger quantities than are usually required for plant growth.

There is also a large quantity of PHOSPHORUS—in a form howeve, which makes it unavailable to plant life. Being an essential element it may be provided in commercial form, either as liquid phosphoric acid, superphosphate, treble superphosphate or ammonium phosphate.

SULPHUR is an acidulating agent and most important in correcting the alkaline conditions of Arizona soils. It must be worked to a depth where the soil is moist, or worked in at least a few inches without disturbing the roots, and watered down, for the soil bacteria are active only in moisture, and sulphur is of no value until the bacteria have changed it into sulphuric acid. For garden applications ¼ to ½ pound per 100 square feet is advisted. Sulphur and gypsum are both used as soil correctives, and each has its advocates. Sulphur is higher priced, but it is also five times as effective.

The use of GYPSUM has increased greatly in recent years. By its employment some black alkali soils have been successfully neutralized. But its price today makes it a rather costly agent for correcting the most extreme conditions excepting for a small garden spot. However it is a dependable preventive of alkaline development. It softens tight soils, improves the rate of water penetration and causes hardpan to crumble. It must be thoroughly leached through the soil by flood irrigation. Use ½ to 1 pound per 100 square feet.

**COMMERCIAL FERTILIZERS** are not substitutes for manures, and used exclusively they will lessen the organic matter in the soil. But used to supplement manure they can furnish not only the major elements, but also certain so-called trace elements. A plant may need but a speck of boron, for instance, to be in waxy, green leaf, and without that speck it will show signs of starvation. Remembering that manures or any other organic material can not be of benefit to growing plants until thoroughly broken down by bacterial action, the soil of a new bed should be enriched with commercial fertilizer for immediate plant nutrition. If your compost pile is made up of green cuttings of plants that grew in healthy well-fed gardens, your plants which get the benefit of that humus are likely to show no lack of the vital elements.

J. F. Wischerson of Cleveland Research and Development Foundation lists 22 elements necessary to plant and human nutrition. Few soils contain all of the elements, but when serious deficiencies occur there will be weakened resistance to disease in all its forms. It is well substantiated that plants getting a perfect balance of nutrients are strongly resistant, and that plants suffering deficiencies are attacked first. Bromfield claims that even leaf hoppers and aphids show a preference for weakened plants.

**COMPOST.** We have seen that organic material in the soil is of greatest importance, for it largely governs productivity. Not only does it keep the plants and the microbe population mutually happy, but it tends to relieve alkali toxicity, increases the moisture retention of sandy soils, promotes both air and moisture penetration in clay soils, facilitates drainage, and thus causes better soil sanitation. This organic material may be barnyard manure, grass clippings, fruit and vegetable refuse, plate scrapings, etc. The garbage collector does not have to peep over the back fence to know whether or not you are a good gardener. An empty garbage pail tells the story. No good gardener wastes any organic matter. In some corner he digs it all in, perhaps adding nitrogen or special compounds to hasten the process of decay. He keeps the heap moist. Decomposition takes place quickly and without odor. It is claimed for compost that it contains four times as much plant nourishment as manure.

**COMMERCIAL MANURES,** dried and shredded are easy to handle, and act quickly, but are quite lacking in humus content.

**WOOD ASHES,** so useful "back east," are not used in Arizona because the soil is already too alkaline.

**EARTHWORMS** are scientific gardeners. They convert fresh, organic matter into richest plant food. They transplant deep subsoil into topsoil. They drain and aerate the soil and actually increase it, as they produce 100 times their weight in humus each year. They thrive and multiply on manures, leafy wastes, orange peel, all decomposing vegetation. Some valley gardeners have grown large numbers of earthworms by systematic feeding and have stocked all their garden beds with them.



The physical condition of the soil is more difficult to improve and maintain than its fertility. **SOIL STRUCTURE** is good if a damp handful retains its form when squeezed into a ball, yet falls apart in crumbs when lightly tapped. If the structure is too loose it will not retain moisture and nutrient materials, if too compact air and water circulation is choked off. The carbon dioxide normally given off by plant roots cannot be diffused away from them, and toxicity results which may cause a break down of root tissue.

If your soil is on the sandy side humus will help to bind the granules, and add to its water retention. If it is on the clay side granulation is difficult to achieve, but here again the addition of humus is most beneficial. Humus is not a permanent fixture in the soil and must be constantly replaced. **PEAT MOSS** has no nutritive value but definitely improves soil structure.

All gardens should be well mulched. A loose, porous layer of peat, grass cuttings or pulverized manure slows up evaporation, tends to keep roots moist and cool, and makes frequent cultivation unnecessary. Having attained a satisfactory soil structure, **keep it!** Dig your bait down by the river and leave your amiable earthworms working your garden while you fish. And don't over-cultivate. Neither earthworms nor rootlets like to be disturbed.

**WATERING.** Each type of soil has its own water requirements, which vary with temperature, humidity and air movements. A loam soil will hold twice as much moisture as a sandy loam, and a clay soil three times as much. The same amount of water (4 inches) that will penetrate sandy loam to a depth of 5.3 feet, will penetrate loam to a depth of 2.65 feet and clay to a depth of only 1.77 feet. A gardener might do well to check up on moisture penetration with a soil auger two days after irrigation for his future guidance.

Watering should always be deep and thorough. Light sprinkling which encourages shallow root growth should never be indulged in. A hose must run almost 40 minutes at an average pressure of 5 gallons a minute to deliver moisture to shallow rooted plants in a 10 foot square of sandy loam.

The plants must have a chance to take up most of the soil water between irrigations. Otherwise the air will be driven from the soil and the plant will drown. Where summers are dry most gardeners prefer the flooding system to furrow irrigation. But each gardener must establish his own technique, and must learn how to work with nature, and not try to outwit her.

University bulletins, to be had for the asking, offer you scientific advice on your problem, the best to be had, and well-trained, friendly, co-operative County Agents stand ready to help and advise you at all times.

## ARIZONA PLANT RANGE

The Salt River Valley has a wide variety of climates within its bounds. Locations near Camelback Mountain are so warm that flowers bloom all during the winter season. Regions in and near South Mountain Park are also warm and will grow poinsettias and cassia (splendida and nairobensis) without covering, unless the winter is exceptionally cold. Nearer Phoenix the nights are a trifle colder, and delicate plants from the tropics require covering on the coldest nights—which are very few. In a protected patio or near a building sub-tropical trees and shrubs flourish.

Many homes in the warmer sections have beautiful displays of Bougainvillea—Crimson Lake, Pinwheel Jasmine, Bignonia Tweediana—all evergreen vines—which make a rapid growth and bloom profusely. Evergreen trees such as the Jacaranda, Bauhinia (Orchid Tree) and Grevillia—Robusta, attain a larger size. In the colder sections they require protection for the first two or three winters. Banana palms should be taken care of in the same manner, and even if they do freeze down to the root, they make a rapid growth the following year—and have been known to mature a crop on such new growth.

Since the use of peat moss and sulphur have become popular many people are growing gardinias and camillias with little difficulty. Some are grown in full sun except for a western protection while others are planted on the north side of shrubbery or buildings.

The Queen's Wreath—Rosa de Montana, is a favorite vine in all parts of the Valley. Vines are cut back to root in late fall. New growth starts in early spring and by mid-summer the vines have made a tremendous growth and are covered with rose pink twining blossoms.

The home maker in Central Arizona may choose his plant material from a variety of broad leafed evergreens such as Euonymus, Feijoa (Pineapple Guava), Arbutus Unedo—Strawberry Tree—the Nandina, Olives and all types of Citrus trees. Oleander, (Nerium) Pepper and Umbrella trees line many streets.

There are many attractive native gardens, created from desert growth which grows more luxuriantly in cultivated gardens than on the desert.

Arizona gardeners may enjoy as great a variety of trees and shrubs as gardeners in most any other part of the world. Alpines grow on the higher slopes of San Francisco Peaks in Northern Arizona. Tropical and sub-tropical exotics grow in the South and Central portions of the state.

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## HOTBEDS IN THE SALT RIVER VALLEY

In writing on hotbeds for the Salt River Valley we are cutting the subject down and making it specific enough that local flower growers may get some good from the information. If we wrote on "Hotbeds" or even "Hotbeds for Arizona" the subject matter would have to be so general that it would be of little practical value. So the wise thing to do is to include only our general area, where the climate is mild through out the winter. We will discuss the various points pertaining to a hotbed for our climate under the following heads: (1) Location, (2) Size and shape, (3) Preparation of Seedbed and (4) Care of Plants.

**(1) Location:**

The location of the hotbed is very important. The ideal place would be on the South side of a large building or in a huge patio, providing the sun could shine on it from sunup to sundown. The sun is very important during the short cold days. Of course the patio idea is too impractical to consider so place your hotbed on the southside of the largest building available making certain that there is no obstruction on either side to keep the sun from shining its very warmest on it.



**(2) Size and Shape:**

Now for the size. One would be surprised how many plants can be grown in a small hotbed. Of course it would be better to have plenty of room for the plants, say one-half inch apart, but this would be a waste of space and materials, although the plants would be healthy and grow off much quicker. However, it seems to be the more common practice in one garden club project, to sow them thicker. Six hundred stocks fared very nicely in a space twelve by thirty-six inches or two hundred plants per square foot. But in another square foot of space four hundred Petunias did not do so well. Then too, Petunias demand more room than Stocks or Snapdragons because the plant spreads out as it grows while the other two shoot upward. So one would be safe to grow two hundred Stocks, Snaps, or most other flowers in a foot square space, but one hundred fifty Petunias would be plenty, if not too many.

Then let us make some estimate on the size of your hotbed. Which of the many types of gardener are you? Do you like a few small neat beds of fussy particular flowers close to your house or do you scatter flowers all over the place in wild profusion and in every nook and cranny. The first type could get by nicely on a bed three feet square with another foot added in case the owner would like to experiment with cuttings. The other type would need a bed three feet by five feet not including a cuttings bed. The Garden Club's project was planned for twenty members. You have probably noticed that we have mentioned three feet in every dimension given; that is, three by three; three by five or three by thirteen. It is better that the hotbed be not over three feet in width because if it were wider one would have difficulty in reaching the plants at the back.

Now if we are going to have a framework and some people do not, the back should be twelve inches wide and the front four inches wide, preferably two inches thick, thus a two by twelve and a two by four. Then the ends can be made by cutting a three foot long two by twelve diagonally so as to form two wedge-shaped pieces. Then when you get the pieces together you place the back towards the North in order that the sun, which is far to the south, will shin into it. The top, a framework of one by four's, can be covered with burlap sacks and hinged on the framework. This furnishes adequate shade during the first few hot weeks and is thick enough for protection in the winter, unless the season is unusually severe, in which case another thickness of burlap might be added, or canvas may be thrown over it at night.

**(3) Preparation**

The soil is one of the most important things to consider. A mixture of equal parts of good soil, sand and peat moss was recommended. The Garden Club used this mixture in their hot bed and obtained good results. This, however, raises the question of fertilizer. The danger is of course in burning the tender young plants. One gardener uses no fertilizer in the seed bed, but when the plants are about two inches high, he soaks a quart of barnyard manure in five gallons of water and gives the plants a "liquid feeding" once every week for about three weeks. This method proved to be very satisfactory. Not over a couple shovelfuls of manure for the ordinary bed should be used if one must use it. There are of course many good mixtures and before making a hotbed one should check on them at a reliable nursery. All materials should be screened with a one-fourth inch mesh screen. This insures a smooth easily worked seedbed and makes for more uniform germination.

After thoroughly working the materials together and smoothing it you should then decide how to plant the seed. There are two general methods used, broadcasting and sowing the seed in rows. Both have good as well as bad points. By broadcasting the space is utilized more fully, while planting in rows makes sturdier plants, and makes transplanting a little

easier. One can express his own individuality in dividing off the seed bed and labeling different plant plots.

**(4) Care of Plants:**

At this point let us bring up the point of shelter. We read, above, the plans for a framework for a hotbed. Now a framework has its advantages, but it also has some disadvantages. It offers protection to the plants from the cold and keeps out animals. But on the other hand it takes time and money to build it and most important of all the plants growing around the edges do not do nearly as well as they do in an open bed. They are spindling, weak and bent-over, sometimes breaking off. The reason for this is that the boards cut out the sun, no matter how much sunlight you can give them. There may also be a factor of too little air circulation, thus heating the plants.

Never let the noonday sun shine on the plants. The morning sun up to about ten o'clock is ideal. There is no formula for the amount of sun required because there is so much variation in the sun's intensity from day to day. A good rule is to give them all the sun possible without wilting them. This makes for sturdier plants. When flowers get too little sunshine and too much water, they make too much of a growth towards any source of sunlight available then bend over and die because the stem dries up. In general, they are unhealthy either from disease or uneven growth. Painted screen makes a very good covering for the open pen or the burlap sacking, as mentioned, for the enclosed bed is also good.

Unless the winter is unusually severe the open bed should be used. But, as we can never tell for sure about the weather, the gardener will have to review the good and bad points of each type and make his own decision.

Now for a brief review of culture methods of the various plants. In general, plant the seed at depths specified on the package. The main thing is to keep the soil thoroughly damp until seeds are fully germinated. One thickness of burlap sack kept wet will help in keeping the right moisture. Sprinkle at least twice a day until they are up. Take the sack off one day after the first plant is noticed, but keep the ground damp until all plants are up. Petunias, Snapdragons, and Phlox are very easy to grow. Stocks require a little more attention because they seem to want to grow towards the sun and bend over. Their stem is very weak and a good remedy is to water deep and not too often. This causes deep root growth. Also give them all the sun possible without wilting, causing a slower upward growth. The plants should be watered about every three days.

Verbenas are perhaps the most particular plant. It takes about two weeks for all the seed to germinate. Some start coming up within a week and this causes difficulty because the sack can't be taken off until all are up. If the sack is taken off when the plants first start coming up the rest will not likely come up. Then again, the seed coat stays on most of the plant's leaves when they first come up. These must be kept very damp or the seed coat will dry up and the leaves will never get out. That is one of the problems. So the sack will have to be left on until all the plants get up, which sacrifices the first plants which will not get enough sun causing a too rapid, spindling growth in an effort to find the sunlight.

One way to deal with the problem is to transplant with a very small spoon (in order not to disturb the ungerminated seed) those plants reaching one half inch in height, thus saving the others. Transplant into a flat much the same as the commercial flats on the market, and transplant into open ground as soon as they are well established. This method demands a lot of attention, so the other possibility is just to save the first plants. Two things are necessary with Verbenas; i.e., they must be kept damp until they are at least one-half inch in height, and they must be shaded throughout the day. Also worms are more prevalent on this flower than any other. They cut the flower off just below the leaf. A good worm



poison should be used from the time of planting until the plants are ready to transplant. This is true of the whole hotbed as well. Ants are also troublesome especially because they carry away seed the first two or three days after planting. One will do well to watch for these troublemakers.

This almost concludes our discussion on hotbeds for the Salt River Valley. But first let us summarize a few points:

1. Build hotbeds on south side of warmest building available.
2. If you use framework:
   (a) Eliminate chance of freezing.
   (b) Keeps out animals.
   (c) Is more expensive.
   (d) Plants do not do nearly as well as in open bed.
3. If you use open bed:
   (a) Saves time and money.
   (b) Plants are sturdier, less susceptible to disease.
   (c) Plants are more in danger of freezing unless a temporary wall is built during the coldest days.
4. In both cases do not make bed over three feet in width because this makes the fartherest plants hard to reach.
5. There are many good mixtures for seed bed but a common one is equal parts of soil, peat moss, and sand.
6. If barnyard manure is used it should be well rotted and not over two shovelfuls for an ordinary sized bed.
7. Soak one quart of barnyard manure in five gallons of water and give plants "liquid feeding" once a week for three weeks after the plants are about two inches high.
8. Screen all materials.
9. Watch for worms, grasshoppers, and ants, spray the bed or use some other good insecticide.
10. Keep the seed bed damp until the plants are up, using wet sacks to help keep moisture from evaporating.
11. Water about every three days while plants are young, and not so often later on.
12. Water well when you do water to get good deep root growth.
13. Give the plants as much sun as possible without wilting them.
14. Always keep plants covered from ten o'clock to four o'clock when the sun is shining on hot days.
15. Stocks need lots of sunshine.
16. Verbenas are the most particular of all ordinary plants.
    (a) Keep the ground wet until plants are well up.
    (b) Keep the sacks on until seed coat is off leaves.
    (c) Be alert for worms for one worm will cut off the tops of plants in a whole seed bed in one or two nights.
    (d) If one cares to, he can transplant into flats and then to the ground the hardier looking ones when they grow to about one-half inch in height, in order to leave the sacks on the last ones.

## PLANTING BY THE MOON'S PHASES

As far back as we know anything about civilization, the cultivation of the soil has been the first and most important industry in any thriving state, and it always will be .

The planting of seeds and bulbs by the phases of the moon has been handed down to us from ancient times. In fact, I have taken my information from the text book edited by "Jerom Carden of Milan" of the year 1675, long out of print. Other contributors were: Placidus a Greek, Simmonite an Englishman, Ptolemy, an Egyptian, and Henry Coly an Italian of Milan.

It is well known that the ancient agriculturists in the Valleys of the Euphrates and the Nile did their planting with especial regard to the Moon's phases and its sign in the Zodiac. Their notable success as husbandmen had been heralded down through the ages. Herodotus, the father of history, tells the story of the human race in the Valley of the Euphrates. He says that with poor cultivation those who tilled the soil there got a yield fifty fold, with fair cultivation and one hundred fold, and with intensive cultivation, two hundred fold.

The information we are giving you is authentic; we have found it so by our own experience:

Cultivate your soil in barren signs, Gemini, Leo, Virgo and the dark of the Moon or fourth quarter .

If you wish to develop bulbs for planting purposes (seed), choose your time in third and fourth quarter to produce healthy tubers. If you wish to develop the blooms to a high quality, plant in the increase of the moon, in Pices, Cancer, Scorpio, Libra, Taurus and Capricorn, or the fruitful signs. Bulbs which happen to be of a variety that are dug up and rested for a time before replanting, should be dug during the decrease of the moon in a fruitful sign.

Plant seeds during the increase of the Moon or 1st and 2nd Quarter in Libra for beauty and fragrance; Cancer, Scorpio and Pices for abundance.

To develop choice blooms, plant in the second quarter in Cancer for fruitfulness. Second year, plant seeds from these plants, in Libra for beauty; third year plant second seeds in Taurus to produce hardiness.

Try this plan continuously with various kinds, keeping an exact record of times and results, then you can develop the finest grade of stock.

Plant that which produces its yield above ground in the New Moon, 1st and 2nd Quarter, this also applies to budding, grafting, pollenizing blossoms or transplanting.

Plant that which produces its yield in the ground in the old of the Moon or 3rd and 4th Quarter, decreasing. At this time prune plants and trees, pick apples, pears, etc., at this time and spots and bruises will dry up. To retard growth of the lawn grass, mow at this time. To increase the growth of grass, mow during the 1st and 2nd Quarters.



## BULBS

In planting bulbs of all varieties—prepare the soil several months before time to plant. To prepare the soil it is wise to spread old barnyard or cotton seed fertilizer on the bed where the bulbs are to be planted then spade to the depth of twelve inches or even deeper. When time to set the bulbs make a furrow and put in several inches of sand. Set bulbs then mix sand and soil together and cover.

**Anemones**

The anemone blossoms are usually brilliant large single types, although some are semi-double. They come in red, blue and white. While they do not bloom as prolificly as the ranunculus, each bloom is a joy to behold. They require a little more water than the ranunculus.

Both ranunculus and anemones must be lifted from the soil shortly after the blooming period is passed. Dry the bulbs with the tops on in a shady cool place. Remove the tops when convenient and keep over the summer in a dark dry place—a brown paper bag— and replant in the fall.

Seeds may be kept and planted at the same time as the tuberous bulbs. A small tuber will develop many bloom in the spring. Care is required to keep the seedling moist. A flat is the best place in which to plant them, so that they can be properly watered and protected from extreme heat or cold.

**Agapanthus (Blue Lily of the Nile)**

Is very beautiful and does well here in the Valley. Blooms in June and July, stem twenty inches high with as many as eighty small blue flowers, does best in part shade.

**Amaryllis (From Seed)**

The seeds of Amaryllis should be planted one inch apart each way in trays three inches deep. The soil should be three parts loam to one part leaf mold with a good sprinkling of sharp sand well mixed. The bulbs should be kept in a temperature about 60°. Best to plant during the month of February. Water immediately after planting then keep moist, too much water rots the seed.

When seedlings have developed two leaves three inches long they should be planted in the ground in a partially shaded place using a soil with about 1/3 rotted cow manure and some sand well mixed with the usual loam. Each year as the plants grow more manure should be added. The bulbs may be left permanently in the ground.

**Daffodils (King Alfred)**

Set Daffodils five inches deep, when they are two or three inches high put more fertilizer on the ground and work in around the plants. They do well both in full sun or part shade.

**Freesias:**

Are so easily grown, attractive and fragrant flowers. Pretty under a tree or planted in a border, pure white and all colors. Plant about two inches deep.

**Gladiolus**

Gladiolus, which is a beautiful flower for the garden and for cutting, may be grown very satisfactorily in the Salt River Valley.

Gladiolus bulbs should be planted in full sun, preferably in rows running from north to south to avoid damage from prevailing winds and to admit sun to the plants. Small groups may be planted in the edge of shrubbery for decorative effect, but in such locations need to be well fertilized.

The soil should be moisture holding, but allow good drainage. It should be cultivated to a depth of twelve or eighteen inches and coarse, clean river sand should be added if the soil is heavy. Well rotted manure is the best fertilizer. Peat moss and other humus may be added.

Good bulbs are thick, with high crowns. Virgin bulbs give the best results but fair bloom is often had from bulbs saved from one year to the next. If bulbs have not been treated for pest prevention by the dealer, some recommended preparation, such as Rototox, may be used according to the directions provided.

Bulbs may be planted late in August but the percentage of bloom from early planting is comparatively small. The best planting time is through November and December and may be continued to the end of January. Plant bulbs three to five inches deep. Bulbs should be taken up when the leaves begin to yellow, put in a cool place to dry, then cleaned and stored in a container that allows circulation of air.

Plenty of cultivation is needed but care must be taken not to disturb the roots when growth has begun. A hand cultivator may be used in large plots. In small ones a narrow hoe or similar tool will serve.

In preparing gladiolus for display the stalks should be cut when two flowers are in bloom, placed in deep water and kept cool and out of drafts.

Among varieties recommended are: Mammoth white; Clarion, yellow; Commander Koehl, red; Marmora, smoke; Early Rose, pink; Pelegrina, dark blue; Minuet, lavender.

**Leucocoryne (Glory of the Sun)**

Very beautiful small blue flowers, stem twelve to fourteen inches high. Plant two inches deep, best in part shade.

**Leucojum (The Snowflake)**

The Leucojum, pronounced lu-ko-jum, is one of the daintiest bulb flowers grown in Arizona. It is commonly called Snowflake, and is sometimes confused with the earliest blooming shorter stemmed Galanthus or Snowdrop. Both flowers are white with a small speck of color on the tip of each petal.

There are several varieties of this bulb, but the one best known in Arizona is Leucojum, vernum, whose white hanging bell-shaped blossoms are welcome in any spring garden. The flower stalk is a flat green tubular shoot not very different from a jonquil leaf, but as it develops the upper end fattens and becomes lighter in color until it finally splits down one side allowing the green tipped six white petals to open, exposing the delicate cluster of yellow stamens of the topmost blossom.

In a shaded location the blossoms last longer and the lower blossoms along the stem are slower to open. As the first flower withers others open to replace it. The number on the stem varies from two or three to as many as nine or ten. Its lack of fragrance is disappointing. A flower so like the fragrant lily-of-the-valley, but with no fragrance of its own.

Following a warm winter the snowflake is apt to burst forth in bloom by the end of January. They are most attractive when planted in groups of a dozen or so where they are allowed to increase naturally and may remain for several years without being disturbed. They do well in partial shade of tall shrubbery or nestling beside a doorstep where the soil is well drained and loamy. The bulb is rather large for the flower it produces and requires ample food to do its best. A light mulch of peat moss and well decayed barnyard fertilizer will hold sufficient moisture and provide food to bring up numerous blue-green strap shaped leaves in early December. The leaves are a beautiful sight even before the blossoms come. They have a soft fresh texture unlike other bulb leaves, and remain in good condition until long after the flowers are gone, but in mid-summer turn yellow as do narcissus leaves, and finally brown and die.



During the dormant period the bulbs require little attention, except some landmark to protect them from a gardener's sharp implement. They need some moisture during the summer and a loamy cultivated soil brings more blossoms to each stem the following early spring.

Bulbs planted six inches below the surface of the soil are well protected from summer heat.

**Narcissus**

The narcissus family is one of the largest and most popular of bulbs. There is a wide variety in both form and color. Some are companions of the snowdrop and th crocus, while the single poeticers type is apt to linger in the garden along with the last iris. The names narcissus and daffodil have been confusing to gardeners, although they are one and the same. Narcissus is the botanical name, while daffodil is the English. The jonquil is one particular narcissus division.

At present there are eleven divisions or classifications which grow well in a moderate climate. At the Madison Bulb Show all types are usually shown.

In the garden narcissus may be planted in a border, in massed beds or naturalized among the shrubs. The small Tazetta type, known as Chinese lilies are common in Arizona gardens. They multiply so rapidly that they must be taken up and replanted every two or three years for good blooming. An over amount of fertilizer and water produces more foliage than flowers. A loose, well drained soil in either full sun or partial shade will produce a beautiful spring garden.

**Ornithogalum (Star of Bethlehem)**

Stem about twenty inches high with a cluster of star shaped flowers, white with dark centers. Excellent for cutting, lasting a long time in water. Plant about three inches deep.

**Oxalis (American Shamrock)**

This lovely flower, in a variety of colors, is suitable for hanging basekts, pots, window-boxes, borders, rock gardens and mass planting. The shamrock foliage is itself very attractive, rich green shaded maroon in the center of each leaf. No matter where you plant Oxalis in the garden it is beautiful and you may expect continuous bloom.

Easy of culture, they grow in any kind of soil, anywhere. The usual watering of the garden is agreeable to them. Plant the bulbs two inches deep in a friable soil. For a single row border, plant five to six inches apart. If you want an especially effective border, plant a double row, six inches apart each way. You will have a solid border one foot wide, eight to ten inches tall, with beautiful foliage and an abundance of flowers most of the year. A sunny location, naturally, gives a greater abundance of brighter flowers than a shady place.

As these bulbs multiply rapidly, it is wise to divide them every two to three years to avoid overcrowding of plants.

**Pedumculatum (White Spider Lily)**

Has a stem between three and four feet high with a cluster of large finger-like lilies sometimes as many as forty-five per stem. Plant so as not to get afternoon sun.

**Ranunculas:**

We began our preparation for the raising of ranunculas by working a moderate amount of peat moss into the soil along with regular barnyard fertilizer. The second year a generous amount of sheep and goat fertilizer was added. The beds were located along a south wall and a west exposure.

It is very important that the fertilizer be thoroughly assimilated by the soil before the bulbs are planted, as they will not grow, but burn if they are next to the pure fertilizer. The bulbs have been soaked for an hour or so in preparation for planting, and then planted two inches deep and from six to eight inches apart. The watering has been done by flooding the beds once or twice a week, or as often as necessary to keep them nice and moist.

The first two years the bulbs were planted in October, but this year they were not put in until the last part of November. In spite of their late planting they are growing very well, and our observation has been that the plants getting some morning sun, grow more rapidly than those that get only the afternoon sun.

After the blooming time was over the bulbs were left in the ground until the tops were entirely dry. They were then taken up and stored in a box (without sand), in a dry place until the next planting time.

The blooming time has been about two months, beginning the last part of February, when planted in October. The average size plants have had between twenty-five and thirty blooms, but many of them have had fifty or more.

They have double and single blooms, and the colors are beautiful, ranging from the snow white, through the pale and intense yellows, different shades of orange and red to a deep wine and variegated types.

Ranunculas are truly beautiful flowers and we should be very happy and grateful to have them thrive in our Valley of the Sun.

## IRIS

The Iris family covers a broad field and a long botanical classification. However, for garden use in this vicinity irises will be classified into three types, bearded, beardless and bulbous. The first two classifications are based principally upon differences in the flower, altho there are some differences in the root system and cultural requirements. Both have a thick, fleshy rootstock called a rhizone ,growing just under the surface of the ground. The bulbous iris grow from a true bulb and have the usual root system of any bulb. An iris flower has six petals, three of which stand erect and are called the standards, the other three curve downward and are called the "falls."

### BEARDED IRIS

The bearded iris is the type most widely grown and the one most developed through recent hybridization. The falls of bearded iris are decorated upon the curve of the upper surface with a cluster of short hairs, called the "beard" which constitutes the "trade mark" of this particular type. Both the standards and falls of bearded iris are much larger, broader and more rounded than other types. Due to this rapid development one may now enjoy new creations that are larger, taller and of exquisite color blendings; varieties that surpass in beauty the blossoms of every other flower. Where garden space is limited, discard the older varieties to make room for the newer and superior introductions. The addition of a few new varieties each season will sustain interest and give added pleasure to the flower enthusiast. The tall bearded iris are probably the most satisfactory of all hardy flowers for the average garden situations where flowers must be depended upon largely to take care of themselves and for planting where a lack of moisture or prolonged dry spells make it difficult to grow other flowers. Bearded iris come in a wide range of size from the dwarf, 6 to 12 inches, through the intermediates to the tall which will run to as high as 48 inches. The color range is so great that one may work out almost any color scheme they wish. For those interested in color possibilities, Schreiner's catalogs for 1948 and 1949-1950 have a wealth of information.



### WHERE, HOW AND WHEN TO PLANT

Plant bearded iris in any good garden soil in a place that has good drainage. These iris are not water plants, although they will stand considerable water if it is not allowed to stand in the beds. After blooming they like to dry out and bake ,so it is well to arrange the planting so that water may be withheld at will. These iris like lots of sun and should be planted so that they will have full sun at least half the day. Too much shade induces heavy foliage at the expense of the bloom. Here in the valley, shade from late afternoon sun seems to be very beneficial in the prolonging of the keeping qualities of the blooms. In setting the plant, dig a hole broad enough to receive the roots spread in a circle, place the rhizone on a small mound in the center of the hole, spreading the roots in all directions so that the plant is well anchored in the soil. When finished the top of the rhizome should be about one-half inch under the level of the bed and the soil firmly packed. After planting, keep the ground moist and lightly cultivated until well established. Too deep planting will be apt to invite root rot, which seems to be the only disease affecting iris in this climate.

Attacks of root rot apepar to be more prevelant here from midsummer until late September. A light pull on the leaves of a plant affected will result in the leaf coming off very easily, showing a yellow rotted foul smelling mass where the leaf was attached, or the plant may be so badly infected that the leaves or fans, will have dropped flat to the ground. Such plants should be dug and the soil sterilized as once to prevent spreading to the balance of the plant. If plant has been found before the rhizome itself is too badly affected, it is possible to save it by digging up and washing off all dirt, cutting out all rotted portions and soaking in a solution of potassium permanganate, one level teaspoonful to a quart of water, for 20 to 30 minutes, then allow to dry out before replanting. Sterilize the soil with the permmaganate solution where the affected plant was previously set. All badly affected plants or parts of plants should be burned as a safety measure, as root rot is a fungus disease and spreads easily. Leaf spot that will appear in winter, especially if there has been lots of rainy weather, apparently does no harm as the new growth seems to come on without being affected. As in any gardening, the removal of old foliage and clean light cultivation "pays off" in reducing the chances of disease. After blooming leave the foliage alone as it will provide some shade for the rhizome, until about the middle of July. At this time, trim off old foliage and cut fans back to about 12 to 15 inches. This gives the sun a chance to dry out the surface of soil and lessens the chances of rot at its most prevalent time.

Irises may be transplanted any time of the year except during the blooming season. It is better to wait five or six weeks after blooming before transplanting, to give the plants a chance to develop larger divisions. Irises may be transplanted in Phoenix from the first week in June until October, with late August or September being probably a little better than any other time. If transplantings are made early the new setting should be given shade. Plants purchased from growers on the west coast or the east, have stronger divisions after the middle of July and are probably better planted locally after the middle of August. Plantings may be made from 12 to 15 inches apart, depending upon variety and the effect desired. The more rampant growing varieties should be thinned out about every third year. This may be accomplished by taking out the old rhizome from the center of the clump and filling with new soil or digging entire clump and cutting up into its natural divisions, resetting each division.

### PREPARATION OF BED

Soil should have good drainage and bed raised where garden is irrigated by flooding. Spade to the depth of at least one foot, work in well rotted manure and bone meal, turning over several times to assure good mixing of fertilizer with soil. Compost is the ideal fertilizer when avail-

able. If manure is used the bed should be soaked several times and allowed to stand several weeks before planting. Established plantings may be fed safely with top application of commercial fertilizer such as Vigoro or similar products, lightly cultivating in. Iris feeder roots are close to surface is reason for light cultivation.

Bearded varieties that do well in this locality are:

White: Mount Cloud, Snow Flurry, Purissima, Mount Washington, Winter Carnival, Arctic.

Light Blue: Shining Waters, Sylvia Murray, Lake George, Blue River, Azure Skies.

Medium Blue: Sierra Blue, Narain, Seadeep, Blue Rhythm, Lucerne.

Dark Blue to Purple: Destiny, The Bishop, Spring Meadow, Down East, San Pascual, Elmohr, Indian Hills, Master Charles.

Yellow: Happy Days, Fort Knox, Song of Gold, Golden Majesty, Golden Bear, Ming Yellow.

Pink and Pink Blends: China Maid, Tea Rose, Tapestry Rose, Rose Gold, Miss California, Rose Bowl, Melanie.

Red: Russian Bronze, Ukiah, The Red Douglas, Solid Mahogany.

Variegatas: (Yellow Standards and Red Falls), Black and Gold, Mary Vernon, Frank Adams.

Amoenas: (White or light blue standards with dark falls), Amigo Lothario, Shannopin, and Marquita.

Plicatas: Blue: Aldura, Blue Shimmer, Minnie Colquit; Yellow: Tiffany Tiffanga.

Rose tone to red: Inspiration, Mulberry Rose.

Cream: Caroline Burr, Snoqualmie.

### BEARDLESS OR APOGON IRIS

This group are characteriezd by a lack of distinguishing hairs on the falls. The standards are very erect and in some varieties much smaller in proportion to the falls than the bearded. The falls are usually quite long and narrow. The flowers as a rule keep much better when used as cut flowers than the bearded varieties.

The cultural requirements differ in many respects. They will stand much more water, in fact some demand almost a mucky swamp condition. They are best planted in September and do not need transplanting as often as the bearded type. The most common beardless grown in the valley are the spurias. The planting of spuria rhizomes is the same as for bearded iris and the cultivation the same except that they can be grown in places that are flooded by irrigation and will stand more water.

Some varieties that do well here are:

Purple: Lord Wolsey.
Yellow: Monnieri.
White: Ochroleuca.
Brown: Bronzspur.
Lavendar Blue with cream yellow falls: Saugatuck.
Light Blue: Azure Dawn.
Russet Brown: Russet Flame.

### BULBOUS IRIS

The bulbous iris most commonly grown here are the Dutch and Spanish, with the Dutch being the most widely used. The cultural directions are the same as generally followed in growing of daffodils and other bulbs. In well drained beds the bulbs may be left several seasons, but may be dug and cured any time after the tops have died down. Replant in late September or October. Varieties that do well here are: Blue: Wedgewood (early), Imperator (later); White: Excelsior; Yellow: Yellow Queen (Spanish).



## ROSES

Of all the ornamental and flowering plants that thrive in Arizona gardens the rose is the most outstanding and is easily grown.

**Propagation Of Rose Cuttings:**

Dig a one foot trench. Put in a little fertilizer, then a layer of rock, then fill up with sand and soil. Remove all leaves from five or six inch cuttings. Tie 6 cuttings loosely together and stand in the trench upside down. Cover with 3 inches of soil, then a covering about 1 inch deep of straw. At the end of three weeks scrape off a little of the dirt and peep in at the cuttings. Little white scales will appear on the cuttings if growing is progressing. Cover and let remain two more weeks. The cuttings are then ready to be planted.

**Selection Of Rose Bushes:**

There are four grades of roses—No. 1 - top; No. 1½ - medium; No. 2 - small plants and No. 3 - culls. Numbers 1 and 1½ are the really worthwhile plants as the flowers are nearer perfect, the plant healthier and longer lived.

**When To Plant:**

January and February are the best planting months in Arizona.

**How To Plant:**

Dig a hole 30 to 36 inches deep; for better drainage and to prolong life, place 6 inches of gravel in the bottom and fill with a mixture of one-third compost, onethird peatmoss, one-third good loam and, if heavy, a little sand. Make a mound and spread the roots, cover, leaving the bud 2 inches above ground. Fill in remaining soil, keeping plant upright. Tramp down firmly and water soakingly.

**Watering:**

Water soakingly at planting time then no more till first leaves appear. Then water thoroughly every ten days. To test soil moisture dig down 3 inches and if a handful of soil at this level does not hold together a good watering is necessary.

**Fertilizing:**

As soon as first leaves appear cover bed to the depth of 2 inches with manure 3 or 4 weeks old.

In middle of May cover bed with a 2 inch peat moss or straw coverage to conserve moisture.

**Summer Care Of Roses:**

Do not force roses in summer. No pruning except on climbers. Trim these lightly in July. Do not cut all blooms from top of bush as these help to shade trunk of bush during hot months.

**Winter Pruning:**

Best to do heavy pruning in latter half of January. Cut out all bruised and crooked branches. Cut so that last remaining bud below cut will be on the outside of the bush. Touch each cut branch with "tree seal" to prevent the entrance of the bore worm.

**Preparing Roses For Rose Shows:**

Allow only 1 bud to develop on the stem removing other buds while they are very small so as to leave no scars.

Give rose a deep irrigation 48 hours before cutting. Cut in cool of the day, late evening or early dawn. Cut long stems, slantwise. Make a 2 inch slit in stem and put in cold water up to base of bud. Put paper cap over bud to keep from further opening.

**Roses Hardy in Arizona:**

White - Caledonia, Frau Karl Druschki; Red - Nocturne, Freedom, Mirandy, Christopher Stone; Pink - Sterling, Lulu, Charlotte Armstrong; Multi-color - Yours Truly, Tally-Ho, Taffeta; Yellow - Madame-Chiang-Kai-Shek, Lowell-Thomas, Sam-Lubsky, Peace.

**Diseases and Insects of Roses:**

The rose bud-worm—spray or dust with arsenate of lead. The stinging rose caterpillar—feeds on underside of leaves. Worse during September. Spray or dust underside of leaves with arsenate of lead.

The rose slug—skeletonizes the leaves. Spray with a Nicotine Sulphate spray. Also frequent washing of underside of leaves with a spray of water under high pressure is helpful.

Rose stem borer: Adult lays eggs in punctures or broken branches—cut off and burn all infected stems.

The rose curculis or beetle—they bore holes into unopen buds. The injured buds either fail to open or if opened are riddled with holes. Spray with arsenate of lead and burn all diseased buds.

Aphids or suckling insects—they curl and distort leaves and harden the buds. Usually found in clusters on new growth at base of buds. Spray with a Nicotine Sulphate and soap solution.

Thrips—minute insects causing browning of petals and often failure of flowers to open properly. Spray with Nicotine Sulphate and soap solution.

Rose Scale—a white incrustation on the stems. Thoroughly spray with lime sulphate in the fall after leaves fall and before they appear in the Spring.

Red Spider—leaves become a pale brown, sometimes the leaves are webbed. Clean grounds well. Dust with dry superfine sulphur or spray with nicotine sulphate and soap solution.

Mildew—Dust with one part dry lead arsenate to 9 parts dusting sulphur.

**The Types of Roses And Their Place in the Garden:**

For beds—Hybrid Teas, single roses, tea roses and large flowered Polyanthas.

Bedding or Shrub—Hybrid Perpetual.

Shrub Rose—valuable for hedges or planted among shrubbery.

Borders—Polyanthas - small flowering.

Hardy climbing roses for pillars, fences and sloping banks. Climbing Hybrid Teas are to be used in any place a climber is wanted. These roses are the same as the Hybrid Teas in our rose beds.

— NOTES —



## ALYSSUM

Since miniature arrangements have been growing in popularity, especially for home decorations, the low growing alyssum has found an even more important place in the garden. Its white and mauve shades present an ideal array for border planting and thrive in almost any bed prepared for annuals. The Alyssum Minimum is used largely in the gardens of Sandringham, one of the Royal Palaces of England. The Voilet Queen is deep in color and not likley to go into white; the Saxatile is a hardy dwarf bearing a profusion of yellow flowers, but is not as easily grown as the other species of white and lavender.

The seeds should be planted during August or October in the open ground where the plants are to remain. They are planted about ¼ inch deep with light soil pressed upon them and a light mulch spread on top to keep the soil moist. The seed usually requires eight days to germinate. Water with a fine spray to see that the seeds remain damp until "well up". Alyssum may be allowed to grow with the plants quite close together in order to give the massed effect desired in the border. They reseed very easily or can be propagated by layering or cuttings. They flower from early February and March until late summer if kept trimmed each time the blossoms begin to fade. They have a sweet fragrance and can be grown by a beginner with success.

## BELLS OF IRELAND (MOLUCELLA LAEVIS)

This curious Bells of Ireland is really more than a novelty flower. It is an annual which grows light green bells along its branching stems. Inside of each delicately veined bell is a small white flower with a pink tinge. Reminds one of a tiny snapdragon. The stems are so surrounded by these two inch bells that you find very few leaves. The bell laden branches cut exceedingly well and are more than useful in flower arrangements.

The flower in each bell, when dried, becomes four seeds. The seed which is easily raised, can be sown in September through February in full sun. They transplant very easily and when watered a little extra, respond readily into a bigger and taller plant. It is pest free, also both unusual and beautiful.

To dry the flowers they should reach maturity before picking.

Vaughan's catalog is the only place where I have been able to obtain the seeds.

## CALENDULA (POT MARIGOLD)

Calendulas do best in sunny locations. It is a hardy annual of the easiest growth and blooms all the time, at least it was formerly believed that it bloomed every month of the year since the name Calendula comes from the latin calendae, meaning the first day of the month. It produces a cheery, brilliant and showy effect in beds or for borders and is an exceptionally fine cut flower. Does well under any average soil condition.

Plant seed to a depth of about three times its size. Press soil down firmly and when plants are well established, thin out or transplant to prevent crowding. When buying plants, choose sturdy, well formed ones that are not too tall. Calendulas may be planted from September on through the winter months. They grow from one to two feet high. Cultivate after each irrigation, but carefully, when plants are small.

Almost the only pest to watch for is for aphis. Use one teaspoon of Black Leaf 40" to one quart of water and spray, or easily sprayed with any insecticide.

Pinch out all but one shoot if you want large flowers for shows. The first formed flowers are usually on short stems and may be discarded.

Pot Marigold was highly regarded in our forefathers' day for its medicinal qualities and as flavoring for soup and stew.

## CARNATIONS

Carnations grow very well in the Valley of the Sun. These delightfully fragrant and richly colored flowers may easily be grown from seed. Sow in boxes or flats in September or October and when 2 or 3 inches high transplant to open, sunny bed, preferably east or south exposure. They like good drainage so plant on a slight ridge. They also prefer a lime soil, rather than acid, therefore do not use peat moss in the bed but lighten the soil by using liberal amounts of well rotted barnyard manure.

Propagation of new plants by cutting: Cuttings may be taken from good varieties in October. Take slips midway on a flowering stem and these should be between 3 or 4 inches long. These are new shoots coming out at each leaf. Use rotenone according to directions to hasten rooting. Place cuttings in clean, medium-coarse sand or vermiculite in a pan with holes for drainage. These should not be placed deeper than ¾ inches, water thoroughly. Place glass over top of pan, or shade from direct sunlight and protect from wind. It takes between 4 to 6 weeks to form roots ½ to 1 inch long. These are then transplanted 15 inches apart in permanent beds of sandy loam. Plant no deeper than they were in rooting sand. Water well, then leave fairly dry for 8 to 10 days. Protect from drying sun till well established.

When they show signs of growth and are about 4 or 5 inches high, the plant needs "stopping" to make it branch. Firmly hold the plant with left hand and with right hand pull center out with a quick jerk. This causes new growth to branch at each leaf. Centers of new growths are further stopped occasionally until a bushy plant is assured. Do not fertilize newly planted carnations for 1 month. Very wet soil or very dry conditions are both detrimental. During hot sultry summer days do not over water and watch drainage carefully. Root rot will soon begin in soggy soil.

Never cultivate close to an established plant as feeder roots are near the surface.

Dis-budding: When buds become sufficiently large all are removed on a stem except the top one. Delicately colored types can be protected from fading by tying a sandwich bag over each bud. Do not allow the plant to bloom too early as this weakens growth; many growers wait till plant is nearly a year old and well branched.

Feeding: Carnation are almost ever-blooming so feeding is almost a year around procedure. Nitrogen stimulates stem and leaf growth, phosphoric acid and potash build up sturdy firm growth with large flowers, good color and substance. For this reason a complete plant food such as Vigoro should be used regularly. Dissolve 2 tablespoonfuls to each gallon of water. First flood bed, then give each plant 1 quart of Vigoro solution, then water that down good. Provide stakes and tie loosely.

Diseases and insects: Control thrip by dusting with DDT. Control leaf or rust with a Bordeaux mixture and spray thoroughly. Carnations, as a cut flower or in a corsage, are unsurpassed. Corsages can be worn again and again if ribbon is removed and flowers placed in a covered glass dish lined with a wet paper towel. Occasionally dampen the paper over the top of the flowers.



## CHRYSANTHEMUMS

Chrysanthemums are the glory of autumn. Their shades of red, bronze and yellow give life and color to a fall garden when color is so essential. Their many types and varieties are adaptable to any type of garden.

Although some varieties will grow in direct sun, the plants thrive best in an eastern exposure that has high afternoon shade. If no natural shade, such as tall trees or buildings are available, an artificial shade may be grown such as Tithonia, Sesbania, or Castor Beans. In the fall when the shade is no longer so necessary, the shade plants may be removed. The soil should be neither heavy nor too light, but of medium lightness. Peat moss or sand may be used to lighten the soil. A little fertilizer or leaves may be used in soil that is too sandy so it will retain moisture. Good drainage is an essential here as with many other plants.

Excessive alkali is detrimental to the growth and often the life of the plants. This may be controlled by the use of soil sulphur. Sulphur is added to the fertilizer by using one pound of sulphur to a large sack of barnyard fertilizer and well mixed, then work into the top of the soil. It is best to add this to the soil several months before planting.

An average good soil is usually sufficient for young plants, but when the flowers begin to develop more food is required by the plant. This may be supplied by any good fertilizer.

Plants may be rooted in sand by using the tips of growing branches. Small plants also grow from the roots of the mother plant. These may be taken off when rooted well and planted about six inches apart either flat to allow flooding, or in small furrows to direct the water. These ways of planting are recommended to prevent the water from forming an alkali ring at the crown of thte plant. Plant about two inches deep, if size of plant permits, during the month of February or March The rows may be a foot to eighteen inches apart or if desired a bed with plants massed will be very colorful.

If planted farther apart a ground cover is desirable and may be used in any planting. Some low growing plant as verbena may be used. This will keep the ground cool and moist which is so essential to the Chrysanthemums' best growth and development.

Water so the ground is moist but at no time stands on the ground. The larger plants will reach a height of from six to twelve inches by the middle of April or the first of May and should be cut back five or six leaf buds from the ground. The plant will then send out a limb at every bud and one root system can supply food and water to these satisfactorily. Otherwise the plant, if not cut back, becomes spindling—too tall and unruly.

The tips that are cut off may be rooted in moist sand and used to replace plants that do not live. Very small plants may only require the very tiny tip pinched out.

Early in June or not later than July the staking of the plants should be done. Some prefer staking plants in May before the feeder roots spread very much, then the root system is not injured. Any substantial support may be used such as laths or small straight branches of trees. The support should be as tall as the mature plant, the plant being tied to it as intervals as it grows. Any type of material may be used to tie up the plants as long as it does not cut it; raffia is ideal.

Large exhibition type mums, some commercial varieties and even some of the larger pompoms are grown with only one bud maturing at the top of the stem. This is done by removing all the buds but one or possibly two as soon as the buds appear. With the increased food and water being used by only one bud it becomes much larger than a cluster would be.

Some varieties have weak stems and in order to have upright blooms must be disbudded.

## COLUMBINE (AQUILEGIA)

Because of its jauntily dangling spurs, its nectar laden petals, its loose panicles of red, yellow, blue or white flowers, the columbine might well be the Pierrot of the woods. It is a hardy perennial of the mountain areas preferring a residence of about six thousand feet or higher, with stately oaks or quaking aspen trees as companions. Here it grows in a bed of acid soil made so by Mother Nature who used fallen leaves in a way far excelling the efforts of man. But with care in planting and proper location it can be an addition to any garden of lower altitudes such as we have in the "Valley of the Sun." In other words, it requires a cool, moist, half shaded spot containing slightly acid soil to a depth of one or two feet. The north side of the house or a well shaded hedge is preferable.

They blend beautifully with other flowers of the garden. Why not make your crusty old rock garden fairly dance with this Buffoon of Flowerland, the columbine? Let them mingle (in the shade of course) among the flowers of your perennial border adding piquancy to those majestic irises, stately gladioli, lovely stocks, candytufts and many others.

Since this "Harlequin of the Highlands" demands acid soil, and you have none such around, then mix equal parts of sand, leafmold and peat moss to your deeply spaded bed or add fertilizer having an acid base, instead, and if you have a loose, sandy, friable soil, then you have acid soil. If you have none of these, then hie to the nearest fertilizer company or garden supply store, and purchase the following chemicals; aluminum sulphate, soil sulphur or tannic acid, the latter being from the drug store. Use sparingly else it will prove fatal Broadcast about four pounds of either of these over one hundred square feet of soil. Tannic acid can be used in a smaller quantity. As a last resort, vinegar from the pantry shelf or leaves from the tea pot will do in smaller beds.

The best known American species of columbine include: Aquilegia Canadensis (red )of the Eastern States and Canada; A. Chrysantha (yellow) of the Southwest (grows wild in northern Arizona); A. Formosa (scarlet) Pacific Northwest; A. Longissima (canary yellow) Mexico; Southwest Texas, (Sometimes grows spurs five inches long); A. Coerulea (blue) of the Rocky Mountains and is the State Flower of Colorado.

The groups that insure the finest blossoms include the newer strains which are: Blackmore and Langdon, Crimson Star, Mrs. Scott Elliot hybrids, Imperial hybrids, A. Clematiflora, and others.

In planting, sow seeds mixed with sand from October to January, rake in lightly and cover with peat moss or grass cuttings then press with a board, cover with burlap and keep moist until seeds are well sprouted. "Sunset's Flower Book" suggests planting first, in a seed flat of acid soil then transplant to a second flat containing a mixture of garden loam and decayed manure before the final transplanting to a permanent bed. If this is done, set them about fifteen inches apart in a deeply spaded bed. Whatever you do be sure to uproot and divide every three years. Do not permit any dirt to get at the base of the stem where the root begins or the plant will begin to rot. They can also be propagated by root division.

When preparing these sprightly little wood nymphs for flower shows and displays, always arrange them in their natural setting such as a miniature rock garden, or in a low bowl containing small rocks or some standing in a bowl with petals floating in the water as if beside a pool. Set your imagination to work for columbine is a versatile flower and is a delightful subject with which you may produce many pleasing arrangements.



## DAISIES

**African Daisy (Dimorphotheca Aurantiaca)**

African Daisies are bushy plants with linear-oblong leaves, the flowers are large, the colors range from white to salmon, red, yellow and orange. They make a very showy display when used in beds and are also good border plants.

The soil should be prepared the same as any other flower bed and well fertilized and loamy. The seed should be planted ¼ inch deep and the earth firmly pressed down; when planting in rows the furrows should be 1 and ¼ feet apart and ten inches between plants.

They can be planted early, in a somewhat dry and sunny location, and will bloom constantly for about six months. These plants should be cultivated a few days after each irrigation or rain.

For a mixed border they combine very nicely with Iceland Poppies, Blue Salvia or Michealmas Daisies.

**Michealmas Daisy:**

The Michealmas daisy grows tall enough to be used as background planting in the garden. The lavender petals and yellow centers of the many small flowers on each stalk give a nice distant blue shade. The plants grow in any location, blooming later on the north in the shade than in a sunny exposure.

The plant will do well in any bed prepared for flowers; however, a little commercial fertilizer adds to the sturdiness of the plants. They need not be set deep, and can be set out in January and February.

Plants with deep green leaves that are half an inch across in the broad part of the leaf make good "starters". The Michealmas daisy blooms late in August and its foliage and blossoms are very satisfactory used in bouquets with heavier and larger blossoms, late summer roses for instance. The Michealmas daisy spreads rapidly and once started can be "weeded out" from year to year. Their cultivation is only what loosening the bed may require to help the other plants there. They like a moist bed.

The Michealmas daisy would probably never go to a flower show alone but in the fall it might enhance crysanthemums or an autumn arrangement.

There is now a wide choice of colors in these daisies, we give the following as a partial list:

Tall growing:

Beechwood—Challenger—Clear red.
Blue Eyes—Violet blue.
Burbank Charming—Clouds of small pink covering the sprays.
Harrington's pink—Pure clear pink.
Mt. Everest—Snow white, bloom over a long period.

Dwarf:

Daphne—18 inches—Bright pink.
Lilac Time—15 inches—Lilac blue.
Marjorie—10 inches—Rosy pink.
Niobe—10 inches, Pure white with double rows of petals.

**Pyrethrum Roseum, or Painted Daisy:**

The Pyrethrum Roseum, also called the colored Daisy, is a favorite of the old fashioned gardens, but is not commonly grown in the gardens of today.

The plants like a cool root run, in well drained, rich, loamy soil, dug deeply and manured well. The roots lie close to the surface and the plants cannot stand too much sun.

Pyrethrums are best started in a warm spot in mid-winter, and the plants should be near the front of borders, as they are neat, close, dwarf

growers. They are subject to rotting of stems in midsummer and should then be cut away unsparingly.

They are perennial flowers, single or double, with color range from white to pink, to scarlet to lilac. The leaves are finely cut, the blossoms several inches across, daisy-like in appearance and bloom from April to August.

**The Shasta Daisy: (perennials) (Chrysanthmum Maximum or Chrysanthemum Leucauthemum)**

They should be planted in a large border where there is plenty of room for them to develop. In a small garden a few of them go a long way. They like plenty of sun but will grow in half shade. These daisies grow to a height of 2½ to 3 feet.

The soil should be rich and kept mulched and well watered during flowering season. The bed should be deeply dug. The Shasta Daisy will grow in almost any type of soil.

Dark green colored plants should be selected. The plants grow in clumps with roots matted together and should be separated one from another in transplanting.

The daisy may be propagated from the seeds or from the division of plants. Seeds should be planted from April to May in well prepared rich ground, covering 1/8 inch with fine soil well pressed down. Transplant or thin out young plants to about 10 inches apart. The time for division of plants is from November to February when the soil is not too wet.

The Shasta Daisy is a fine plant for those who have little time for gardening because it needs very little cultivation and is extremely hardy. The plants grow almost too rampantly. A small clump planted in autumn will be a big clump by the end of the season. Keep plants mulched and well watered during the flowering season. When in good rich soil the flowers bloom from early summer until September. Do not permit them to flower the first month or they will exhaust themselves and disappear the following winter.

The following are some suggestions of combinations in arrangements for flower show display:

Shasta Daisies and Cosmos
Shasta Daisies and Narcissi
Shasta Daisies and Roses and Spirea
Shasta Daisies and Baby's Breath
Shasta Daisies and Blue Delphinium and Shell Pink Gladioli
Shasta Daisies and Calendula

The flowers are snow white with bright yellow centers on long wiry stems.

**Transvaal Daisy (Gerbera):**

Transvaal Daisies may be planted in full sun. It is a rosette formation of long, lanceolate, gray-green leaves long, curving flower stems, bearing large daisylike, narrow petaled flowers; colors are salmon, rose, amber, ruby, red, and yellow with black smutty centers.

These flowers require a well-drained, light, moderately fertilized loam. The beds needs no special preparation other than keeping the soil well spaded and worked. Transvaal daisies require very little water as they are a South African Dsert plant. Too, the soil or the fertilizer should contain more phosphoric acid and potash than nitrogen.

You may sow seeds in early spring. The plants do best when they are divided in the fall. Seeds do best planted in spring and plants may be put out most anytime of the year here. They make their most rapid growth in the very hot dry months.

Transvaal Daisies require very little cultivation. They are best suited to use as border plants or grouped by themselves. They combine with Viscaria, Ageratum, border of Phlox subulata, Blue lace flowers and Snapdragons.



**Gaillardia (Indian Blanket or Firewheel)**

Showy North American herbs of the family of Compositae, named for Gaillard de Morentonneau, French botanist.

One of the most useful perennials because of long blooming period. Plants grow to about two feet high. The Gaillardia will do well in any part of the garden, but it is most effective when used as a border, where the plant will remain in bloom for a long period and the flowers afford charming tints for color schemes.

Use the same moisture of sandy loam and decayed manure as for Calendulas. Seed and plants should be chosen with as much care. Plant seed from September on through January, covering with ¼ inch of fine soil and when plants are well up, thin to eight inches apart.

Cultivate after each irrigation to prevent any caking of the soil when mulch is not used. Watch for aphis, especially in the early spring. Spray with "Black Leaf 40".

As cut flowers Gaillardias are extremely popular for the bold decoration of bowls and vases, for which they should be widely grown.

## DAYLILIES (HEMEROCALLIS)

Fifteen years ago Hemerocallis, commonly called Daylilies, were looked upon disdainfully by most gardeners—the only species that was grown at all was one called "Hemerocallis Fulva" with tannish-yellow flowers. It was tolerated only because it thrived cheerfully each year, never asking for any special culture.

**Description:**

These easily grown plants have long, narrow leaves arising from the base. The leaves look something like those of the Red Hot Poker. Their flowers have faces like stars, and their forms are always lily-like, resembling trumpets, bells, or wide funnels. Colors range from tones of lemon yellow through orange, mahogany, red and maroon. A few new rare hybrids have pink blooms. The texture of daylilies is like golden wax powdered generously with gold pollen. Faint markings of orange, chocolate brown, or Indian red soften the edges on some varieties. Some types have frilled edges, others pleated. Most flowers are single but there are semi-doubles and doubles as well.

**Culture:**

While excellent border plants, the versatile daylilies also do well planted around pools and in damp places.

The plants do best when given just an ordinary garden soil in sun or shade, and should be left alone for several years. They seem to resent too frequent dividing or moving, and if disturbed may take an extra season to become re-established.

However, division should be done every 5 or 6 years. March or April, when the plants are just starting growth for the current season are the best times to do it. If absolutely necessary, the division can be done from October to April.

When dividing, carefully lift the whole plant and with a forceful hose wash the soil away from the bulbous roots. Then with a stout, sharp knife, cut the root crown into sections, each with at least 3 fans. Plant the roots immediately so that the plants will get a good start.

**Varieties for continuous bloom.** If every variety listed is planted, your garden will have continuous daylily bloom from mid-March, April or May to early September. Plants should bloom in the order given:

**Middendorfi**, earliest, blooms right after tulip time. Has star-shaped flowers of rich orange-yellow. A dwarf plant, never attaining a height

of over 2 feet. It looks fine when combined in the border with blue flax or blue iris.

**Hyperion** is a soft, canary-yellow flower of immense size. Its one of the few American hybrids to win an award of merit from the Royal Horticultural Society. It flowers in July and August and looks well in a border of roses.

**Anna Betscher** blooms in July and August (in fact, is sometimes blooms from June until the latter part of August). Its deep orange-yellow petals are touched with a light striping. It grows 3 feet high-good for background planting.

**George Yeld**—blooms in July and August in the Valley. It has large open flowers nearly 6 inches across. Its outer petals are rich orange and the inner ones are flushed orange scarlet. It easily grows to a height of 3 feet.

**Margaret Perry** blooms from the latter part of July into mid-September. Flowers are brilliant orange scarlet lined with yellow. Sometimes attains a height of 5 feet.

Apricot blooms from late April until early June. It is a very heavy bloomer, although a little slow starting after transplanting, has light apricot orange flowers on 24 inch stems.

**Queen of May**—flowers in late May or sometimes if we have a mild winter it comes into bloom in late April and has continuous bloom until mid-June. It has large spreading yellowish-orange flowers on husky 3 to 4 foot stems. Its petals are fluted and touched at the tip with faint reddish orange. It harmonizes beautifully in the border with orange and scarlet Oriental Poppies, blue iris and blue flax.

**J. A. Crawford**—which flowers in June, has large flowers of apricot and cadmium yellow. Height is about 4 feet and some of the flowers attain a width of 7 inches. A magnificent sight is a planting of this variety against a background of blue morning glories or foreground planting of blue petunias.

**Golden Dream** is the deepest golden-yellow known in daylilies. The flowers are very large and the plants are vigorous.

As stated above in the first paragraph of this article, the Hemerocallis Fulva is a very strong bloomer, and one that is most commonly known to the gardeners of this Valley—this lily seems to be the exception to the rule in blooming seasons, as it has been known to bloom from early spring to late summer continuously, when planted in the right location and given the proper soil conditions.

There are many varieties of Hemerocallis, probably running into the hundreds, but the ones listed above have been tried in the Valley and found to be dependable under most all conditions—from different colors it would be wise to buy only the ones recommended as vigorous plants so you will not be disappointed in your garden planning.



## DELPHINIUM

They are extremely hardy and make satisfactory garden plants, if given special consideration, they reward the grower many times over. Fine plants depend on sun circulation of air and rich, light alkaline soil. Plants should stand 2 feet apart for air circulation. "Sprinkle" agricultural lime over soil once or twice during growing season to mantain a highly alkaline soil. A well balanced commercial fertilizer is one that has about 5% nitrogen and 10% phosphates and 5% potash. This should be applied to the plants in early spring.

The popular garden varieties, if cut to the ground after blooming, will often produce a second set of blossoms in the summer. A second feeding should be given after a 10 day rest period after the cutting down. The taller varieties must be staked in the early season to prevent damage by high winds and storms.

If the plants are treated as instructions, that is—have plenty of sun, watered during prolonged dry spells, fed lime and given air circulation infection is rare.

Although nothing can take the place of delphiniums in the herbaceous border, they are usually at their best when grown in rows by themselves. Any plant that enjoys or tolerates the same conditions, may be planted in front of them for decorative affect, but be sure you allow the 2 ft. clearance for circulation.

By sowing seeds in an outdoor frame sheltered from the sun, in mid-summer when the first crop of seed has ripened, one may have the following year, small plants, which will blossom in between the first and second flowering of the older stock.

A cold frame, or wooden flat with bottom knocked out and set into the soil, is ideal for summer sown seeds, as it simplifies the matter of giving protection against storms or intense heat with stretched burlap. Once the seed is sown the bed should not be allowed to dry out. Move the plants by early fall. Transplant a month before frost, so the seedlings can establish themselves. They can be protected from the cold by mulching with leaves.

A few delphiniums can be depended upon to come true from seed. All the young plants should be taken care of to permit a selection of the best colors and types later on. Set in their permanent places in the late spring.

Old established plants in the garden will bloom in June and again in September. When an old clump of delphinium becomes so thick that air cannot circulate through it's stalks, it should be lifted and divided into three clumps of approximately the same size.

A most serious fungus disease of delphiniums is crown rot. Plants suddenly wilt or topple over, and at the crown may usually be seen small red resting bodies and the white mycelium threadlike vegetative part of the fungus. It is important to take care of infected plants immediately since the fungus is able to infect other perennials in your garden. To do this remove each diseased plant with surrounding soil and drench the vacant space and adjacent plants with 1 to 1,000 corrosive sublimate solution.

Other root rots are due to various bacteria fungi, or other organisms and cultural defects—such as, too high soil temperatures, insufficient moisture, too compact a soil and the use of manure too close to the plant crowns. Mildew should be controlled by copper or sulpher fungicides.

Black spot is unsightly but not often serious. To control the bacterial black spot, remove all old plant parts in autumn and drench crowns in early spring with a 1 to 2,000 solution of corrosive sublimate.

Hybrid delphiniums are among the most majestic of garden flowers. Under favorable conditions they often grow over 6 ft. tall. The best known hybrid strains are Wrenham Hybrids, called Hollyhock—flowered, and those sent out by Blackmore and Langdon. These two strains were developed in England. Other strains have been produced by both French and American growers.

## GARDENIAS AND CAMELLIAS

Gardenia Jasminoides or Mystery, is most popular here, perhaps because it blooms in spring and early summer. Veitchii blooms in the winter and is more scarce in our home gardens. However, their culture is the same.

Location should be a very shaded spot, north side preferably. A little filtered sun is good for them but dangerous in our dry climate, as their soil should never be allowed to dry completely. It should be kept as humid as possible but not soggy. The plant itself should be sprinkled often to wash the leaves, except when in bloom.

The soil should be made as acid as possible. Cow manure has acid qualities, and there are many acid fertilizers available at any nursery.

Make a good sized bed to discourage root crowding, using one-third each of soil and sand and no less than one-third peat moss. After carefully setting your plant, sprinkle a handful of acid fertilizer on top of the soil covering, then make a covering of peat moss one or two inches deep over the top of the bed. Never cultivate your gardenia, as the roots are right on the surface.

Feeding makes for the success of a gardenia. Blood meal is a good fertilizer once a month except July and August; use ¼ cup in 2 gallons of water. Iron sulphate combats alkali, used in time and amount as with blood meal. These two can be fed at the same time but be sure not to cut down the water. If regular feedings of iron sulphate do not keep the leaves a healthy dark green, use aluminum sulphate alternately with iron sulphate in the same proportions.

To propagate, make cuttings six or seven inches long in the fall; place two-thirds deep in sandy soil and peat moss, keep moist. And by layering, pin a branch of the plant, still attached, to the ground and cover a center portion with soil; after growth is established, cut away from the mother plant.

Camellias do well, located the same as gardenias; they need the same soil conditions and also the same feeding care. Their blooming period here seems to run from October to April, according to weather and variety. Propagation is the same as for gardenias.

— NOTES —



## GERANIUMS PELARGONIUMS

Pelargoniums (pronounced pee-lar-go-ni-ums) better known by the common name, geraniums, were very popular with our grandmothers but we find them today in almost every garden where a mass of brilliant color is desired. The beauty of the blossoms and the richness of the foliage cannot be surpassed even by flowers rarer and more difficult to grow.

Geraniums can be grown as potted house plants or in the garden as a border against a wall or fence. The house plant should be kept in an airy, sunny window for a sturdy, stocky growth. The soil in which it is planted should be a mixture of good top soil mixed about equally with sand, leaf-mold and peatmoss. On top put some well rotted manure and water occasionally, perhaps every month or six weeks, with liquid fertilizer.

Much the same process is followed when geraniums are placed in beds against a wall or fence. Make the bed deep enough to insure good loose soil around the plants and place a few small rocks or gravel in the bottom for god drainage. Do not overwater as there is danger of root rot. Let the plants throughly dry out and then give a good deep irrigation which should last for several days. Wash off the leaves occasionally with the hose to allow the plant to breath and to give it a clean luxuriant look. Addition of fertilizer or blood meal helps to make good strong plants. Much has been said about placing geraniums on the south, east or west exposure but some of the finest plants I have seen were growing against a north wall.

A simple way to start geraniums is from cuttings or slips. In the Spring or Fall select cuttings of firm wood from a healthy plant. These should be from four to ten inches long and should contain several nodes or places where the leaves grow from the stem. Let your cuttings lie in a shady dry place for two or three days to dry out and you will likely be more successful in getting a start. Cut off all buds and leaves from the lower part of the cutting and place it deep enough in a mixture of sand and soil to cover three or four of the nodes. The bed must be kept damp until the slips have taken root. Protection, such as a glass jar, is a help if the nights are cold and the days hot for a young plant cannot stand too much change in temperature. When the slips are rooted they can be transplanted to beds or pots under conditions described above.

There are four distinct types of pelargoniums:

1. Pelagonium Domestican—which is the showy or fancy type known as Martha Washington. A temperature of 45° to 60° is best for this variety.
2. Pelargonium Harlorium or Zonale geranium—The fish-horse-shoe type. This is a good variety for garden or window boxes. Has a variety of leaves—green, green and white, and green and brown. Blossoms range from rich red to pure white and there are the double and single varieties.
3. Pelargonium Peltatum—Ivy leafed geranium. It is the trailing kind so excellent for hanging baskets or window boxes. If allowed to trail it will make a good ground cover in the garden.
4. Pelargonium—Rose or sweet scented geranium. There are two hundred varieties in this cult, the best known being rose, lemon, cinnamon, nutmeg, and apple. It is grown entirely for the leaves which are roundish in form with five to seven lobes. The lobes are toothed. Very fragrant. Flowers are rose-pink. It is propagated the same as the common geranium.

## LARKSPUR AND LINARIA

One can hardly say enough for the tall, regal, spring and early-summer favorites snapdragons, stock, linaria and larkspur. Their gamut of colors forms an ideal background for the flower garden. A general harmony may be obtained with these annuals as background, using one's own judgment for foundation planting, and with sweet alyssum in white or the lavender shades for the border.

Larkspur requires a rich, generous and well-drained soil. Decayed manure may be dug into the ground. In soils of a heavy nature it may be well to add sand. The seed should be planted in September or October in the open ground, which should be kept damp until the young plants are well-rooted. Two weeks are required for the seed to sprout. Then an occasional watering can be given. Allow a distance of eighteen inches between plants. All the lovely blues, pinks, lavenders and mauves are to be found in larkspur. They reseed very early.

The annual linaria is hardy and produces varied and beautiful flowers resembling miniature snapdragons and is very suitable for bouquets and table decorations. Sown broadcast or in clumps Linaria are an interesting part of any garden. Although hardy, they like well-drained, fertile soil and can be planted any time from September through March.

## MARIGOLDS

The Marigold is an American plant and one of the first to be cultivated here. The legend, well authenticated, is that when Cortez discovered Mexico he found cultivated varieties of the plant grown in the Botanical Gardens of Mexico City, one of the first horticultural institutions to be established in the world. Seeds were sent back to Spain for Spanish gardens. Everyone could succeed with this new flower and it quickly became popular with the peasants. It was used as a floral offering on the church altars to the Virgin Mary. Hence came the common name, Mary's Gold, later contracted to Marigold.

It is well to keep in mind that the name Marigold is commonly applied to several different kinds of plants. In the herb group is the Pot Marigold or Calendula and the common Marsh Marigold or Cowslip. Marigold is actually Tagetes, which title is only used actually in the lists for a small and minor plant of the family. The Tagetes kin include the so-called African and French Marigolds, which are neither French nor African but native from Mexico to South America.

There are many reasons why Marigolds should be rated among the most desirable flowers for our gardens. Ease of culture, ability to withstand heat and drought, and in the autumn when many bedding and other plants are past their prime, Marigolds afford a wealth of color that is simply invaluable. The African varieties produce large self-colored blossoms, and a border of these flowers arranged against a dark hedge makes a most effective feature in the garden. The French marigolds are about 1 foot tall, in single or double form, the type produces blooms which run the gamut of yellow, crimson, orange, reddish brown, and are pretty little things for borders or bedding.

Nor is this all, there are Hedge Marigolds, every plant identical in height and breadth and very bushy, so that a row gives the appearance of a hedge 20' high and 30" wide. Limelight, the palest of all, a delicate primrose; Yellow Pigmy, 4" high; the little species Lucida with a sweetly scented foliage of anise fragrance. And last, the one properly designated Tagetes, daintiest of all with lacy foliage, listed usually under the term Signet. It is a grand family, each member worth knowing.

As to culture, they are slow germinators and growers, especially those of the African variety, and may be sown directly in the open ground when all danger of frost is passed. There is a great difference in the



length of time for the various kinds to come into bloom, the Red and Gold Hybrids are the quickest, Tetra the last. The catalogue ratings always give the length of time required, and to save disappointment this factor should be noted in choosing the seed. Marigolds have the same soil, feeding and watering requirements as annuals in general. The French varieties do better in rather poor soil, as rich earth encourages rank growth.

With the exception of Lucida, all are good for cutting, but whether they are of the odorless division or not, all leaves should be removed from the part of the stems under water.

— NOTES —

## NASTURTIUMS

Few other flowers can rival the nasturtium for brilliant coloring, and when grown in large masses in the garden or in ribbon borders by the side of paths and drives, the effect is most striking. These flowers have also become very popular for decorating the dinner table and small vases in the drawing room, for which purpose the more delicate shades found in the newer varieties are especially suitable. All the varieties should be grown on poor soil. The flowers then appear above the foliage, but on rich land, or on ground heavily manured, the flowers, however abundant, are masked by the taller foliage.

Flowers are funnel shaped and, single or double, bloom most prolifically if kept picked. There are two varieties, climbing and bushy, grow from 12 to 18 inches high.

Plant in early spring after danger of frost.

## PANSIES

Pansies are such friendly flowers. A garden without pansies is like a life without friends. So let us plant the seeds in flats in September, and have the flowers in bloom by January.

Get the seed flat ready by putting in one-half peat moss and one-half sand, and keeping it thoroughly wet for several days. Then press down with a brick and rewater.

Buy the best seed you can. Sprinkle seeds on the pressed soil in flat and barely cover the seed by sifting sand and peat moss over them. Put the flat in a shaded place and cover with paper or burlap until the seeds germinate, which will require about seven to ten days. Seeds should never dry out or never kept too wet, or damping off will result.

As the seedlings grow bring them out into more light and sun. After the plants have four to six leaves, they should be transplanted to another seed flat which has some soil and fertilizer in it, or into a seed bed in the yard. The permanent bed should be well fertilized with barnyard fertilizer and peat moss added. Turn this soil several times and water well; rake the soil until smooth. This should be done a month or more before plants are ready to set out.

Plants should be large and sturdy before putting in permanent bed. Plant eight to ten inches apart in a sunny location. Water well, and after about ten days start giving the plants small amounts of liquid or commercial fertilizers, and continue this fertilizing all through the growing and blooming periods every ten days. Never let the plants dry out, and keep the old blooms picked to insure continuous blooming.

Aphids and cut worms are the greatest menace to pansies. Spray with "Black Leaf 40" solution for aphids and use any of the metaldehyde baits for cut worms or slugs. If kept picked and free of aphids the pansies will continue blooming until very warm weather in early June. No other plant will give so many blooms for so long a period as pansies.

Did you ever pick a pansy
Beside the Garden Walk?
Did you ever hold him in your hand
And try to make him talk?
He just makes ugly faces
And laughs at you and winks.
You can tell from the way he carries on,
All the terrible things he thinks.



## PETUNIAS

Petunias have long been rated among the big five of the gardeners' finest flowers. Their popularity has continued and increased over several decades. They are natives of Brazil and Argentina.

They range in flower size from the small 1½ inch Hybrida Compacta varieties to the extremely large 6 and 7 inch Giants of California varieties. The color range covers practically the entire field of color (except the orange tones) and the flowers may either be plain edged or daintily frilled. Petunias are very effective in beds, borders, porch boxes or pots. They are suitable for any garden whether it be large or small. Petunias do as well in partial shade as full sun. They flower better during the hot summer months, if planted in partial shade. Do not plant on the south side of a building, in full sun, for summer flowering. The low growing types make fine backgrounds. Petunias should not be planted around trees for best results. The Giants do better in pots or porch boxes. Any type looks well in a mass planting. A garden will be a brighter, cheerier, much more enjoyable beauty spot because of the presence of petunias no matter what the form or type chosen.

Petunias will thrive on both ordinary and rich soils, will bloom on land which is considered too rich for other plants, and will even make a creditable showing on evry poor soil if given sufficient moisture. They prefer an arid, humid, light soil with good drainage to be at their best. Good drainage is essential at all times, as the leaves will turn yellow with poor drainage. Good drainage can be gained by adding gravel, sand or organic matter to the soil.

Caution must be used in planting. Lighten soil with sand and use little fertilizer, too much fertilizer makes a pale plant. It is well to get bed ready a few days before putting in plants. Wet earth down thoroughly and let ground settle. When ready to set plants, lighten up top 2 inches of soil, too deep planting is not so good.

Petunias may be grown from seed, although they propagate readily from cuttings. Care must be used in planting seeds. Whether sown directly in the open or started in flats, the seeds must not be buried. They are very minute and should be broadcast thinly on a well prepared seed bed, pressed gently into the soil and then covered only very lightly to a depth of not more than 1/16 or ⅛ of an inch, using sand or sand mixed with peat moss or humus. Since the moisture content must be kept uniform until seeds have sprouted, it is best to cover the flat or seed bed with a pane of glass, a moist burlap sack, a wet newspaper or some similar covering until the little sprouts appear. These shade materials must be removed as soon as germination commences, so the seedlings will not become weakened. A cover of wire should then be used, if planted in the fall, to protect from the birds. They do not bother them so much after five or six leaves have formed. Starting the seeds in a flat or seed bed is recommended in all cases as it is so difficult to control moisture conditions in the open garden.

When the plants are big enough to handle they should be thinned or transplanted to 2 inches apart each way. Two or three weeks in flats will produce plants well established and ready to move to their permanent position in the garden. If they have sent up a center shoot it should be pinched off to induce branching and make a compact plant form.

When not growing own plants, if possible, buy locally grown plants.

When transplanting make a funnel shaped hole, add a cup of water, hold plant firmly, and press dirt around plant. On average garden soil the stronger growing types should be 10 to 12 inches apart each way while on richer than average soil the distance should be as much as 13 to 18 inches. The dwarf growing compact forms may be spaced as close as 5 to 6 inches on average soil or 8 to 10 inches in rich soil. After they start

to grow well if this seems too close for best results, the less desirable plants may be pulled out as they start to flower.

Planted in November they will start to flower in late January or early February and will flower nicely during the summer, into fall and even longer. Petunias well started will last for years. When the plants become straggly cut them back to within 4 to 6 inches from the ground, water thoroughly and in a very short time you will have new flowers. It is not best to use plants over two or three years as they revert back and your colors become very light and the flowers small. There are few flowers grown in the Salt River Valley that equal the petunias for length of flowering.

Petunias can stand lots of cultivation or can do with very little. Cultivate and add a mulch of peat moss during the hot summer months. Water petunias often but do not sprinkle. They do better if the water is let run onto the ground around the plant, as we do here in irrigating. Pinch off the top when the plant seems to be growing tall and not flowering in abundance.

Petunias belong to that small but select group of annuals which have no particular insect or disease attacking them.

For growing here in the Valley we find the common varieties more hardy. Some of the best are Rose of Heaven, Violacea, Topaz Rose, Heavenly Blue and Rosy Morn. In the Miniature or "Gem" petunias the Pink Gem does very well in the Valley and flowers in abundance. The double petunias and large giants do not stand the heat in summer as well as the single types. When growing from seed the General Dodd and Lord Courtney run truer to description than other varieties.

All petunias are nice for cutting. They are especially nice in the winter, when one has few other flowers. Petunias can be arranged either by themselves or with other flowers.

## THE OLD FASHIONED PINK (DIANTHUS PLUMARIUS)

The old fashioned, or grass pink, Dianthus Plumarius, is distinguished by its sweet, clove-like fragrance. This pink has been hybridized into a wide range of single and double blooming varieties, and is grown as an annual and as a perennial, blooming the first year, if seed is sown early.

Pinks are generally used for borders and mass bedding, preferably in a sunny location.

Prepare the soil by spading a spade-deep, adding sand and well-decayed barnyard fertilizer, if necessary, because pinks prefer a good, well-drained soil. It should be a neutral or a slightly alkalin but not acid soil.

Pinks are very easily grown from seed which germinates in about a week. But a joint or heel of an old plant will take root if left lying on the ground, reproducing more young growth, when the old and dead growth should be cut back. They may be planted from September until February here in the Valley, and their blooming period is from January to June. Frequent cutting, as soon as flowers begin to fade, will prolong the period of bloom.

If the border or bed of pinks is mulched with some kind of decayed humus, very little cultivating is necessary, other than keeping the weeds and grass pulled. Too close cultivating will break the plants and disturb the roots. Water often enough to keep damp.

For display, cut the pinks that have just opened and let them stand in water up to their blossoms in a cool place several hours or overnight before exhibiting. They will then hold up better.



## STOCKS, WALLFLOWERS AND SNAPDRAGONS

The Stocks are known as Matthiola incana to the botanist, and their native home is the Western Mediterranean region. They were popular in Spain, because the Spaniards like their flowers fragrant.

The Wallflower or Cheiranthus cheiri is native to Southern Europe, but is a special favorite of the English.

The Snapdragon or Antirrhinum majus is from the Eastern Mediterranean region. Oil from the seeds are used instead of butter in Russia.

Seeds of these plants are all planted in the early fall, usually waiting until the temperature is near 90°. This is about the 15th of September. Seeds can be planted until about November 15th. Seed planted after this do not usually do very well.

It is better to wait until the cooler weather to plant Snaps. The seeds are so small and the plants so delicate that they are easily killed by the heat.

Plants from flats can be planted until as late as January 15th. This is truer of Snaps, because they usually bloom in late Spring anyway. Stocks planted late will have short flower stems.

Plant in rows 18 inches apart and space the plants 12 inches apart in the row. Except Colunmar stocks which are planted 6 inches apart.

Transplant the extra plants when they have 4 to 6 leaves. Plan to do any transplanting just after the new moon and to the full moon. Have the bed of plants on the dry side. Make a furrow, then deepen where the plant is to be placed. Pull a little dirt against the root of the transplant and then water thoroughly. The next day move more dirt against the plant and wait until 3 or 4 days have passed before irrigating.

The ultimate beauty of the flowers depend on the pre-planting care of the bed it grows in. If you can let the bed be bare for 6 weeks, barnyard manure is the best Humus to use. It would be worked into the soil about the first of August, and irrigated 2 or 3 times before planting. If you pull up the summer annuals and plant the same weekend, compost should be used. Peat moss should be in the ground 2 weeks before the seed. It should have some time to break down. Use about 3 inches of steer manure or 1½ inches of compost. If the soil is tight and alkaline, use some gypsum at the same time.

The Humus should be thoroughly mixed from 9 to 12 inches deep.

Next to soil preparation, irrigation is just as important, if not more so.

Winter plants should be planted on raised beds. If you have any doubt in your mind about what raised beds look like, go out by Chandler or Glendale and study the Lettuce fields.

Mark off the first and second rows and then draw furrow. Then make a furrow every 3 feet of the width of the bed. Smooth the top with a rake. Leave the center higher than the ground next to the furrow. The seed is planted on the side of the furrow, so that the rows are 18 inches apart.

The raised bed collects the salt and makes for a warmer root environment.

The first irrigation after the seed is planted makes a good or a poor germination. Run the water in the furrows for 12 to 24 hours. The water should soak the bed to the very center of the ridge. If the weather is 90° or more, run the water slowly for the full 24 hours. If it is cooler, run it 12 hours one day and 6 hours the next day. Anyway, the ground should not dry out and crust until after the seed is up. Stocks germinate in 36 to 48 hours.

This long irrigation serves two purposes. It cools the soil for the seed to germinate in, and it fills the soil with water to a depth of 4 feet. This is important because by the time the plant develops flower stocks, its roots are down that far, if water is there.

It takes 1½ inches of water to saturate 1 foot of soil. The first, second and third irrigations need only be enough to penetrate 18 inches. But after that, one should irrigate to 36 inches one time and 18 inches the next. Always use enough water to penetrate to these depths. Six inches or 12 inches of water penetration develops stunted plants.

Do not irrigate too often in cold weather. Use more water per time and let the ground warm up between times, so that the plants can be developing a large root system.

Flowering plants need a little care all during their growing season such as cultivating and feeding. Cultivate only enough to keep the weeds down, and work in the beds when they are dry.

When the Stocks and Snaps are six weeks old, give them a small feeding of a commercial plant food that has more Phosphorus and just a little nitrogen. During cold weather feed them a little every two weeks. When the flower stems start, feed them a commercial that has some Nitrogen added. Such as a mixture of Vigoro and Ammonia sulphate. The added Nitrogen causes the flower stems to shoot up and one has a nice long stem of flowers. Fresh steer manure should not be used as a mulch because when the weather warms up the Nitrogen tie-up caused by Bacteria, will rob your flowers just when they are developing fastest and need the Nitrogen most and they become stunted.

By carefully choosing the varieties of these flowers, the bloom period can be prolonged. The Cheiranthus is the earliest to blossom. They bloom for quite a while, but they are not too good for cutting. They make the water bad in a few days. The Stocks come next. The Ten Weeks, Beauty of Nice and Giant Imperial, are the standard varieties. They grow from 18 to 30 inches high. "The Giant Excelsior" or Columnar Stocks are my favorite and also the favorite of our arranger. They grow 30 to 48 inches high and have a 24 inch spike of flowers. For Night odor, plant a package of Evening Scented of Stocks, they can be smelled for a mile.

The standard Snap is the Maximum Rust Resistant. By all means, check to see if they are rust resistant. These bloom late in the season. However there is the Tetra Snapdragon, which is an early variety. It blooms about the time of the Calendula. But it is very subject to rust. The flowers are large and ruffled.

These flowers, Stocks and Snaps, do not have many pests. Aphis on the Stocks is controlled by Nicotine Sulphate or Pyrethium spray or dust. Dust is preferred. Lady bugs are a control for Aphis, so do not use D.D.T., Ben Hex, or all the chemicals you can buy. Rust on Snaps is controlled by Sulphur. Dust or spray when it first starts and then every week until controlled. Next year plant elsewhere.



## SWEET PEAS

Most of us love the colors and fragrance of sweet peas. So, starting with the advice of an experienced and successful grower who gives deep fertilization as the key to attaining longer stems, larger flowers, brighter colors and a longer season, we proceed in this fashion:

Dig a trench about 14 inches wide and 20 inches deep, putting the dirt on each side of the trench as you dig. Next, fill it with cow manure if possible. Do not use chicken fertilizer because this increases danger of aphis attack. Cover with about two inches of the loose dirt, tramp to pack, then fill the trench with water and allow to settle over night. Then fill the low spots and raise the dirt level about 5 or 6 inches and water again. Leave until it will not pack in the hand. Then run 2 furrows in the soil about 8 inches apart; put in the seed about 2 or 3 inches apart in the row and cover 2 inches deep. An ordinary package will plant about 5 feet of row.

Put heavy paper on top of it all, weighting it down to prevent being blown off. About 2 days later begin sprinkling the paper once or twice a day, depending on the dryness of the weather. Do not water until you see the sprouts when you raise the paper; then remove the paper, make a little furrow between the rows and water IN IT—do not flood.

Holding the moisture this way it is unnecessary to soak the seed first and it takes the "trickiness" out of white seeded varieties. Even a rain after planting will pack the soil and prevent seeds coming up. The seeds of other varieties are also affected.

Next, put lath or sticks across the planting, from the dirt still piled at the sides of the peas, and over them, put cheese cloth, to hide from the ever hungry birds. When too tall for the cheese cloth, remove it and bank up the plants with these same mounds at the sides about 3 or 4 inches more then make an irrigation furrow each side of the peas. DO NOT water up against the plants. Give plenty of water in the furrows. After coming into bloom, water well 2 or 3 times a week.

All this soil preparation and pre-blooming care puts the roots deep and keeps them cooler when the late spring and early summer heat comes and will insure longer blooming. If more than one row is planted, they are best put 4 feet apart. Best planting time is in late September or early October. Pick all the blooms that are wide open 2 or 3 times a week and if only one bud is not open the blooms are larger—they grow on the plant. When blooms are picked with only one open bloom, they are not as large and often not so bright in color.

**Seed:**

If the cuprocide treated (or equivalent) seed is not available, this may be done by buying it in tin containers and treat by putting a little in a jar or an envelope and shake, thus preventing seed rotting before germinating. Many dealers do this before marketing. The legume aid is a wonderful boost too—an inoculation of nitrogen, and the expense is negligible. To be choosy for good seed and the finest varieties in each color is decidedly worth while. Seed is the least consideration in outlay; work, water, fertilizer combine for success.

After blooming 2 or 3 weeks, give light doses of calcium nitrate—about 4 tablespoonfuls to 2 or 3 gallons of water, and pour along a wet furrow. This should do for a 15 to 20 foot row. If planting in the same place in consecutive seasons put about 3 pounds of calcium carbonate into the soil, mix well. If possible, shift the row about 2 feet from season to season, perhaps reverting to the first location the third season.

**Aphis:** Dust with nico-dust. Also a sprinkling with the garden hose will wash many of them off. Provide poles, string or wire netting for support.

**Varieties:** There are three well known strains of sweet peas. The Spencer is very fine but not the sort for us here, because they are so late coming into bloom, and soon too hot. A later development is the early flowering, brought out especially for the green houses ,and in our warmer climates we put them outside. Now, the Cuthbertson, or spring flowering, nearly as early as the early flowering and will tolerate more heat than either of the others. Cuthbertson is comparatively new and there are not so many named sorts, but all are nice. A white is very good. There is a very lovely salmony pink, a cream color—just short of yellow, red ones, a nice maroon and violet blue.

In the early flowering, the finest in salmon pinks are light—Daphne, most dainty; deeper tone—Chime, a sunset hue; deeper, but not red is Helen Hayes. Also Inspiration and Apollo; all have large blooms and long stems. Others are Red - scarlet or orange scarlet, Fiesta, Sparks, Violet blue, Top Hat, Mid blue, Tahoe. Maroon - Bacchus by all odds the finest, being semi-double and large and frilly. The orange or salmon colors must definitely be protected from the Arizona sunshine. Treasure Island is supposed to be sun proof, but failures have occurred. Do not choose a spot in tree shade, some direct sunlight is necessary.

If desiring to prolong the season, a light shade of cheese cloth, muslin, burlap or lath is a great help in affording better stems and brighter colors after the sun grows hot.

## — NOTES —



## STATICE — LIMONIUM

Statice, commonly called "everlasting straw flower," also "immortelle," which is the French word for everlasting, is easily grown and does exceedingly well in this climate.

The small clustered flowers of paper texture are white, rose, lavender or blue. When left on the plants they are surprisingly long lasting.

A low rosette of dandelion like leaves for the base for the stiff, angular branching stalks. They grow readily from seed in any ordinary garden soil and should be planted from September through February, in full sun. When used as a border or in a rock garden they are especially attractive, for they bloom all summer long.

Flowers for drying should not be picked until well matured. They should then be tied in bunches and hung by their stems to dry. If the flowers are kept picked they will produce from two to three crops.

Like the Bells of Ireland, Statice is pest free and hardier. They take transplanting with or without soil, in their stride. The flowers blend in beautifully in arrangements because of its airy effect. They are lovely in a room during the winter months because they retain their form and color.

There are about 200 varieties of straw flowers, but this that you are reading about is the one so widely used by florists. Seeds may be bought at any nursery.

## VERBENA

The verbena might be called an old-fashioned flower. Fifty years ago the verbena was second only to the rose in the affection of the people. It was grown in enormous quantities. Certain named varieties were propagated and eagerly purchased; great sums were spent for rare and reputed varieties. Today the verbena is regarded as a brilliant summer blooming annual in the northern states and as a perennial in the southern states.

The species most widely grown is verbena hortensis. It is a hybrid race with variously colored flowers, varying habits of growth—semi-trailing with shoots rooting rapidly.

There are between 80-100 species of verbena ,including one Mediterranian specie. Leaves are generally opposite,usually lobed or toothed. Flowers are in various shades of white, lilac, rose, purple, yellow, and red, in clusters of a dozen or more single flowers. They are useful for border, edging or for ground cover.

Verbenas may be started from seed but to be sure of a certain color or variety, propagation by cutting is best. Shorten back the plants about September 1, and keep well watered. By the end of the month there will be plenty of quick tender growth suitable for cuttings. Put cuttings in sand flats, keep them moist until they are rooted: then transplant to pots. When planting out in beds for summer bloom, bend plants over nearly horizontal so that new growth will spread along the surface of the soil.

The first mention of verbena was in 1836 when Louden styled the verbena "a genus of woody plants." The parent species was introduced in 1826. The first specie was the Verbena Chamoldryfolia, a dazzling scarlet. The second important specie was from South America, the Verbena Phelogriflora in 1834; the flowers were inclined to be rose or purple, more regular with oval or oblong clusters. These two seemed to be the principle parents of the red, scarlet, rose colored varieties in cultivation today.

Among the speies of verbena found today are the following:

**Rigida:** A tuber verbena, blooming the first year from seed, spreading rapidly, bearing many short spikes of purplish flowers.

**Canadensis:** A perennial with creeping root stock, grows 18 inches high, covered with stiff hairs. Leaves are ovalish, flowers reddish purple, lilac or white. Found in the United States southwest of Colorado.

**Hastata:** This is sometimes called Blue Vervain. It is hardy, erect, perennial with square stems, growing four to five feet tall. The leaves are lance shaped, flowers blue on slender spikes. Found in eastern United States.

**Hortensis:** This is called the garden verbena. It is a tender trailing verbena growing one foot high. Leaves are broadly lanced, two to four inches long and margins bluntly toothed. Flowers are pink, red, yellow, and white in terminal compact clusters.

**Lacinata:** Tall, perennials of spreading habits, the stems hairy and rooting, branches erect. Leaves are ovalish, deeply cut into three lobes, each lobe cut into narrow segments. Flowers are lilac in short dense head-like clusters. Found in Argentine and Chili.

**Abronia:** This is sometimes called Sand Verbena. It is a low trailing native herb with a fragrant white, pink or yellow flower.

**Umbrella:** This grows nine inches tall with pink flowers.

The period of the greatest popularity of the verbena was from 1848 to 1868. From 1850 to 1868 history tells us that it was the greatest exhibit plant. The Royal Horticulture Society of England awarded premiums to seventeen varieties. The decline in popularity was due to two reasons: 1. Introduction of new plants such as the phlox and the begonia. 2. Destruction by pest and disease.

The verbena of today has certain enemies. If a powdery mildew should appear on the verbena leaves, dust with sulphus. For spinach aphis spray with nicotine sulphate and soap. The verbena bud worm bores into the new shoots causing them to wither. The larvae is greenish yellow with a black head: The adult is a purplish brown moth. The control is to clip off the infected parts and burn. The "Wooly Bear" is a white, yellow or brown caterpillar two inches long covered with long yellow or brownish hairs. It feeds on the leaves in late summer and spins cocoons under rubbish. Control by picking off and destroying caterpillar or spraying with lead arsenate.

The red verbena is our oldest form. In every list of varieties since 1845 to the present time, there is a preponderance of red verbena.

## VIOLETS

Violets may be grown here very easily and give a sweet and beautiful return for the time and labor spent.

The north side of the house or a very shaded east location is best, as violets are native to a much colder climate. To make the violet happy it is necessary to provide enough plant food, root space and drainage to enable the plant to make a healthy growth.

The soil should be a good, loose, sandy loam having old, well rotted fertilizer dug into it—a layer of two or three inches if it is definitely very old. This should be spaded into eight or ten inches of soil. To plant seed, level off the surface. Take two parts of good soil and one part fertilizer and sift through a screen until there is an inch of this mixture over the entire surface of the bed. Press down and level off with a board.

Sow the seed in the early fall broadcast, covering about an eighth of an inch of the same soil, and again press the surface down with a board. Take a piece of burlap the size of the seed bed and stretch it over the ground, fastening with stakes around the edges. Keep this well watered, using a fine spray each evening, and a light sprinkle each morning if necessary, to keep burlap moist.

As soon as the seed has sprouted (violet seed is slow to germinate), take the burlap off and nail to stakes about one foot from the ground.



After a week remove the burlap excepting during the hottest part of the day. Discard entirely at the end of two weeks.

Prepare the transplanting bed as for the seed bed, making ridges with furrows between for irrigation. Make the ridges one foot wide and two feet apart. The depth should be full length of the roots, planted straight down to insure a deep root system. The crown of the plant should be level with the surface of the ground. Anchor roots securely, then very gently put in enough water to thoroughly wet them. Fill in the remaining dry furrow soil within two inches of the crown. Then with two parts of furrow soil and one part fertilizer, well sifted, fill in to crown. When finished, the top soil should be dry.

It is well to reset the plants about every four or five years or when it seems necessary to rebuild the bed and thin the clumps.

Red spider is the worst enemy of violets in this Valley. When present the leaf begins to curl, has yellow spots and brown edges. If dusting sulphur is applied once or twice a week these insects may be eradicated, if caught in the early stages.

## ZINNIAS

The Zinnia has traveled a long road from its humble origin in the hot, dry hills of Mexico to flaunt its vivid, brazen beauty among the loveliest garden and hothouse blossoms of Europe and of its homeland; no flower stands so gay and fearless against the blazing summer sun.

Zinnias are of the easiest culture, thriving under the most adverse conditions, but like all living things respond joyously to a little care and attention. The gardener should always keep in mind that while they often survive neglect, drought and poor methods of cultivation, Zinnias appreciate and amply repay the gardener who supplies a rich well watered soil for their growth.

The seed should never be planted until the ground is warm and all danger of low temperatures is past. They are very fast growing and successive sowings can be made all through the summer and as late as the middle of August. One of the most successful growers in the Salt River Valley has this to say relative to the planting and cultivation of Zinnias: "After the early spring flowers have been taken out, a layer of well-rotted barnyard fertilizer is thrown over the beds and well-spaded into the soil. Ridges are made about twenty-four inches across the base, narrowing to twelve inches across the top. It is well to prepare the soil a short time before putting in the seed. Water is rundown the furrows between the ridges and the seed are sown just at the top of the water line on either side of the furrow. They should be spaced far enough apart so the branches may have room for uncrowded growth. The beds should be watered as they seem to need it, which depends on the weather and soil conditions. Do not sprinkle the foliage if you wish it to look healthy and green."

One of the most common complaints of Zinnia growers is that the Zinnia roots are so lacking in strength that the plants often are blown to the ground by brisk valley winds, especially during the flowering season. Good results have been obtained by planting the seed in trenches six to eight inches deep, covering the seed as usual with only a quarter to half-inch of soil and a light mulch to keep the ground from baking. As the plants develop, dirt is gradually brought to them. A thorough watering is needed directly after if the soil is dry. This should result in sturdy branching growth, fine long stems for cutting and large blossoms.

Zinnias are practically free from all plant diseases, another point which makes them especially valuable for the garden and cutting use. Their natural robust character gives them a high degree of resistance enabling them to withstand the attacks of most diseases. In the late fall they may be subject to mildew, but if the plants are properly spaced so that a free circulation of air is possible this trouble should not be serious. A dusting

of sulphur will check it if applied in the early stages. Other diseases occur so infrequently that they cannot be considered of major importance.

There are so many types of Zinnias that it is not difficult to find a suitable variety for any location or to fill any garden need. They range from the giant plants with six and seven-inch blossoms to the tiny scarlet buttons of the popular Red Riding Hood or Gracilliam. The three most popular of the larger growing types, the Dahlia Flowered, with its bright intense flowers, the California Giant, so perfect as a cutting plant, and the Crown of Gold with its deep golden overlay at the base of the petals; all produce flowers about sixty days after planting. The plants are strong and robust growing, and are excellent for general garden use and for cutting.

Among the semi-tall, medium flowered types, the Fantasy is outstanding. Although it is of rather recent introduction it is best known of this group. The plants are two and a half to three feet in height, strong growing and very free flowering. The flowers are composed of shaggy, ray-like petals, which give a delicate grafeul effect. For flower arrangement this type is excellently suited to the ordinary home.

Two varieties of semi-tall Zinnias, which closely resemble other flowers, are the Seabiosa and the Gaillardia Flowered Zinnias. The Scabiosa Flowered bears blossoms about two inches across, ranging in color from vivid scarlet and crimson to delicate pink and white. It is excellent for cutting purposes, blooms quickly, taking only forty days from planting, and shows to fine advantage in indoor arrangements. The Gaillardia Flowered is medium in size and blooms about forty-five days after planting.

Of the dwarf, small flowered types, the best known is the Lilliput or Pompom Zinnia, very popular for cut flower use and as a garden plant. The flowers are small, compact and symetrical and range from the vivid, intense colors, to a wide range of lovely pastels. The Tom Thumb, an especially dwarf form of the Lilliput, is an excellent edging plant, compact in habit, with a spread of eight or ten inches. Useless for cutting, it is charming for borders as the plants are literally covered with blossoms over a long period.

The smallest flowered Zinnia, the Gracillima, bears miniature, half-inch flowers, bright scarlet in color. They are lovely for miniature bouquets, early flowering and very popular as garden plants.

An old variety which has become very popular in recent years is the Mexican Hybrid Haageana. The blooms are semi-double, and the majority are bi-colored. They bloom when only six or seven inches tall, and continue to bloom profusely throughout the season, reaching a height of about twelve inches. Although especially adapted for bedding use, the stems are long enough to permit their use in bouquets for cmall vases and bowls. Unlike other varieties, the color range does not include the bright purples and reds, and the flowers are of a looser composition than is usually found in Zinnias.

The most recent Zinnia to find its way to American gardens is the Zinnia Linaeris which comes from Australia. The flowers are single, deep golden orange in color, each petal marked at the center with a delicate light yellow stripe, contrasting with a bold, dark brown center eye, a most effective combination. It is extremely showy in the garden and effective in small bouquets, especially when combined with purple flowers.

The following summary is given for the convenience of the gardener in selecting the varieties of Zinnia most suited to his gardening and cutting needs.

**Tall, Large Flowered Types:**

**Dahlia Flowered,** 3 ft. tall, large coarse flowers, for cutting use. Flowers in 60 days.

**California Giant,** 3 to 4 ft. tall, large graceful flowers, for garden and cutting use. Flowers in 60 days.

**Crown O'Gold,** 3 feet tall, large unique flowers, for cutting. Flowers in 60 days.



**Semi-Tall, Medium Flowered Types:**

**Fantasy,** 2½ to 3 ft. medium, shaggy flowers, cutting and garden use. Flowers in 45 to 50 days.

**Scabiosa Flowered,** 2 to 2½ ft. small scabiosa shaped flowers for cutting. Flowers in 40 to 45 days.

**Pumila Picotee Delight,** 2 to 2½ ft., medium, picotee edged flowers for cutting and garden. Flowers in 40 to 45 days.

**Dwarf, Medium Flowered Types:**

**Pumila Dwarf Double,** 12 to 18 inches, 2 inch flowers, for garden use. Flowers in 45 days.

**Early Wonder,** 12 to 15 inches, flowers 3 to 4 inches, rounded, very sparse foliage, cutting and garden use. Flowers in 30 to 40 days.

**Dwarf, Small Flowered Types:**

**Lilliput,** 12 to 15 inches, small pompom flowers, for cutting and garden. Flowers in 45 days.

**Gracillima,** 12 inch plants, tiny button-like flowers, garden use. Scarlet only. Flowers in 45 days.

**Tom Thumb,** 4 to 5 inches, compact, small pompom flowers, for border and edging only. Flowers in 45 days.

**Haageana,** 12 inches, small flowers, for garden use. Flowers in 45 days.

**Linearis,** 8 to 10 inches, small single flowers, free flowering, for garden use. Orange only. Flowers in 45 days.

**Sarvitalia,** 4 to 5 inches, spreading, small yellow flowers, rockery or edging use. Yellow only. Flowers in 50 days.

## FLOWER ARRANGEMENT

It is much more fun to arrange flowers with a definite purpose in mind than simply to thrust them carelessly into any handy vase. Flowers placed in a bowl without thought or plan do not constitute an arrangement.

The most important element in flower arrangement is design; color being secondary. To have good design an arrangement should have balance and proportion. A general principle is balance and without symmetry. Nature is seldom symmetrical. Balance is best achieved by placing heavy or large flowers just above the center. Dark colors giving a feeling of weight or stability should likewise be just above the center; this forms the center of interest. Lines going out from the center of interest should taper and become lighter near the end. Otherwise, the effect will be top heavy. If the outline is higher on one side it should be correspondingly low on the opposite side, with always the same amount of weight on both sides of the center.

Handling of color in the art of arranging flowers is just as important as a knowledge of good design. In any color combination there should be more of one color than the others. This requires a full knowledge of the color rhythms. Detailed information may be secured from any good color book on color rhythms. In this regard, divide the colors in this manner; dominate color greater in amount than the second color used and the third less than the second.

Parallel lines, especially those of nearly equal length, sprays or branches of precisely the same height, and flowers on a direct level one above another, are considered very bad.

The general height of the arrangement should be once and a half the height of the container, if it be tall, or once and a half the diameter of a very low container. If the main mass and height of a composition is to the left of the bowl, plant material should project far beyond the left side. Flowers may project forward over edge of container and thus help to tie vase and flowers together by their position and color.

Usually, low flat containers are preferred for most flower arrangements, as they afford greater possibilities of preserving naturalness. However, container and flowers should compliment each other. Round, sturdy-stemmed flowers, such as small dahlias, marigolds and zinnias suggest round, squat bowls, while flowers with slender, graceful stems should be in vases that are tall and straight.

Different vases have different apparent weights, according to their material and design. Vases that are fragile and fine in appearance should be used only for slender stemmed and feathery flowers or leaves. A heavy container is best for flowers of heavy, bold growth or strong, dark colors.

The lines and decoration of the vase should never detract from the flowers, but rather supplement them.

The lines of the stems should harmonize with those of the vase, as if the flowers had actually grown there. Curved stems are graceful in vases with curved sides, while straight, stiff stems are good in vases with simple, bold outline.

Don't crowd flowers and thus lose their individual charm and beauty. A few choice blossoms effectively placed can be more effective than a great many crowded into an unnatural mass.

The flower's own foliage is the best to use. Of course, if there is little or no natural foliage, the addition of foreign greens of harmonious color, texture and shape may improve the arrangement. Colored oak leaves are good with chrysanthemums or dahlias, but not small, fragile blooms. Roses seldom need additional foliage. Gladiolas look best with their own foliage.

The ability to make distinctive arrangements comes by applying these fundamentals of line and weight balance, as well as color harmony. One needs to observe carefully pleasing arrangements, and above all, one needs constant practice. Try for individuality and originality but avoid freakishness.

## THE CACTUS GARDEN

W. TAYLOR MARSHALL, F.C.S.S.
Director, Desert Botanical Garden of Arizona

Many members of the Cactus family make most appropriate garden subjects, especially in the hot central valleys of Arizona and where water is available in minimum quantities.

The family is represented in Arizona by members of two of the three tribes in Cactaceae, the third tribe includes a group of tropical, leafy plants which resemble wild roses and thrive only in climates of considerable humidity. The tribe Opuntieae is represented by the Chollas and Prickley Pears, and members of this tribe can be distinguished from members of other tribes by the presence of barbed hairs, called glochida, at each enlarged pore from which the spines, if any, arise also.

The Chollas are cylindrical, jointed plants with barbed spines which can cause painful wounds. They are of little value in landscaping unless the section selected for the cactus beds are sufficiently extensive to permit the chollas to be planted back from the possibility of contact.

The Prickley Pears are plants with flattened, leaf-like joints and they bear large, colorful flowers and red, showy fruits. They can be effectively used against the walls of Spanish or Indian style houses or against adobe walls, and are also effective in cactus beds. For wall plantings tree-shaped species are indicated including the velvet prickley pear (Opuntia velutina), the spineless prickley pear (O. megacantha) and the native clock faced prickley pear (O. chlorotica) from the vicinity of Wickenburg.

For bed planting choose showy species such as Engelmann's prickley pear (O. Engelmannii), cow's tongue prickley pear (O. linguiformis), purple prickley pear (O. Santa-rita) or the delicate prickley pear (O. delicata).

Most chollas and prickley pears will thrive in poor soil and will tolerate considerable water once they are established.



In the tribe Cereeae we find species of globe-shaped or columnar cactuses which do not have the barbed hairs of the Opuntias and usually with large and more colorful flowers. For a cactus bed the hedgehogs are desirable and obtainable. Engelmann's hedgehog (Echinocereus Engelmannii) and Fendler's hedgehog (E. Fendleri) are found in all of the central portions of Arizona. The claret cup hedgehog (E. triglochidiatus variety melanocanthus) is found at altitudes over 3,000 feet all over the State and its scarlet, goblet-shaped flowers which remain open day and night for five to seven days make it most desirable.

Any one of the five species of barrel cactus native to the State, or any of the barrels are useful and ornamental for bed work. The Saguaro, our State flower, the organ pipe cactus of Sonora and Arizona and numerous other species of tall growing Cereus, most of which are night flowering, can be made the center of interest in a cactus garden and these, and all of the species so far mentioned can be grown in full sunlight.

Our native sweet potato cactus (Peniocereus Greggii) can be successfully grown only in partial shade as it inhabits the soil sheltered by trees in its habitat, using the lower branches of the trees to support its weak stems.

The prized Easter lily cactus (Echinopsis sps.), our native pincushion cactuses and the large flowered, small growing species from Mexico and South America will require partial shade and will appreciate liberal waterings in hot weather.

### The Cactus Bed

As cactuses all have shallow roots and as they will not tolerate water standing at their roots it is essential that the cactus bed be raised about eight inches above the level of the surrounding ground. This can best be accomplished by building a dry wall of native rocks to outline the area intended for the cactus garden and by filling in the area with a soil prepared by mixing one part top soil with two parts of sharp sand adding five pounds of Vigoro, or a similar fertilizer to each yard of prepared soil.

For best results buy from your nursery seedlings of cactus plants as these seedlings are acclimated and are usually perfect plants which can be planted in the beds just as they come from the nursery.

If you prefer to collect your own plants remember that all desert plants are protected by Arizona law and their removal from public lands is prohibited. They may be secured from privately owned land, with the owner's permission, and a few plants of each species except the Organ cactus (Lemaireocereus Thurberi) and the senita, or old man cactus (Lophocereus Schottii), neither of which may ever be collected, from public lands if you will keep 600 feet back from a road and collect only the few that you will need for your own small garden.

Select healthy, young plants as mature plants seldom reestablish. Cut completely around the plant with a trowel or shovel before removing from the ground, then shake off all the dirt from the roots and use the roots for carrying the plants. When you get the plants home remove all of the roots close to the body of the plant with a sharp knife leaving a clean cut and place in a shady, dry spot for a week to ten days or until a callous is formed over the cuts, then place on the ground rather than in it, supporting the plant with a stake if needed, until new roots are formed. This collecting should be done in spring or early summer.

Your cactus bed can be watered every day lightly or every week thoroughly in hot weather or may be neglected for weeks if you prefer.

Do not attempt to grow succulents other than cactus in your cactus bed as the other succulents require more water and less sun than do the cactuses. Some of the native or exotic xerophites can be grown with cactuses, such as the century plants (Agave sps.), the Yuccas, including the Joshua tree, the soap weed and the spanish bayonet, and the palo verde, mesquite, ironwood and acacia trees.

The Agaves and Yuccas do not require derooting when transplanting but do require considerable water at once, in which they are the direct

opposite to the cactuses. The trees can best be grown from seed exactly where needed or seedlings in gallon cans can be purchased from nurseries.

**Leaf Succulent Plants**

A plant which stores food and water in its stem or leaves for use in periods of drought is a succulent plant. The cactuses and the cactus-like forms of the African and Asiatic spurges (Euphorbia sps.) are examples of the stem succulents.

Stem succulents are found in many plant families from Composites to Geraniums and the vines. As this water storage in leaves causes a pronounced swelling of the leaves it follows that many very interesting forms are available. A general rule for leaf-succulents culture is to provide a raised bed of well drained but rich soil and, in our dry air particularly, about the same water as would be needed by begonias. The bed should be on the north side of a house or in the shade of a tree or large shrub. Popular succulents are found in the following families:

**Aizoaceae—Fig Marigold Family**

Many of the interesting species in this family are found in the genus Mesembryanthemum called Mesembs for short, the word meaning noon-flowers because many of the flowers open only in full sunshine. They are ground cover plants with thickened, awl-shaped leaves or plants which imitate rocks in shape and coloration. All have showy flowers. The bushy types with smaller and less succulent leaves are not grown with marked success in Arizona. The one annual species, Cryophytum crystallinum, the ice plant, does very well here when grown from seeds each year.

Desirable species include Faucaria, the tiger jaws, Pleispolis, living rocks and Lithops or stone faces. Certain species are extensively grown as soil erosion control in California and also as parking strip plants and these would do equally well here.

**Ascpepidaceae — Milkweed Family**

The south African carrion plants are ground cover plants which bear star-staped flowers of most extraordinary color and obnoxious odor. Best known and hardiest is Stapelia variagata.

**Crassulaceae—Orpine Family**

In this family we find many very interesting leaf succulents including several species known as "hen and chickens" (Echeveria sps. and Sempervivum sps.), the jade tree, (Crassula argentia) and the Kalanchoes which produce racemes of bell-shaped flowers in coral and red shades and many of them bear tiny plantlets at the leaf margins which fall to the ground, root and produce new plants. Many nice ground cover plants are found in the genus Sedum.

**Liliaceae—Lily Family**

In addition to the Yuccas, Dasylirion or spoon flower and the bear grass (Nolina) which are not true succulents but xerophyoes, the lily family gives us the succulent Aloes from Africa and Asia which parallel in form the century plants of the Americas. A number of the Aloes are quite hardy and make excellent succulent garden plants as they flower in winter when color is needed.

Gasterias, called mother-in-law tongues, also are lilies and these and the closely related Haworthias, which form neat rosettes of highly succulent leaves are desirable and obtainable for our gardens.

Space does not permit mention of many of the twenty thousand odd species of succulent plants but we have indicated a few desirable species and will gladly answer questions addressed to us by mail with a self addressed stamped envelope for reply or by phone at Phoenix 5-1815. Mail address: The Desert Botanical Garden of Arizona, P. O. Box 647, Tempe, Ariz.



## THE LILY POOL

The lily pool is always a center of interest in the garden; there is a fascination about fish that is irresistible to young and old alike. Inexpensive to build, it requires a minimum of care, once it is properly planted and balanced. Informal in shape to blend into the garden most naturally, the pool should be approximately two feet deep. This allows a foot of soil for planting and a foot of water above the bulbs. The sides should be straight up and down, for the bowl shaped pool is not only difficult to plant, but causes too much difference in temperature. With a curving floor, there is no place to set boxes or tubs firmly for planting the lilies; they are apt to tip and spill the soil. With the water deep in the center and shallow at the edges, the water is cool in the center and fairly boiling at the edge in summer, and frozen at the edges and warmer in the center during the winter. As the fish swim back and forth they get the same effect as you would in taking alternate hot and cold showers, the shock drives the blood inward and causes congestion, which weakens the fish even as it would you, and he becomes sick and is attacked by spores in the water that would not effect a strong, healthy fish.

After the pool is dug, chicken wire may be tacked to the sides for reinforcement and the cement plastered right onto it. We use two layers of cement, mixed three parts of sand to one of cement (no gravel). The layers are each probably an inch thick, for cement curls up if spread too thickly. In the north, where the pools freeze, a thicker wall would be necessary. Then the pool is painted with a brush, using a mixture of cement and water the consistency of paint. This waterproofs the pool. As soon as this "sets up" the pool should be filled with water and allowed to stand five days to a week to cure, or draw the lime out of the cement. The lime burns the skin off the fish and is also injurious to plants. It is unnecessary to change the water during curing. The pool is then cleaned and can be planted, filled, and stocked with fish immediately.

Lilies require rich soil; one-third barnyard fertilizer mixed with two-thirds garden soil is good. Then an inch or two of sand or gravel over the top will hold the light soil and fertilizer down, and also prevent the fish clouding the pool as they root for aquatic bugs and worms. Containers may be galvanized tubs—old leaky ones are just as good—but if new ones are used they must be well scrubbed to remove the acid in the finish, for it is poisonous to fish. Pine boxes made of 1x12 are satisfactory. One large box is much better than small individual ones as the lily roots get the benefit of all the space as they spread out and intertwine. Cramping the roots dwarfs the blooms and leaves. For the larger pool especially, "wild planting" is very satisfactory. This means putting the dirt right in the bottom of the pool. This gives a neater effect during the winter especially, when the lilies are dormant and their leaves do not hide the containers. The same soil mixture is used as for boxes, and a layer of sand or gravel over the top. The pool is no more work to clean than when planting is done in containers, for the dirt is not changed every year. Only four or five inches are removed from the surface, as this contains most of the old roots, and fertilizer put in to replace this dirt and worked into the soil. Then the planting is done, the layer of sand replaced, and the pool is ready to fill.

The crown of the lily bulb, where the leaves sprout, must be above the sand or the growth of the plant is retarded, and with the tropical lily, may cause it to rot. Tropical lilies which have a bulb like a pine cone, are planted with the broader end up, while hardy ones, which have a bulb more like a long potato, are planted at an angle of about 45 degrees. Since they do not go completely dormant, there are always a few small leaves to indicate where the crown is.

The balanced pool must have not only lilies to shade the surface, but oxygenating plants to feed the fish and help keep the water clear and sweet, floating plants for spawning, and tall bog plants for contrast. The

best of the oxygenating plants in anacharis, the common moss or "sea weed" seen in fish bowls. This is anchored or planted in the bottom of the pool, as it is inclined to turn brown and rot in the sun if allowed to float. Anchored down at any depth, it will grow to the surface and produce miniature blossoms. Eel grass, cabomba, coon-tail and other subaquatics are ornamental, but produce less oxygen and are not as good food for the fish. The floating plants like water hyacinth, water lettuce, parrot feather and primrose creeper provide bushy roots for spawning. Fish always spawn at the surface because the newly hatched baby fish cannot stand the water pressure deeper down.

Any wild pond has cat tails or similar tall growth about the edge. So to attain a natural effect and an interesting contrast to the floating lilies and plants, we want water palm, blue flowering pickerel, white blossoming arrowhead, blue or yellow water iris, calla lilies, elephant ear or porcupine grass. These want only wet feet to four inches of water. The Egyptian Lotus, so famous in history, does beautifully in our climate. Its large round leaves with the stem supporting them in the center like a lovely green umbrella, stand at least two feet above the watr and the huge rosy flowers top the leaves by several inches. When the petals fall, a seed pod resembling a microphone is left standing, and this is ornamental also. The Lotus, unlike the lilies, prefer some protection from the hot afternoon sun, although it is not necessary. The bulb resembles a banana in shape and color, and is planted flat. It will grow in water from four inches to two feet in depth, and while we just cover the bulbs with dirt to anchor them down, they burrow down to the bottom of the container during the summer, regardless of depth. Instead of all of the leaves coming from a crown like a lily, the bulbs send out runners that send a leaf and bud to the surface at regular intervals.

I mentioned two kinds of lilies: hardy and tropical. The hardies have floating, cup shaped blossoms, are moderate in size, do not go completely dormant in winter, and start blooming about a month earlier than the tropical ones. In the Salt River Valley, this means about the middle of March. The colors run from white through pink to deep red, and yellow. The tropicals are larger in size, measuring up to ten or twelve inches for blooms and eighteen inches for the leaves. They are more fragrant, freer in bloom, and the flowers stand ten or twelve inches above the water. They come in white, pink, red, blue and purple. There has recently been a yellow one developed. The night bloomers are all tropicals, opening at dusk and remaining open until nearly noon next day. They have a heavy waxy texture, and are very lovely; they are especially enjoyable for the garden lover who must be away from home during the day. They come in white ,pink and red. All kinds of water lily blooms open four successive days, and are most satisfactory as cut flowers. Bulbs must not be allowed to freeze; so in a climate where the pool freezes deeply, the bulbs should be taken up and stored in wet sand in the basement during the winter. The bulbs must not be allowed to dry out at any time.

In the early spring, when the sun begins to be bright and hot, and there are not many lily leaves to shade the surface, the water sometimes turns green. This is the action of the sun and not anything wrong with the pool, nor does it harm the fish in any way. However, it is somewhat unsightly and may be cleared by dissolving perhaps half a teaspoon of potassium permanganate crystals in a gallon of water and pouring it here and there in the pool, stirring until the water is all the same color. Depending on the size of the pool and the amount of algae in it, it may take more or less than this amount of permanganate to clear it. The water should be a good deep pink, but not red. Unless it is too strong, it will not injure either fish, plants or snails in any way. Due to lack of surface shade, a scum sometimes appears on the surface. This happens later in the day rather than in the early morning, after the sun has been shining on the pool for a number of hours. This may be flooded off, but it settles during the night when the sun is gone, and as soon as the leaves appear and make sufficient shade, the scum will disappear of itself.



Snails are essential as scavengers in the pool, and as they never go above the water line, you will not be annoyed with them like the plant snails found on garden plants. The Japanese Trapdoor snail grows quite large and takes it's name from the trap door, which it closes when touched, and protects its soft body from any intruder. It gives birth to young snails about the size of a small green gea, in the spring, sometimes as many as forty in a litter, each perfect as to shell and horns and little trap door. The Ramshorn snail is a flat circular curled shell, growing about the size of a quarter, and laying its eggs on the underside of lily pads of stems, or even on the shell of another snail. They look like flat blobs of clear jelly divided into cells, each of which contains a white dot that is the egg. These develop into little snails in about fourteen days.

The fish spawn about once a month, beginning the end of February in the Salt River Valley, and continuing until about September. In a colder climate like Prescott, the spawning would be delayed until the water warmed up a little. Beginning very early in the morning, the males chase the females through bushy roots at the water surface, and the eggs are sprayed onto the roots of the plants. The spawning finished, usually by noon, the fish often rest quietly on the bottom of the pool or swim languidly for a day or so until they are rested from their vigorous activities. They are not ill, simply tired. The eggs are clear, about the size of a pin head, and attached singly to the plants. In a day the infertile eggs have turned white and fungused, but in the fertile ones you can see a fine black line curled up, which is the fish. Two tiny black specks indicate the eyes and in four days the fish may be seen to wriggle and break the egg, straighten out and attach itself to a plant or convenient bits of moss. During the first three days the wee fish absorbs the yolk-sac on its stomach, the fins form and the air bladder fills. At the end of the third day it is really a little fish, able to swim and eat. In six weeks it really looks like a fish ,and if it is the telescope variety the large eyes have developed and the fan tail shows. The young fish are a dark, bronzy color, but as they grow larger so they are not so attractive a morsel for the adult fish, they turn gold, beginning on the underside. The calico fish are colored from the beginning. If the color does not change before cold weather in the fall, it remains dark until warm weather the following year. Some fish turn when not over an inch long, others may wait until they are four or five inches in length. There is no way to account for this difference any more than in our children. Give them the same food and care, and one child gets fat and another stays thin. The same with fish. A large goldfish will lay four or five thousand eggs at a spawning, so there is no occasion to be alarmed if some of the eggs are eaten. If every egg that is laid were hatched, you would soon have a sardine can rather than a pool in your garden.

Fish have as many troubles as humans. They have not only birds and snakes to contend with—and sometimes small boys—but the larvae of various dragon flies and beetles eat their young; they have water ticks that bite them and will cause death if there are too many bites; dropsy may develop and cause the fish to swell and all of its scales to stand on end. Or it may develop swimming bladder trouble and be unable to balance itself, and be forced to swim on its nose or tail. The latter two difficulties are not infections and there is no cure; although dropsy may be treated with a small amount of digitalis. Water ticks may be picked off with tweezers or by small Gambusia fish, which find them a tasty morsel. Itch is a disease in which small white dots appear all over the fish, giving it the appearance of having been salted. This is usually caused by sudden, extreme chilling. Fish can stand a great deal of temperature change if it is gradual. If the fish is bruised or scraped, it is apt to develop a white fur or fungus, even as you develop an infection if you do not disinfect an injury. Either of these diseases may be treated by dipping the fish in coal oil, then into clear water for a moment to remove the surplus oil—otherwise the oil would coat the water surface and smother the fish—and then put it into salt water until the spots or fungus sluff off and leave

the fish clean. A teaspoon of rock or ice cream salt to the gallon is right. A sick fish should always be removed from the pool as soon as possible, for water carries infection very rapidly. There will never be mosquitoes in a pool with fish, for they are a favorite food.

With an annual cleaning, your pool should be a thing of beauty and a joy forever, with about the least labor of any part of your garden.

## BUILDING A ROCK GARDEN

The rock garden blends perfectly into our western landscaping. Correctly built and planted it is truly a "thing of beauty," for throughout the year it will be a continuous riot of color. Quantities of our lovely natives are completely at home among the rocks, and many of the African immigrants so thoroughly approve of our climate that they respond with a prodigal quantity of bloom. Best of all, they endure unlimited sunshine, and thrive on a minimum amount of water and care.

The most attractive garden is the one that reproduces, in miniature, a bit of our natural scenery. Notice the formation of the rock strata when you go to the mountains for your next picnic, and try to reproduce some spot you particularly like. You will not duplicate it exactly, but you will achieve the desired natural effect. Use rough, irregular rocks, some with patches of lichens embroidering the surface in shaded greens and red browns. The lichen- decorated sides should be placed facing north for shade; that is the way they grow naturally. Rocks from old mines, with streaks of blue or green from copper veins are very lovely. If you have an old Indian metate, it will show to advantage in the rock garden, and make an irresistible bird bath if you will see that it always contains a little water. Plan little nooks and crevices for the plants that naturally grow there. Notice how cacti cling and thrive in the most unlikely places, and rock ferns that nestle under jutting ledges for shade and protection.

Before the rock garden is begun, care should be taken to remove every bit of bermuda sod from the location, or the grass will eventually work its way up through the rocks and be impossible to eradicate later. Rocks and flattened tin cans in the base aid drainage, and the addition of a generous quantity of decomposed granite or rather fine gravel will aid materially in preventing the soil from packing. Much of our Valley soil packs so readily and thoroughly that it must be kept porous in a rock garden where drainage is so essential.

If the gardener desires a different type of rock garden, without cactus, or a combination of cactus and succulents, an equally charming and perhaps cooler effect for summer may be obtained by using garden plants that like fairly dry soil or good drainage. I have found that my German bearded iris do far better in the rock garden than they ever did in flower beds, because they had the good drainage they wanted and needed. By using the tall types for background, then intermediate, and finally dwarf types for the foreground, scattered clumps give a delightful contrast to the leafy plants.

Leucophyllum or Texas Silver Bush is a lovely evergreen for background. So is the spring blooming Cassia, with its grey-green needles and golden blossoms. The purple Rockrose (or the white, if you prefer) is another good evergreen, making a rather low, spreading bush that is a mass of color for many weeks in the spring. Perennials and self-seeding annuals such as Pentstemon, African Daisies, Gazanias, Blue Convolvulus, Mexican Primrose, Arizona or California Poppies, Matilija Poppy, the tall yellow Evening Primrose or the low pale pink one, Strobelanthus, Chinese Plumbago and Rock Verbena will provide almost year round color .

Rocks set at an angle and partly embedded in the soil not only add to the natural effect, but are an aid to drainage. Water must drain into, and not off of, the garden. Pockets formed by the rock arrangement will assist in retaining moisture, as well as provide convenient planting spaces. The rocks should be set as the garden progresses, if they are to look, like the flowers, as if they 'just grew there."



## LANDSCAPING

**Design of the Small Place**

The design of a place, where large or small resolves itself into the practical disposition of the area at hand, according to the requirements of the owner. His needs will fall under the headings of the amount of space necessary for:

Parking—Should be neat and simple. Uniform effect both sides of street within same block or better yet along the whole street.

Entrance—Treatment determined by style of architecture of the house. Accent certain details of house—either its corners or its doorway or enframe its windows. Every tree, shrub or evergreen should suit a definite purpose. It should be individual, permanent, sufficiently colorful and fitted to the site of your home.

Living Portions—The lawn, the formal and the informal garden.

For a small level lot the most satisfying treatment of a place is a simple lawn with an irregular boundary plantation of trees and shrubs for enclosure—(gardens should have strong high enclosures to insure privacy). This requires the minimum amount of upkeep and with a wise choice of plant material, may be made attractive the year around. Develop interesting design—avoid monotony.

1. The Formal Garden.

Balanced symmetrical gardens are most commonly designed with axes and cross-axes. Axes should have definite beginnings and endings. A formal garden usually contains one or more pergolas, walls, fountains and so forth.

2. The Informal Garden.

When the house is not rigidly symmetrical or when the shape of the land does not lend itself to a precise treatment, an informal scheme may be best. It is characterized by the lack of apparent axes, straight and parallel lines. The general scheme for such a garden is an irregular area enclosed by trees and shrubs.

**Service Areas**

The emphasis should be on the efficient and economical use of space and proper co-ordination of units to eliminate needless entrance steps. Service entrance to dwelling—laundry yard—garage—entrance, and its driveway, need not necessarily be disguised.

**Play Areas**

Sand boxes, clay tennis courts and the like, should be concealed from the main windows in the house. Croquet, lawn tennis, and bowling may take place on the lawn and constitute decorative units. Swimming pools may be developed into elaborately beautiful schemes.

**Fitness**

Should be the keynote of everything. The individual mode of life will largely determine a relative amount of space to be allotted each unit. The units should be related one to the other in the most efficient and practical way with the greatest possible amount of beauty.

In closing this chapter on shrubs we would like to give this paragraph by Edgar Guest—

"I urge newcomers to garden pleasures not to be frightened by the strange and difficult names these landscape fellows employ. In time you will become acquainted with them and speak them very easily.

"These blossoming things make very fine and lasting friendships. Take your time. Keep the plan as something to work on and look forward to. It is the beginning of a lifetime of pleasure."

# TREES

**Selection:**

The selection of a tree for landscape purposes should consider primarily the effect that will be obtained when full growth has occurred. Many people select trees for immediate effect and later have to remove them because they have developed an unsightly effect when full grown. A notable example of this is the use of the Italian Cypress which has been planted close to a walk or beside a low roofed house and when grown to 50 or 60 feet has the effect of throwing the house out of balance, as it accentuates the low roof. Another consideration of importance is the adaptability of evergreen or deciduous trees to the location. Evergreen trees are not pruned and therefore obstruct a view and yet they are highly desirable in completely covering an unsightly corner and find a further use as a screen. Deciduous trees may be pruned up to a height that will allow clear vision from windows and doorways. They also provide pleasing effects in addition to shade. In general, trees should be selected to furnish a frame for the landscape picture. A background of tall growing trees at the rear of the property with lower growing trees in front is the usual selection.

The form and shape of a tree as well as the size should be given definite study in the landscape program.

Spreading shade trees are difficult to use as they shade out all plant life underneath and greatly overbalance the landscape effect unless built up to with the use of supporting lower types of growth. In contrast, evergreen trees are pyramided in type and difficult to use with other plants.

Finally the selection should be limited to those trees adapted to our climate and soil. The resistance to disease, particularly root rot should not be overlooked. (Consult table in University of Arizona Bulletin No. 103, Page 23).

**Method of Planting:**

When the variety has been chosen, it is well to give careful consideration to the tree's ultimate size in relation to the house and other plants when locating the spot of planting. A hole then should be dug at least twice the diameter of the root system, likewise, the depth must be several inches deeper than the root system itself. After the soil is removed it may be mixed with a small amount of **well decomposed** organic matter, (manure), not more than one part of this organic matter to three parts of soil as heavier applications can easily cause burning. Should the tree be even moderately susceptible to Texas root rot the organic matter must not be used, as it might contain some of the fungus.

In planting the tree, it should be set slightly deeper than it was in the nursery. The soil may be thrown in but should not be tamped as it will become hard and bricklike from such an operation. Fill the hole around the tree to within a few inches of the top and immediately give soaking irrigation that will settle the soil closely around the roots. After the water has disappeared, sufficient soil may be added to complete the filling of the hole.

**Training and Pruning:**

Where trees are slender it is well to furnish support by the placing of a stake alongside to which the tree may be loosely tied at two or more places. This support should be maintained until sufficient strength has been developed to prevent breakage during heavy winds.

Deciduous trees are normally pruned to develop a sturdy framework. The head, that point from which the branches arise, should be selected in relation to the location of the tree. It may be chosen as desired, but in general should be not less than five feet from the ground to permit an unobstructed view and proper clearance.



In selecting the limbs that make up basic framework, one should be sure that they are well distributed in the horizonal plane. The usual number is from three to five. These limbs should also be spaced over a distance from twelve to fifteen inches in the vertical plane and no two limbs should be opposite. This will insure strong crotches and reduce the possibility of splitting under wind pressure.

In the second year the basic limbs should be topped back to a distance of from one to three feet from the trunk. Subsequent growth is then reduced to two secondary limbs from each basic limb. These, likewise, should not be directly opposite one another but must be on opposing sides of the basic limb.

In the third year the same program is followed with the secondary limbs but the length is reduced to eighteen inches. Following this procedure a strong well balanced framework will have been developed and all further pruning resolves itself into thinning out of heavy growth, cross limbs, and those that might be rubbing together. In removal of limbs, do not leave a stub, but rather cut back to a lateral.

The practice of topping of all limbs to a uniform circumference is undesirable, as it produces a feather-duster type of growth that is unsightly and very weak.

Deciduous trees are normally pruned in the dormant season to prevent bleeding; however, minor pruning cuts may be made at any time in the process of forming the framework. In other words ,when selecting framework limbs, it is desirable to rub off the unnecessarv growth that lies in between while it is still only an inch or two in length. All cuts three-fourths of an inch or more in diameter should be immediately painted with any one of the materials manufactured for this purpose. This protective covering prevents infection by disease and the entrance of borers or other insects.

Evergreens are never pruned but are generally grown with their lower branches at ground level as we find them in their natural state. They are adaptable, however, to surface trimming and shaping and in rare instances it is desirable to remove one or more limbs in order to maintain the desired shape.

**Cultural Care:**

The care of ornamental trees in Southern Arizona resolves itself into rational irrigation and fertilization. The general practice is to irrigate too often and not heavy enough at any one time. A weekly irrigation in Summer graduating into and away from monthly irrigation in the winter is recommended. An adequate basin should be provided around the tree and sufficient water applied at each irrigation to insure penetration to a depth of three feet.

Fertilization may be accomplished by the use of commercial fertilizers or by generous application of well rotted manure. The directions accompanying commercial fertilizer should be carefully adhered to. The first application is best made just before growth starts in the spring. Another application in mid-summer should be sufficient to promote health and vigor that will result in luxuriant foliage accompanied by desirable growth. Where barnyard manure is used it is best to apply it in the fall so that it may become available as plant food in time for the following growing season.

**Diseases:**

There are two important diseases of ornamental trees in Arizona. The first of these, crown gall, may come in on nursery stock. There is little danger of this now under our rigid inspection laws. It should be remembered, however, that where this does occur it is well to remove the tree and not to replant in the same location, unless the soil is removed to a depth and width of at least four feet in each direction and new soil brought in.

Even then, there is still danger that the new tree may become infected. There is no cure for an infected tree.

The most dangerous disease of trees is Texas root rot, and the best way to avoid this is in the selection of resistant trees. Where the disease is in the earlier stages it may be controlled.

Apply ammonium sulphate to the surface of the soil within the basin at the rate of one pound for each ten square feet. (A basin ten feet square will take ten pounds). Scatter the sulphate evenly by hand after breaking up any lumps, screening if necessary. Hoe the salt lightly into the surface soil to prevent uneven distribution by washing. Apply water from ditch or hose until at least three or four inches of water have been applied to the basin. Enough water should be used to wet the soil to a depth of at least three feet. The amount of water will vary with the nature and wetness of the soil treated. Insufficient water will expose the roots to a solution strong enough to kill them.

A warning is given that much of the root rot around our homes is brought in with silt or soil and every precaution should be exercised to prevent it. The surest way is to get soil from a location where such susceptible crops such as alfalfa are growing free from the disease. Since many soils are infected and since alfalfa is a susceptible crop and also one of our main animal foods, we may reasonably expect that barnyard manures can be viewed as a source of infection.

The following is a list of ornamental trees suggested for planting in this area:

**Generally Successful:**

Chinese Elm; Eucalyptus - Red Gum; Eucalyptus - Desert Gum; Loquat - Japanese; Mulberry - Kingman, Fruitless; Oak - Silk; Olive - Common; Orange - Seville or Sour; Palm - Canary; Palm - Fan; Palo Verde - Bagote, Green; Pecan; Pine - Aleppo; Pine - Canary Island; Arizona Ash; Carob.

**Moderately Successful:**

Beefwood; China Berry; Eucalyptus; Eucalyptus - Grey Gum; Locust - Honey; Palm - Date; Pepper Tree; Pistachio - Chinese; Sycamore - Arizona; Umbrella Tree.

**Doubtful:**

Bottle Tree; Cottonwood - Western; Palm - California Fan; Tamarisk; Athel Tree; Willow - Desert; Walnut - Arizona.

**Flowering Trees, Moderately Successful:**

Callistemon Viminalis, Flowering Peaches, Orchid Tree.

**Flowering Trees, Doubtful:**

Acacia Baileyana, Acacia Floribunda, Acacia Latifolia, Flowering Eucalyptus, Jacaranda.



## SHRUBS

**Soil Preparation:**

Manures or soil amendments, such as sulphur or gypsum, should be applied before spading. Heavy applications of from two to six inches of manure should be applied 6 weeks to 2 months before planting to insure breakdown of the manure, so as not to interfere with the growth of the seedlings. Light applications of well rotted manure or compost may be worked well into the soil and seed planted immediately. Pulverize the soil thoroughly to insure a good physical condition for seeding. Plants must remain moist to insure proper growth.

**Soil Amendments:**

SULPHUR. Best results are obtained when applied with organic matter. The sulphur should be mixed with manure at the rate of about 15 pounds per cubic yard of manure, or one pound to each 100 lb. burlap sack. This mixture may be spaded in during the preparation of the seed bed several weeks prior to planting, or used as mulch around established plants.

GYPSUM. Used also to counteract black alkali and improve the physical condition of the soil. Should be applied at the rate of 5 to 10 pounds per 100 sq. feet and then spaded in.

Additional don'ts: Don't plant immediately after heavy manure application. Don't plant too deep. Follow directions of your seed dealer.

| NAME | SHRUB, SIZE AND COLOR OF BLOSSOM |
|---|---|
| **Hedge Shrubs** | |
| Oleanders (Nerium) | 4 to 12 ft. white-orchid-red, pink and cream. |
| Roman Myrtle (Myrtus Communis) | 2 to 8 ft. white flowers followed by dark blue berries. |
| Japanese Privet | 4 to 20 ft. Large leathery leaves, white flowers. |
| Dwarf Myrtles (M. communis compacta) | |
| Euonymus | 2 to 8 feet. Has dark green waxy leaves. |
| Dwarf Pomegranate | 1 to 3 feet. Almost evergreen, bearing bright red flowers and fruits all season. |
| Lantana | 2 to 5 ft. Orange, yellow, red, lavender and white flowers. |
| Pyracantha | 5 to 8 feet. White flowers followed by large orange or red berries. |
| **Screen Shrubs** | |
| Oleanders (very desirable) | |
| Nandina | 5 ft. White flowers followed by red berries. |
| **Dry Places** | |
| Cassia (Australian Senna) | 4 to 7 feet. Yellow flowers, silver grey foliage. |
| Carissa (Natal Plum) | 3 to 5 ft. White star shaped flowers followed by red fruits used by some for marmalade. |
| Bottle Brush | 6 to 8 ft. Red flowers resembling brushes. |

**Shady Wet Places**

| | |
|---|---|
| Camellia (Japonica) | 3 to 4 feet. Color ranges from pure white to deep red. |
| Eunoymus Pittosporum | 8 to 12 feet. Yellow and white flowers. |
| Viburnum | 3 to 6 feet. Pure white flowers, large glossy green leaves. |
| Japanese Privet (description given above) | |

**Shrubs for Ornamental Berries**

All Pyracanthas
All Cotoneasters
Myrtus

| | |
|---|---|
| Photinia (California Holly) | Red berries |

**Shrubs for Extreme Heat**

Roman Myrtus (description given above)
Cassia (description given above)
Dwarf Pomegranate (description given above)
Lantana (Description given above)
Carissa (description given above)

| | |
|---|---|
| Plumbago | 2 to 6 feet. Azure blue flowers the entire summer and fall. |

**Shrubs for Weeping Effect**

| | |
|---|---|
| Pittosporum (weeping) | 8 to 12 feet. Willowly slender leafed. |
| Bottle Brush (weeping) | 8 to 15 feet. Flowers are borne on tip of branches. |
| Forsythia | To 10 feet. Yellow flowers in early spring before the leaves come. |

**Shrubs for Fall and Winter Color**

All Pyracanthas
All Cotoneasters
Viburnum
Cassias

| | |
|---|---|
| Chinese Photina (Xmas Berry) | 6 feet. Marked by brilliant bronze and red leaves. |

**Shrubs for a Variety of Color**

| | |
|---|---|
| Spanish Broom | 5 to 8 feet. Yellow flowers. |
| Texas Silver Sage | Blue flowers. |
| Bird of Paradise | Yellow flowers. |
| Flowering Peach | Double red, pink, white and variegated flowers. |
| Flowering Apricot | Warm shell pink. |

The following choice shrubs which are not considered native—might be included and would prove a real asset to your garden.

Lagunari Pattersoni—about 4 feet, has been imported from Australia, silver gray foliage—lovely orchid blossoms early in spring. Hardy and will thrive in any exposure. Successfully planted at Wrigley home and Biltmore.

Carolina Cherry—5 ft. Dark green foliage. Very attractive shrub and can be used in any exposure.



Catalina Cherry—(Cherry Laurel) 3 to 4 ft. White fragrant blossoms. Needs partial shade.

Santolina—A new shrub dwarf and used mostly as a hedge or for a low border along walkway. Has vivid gray foliage.

ALSO—
Coolidge Guava (only guava that will fruit by itself)
Althea (Rose of Sharon)
Coculus (Evergreen)
Pampas Grass
Beleoperone (Shrimp Plant) Particularly colorful blossoms at the end of spray.
Sofora—lovely head of blue.
Lysoloma—5 to 10 feet. Yellow flower.
Dodonea—Hop bush.
Xylosma Senticosa—5 feet. Can stand heat and cold. Does not bloom.
Thevetia (Yellow Oleander)

**The Why, When, and How of Pruning**

An important contributing factor to having healthy, good looking shrubs is in the pruning of them.

Adequate and proper tools which are kept sharpened and clean at all times are a necessity when the pruning urge comes.

Remember not to cut too much or too promiscuously and be informed as to whether flowers or fruits come on the old or on the new growth of the plant in question.

Paint wounds with an antiseptic dressing to prevent cracking and shacking of wood and to check the germination spores of disease causing organism. Bordeau paint mixture and raw linseed oil is recommended for this operation, or shellac, and a thick paint of zinc oxide and linseed oil. Applied with a stiff brush.

**Principles of Pruning**

1. Heavy top pruning of a shrub causes more leaves and branches.
2. Heavy root pruning of a shrub, lessens vegetative growth but increases the production of flowers and fruits.
3. A pruned plant always tends to resume its natural habit.
4. The uppermost buds of a plant grow first.
5. Heading back of young growth in a healthy plant induces flowers and fruitfulness, girdling a twig or bending or twisting it causes food which is manufactured by the leaves to remain in the injured twig, rather than being carried away to the trunk and roots.

**Suggestions for Pruning Operations:**

1. Make all wounds clean.
2. Do not shear shrubs. Reach in and take out old branches at the base so that new shoots can get the light to grow and not be checked. Renews the whole plant, not only the top of it. Such cutting also saves time.
3. Make all cuts parallel and close to the branch that is left.
4. Never leave a stub, if possible to avoid it.
5. When heading back twigs, cut just above the healthy bud pointing in the desired direction.
6. Wounds made in spring heal faster than those made during the summer.

7. In removing large branches, first, undercut until the saw binds, then cut down from the top until the branch snaps off. This prevents stripping down of the bark of the trunk.

**Reasons for Pruning**

1. To remove diseased, dead, broken or crossed branches.

2. To shape a shrub for some special purpose, such as a hedge sheared specimen. The thick mat of fine twigs, at the top of the mature hedge, sometimes needs thinning to let the sun awaken life in the branch below.

3. To renew and rejuvenate old plants.

4. To eliminate suckers or wild growth. This applies to any kind of plant that is not on its own root. A few plants that need watching are standards, such as tree roses and tree wisterias, flowering almond, double and purple leafed plums, dogwood, French hybrid lilacs or privet or other grafted stocks including roses.

5. To hold a plant within bounds, is done by a combination of thinning, heading back and root pruning.

6. To secure new growth for winter color cut back quite severely, in early spring before growth starts, or after the running sap is becoming a little dormant in the fall. If leaves fall, prune after the leaves have fallen. Plants which flower first, before leafing, should be cut after blooming, unless it is for the purpose of removing dead wood or diseased wood.

7. When very large flowers are desired, it is necessary to reduce the number of flowering buds, so that those remaining receive an abundance of plant food. For flowers that bloom on shoots of the same season, as tea and Hybrid tea roses, Hibiscus, Buddlea and Tamarisk, the pruning treatment is to head back the plant severely, leaving but a few buds on several branches. To cause the flower-bud formation in plants that have been growing rampantly without flowering, judicious root pruning in early spring will help. A few of the common evergreen shrubs are here mentioned for examples:

Buddlea—varieties Globosa and Alternifolia—Pruning only if straggly by shortening stems after flowering. Other varieties cut back hard.

Cassia—Prune only when too straggly by cutting back. Usually very early bloomer therefore delay pruning until after bloom.

Cotoneaster—Little pruning required especially if berries are to be cut.

Euonymous (Evergreen varieties). Prune very little unless for hedge.

Lantana—Will respond to hard pruning before spring growth starts.

Ligustrum—(Privet) Prune hard, in winter or spring.

Myrtus (common myrtle) Little pruning required.

Nandina—Little pruning required.

Nerium (Oleander) Often cut back hard every 3rd year and old spring wood removed every year after flowering.

Pittosporum—Prune for shape and size.

Pyracantha—May be pruned heavily in cutting berries.

Viburnum (Evergreen varieties)—Prune only when necessary, little required.



## LANTANA

Lantana is the name of a genus of shrubs of the viburnum or verbena family, growing native in tropical or subtropical America. It is of three types: the flava—yellow flowers, the selloweana—vine like used as a trailer with pinkish lilac flowers and the camera with red or yellow flowers. There are some fifty different varieties. The most common types are the camera which are the most showy. The plant has been introduced as a hedge plant in India and the Hawaiian Islands where it has become a pestiferous weed.

The lantana can be grown in almost any location where it has plenty of sun. Full sunlight on the south or partial shade on the east or west is good.

There is little special preparation for the lantana bed. The plant is usually used for a foundation planting or as a hedge, but occasionally is shaped into an ornamental plant resembling a gaudy rose tree. The soil should be spaded and have enough sand for good drainage as it needs plenty of water. If a potted cutting is to be planted the hole needs to be a little deeper than a one gallon can. If the plant is to be a smaller cutting or seedling the space will be smaller. Allow at least six feet between lantana plants unless they are to be kept closely pruned. No plant foods are necessary for the lantana seems to love a rather alkaline soil and after a short time provides its own mulch, as the leaves on the lower branches will drop and form a humus.

Lantana can be grown from either seeds or cuttings. The plant does not come true from seed as the various varieties are cross fertilized by humming birds and insects. The cuttings are more likely to favor the parent plant but often a cutting from a red flowering lantana will turn out to have a deep orange flower. For this reason it is best to buy cuttings already in bloom if some special color is desired.

In growing from seed the blue berry-like seeds are planted in pots or a seed bed in December. The soil is kept rather moist and the seedlings are not likely to be ready for transplanting until later summer. As the summer months become hot the seedlings need partial shade.

Cuttings from lantana may be made best in late January or February. Then the new leaves begin to show. A finger sized cutting from a branch one-half to three-fourths inch in diameter is made being sure that a joint or bud is in a position where it will be just below the surface when planted. The cuttings are placed in a frame or in gallon cans in sand. The sand must be kept well watered and must be in a sunny location. If there is any danger of frost they should be covered.

After the cutting has begun to root and has put out some leaves, usually in April or early May, it can be transplanted to the desired location.

Lantana may also be propagated by layering. In December the lower branches of the parent plants can be covered at a joint with soil to a depth of about an inch or more. If the plant is watered occasionally these branches will grow roots and be ready for transplanting in February.

Plants from seeds grow tall and can be trained to cover the side of a house to quite a height or used on porch pillars where a lower growth than a vine is desired. Plants from cuttings grow more stocky.

The best time for planting potted plants is in February after all danger of frost is over but they can be moved at almost anytime with precautions. In transplanting lantanas Vitamin $B_1$ is very helpful. Plants have been moved in August without wilting where the hole, in which they are placed, is well puddled with Vitamin $B_1$ and the plant watered with it for several weeks. Plants moved in this way can be taken from the ground with no soil about the roots, placed in a pail containing a strong solution of Vitamin $B_1$ and left for fifteen minutes. They are then set in the new location using part of the solution in the hole and putting the rest about the plants. The transplanted lantanas need to be shaded during the full sunlight for a few days.

Occasionally the owner of a large lantana will find rather large seedlings growing under the parent plant. These can be moved to a new location and will often grow into flowering plants the same year.

Some lantana growers prune the plants to within six or eight inches of the ground in November or December and keeps them covered with straw or cover them when necessary. Others prefer to let the lantana bloom during the winter when it will and prune into the desired shape after all danger of frost is over. The plants sometimes lose all the leaves in winter and can best be pruned when the new leaves begin to show. As the sheltered plants will usually bloom the entire year they can be pruned at any time when they get out of bounds.

There is no cultivation of lantana necessary after the plant is well established. It will kill all plants under it even Bermuda grass, so there is no weeding necessary.

The only pest bothering the lantana is the common house fly. These will collect on the plants preceding a storm and for this reason some do not care for them as a foundation cover.

The flower of the lantana does not stand well after cutting, the foliage has a tendency to wilt and the small flowerets from the clusters fall. However, the plant is well worth growing for the simplicity of culture, continuous blooming, fragrance of the foliage and abundant growth, it makes a lovely addition to any garden.

## GOURDS

Gourds are members of the cucurbitaceae family which also includes pumpkins, cucumbers and squash. There are about seven hundred species of cucurbitaceae, most familiar being the Lagenaria and Cucurbita Pepo. There are more than two hundred varieties of these two species and the crosses of these give enormous range of both shape and color.

The Lagenaria are the hard shell gourds. They are night-blooming and have a white flower not unlike a petunia. They are fertilized by pollen carried by a moth and in the Salt River Valley do not begin to set until rather late in the summer when the nights grow cooler. The male blossom begins blooming first. This has a rather long stem. The female blossoms do not appear until about two weeks later. These blossoms have a short stem and are less profuse. The hard shell gourd has more vine, longer tendrils, and larger leaves, which alternate in woody vine. For this reason it is much better where shade or fence covering is desired.

The Cucurbita Pepo are soft shell or ornamnetal gourds. Belonging to the same group are the squash and pumpkins. The soft shell gourds are day blooming and have yellow blossoms. They should not be planted near either squash or pumpkins as they cross fertilize and the results are sometimes wonderous to behold. The vine is more hairy than the hard shell vine and the leaves are of coarser texture and more angular.

Gourds may be planted in hills, in almost any location where vines are needed except on the north side of a building. They may be used as fence cover, shade or wall cover or may be planted in the open field as other cucurbitaceae. The hills in any case should be from four to eight feet apart.

The bed for gourds needs to be well spaded with plenty of fertilizer dug in as they require plenty of nitrogen. It is almost impossible to feed the plant later on without burning the vine or producing a vast growth of vine and foliage with few gourds. Where gourds are planted along a fence a space about a foot square and four or five inches deep may be dug for each hill without disturbing the soil between. The vines will later smother the grass beneath them. It is best to raise gourds each year in a new location.

Gourd seeds are fertile from four to five years. A single gourd may contain from five to four hundred and fifty seeds. The best seed for this locality are those from large gourds of good shape raised in the Valley and dried slowly out of doors. It takes imported gourds from two to five



years to become acclimated to our hot summers so that the first year or so the harvest from imported seed is not prolific.

The seed should be placed in a jar in warm water from twelve to forty-eight hours before planting. The heavy or fertile seed will go to the bottom while the less fertile seed will remain on top. Some of these light seed will probably grow if planted but will result in inferior plants.

In the Salt River Valley gourds can be planted in March in the open ground. It is possible to plant as late as early July and still have a good crop of gourds. After the seeds are planted they should be watered every day until they are up which may not be for two weeks. After the seedlings appear they require frequent evening watering until the plants are large. After that time watering need only be about twice a week. It is best to lay the hose near the vine on the ground and water by irrigation as watering the vines injure the blossoms.

When plants have four leaves thin out the weaklings, leaving one or two plants to the hill.

Gourds need little cultivation. If the vines are covering a fence and the ends stray across the yard they may be mowed or cut back. This tends to make for earlier setting of the fruit.

There are a great number of pests which delight in feasting on gourd vines. Some of these pests and the remedies are:

Cut worms—napthaline flakes or cuffs of tar paper sunk in the ground around the vine.

Cucumber beetles—also called summer wilt—spray with lead arsenate or dust with wood ashes.

Squash vine borers—nicotine spray or cut a slit in the wound and remove the borer.

Squash bug—nicotine spray.

Aphids—nicotine spray

Scab—bordeaux mixture

Mildew—dust with sulphur

Gourds do not come true to shape unless they are hand-pollinated or only one type of gourd is planted. The shapes may be changed by boxing or staking.

Soft shell or ornamental gourds are the first to be harvested. They may be cut when the stem turns brown, and the gourd can be dented with the fingernail. As grasshoppers eat these it is well to harvest those ready every day or two.

These gourds may then be waxed or rubbed with a soft cloth and used in dish arrangement. With our many Indian and Mexican baskets and forms of pottery it is easy to find a suitable container. Use an odd number of gourds in the bowl and few enough so they do not seem crowded. A smooth gourd emphasizes a warty one and a yellow or green should accent a white gourd.

Hard shell gourds may be left out all winter to dry if they are in a place inaccessible to field mice and gophers. They can be gathered when the stems are brown and hung in a well ventilated place. As it takes from three months to a year for them to dry thoroughly they may be used to decorate a patio or porch while drying. Fungi may form on the gourds while drying. This will wipe off with a cloth dampened with kerosene and will add beauty to the dried gourd when waxed. If the gourd fancier has objection to the fungi the gourds may be dipped in sulpho-napthel when first harvested.

The dried gourds are useful as well as ornamental. In "An Introduction to Cultural Anthropology" by Robert H. Lowie, there is mention of over two hundred uses of the gourd by primitive people. Modern uses are in charm strings, leave-a-notes, candle sticks, bowls, dippers, lamp bases, pencils and paint brush holders and even, believe it or not a gourd dinner service.

## VINES

Our warm climate gives us the choice of many beautiful vines. Many vines which are considered perennials in other planting zones are evergreens here.

In planting vines one must first decide the purpose of the vine; whether it be to produce fruit, abundant shade or light shade, to hide an unslightly object, to give privacy, or to produce floral and foliage beauty.

A good station for the vine should be prepared. Most vines are vigorous growers and are expected to remain in the same spot for several years; so a bed at least two feet by three feet should be prepared and enriched from time to time with old manure or leaf mold. Planting is best done in the spring with attention given to the basal growth. The young shoots should be properly secured from the start. Some pruning is neessary but should be done with discretion and good judgment.

Vines naturally fall into three groups: (1) those which cling by means of root-like organs in their stems (English Ivy), (2) those which hold fast by means of tendrils (grapes) or by modified leaves (garden pea) and (3) those which coil around their support (clematis).

Since many of our vines have been treated in other articles I shall limit myself to listing the most common, easily-grown vines; the two classes, annuals and perennials; and the purpose each would best serve.

Annuals: (For quickly covering unsightly walls or fences).

Morning Glory: Heavenly Blue, Scarlet O'Hara—Floral.

Moonflower—Floral and foliage.

Hyacinth Bean—Floral.

Hop Vine—Foliage.

Gourds—Fruit, foliage.

Wild Cucumber—Foliage (fruit later).

Nasturtiums—Floral, foliage.

Sweet Pea—Floral, foliage.

Perennials are those whose roots last from year to year and bloom annually. Many are evergreen and are starred to indicate:

*Honeysuckle: White, floral; Red, floral; Pink, floral.

*English Ivy—Foliage.

Woodbine—Foliage.

Trumpet Vine—Floral.

*Tecoma Capensis—Floral, foliage.

Queen's Wreath—Floral.

Silver Lace—Floral.

Ferns—Foliage.

*Clematis—Foliage.

*Roses—Floral.

*Bougainvillea—Floral.

*Jasmine: Cape Jasmine—Foliage, floral. Mile a Minute—Foliage.

*Australian Pea Vine—Foliage, floral.

Silk Lace or Star of Bethlehem—Foliage.

*Bignonia—Foliage, floral.

Wisteria—Floral.

Grape—Fruit.



## THE BOUGAINVILLEA

The Bougainvillea is a native South American plant. It was named for De Bougainville, a French navigator. In South America it proves a very sturdy plant and is found in seven or eight different varieties and in many different colors. It grows in such profusion it is often used as a shrub for hedges and requires heavy pruning.

In the United States, the Bougainvillea is most common in the southern coastal regions. Homes in the southern part of California and Florida are made lovely by huge clusters of the purple or crimson flowers of this flowering vine. These clusters are made up of individual flowers, formed by three leaf like petals, enclosing three little flowerlets, yellow at the tip.

Most flower catalogues list only four varieties. These are:

1—Bougainvillea—Brazilienses, reddish purple.

2—Crimson Lake—crimson.

3—Magnifica—very rare—royal purple.

4—Praelosies—tangerine, bronze gold varying occasionally to apricot or orange.

Only in the last few years have gardeners grown bougainvillea in this part of the country. The Crimson Lake seems best suited to our climatic conditions, although the Praelosies variety is being used with some success. However, none of the varieties will stand very low temperatures. Temperatures of 22 or 23 degrees will kill the vine and a temperature of 27 or below will spoil its appearance. Consequently, any region that can successfully grow citrus trees will prove satisfactory if the plant is planted in the proper place. This would be with a southern exposure, preferably next to a wall or in a place protected as much as possible from cold winds. Bougainvillea thrives on sunshine and will bloom all the year, but the heavy blooming is in April and May and then in the fall from October until the cold hurts the blossoms. It is wise to tie the vine securely to the wall or trellis as the wind proves very destructive to it.

In preparation for planting, the best plan is to prepare the soil a year ahead if soil isn't very rich. This preparation would be to remove original soil to a depth of two or more feet and replace it with river silt mixed with manure. The next spring as soon as frost danger is over, about the last part of February, the plant is put in the ground. It is well to give it a good chance to get a start before warm weather. Cuttings are fairly successful if half-hardened wood is used. Place in cans of good soil and keep moist. Cuttings may be cut in October and put into the ground the following spring; or cut in February and planted the next spring.

After planting the Bougainvillea vine, keep the ground quite moist all of the time. Frequency of watering will depend on the weather. In order to be successful in having a profusion of bloom, the plant must be kept growing rapidly, as the bloom comes on new growth. This may be accomplished by fertilizing about three or four times a year. A variety of fertilizers seem to be best. Would suggest using blood meal, phosphate, ammonium sulphante, calcium, sulphate of iron and manure in rotation. The combination used at different times, furnishes the necessary material for growth.

The first two years pruning will not be necessary, but later all the ends may be pruned as this makes prettier blossoms. August is a good month for this pruning, for the growth will then be sufficient for fall blooming.

In conclusion, would like to point out, that any one will be well repaid in pleasure for the work required in growing the lovely Bougainvillea vine.

## THE POINSETTIA — EUPHORBIA PULCHERRIMA

Known as the Christmas flower the Poinsettia is very popular and possibly makes its best showing in the Salt River Valley. So far as it is known Poinsettias were brought into this country from their native land, Mexico, about 1830 by Joel R. Poinsett, the American Minister to Mexico.

An open sunny location with southern exposure is best for Poinsettias. While their soil requirements are not strict, they do better in a light soil than in one too heavy.

March is the proper time to set out and cut back your plants. If you wish to start more plants in the open ground, cut the woody canes into sections a foot long. Plant them at least six inches deep, and be sure the cuttings are inserted right side up—that is, retaining the same position they did on the old stalk. Cuttings should be kept slightly moist but not too wet. The original plant should be cut back to two or three eyes or joints from last year's growth. Cutting the plants back this far produces more branches, therefore, more flower bracts. It is well to have new plants coming along regularly to replace the old ones. After five or six years the old plants do not seem to produce so well. Young plants bear the largest flowers.

Throughout the year give the garden poinsettia an occasional application of good fertilizer. In September, a mulch of rich stable manure will greatly improve the color of the blooms.

To cut Poinsettias for flower arrangements, one must take into consideration the fact that the stems exude a milky substance. The problem is to seal in the milk so that the flowers will last. The old method consisted of either burning the ends or plunging them into boiling water. However, the latest recommended method consists of dipping the ends two or three inches into a can of sulphur dust. After dipping Poinsettias lay them aside for about fifteen minutes to "set" before using.

Very tender to frost.

## PEST CONTROL NOTES

Following are a few notes relatives to the control of certain common plant pests frequently found in home gardens, ornamental shrubs, shade trees and fruit trees in Southern Arizona. These notes are neither complete nor scientific and they are not intended for the critical eye of the professional biologist, pathologist, or entomologist, but rather as a simple guide for the average gardener who may derive some benefits therefrom.

For practical purposes plant pests may be placed in three major groups as follows: A. Insect Pests, including the mites, B. Plant Diseases bacterial and fungus, and C. Miscellaneous Pests, birds, rodents, worms, weeds, and man. The various methods of control for these pests are designated as insecticides, fungicides, germicides, fumigants, weedicides, baits, traps, mechanical control and cultural control. All of which merely mean "Materials and Methods" used in combatting or controlling pests of the group or groups to which they pertain.

A. Insect Pests (including mites)

For control purposes this group may be divided as follows: **Chewing insects, Sucking insects,** and **Boring insects.**

**Chewing insects** are those which eat portions of the leaves and stems, often devouring entire plants. Some of them skeletonize and mutilate foliage or bloom. These bold marauders include the grasshoppers, cutworms, caterpillars, leaf-eating beetles, loopers, and katydids. Their work is plainly visible and self evident. They are controlled by the use of poison dusts, sprays, and baits which are known as stomach poisons, or by the use of powerful contact dusts and sprays that have been recently



developed and are now available with complete instructions. These materials, when properly applied, will usually control or eradicate the pests for which they are intended, without danger to plants or animals. Following are a few **insecticides** commonly used in the control of **Chewing insects.**

**Lead Arsenate Spray**—2 to 4 pounds per 100 gallons water (1 ounce to 2 gallons water). This is an old but effective spray for loopers, leaf beetles, cabbage and tomato worms, and other chewing pests.

**Cryolite**—A dust that is easily and quickly applied to foliage. Will control Elm Leaf beetle, bean beetles, caterpillars on zinnias, etc., can be mixed one-half and one-half with dusting sulphur to control mildews and mites as well as the chewing pests.

**D.D.T—5% and Chlordane 5%**—used separately or together is quite effective as a dust. Can also be combined with fine dusting sulphur in equal parts to make an effective general dust. Chlordane is very effective in the control of grasshoppers, roaches, and ants. D.D.T. has a prolonged killing action which is good for several days. When these two materials are combined the resulting mixture is very toxic and lasting.

**Rotenone and Pyrethrin** sprays or dusts are quite effective control against most insects. These are non-toxic to humans. Many sprays on the market now, under various trade names, contain liberal amounts of rotenone, pyrethrin, and certain emulsified oils. They are effective and safe to use.

**Lindane**—is a new and powerful insecticide which is more or less general in use. It is especially good in thte control of aphids.

**Poison Baits**—apple and bran baits containing metaldehyde or certain arsenicals have proven effective for the control of grasshoppers, cutworms, weevils ,and other pests. These baits are scattered about freely in flower beds and garden plots, and when the foliage is dusted well with Cryolite at the same time the control is usually complete.

**Sucking insects** are those which pierce the foliage and stems of plants, sucking the juices therefrom without actually eating the plant tissue. These are the plant lice (aphids), the leafhoppers, the scale insects, the mealy bugs, and the true bugs (Squash bugs, stink bugs, harlequin bugs, etc.). Stomach poisons are of no avail for these pests. They are best conrtolled by contact sprays and dusts which kill by suffocation and paralysis. Many of these new and powerful insecticides are on the market now under various trade names and most of them accepted in reputable trade channels are good. They include D.D.T., Rotenone, Pyrethrin, TEPP, BHC, Lindane, Chlordane, and Parathion in various combinations or alone. These materials are to be used as sprays or dusts, as directed, and some are specific while others are general. All of those released in regular trade channels are plainly labeled as to content and use and they are reasonably safe when used as directed. Some of the new insecticides have not been released for the general public and are used only in large scale operations by licensed operators.

The sucking insects are not always easily controlled (as evidenced by certain scale insects and mites) and frequent applications may be necessary to control them. This is due to the fact that these pests have a waxy covering in the mature stage which is difficult to penetrate. Another factor is that they may be so numerous and widespread on other crops or weeds that they continue to migrate to our ornamental plants. Thoroughness and frequency of application, as well as proper timing, means a lot in their control. Some of the safest sprays to use are those containing Pyrethrin and Rotenone in oil emulsion. DDT—5% and Chlordane 5% mixed and combined 50%-50% with dusting sulphur is an effective garden dust for many insects. TEPP or Parathion are both effective for red spider control—either as dusts or sprays, but they are also a little dangerous to use and directions should be **carefully** followed. Nicotine dust and nico-

tine sprays are used to control plant lice (aphids). Lindane and BHC are effective sprays and they will control most insect pests except some of the scales and spider mites. Oil emulsions combined with pyrethrin and rotenone are very effective on scale insect control. **Consult your nurseryman regarding proper materials to be used.**

**Boring insects**—those which tunnel into the trunks or stalks, stems, branches ,and foliage of plants and complete most of their life cycle from within. Examples are the bark beetles, the flat-headed and round-headed borers, the leaf miners, and the gall insects. These fellows are difficult to control as they spend most of their life cycle within the plant where it is impossible to reach them with ordinary insecticides. The flat-headed borer of roses and pyracanthas in a good example. This pest works just beneath the bark, tunneling about killing branches and canes until the plant is riddled and worthless or dead. They usually attack weakened plants or open cuts that have not been sealed properly. They are seldom found in a strong vigorous plant that has been continually sprayed and properly maintained. If their damage is noticed soon enough they can be pruned out by actually removing the infested part of the plant. Some of the larger borers in trees can be killed by running a wire into their burrows and twisting the same—or by thrusting a pledget of cotton soaked in carbon bisulphide into the tunnels and sealing the same. These are largely mechanical measures. Preventative measures are better control—proper pruning and sealing cuts. Early removal of infested plants or parts of plants. Painting trunks of trees or plants to keep them strong and vigorous. The chrysanthemum borer is best controlled by rotating the beds each year and disposal of the old plants when divisions are made. The cottonwood leaf miner can be controlled by well timed sprays with Chlordane as recommended. Gall insects can be controlled by frequent dustings and by careful pruning. The boring insects have always presented a difficult problem.

B. **Plant Diseases:**

Plant diseases are divided into three classes, the bacterial diseases, the fungus diseases, and physiological disorders. In this group we find the rusts, the mildews, the slimes, the root rots, the molds, crown gall, canker, the gums, the virus diseases, the wilts, chlorosis, root knot and many others. Physiological factors are also included, such as poor soils, alkali, poor drainage, deficient soils, cold factors, sunburn, drought, and so forth. Materials that are used to combat these diseases are known as fungicides, germicides, sterilants; and correctives. Some of the common diseases or disorders are discussed briefly in the following paragraphs.

**Mildews**—fungus diseases affecting shrubbery, sweet peas, grapes and roses. Controlled with sulphur dusts and sprays, copper dusts and sprays, carbamates, etc. Bordeaux mixture (copper and lime) is a good old standby for certain mildews. Sulphur dusts about a week or ten days apart will usually control mildew on roses, euonymus, and sweet peas.

**Rusts**—such as snapdragon rust—controlled by use of resistant stock, rotation of the planting beds, removal of infected plants as they appear. Dusting with sulphur every ten days from the start will help greatly.

**Root Rot**—Ozonium or Texas root rot is a fungus which works in alkaline soils and which is active in hot weather. Affects a wide range of host plants. Control is soil acidifiers, heavy applications of manure and ammonical type fertilizers, and use of resistant varieties. Consult your state agricultural department, county agricultural agent's office, and University Extension Service. This fungus is common and quite insidious and not too easily controlled.

**Slime Flux disease**—or bacterial ooze—frequently found in cottonwoods, mulberrys, and Chinese elms. Control is to clean out pockets thoroughly and disinfect with Bordeaux or mercury solutions as recommended and sealing. Can be prevented to some extent by proper pruning and sealing cuts completely.



**Crown Gall**—one of our oldest bacterial diseases which forms galls—knotty malformations on the roots and stems of plants. This is the cancer of the plant kingdom. Frequently found on roses at the crown of the plant and along the roots. Also found in pyracanthas, deciduous fruit trees, pecans and other plants. Control is to not plant in known infected ground. Do not replant roses in known infected beds, nor transplant roses from the same. Spot treatment with mercury bichloride one to one thousand may help. **No definite control** has been developed as yet.

**Root knot**—this is caused by nematodes, tiny worms which produce root swellings and galls similar to those of crown gall. Beading of rootlets is common. Eradication is very difficult. Much can be done with fumigants and sterilants—both of which are expensive but seldom complete. Commonly found on mulberrys, figs, roses, petunias, zinnias, gardenias, and many other plants. Buy clean stock, plant in clean ground, and avoid highly susceptible plants such as lippia, dichondria, etc. Do not trade plants unless you know the stock is clean. This is a vicious and common disease of many plants.

The whole story as far as plant disease control is concerned is mostly clean culture, rotation, resistant varieties, and sulphur, Bordeaux, Copper, and mercury compounds Consult your agricultural officials, County Agent, University Extension Service, State Entomologist and your nurseryman.

**Physiological disorders**—involve such factors as poor soil, poor drainage lack of certain soil elements, alkalies, sunburn, overwatering, cold injury, general neglect, etc. Many of these factors can be controlled by moderate applications of good common sense coupled with small amounts of curiosity, while others may require the technical knowledge of the soil analyst, chemical treatment, proper fertilization, etc. Again consult your agricultural authorities, reputable fertilizer concerns, and nurserymen. Following are a few hints:

(a) **Sunburn**—shade plants with shingles, screen, muslin, burlap, etc. Trees that have been cut back should be whitewashed along the main branches and trunk until sufficient foliage is produced to provide shade. Tree roses should have their trunks either collared or painted to prevent sunburn.

(b) **Chlorosis**—yellowing of foliage, loss of green color between veins of leaves, often accompanied with tip burn and die-back. This is frequently a deficiency chlorosis, especially in alkaline soils. Deficiency of iron, zinc, potash, manganese, or nitrogen. Iron deficiency is quite common here and may be corrected by adding iron sulphate and super-phosphate or manure one to five in holes six to ten inches deep around the plant or tree. Usually one pound to the years growth of the tree. Large shrubs and trees can be drilled directly in the trunk and packed with iron citrate or iron phosphate—one to several holes may be required per tree, depending on its size. Foliage may be sprayed with one pound of iron sulphate in three or four gallons of water. Pecans are often deficient in zinc which may be applied the same as iron sulphate, using the sulphate salt of this material. Pyracanthas and gardenias frequently respond quickly to the iron treatment. Where chlorosis is caused by over watering, drainage may be provided and watering can be slowed down a bit. Do not run cooler water continuously on one area—move it around. Sulphur and manure mixed in certain soils often helps. Poor soils can be analyzed and rebuilt with proper fertilizers to regain a proper balance. Myrtle is frequently chlorotic because of too much water. In correcting chlorotic plants do not go too strong with any treatment as too much may be even worse than too little.

(c) **Cold protection**—corn stalks around young citrus and fig trees will help protect the young wood from freezing. Severe cold can even penetrate this protection. Tender plants such as bougainvillea, hibiscus ,and others may be covered with sheets or blankets and during severe cold may necessitate an electric bulb or lantern under them for additional protection. Many camellias and bougainvilleas have been saved by this method.

(d) **Watering**—depends on soil types, plant types, and temperatures. No one can set up a universal watering schedule. In general, sandy gravelly soils require more water and clay or adobe soils less water. Shallow rooted plants usually require more frequent watering than deep rooted plants. More watering is required in hot windy weather than in cold weather. Usually one heavy irrigation every eight or ten days with a light watering in between will take care of most plants. Some new plantings may require watering every two or three days or even more often in the case of lawns and young flowering plants. Overwatering is apt to be more detrimental than under watering, a droughted plant is often saved where a drowned plant is seldom saved. Check your plants and soil frequently to see if they have sufficient water.

(e) **Exposures**—Do not plant shade-loving plants in hot spots or sun-loving plants in cool spots.. Try to use plants in exposures more favorable to the plant rather than planting for effect alone. Do not plant plants that like good drainage in ill drained soils. Many rose gardens would do much better if they were given more shade and sufficient drainage, as well as a little protection from hot winds. Gerberas and bearded iris seldom do well in sunken beds or among other plants that require lots of water. They would be better if placed in beds by themselves and given a little special attention and partial shade.

## MISCELLANEOUS

**Birds**—sap suckers (woodpeckers) make rows of tiny holes in the bark of trees and may transmit diseases with their work. Flickers and mocking birds peck foliage and even remove seeds from the ground. Control—flutter strips, tin can tops suspended on strings, or bits of mirrors that flash. Covering plants with muslin, cheesecloth, or chicken wire may help. B.B. guns can discourage real pesky birds although the neighbors might not approve.

**Rodents**—Rabbits, mice, rats, gophers and moles cause much damage to flowers, shrubs, and trees. Control is to trap them, use of poison grain or vegetable cubes. Fumigation of tunnels with carbon bisulphide or other lethal materials. Wire guards around plants is good rabbit control to prevent chewing. It is said that castor beans planted in an around chrysanthemum beds will repel gophers and provide shade.

**Weeds**—Most weeds can be controlled now with selective weedicides. The 24D types are quite effective when used correctly. "The "bad boys" of the weed family are water grass, crab grass, nut grass, and Johnson grass. They are all difficult to control and only a few of the commercial weedicides have shown any promise at all. If these grasses are worked early, before they get too far ahead of us, they can be controlled, but the procedure is long and painful! Crabgrass can be burned out by use of Ammonium sulphate. Sprinkle the bunches lightly first, then apply about one tablespoonful of Ammonium sulphate to the center of each bunch and do not water for two days. Spotted spurge can be controlled by this method also. Nut grass can be killed by breaking the individual blade clusters close to the ground and painting the break immediately with straight 2-4D weed killer. A small water color brush is used with this procedure.

**Man**—(including woman) is perhaps the most difficult pest of the lot. Man will seek advice but not use it. He will kill plants with kindness—digging, overtreating, overfeeding and trying everything to excess that is in the book. He will get over-enthused with his gardening for a spell and really work at it, and then, when the going gets rough, he will suddenly lose interest and forget the whole thing. How many times have those flowers suffered on account of a good game of golf or a bridge party? Pity the poor plants, dear friends, and respect them too. If man could stand the rigors of treatment to which plants are frequently subjected—and survive them—he would indeed be a "Super."



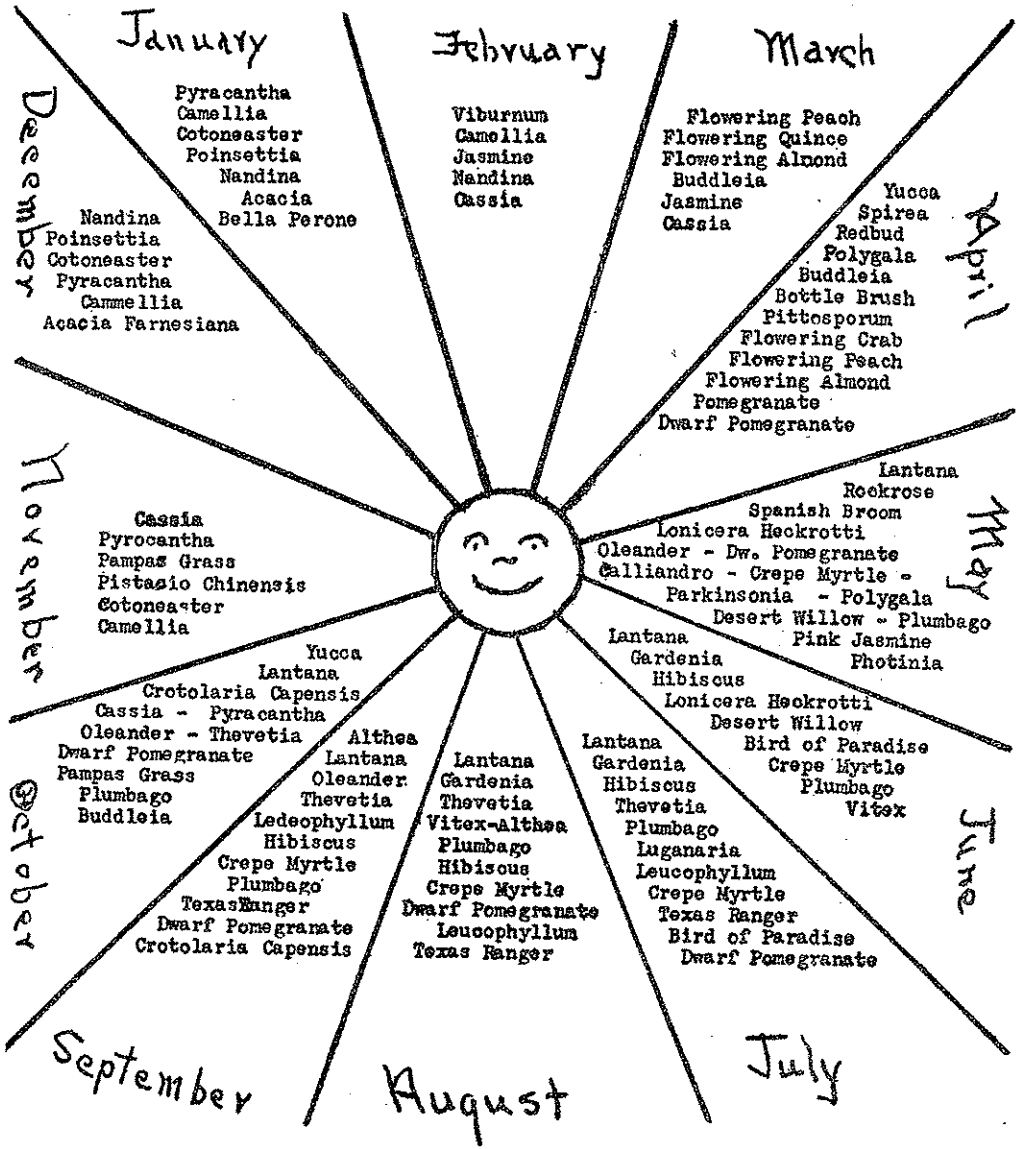
## FAITH

She said:
There is no God.
I have no faith,
No creed.
This thing,
Called life again,
A rebirth from the sod,
Indeed!
It is a myth,
A fairy-tale, a wrath.

Then came Spring,
On lady-slippered feet,
And she:
Who had no faith,
And scorned a creed,
Went forth into her garden
And scattered flower seed.

(Vanity Bag—Margaret Wheeler Ross)

## FLOWERING SHRUBS AROUND THE CALENDAR






## YEAR AROUND BLOOM IN THE GARDEN

**Month—Flower**

January—
- Poinsettia
- Daffodils
- Sweetpeas
- Violets
- Calendulas

February—
- Pansies
- Violets
- Anemones
- Ranunculas
- Alyssum
- Calendula
- African Daisies
- Stock

March—
- Carnations

Petunias
- Nasturtiums
- Snapdragons
- Bougainvillea

**Month—Flower**

April—
- Roses
- Gladioli
- Columbine
- Larkspur

May—
- Lantana
- Cotoneaster
- Petunias
- Roses

June—
- Zinnias
- Petunias
- Roses
- Shasta Daisies

July—
- Zinnias
- Hemerocallis
- Water-lilies
- Crepe Myrtle

**Month—Flower**

August—
- Michealmas Daisy
- Crepe Myrtle
- Zinnias
- Verbenas

September—
- Chrysanthemums
- Zinnias
- Cosmos
- Hemerocallis

October—
- Chrysanthemums
- Clematis
- Tacomas Capensis
- Roses

November—
- Camillias
- Chrysanthemums
- Michealmas Daisy

December—
- Poinsettia
- Sweetpeas
- Pyracantha

## VALLEY GARDEN CLUBS

Astrological
Chandler
Cheery Lynn
Columbine
Country Club Manor
Creighton
Diggers
El Pueblocito
Evergreen (Mesa)
Fairview
Floradora
Garden Club of Phoenix
Garfield
Gilbert
Good Earth
Green Thumb (Mesa)
Los Flores
Madison
Marigold
Martha Washington
Men's Garden Club
Mesa Garden Club
Morning Club of Phoenix
North Encanto
Old Fashioned
Osborn
Rose
Scottsdale
Sierra Vista
Sun Dial
Tempe
Valle del Sol
Virginia
Washington

Washington Club sponsors, Rosebud Jr. Garden Club

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