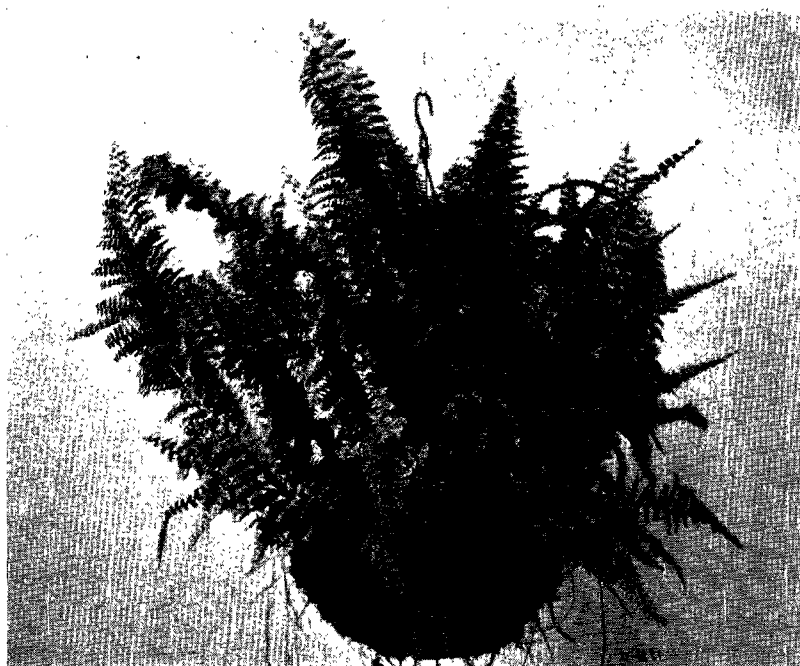


AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF HORTICULTURE



A WELL-KEPT BOSTON FERN.

HOUSE PLANTS AND THEIR CARE¹

WALTER B. BALCH

CULTURE OF HOUSE PLANTS.

The grower of house plants (figs. 1 and 2) must take into consideration both the soil requirements of different plants and the necessary adaptations to meet particular conditions. For example, cacti and begonias have nearly opposite soil requirements; on the other hand, plants must be given more water in hot, dry weather or in a steam-heated house than under more humid conditions. Direc-

1. Contribution No. 58 from the Department of Horticulture.

tions are no substitute for experience. However, an earnest attempt to follow and adapt directions to the needs of the species and the conditions under which they are grown, usually will be rewarded with a fair degree of success.



FIG. 1.—Porch box with asparagus fern and dracaena.

TEMPERATURE.

One of the main sources of difficulty in growing house plants is that in the average home the temperature, as regards the welfare of the plants, is neglected. During the day the temperature is kept rather higher than the optimum for most plants requires. This re-

sults, if other conditions are favorable, in a large amount of tender, unhealthy growth. At night, because of the cost of heating and health requirements, the house is allowed to cool down to a point unfavorable to plant growth. The tender growth produced during the day is easily injured during the night, and the plants die from no apparent cause. Extreme temperatures are not only disastrous to the health of the plants, but favor the development of plant diseases and make plants an easy prey to injurious insects.



FIG. 2.—A group of house plants. 1. Narcissus. 2. Christmas cherry. 3. Asparagus fern. 4. Tuberous-rooted begonia. 5. Begonia.

MOISTURE.

Moisture conditions also are often disregarded. The air in a steam-heated house is often as dry as that of the Sahara desert. Under such conditions transpiration and evaporation are very rapid. The air in houses heated by steam is not as dry as in those heated by hot water, while in houses heated by hot air the humidity is still lower, but in any case the air of a heated house is drier than that out of doors. Under these conditions plants wilt slowly but surely. This can be avoided, without adding an excess of water to the pot or box, by having in the room a pan of water, or by spraying the leaves every morning with a fine spray.

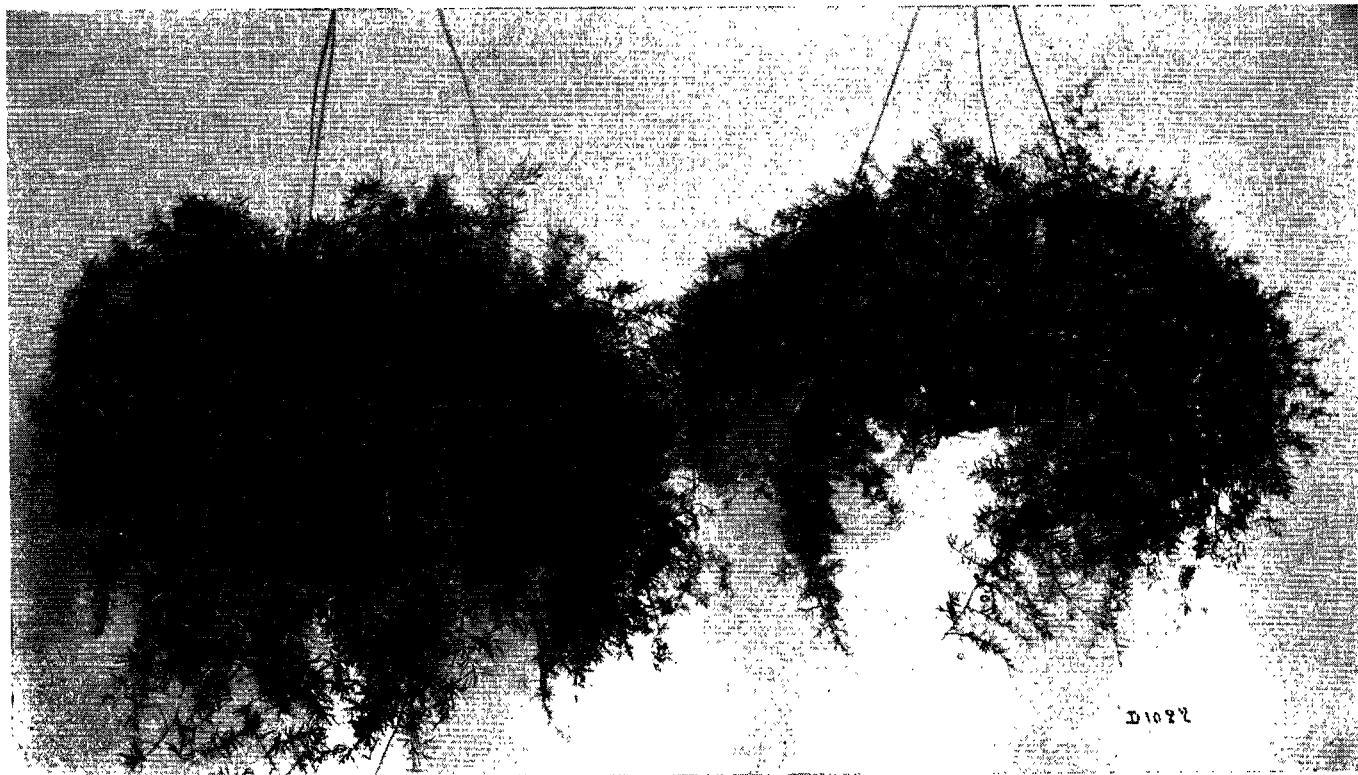


FIG. 3.—Asparagus fern in good condition (left), and overwatered (right).

The principle of watering "every once in awhile" should never be followed. Some system should be followed, else the plants will become too dry for a time and too wet the rest of the time. When the soil is too dry the plants not only become woody and hard, or wilt, but also starve, since much of the food they absorb comes in through the roots, dissolved in liquid form. When the soil is too wet, water fills up the air spaces, and the roots do not get air, which is as necessary as water or food. (Fig. 3.)

Some plants do best in a very moist soil, while others thrive in a comparatively dry soil. Those in pots require more frequent waterings than those in boxes, since a large amount of water is lost by evaporation through the porous clay pots. Likewise, plants in small pots require more frequent waterings than those in large pots. Plants in a resting stage require less water than those that are growing actively. These facts must be considered if best results are to be secured. A fair general rule to follow is to watch the soil at the top of the pot, and water when it begins to show signs of dryness. Add enough water so that all the soil in the pot becomes saturated. This can be determined by examining the hole in the bottom of the pot, which, by the way, must always be kept open. Good drainage is just as essential as plenty of water. When water runs out of this drainage hole, enough has been added. Another method is to set the pot or box in a pan of water in such a way that the water will come about halfway up on the pot. After a short time the water will be drawn up to the surface of the soil, at which time it is sufficiently watered.

LIGHT.

All plants require some sunlight, but, as in other things, plants differ greatly in their requirements. Such sun-loving favorites as geraniums, abutilons and roses, if set away in a dark corner, will not do well. They will do best, especially in the winter, in a sunny south window. Plants that like subdued or diffuse sunlight will do better in an east window than where fully exposed to strong sunlight. Palms, the "apidistra," ferns, and most of the vines, come in this class.

West windows should be avoided whenever possible. The afternoon sun is usually too strong for most plants. When west windows must be used some sort of protection should be provided in order to reduce the amount of light.

SOIL.

Without good soil no one can grow good plants. The idea, however, that each genus of plants must have a different soil is erroneous. Plants will adapt themselves to a wide range of soil conditions providing the necessary food elements are provided in the proper amounts.

A good general soil is provided by a mixture of leaf mold, garden loam, and clean, gritty sand. The leaf mold furnishes most of the food elements in a readily available form; the garden loam adds bulk and supplies some food, but in a form not so quickly available; sand has little food value, but tends to prevent packing and caking, and provides for good drainage. Where leaf mold is not available, well-rotted barnyard manure is a very good substitute. The manure must, however, be well rotted, for fresh or green manure will burn the roots and kill the plants.

Garden loam is a broad term used to indicate a soil which contains considerable clay, some decayed roots, and not too much readily available plant food. Pasture or lawn sod may be used as a substitute. The sod should be cut about four inches thick and turned over. The bottom is then shaved off with a sharp spade, giving a soil with considerable humus and root fibers and some readily available plant food. There is no substitute for the sand, which should amount to about one-third of the soil. The other two constituents may vary somewhat according to the plant. Plants with large roots require less manure or mold than those with fine roots. Also, young plants require less of the richer material than do older plants.

In all cases the soil must be freed of lumps, stones and small sticks. This is best done by pulverizing the lumps and removing the other objects. Sifting is not advisable. When soil has been prepared as recommended, a small amount of bone meal sprinkled over the top and mixed in well will often be of benefit to the growing plants.

PROPAGATION OF PLANTS.

The propagation of plants is an art. Many people have learned to do it satisfactorily in an amateur way, but unless one has a sunny room that can be kept at an even temperature, has time to give the seedlings extra attention, and facilities for frequently repotting the plants, it is usually better to buy young plants. One can usually get what he wants from a florist and can see it before making the purchase, thus saving the inconvenience of growing and caring for the young plants and the necessity of discarding the undesirable ones.

POTTING PLANTS.

A number of plants do not always reach full maturity during the summer growing months. Sometimes this is due to slow development of the plants and sometimes to late seeding. Sometimes plants are wanted for winter flowering, and it is convenient to start a number of seeds out of doors and pot up the best plants before frost. Another increasingly popular custom is the use of potted evergreen trees as Christmas trees. Some of these are secured from the florist around the holiday time, and others are taken from the field before freezing weather sets in. They are carried in the house till spring and carried through the summer in the ground out of door. They are then ready for another potting in the fall. (Fig. 4.)

DIRECTIONS FOR POTTING.

In potting a seedling into a 2- or 2½-inch pot, the first step is to prepare the soil. Then secure the pot and put a small amount of coarse material in the bottom for drainage. Broken pots and pieces of broken china make the best material for this purpose. It is of first importance to keep the small opening in the bottom of the pot open and free from dirt. Cover this coarse material with a small amount of potting soil. Place the pot directly before you; take the seedling in the left hand and hold it in the center of the pot, and with the right hand fill the pot to the brim with soil. The seedling should be about as deep in the soil as it was before. The pot should then be taken in both hands, rapped on the table to settle the soil, and twirled with the first and second fingers while the soil is packed with the thumbs. The soil should be comparatively dry, so that this packing will not make it cake.

After the seedlings are potted they should be well watered, preferably by setting in a pan as previously described, placed upon a level table or bench, and protected from the direct rays of the sun. After two or three days, having been watered when necessary, they may be brought out into full light.

When plants become "pot bound"—that is, when the roots cover the ball of earth and a few of them begin to turn brown—they should be repotted into the next larger pots. (Fig. 5). In repotting one should have all in readiness before removing the plant from the pot. The soil should be mixed and on hand, the pots on the table, and the material for drainage in place. The plant may then be carefully removed from the old pot and placed in the new one as described for seedlings.



FIG. 4.—Red cedar potted for winter use indoors and summer use outdoors.

The plant container may be of wood, tin, clay or glazed clay, as long as it be of the proper size and provides sufficient drainage. A small pot is always desirable. Roots need air, and when a small mass of roots is enclosed in a large mass of soil they will not do well. They will tend to grow in the direction of the air, which is toward the outside of the soil, will not use much of the food elements in the interior, and will need repotting almost as soon as those put in small pots. In repotting use the same-sized or the next larger-sized pot. Only under rare conditions is it necessary or desirable to use one several times larger.

RESTING PLANTS.

Under natural conditions nearly all house plants rest about half the year. In parts of the world this occurs in winter. In tropical regions, where there is no winter, there usually is a continued dry spell each year, during which the plants practically die down. They at least lose their foliage and do not grow. This resting spell always follows the fruiting season, and the more the plant has grown and the heavier it has borne, either of flowers or of fruit, the more necessary is this natural resting spell.

The time for the resting spell varies, as does its length, but in all cases the plant itself, if carefully watched, will indicate when this period begins and when it is over. The first signs are the general wilting of the plant and the shedding of the leaves. Additional supplies of water and fertilizers should not be applied at this time. Only just enough water to keep the plant from dying completely should be given. Too much water at this time will stand in the soil and give diseases a start. Fertilizers will stimulate growth for a short time and force the plant to use up its remaining vitality, after which, having no reserve, it will die completely. Allow the plant to rest as long as it will. A weekly application of water is usually enough during the early part of this period and later once a month will be enough.

After a time the plant will put out a small amount of new growth, a signal that it has rested sufficiently. As soon as this takes place, but not before, it should be given more water. After a good growth is resumed a little fertilizer may also be given. This fertilizer may be liquid manure (one pound of barnyard manure soaked in twenty gallons of water), or sodium nitrate (one ounce dissolved in six quarts of water), and should be applied in small doses. As the plant grows these fertilizers may be added in larger amounts, but the



FIG. 5.—A Thanksgiving picture of a crysanthemum started from a cutting in the spring and repotted several times.

manure water should never be stronger than one pound of strawy manure dissolved in ten gallons of water, nor the sodium nitrate stronger than one ounce in one gallon of water. In applying these fertilizers care should be taken not to let any of the liquid touch the leaves, as it will burn them. It will also burn roots if applied in stronger solutions than those recommended. It should be kept in mind always that fertilizers can be applied safely only to a growing plant.

Summer flowering plants will rest from about November to March; and unless the cellar in which they are stored is exceptionally dry one watering in December, one in January, and one in February will be plenty. The storeroom should be dark and cool, but not freezing. The temperature, however, should be as low as is possible without letting it reach the freezing point.

CARE OF FROZEN PLANTS.

Plants left on the porch in the late fall or put out too early in the spring may be nipped by frost. At first glance one may conclude that since the plant looks healthy, the color being good and the foliage stiff and in place, the frost has not affected it. Later in the day, however, when the temperature begins to rise the leaves quickly become limp. It is then too late to apply a remedy, as the plant must not be allowed to thaw out before restorative treatment is given. If plants have been subjected to freezing, even though slight, they should immediately be put where the temperature is only a few degrees above freezing and cold water applied to the foliage in large quantities. A cold, dark room is a good place for them. In this way the frost will often be drawn out without breaking down any of the tissues. If the plants are put in a warm place the cells are sure to be broken down and the plants lost. Leave them in the cool room for two or three days and then gradually bring them into a warmer temperature. It should be about a week before they are returned to the room or place where they were nipped.

After the plant has returned to normal, look it over carefully and remove any branches or leaves that have not fully recovered. This may result in an unsymmetrical plant, but such is better than one with dead parts, for these are sure to infect the healthy parts and thus cause the whole plant to die, not of frost or its direct effects, but from disease which thereby gets started. Later pruning will allow the healthy plants to regain their symmetry. It may become necessary in pruning to remove the entire top of the plant, but even then it may come through if the roots are not affected.

DISEASES AND INSECTS.

All plants that are worth cultivating are subject to disease. Not all sickly plants, however, are diseased. Usually the fault lies in overwatering, poor drainage, or in failure to observe some of the foregoing directions. If a plant is not doing well and the trouble cannot be traced to any of these defects or to insects, many of which are minute and require close observation to detect, the plant is diseased.

DISEASE CONTROL.

The first thing to do in case of disease is to remove all the diseased tissue to prevent the dead parts from infecting the healthy. Often this in itself is sufficient, but to prevent the development of disease spores which may have contaminated the healthy tissue, a thorough spraying with a fungicide may be beneficial. Bordeaux mixture is the best and cheapest fungicide.

Bordeaux mixture is made of copper sulphate (bluestone), fresh lime (stone lime), and water. The standard formula is four pounds of copper sulphate and four pounds of lime in fifty gallons of water. This is expressed as 4-4-50, but is too strong for most house or garden plants. For them a 3-4-50 mixture is better.

The mixture may be prepared by dissolving one tablespoonful of copper sulphate in a pot of hot water, and stirring it from time to time. Slake one and one-half tablespoonfuls of lime in a small amount of water, taking care not to burn or smother the lime during this process. When this has been made to a creamy consistency, strain it through a cheesecloth to remove grit and other particles which will not pass through a fine sprayer. This is not necessary if the plants are to be dipped instead of being sprayed.

These two stock solutions may be kept separate for any length of time. Before using, dilute each to two quarts, stir well, and pour them at the same time into a third vessel, so that the streams will mingle. This causes a more perfect combination.

If Bordeaux mixture is applied to the plants when they are wet, or if it is not properly prepared, it will burn the foliage. In any case it will for a time discolor the foliage.

The next best fungicide is potassium sulphide (liver of sulphur). One ounce dissolved in three gallons of water will control most diseases and will not burn or discolor the foliage. Any fungicide, to be effective, must cover both sides of the leaves and the stems.

Another fungicide that is sometimes used is ammonical copper carbonate—one ounce in a gallon of water. This is often quite diffi-

cult to obtain, but is a very efficient fungicide. It is quite unstable, and consequently should not be purchased in large quantities. It, like the liver of sulphur, will not burn or stain the foliage.

INSECT CONTROL.

Insect attacks are very common on house or potted plants. In the living room, or in sunny, dry spots, or when the foliage is not washed regularly, the so-called red spider is practically sure to get a start. It is not a true spider, but a minute mite which can be detected by the yellow spots which appear on the leaves. It can be controlled by spraying the plants with cold water under pressure, and prevented by occasionally sprinkling the foliage with cold water,

Scale insects of many kinds attack almost all house plants, especially palms. They can be controlled by first washing the plants in cold water and then applying a thick lather of soap and water over the entire plant. Let this lather stay on the plant fifteen to twenty minutes, then wash in lukewarm water, rubbing off any scales that tend to stick. The plants should then be rinsed two or three times to remove all the soap. Any scales which remain may be easily rubbed off with a toothbrush, a rag, or even the fingers. The same treatment will rid a plant of mealy bugs. While going through this operation, have the pot tilted so that as little soapy water as possible will run down into the soil.

Aphids are sucking insects which appear in clusters. They can be controlled with a contact spray. Kerosene emulsion or a soap emulsion is effective and cheap, but difficult to make properly, and if not properly made is useless. Nicotine sulphate, secured from drug stores under the name of Black Leaf 40, Nikotine, etc., and applied as directed on the container, will successfully combat aphids, and can often be used to combat mealy bugs.

Worms in the soil do considerable damage to plants. They can be quickly gotten rid of by pouring a saturated solution of lime water on the soil. One application is usually sufficient.

SOME HINTS ON GROWING HOUSE PLANTS.

The growing of house plants requires care, time, and careful observation. Good plants cannot be obtained by careless methods, and nothing is less attractive in a house or on a porch than sickly-looking plants. If one has no time for plants it will usually be better to leave them alone entirely.

If one's plants are not doing well, the following hints may be helpful in suggesting means of improvement:

1. The soil must be good and well drained.
2. Plants must be watered properly, but watering can be overdone as well as underdone.
3. The night temperature of the room should not be more than 10 degrees lower than the day temperature.
4. Sun-loving plants should be kept in a sunny location, and shade-loving plants should be kept away from the sun.
5. Fertilizers may do more harm than good.
6. Insects and diseases attack all plants in cultivation, and must be controlled.
7. A supply of potting soil should be kept on hand ready for use.
8. Flowers should be cut off as soon as they fade. Seed must not be allowed to develop on the plants.
9. Dead and dying branches and leaves should be picked off and destroyed.
10. Pots should be used and boxes avoided.
11. Each plant should have plenty of room.
12. Plants should not be kept in rooms that from time to time smell of coal or illuminating gas. The air in the plant room should be kept moist.
13. Only plants adapted to the conditions available should be grown, and only good specimens of the plants to be grown should be secured.
14. A spray pump is best for spraying plants. However, the plant may sometimes be immersed in a vessel containing the spray material.

WINDOW-BOX PLANTS.²

I. PLANTS SUITABLE FOR OUTSIDE WINDOW BOXES.

A. Winter.

a. Center plants.

Box (*Buxus sempervirens*).

Dwarf forms of Thuja or Retinispora.

Irish juniper (*Juniperus communis* var. *Hibernica*).

Hemlock (*Tsuga canadensis*).

b. Vines.

English Ivy (*Hedera helix*).

Trailing Evonymus (*Evonymus radicans*).

². Adapted from "The Principles of Floriculture," by Edward A. White. The Macmillan Company. 1915. Pp. 486-489.

B. Summer.

a. Tall-growing upright plants.

1. Flowering:

Geraniums.

Petunias.

Begonias.

Stevia.

Lantanas.

Salvias.

2. Foliage.

Palms.

Ferns.

Aspidistra.

Dracæna (*Cordyline australis*).

Coleus.

Crotons.

b. Low-growing plants.

1. Flowering.

Pansies.

Forget-me-nots.

Primula malacoides.

2. Foliage.

Peperomia.

Rex begonias.

Alternanthera (*Telanthera*).

Ferns, various varieties.

Mme. Salleroi geraniums.

c. Short, drooping or half erect (for edging the boxes)

Lobelia erinus.

Alyssum maritimum var. Tom Thumb.

Verbenas.

Ivy geraniums.

Variegated grass (*Oplismenus purmannii*).

d. Long, drooping vines (for hanging over sides).

English ivy.

Trailing evonymus (*Evonymus radicans*).

Trailing vinca (*Vinca major*).

German ivy (*Senecio scandens*).

Asparagus sprengeri.

Wandering Jew (*Tradescantia fluminensis*).

II. PLANTS SUITABLE FOR INSIDE WINDOW BOXES.

- a. Tall-growing, upright plants.
 - 1. Flowering.
 - Geraniums.
 - Begonias.
 - Impatiens.
 - Swainsona.
 - Marguerites.
 - Schizanthus.
 - 2. Foliage.
 - Palms.
 - Ferns.
 - Aspidistra.
 - Cordyline indivisa*.
 - Rubber plants.
 - Crotons.
 - Coleus.
- b. Low-growing Plants.
 - 1. Flowering.
 - Primulas, all species.
 - Freesias.
 - All bulbs, such as narcissi, hyacinths, tulips, and the like.
 - 2. Foliage.
 - Alternanthera (*Telanthera*).
 - Ferns, various varieties.
 - Mme. Salleroi geraniums.
- c. Short, drooping or half erect.
 - Lobelia erinus*.
 - Sweet alyssum.
 - Fuschia procumbens*.
 - Variegated grass (*Oplismenus burmannii*).
- d. Long, drooping vines.
 - Trailing vinca (*Vinca major*).
 - German ivy (*Senecio scandens*).
 - Asparagus sprengeri*.
 - Wandering Jew (*Tradescantia fluminensis*).
- e. Climbing vines for inside windows.
 - English ivy (*Hedera helix*).
 - German ivy (*Senecio scandens*).
 - Asparagus plumosus*.

