

House Plants: Proper Care and Problem Solving

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Cynthia L. Ash, Diagnostician

Additional Contributors:

Robert G. Askew, Extension Horticulturist

Dennis D. Kopp, Extension Entomologist

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Growing house plants is a challenging and rewarding hobby that can be enjoyed by everyone and need not be difficult. Give plants what they need and they'll do well for you. Give them just about what they need and they hold their own. Deny too many of their needs and plants fail.

Take time to learn the cultural needs of a particular plant when you purchase it and keep a watchful eye out for possible disease and insect problems. If a plant has poor color, or distorted leaves or flowers, or if the plant tends to droop, something is wrong. These distress signals tell you the plant is having problems and corrective steps should be taken.

Check plants over carefully before purchasing. Pick one which has a healthy green color and shows signs of new growth. Make sure that the pot has good drainage and the plant is not root bound. Avoid plants with abnormal white or brown lumps on the leaves or stems. Webbing or a speckled leaf appearance could indicate an insect or related pest problem. A new plant should be isolated from other plants in the home for two to three weeks to avoid exposing other plants to problems which may develop. If a problem does develop, you have not exposed your other house plants.

Cultural Considerations

Soil

Plant roots must have air, food and water. Potting soil must be porous enough to allow drainage of excess water and to admit oxygen (soil aeration) needed by the roots.

Garden soil may appear ideal for potting indoor plants but actually causes problems. This soil may be wonderful for outdoor gardening under natural conditions, but after a few months the garden soil becomes hard and almost rock-like in a plant pot. Plants in garden soil grow satisfactorily for a month or two, but soon the lower leaves turn yellow and the plants become unthrifty. This problem is the result of poor drainage and the lack of soil aeration due to improper soil structure. Most garden soils become compacted with time and house plants grow poorly in compacted soil.

A proper soil mixture is of utmost importance to a house plant because the roots are restricted by the pot. A good potting soil should have the capacity to retain some air and moisture and yet drain well and hold nutrients. Sand or perlite added to the soil will improve aeration and drainage. Clay or organic matter will help retain water. Organic matter, plus commercial fertilizers, will maintain adequate nutrient levels. Modern "soilless" potting medias do not contain soil so the addition of fertilizer is required to provide all essential plant nutrients.

For general use, a good soil mix includes approximately equal parts of good garden loam, organic matter (preferably peat moss, although well-rotted manure or leaf mold will do) and sharp sand or perlite (Figure 1). When sandy soil is used in the mixture, reduce the amount of sand or perlite.

Always use pasteurized soil when repotting at home. This can be purchased at a local store, or soil can be pasteurized at home.

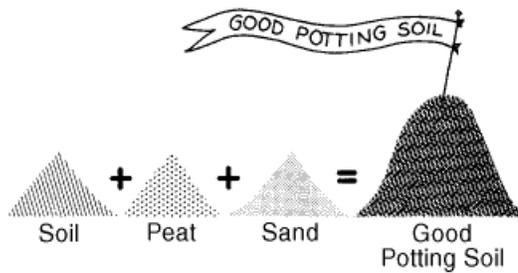


Figure 1.

Methods for Pasteurizing Small Amounts of Soil with Heat

Conventional Oven

Place moist soil in a deep baking pan or roaster (aluminum, glass or iron). The soil should be level and not over 4 inches deep. Bury a small potato (1 1/2 inches in diameter) in the center. Then tightly cover the container with aluminum foil. Punch a small hole in the center of the soil but away from the potato and insert the bulb end of a meat or candy thermometer into the soil. Place in an oven on low heat (180 to 200 degrees Fahrenheit). Keep the soil in the oven for 30 minutes after the soil temperature has reached 180 F. Remove and cool the soil. The potato should be well cooked, indicating sufficient heat penetration throughout the soil. Do not overcook the soil.

Microwave Oven

Place approximately 2 pounds of moist soil in a polypropylene bag. Leave the top open and place in the center of a microwave oven. Treat for 2 1/2 minutes on full power about 650 watts. After treatment close the top of the bag and allow the soil to cool before removing.

Potting

Always use thoroughly cleaned potting containers with proper drainage holes. Before reusing any pots, they should be scrubbed clean and thoroughly rinsed in a solution of one part household bleach to nine parts water to kill disease organisms present. Cover the drainage holds in the pot with pieces of broken clay pots or coarse gravel. Next add enough potting soil to bring the soil level of the finished planting to about one-half inch below the rim of the pot. This top space serves as a reservoir for watering.

When repotting, cover the old soil level with about one-half inch of new soil. Firm the new soil around the root ball and water well to eliminate air pockets. Keep transplants away from drafts and provide extra humidity to reduce transplanting shock. You can provide extra humidity by covering plants with plastic for a day or two. Water when the soil feels dry but avoid fertilizing the plants for a few weeks until new shoot growth is evident. Excess fertilizer can damage the newly developing root hairs and delay plant growth.

Watering

Close observation and good judgment are essential for proper house plant watering. Growing conditions vary from home to home and room to room due to variations in light, temperature (day and night) and humidity. Plants with roots in shallow containers may need daily watering, while plants in large tubs may go several weeks between waterings. Succulents and other dry-soil plants require less watering than moist-soil plants such as ferns and African violets.

Proper watering keeps the soil moist enough to supply the plants' needs without drowning the roots. Saturated soil drives out air, and roots can die from lack of oxygen. Proper pot drainage is critical. All the soil in a pot should be thoroughly wetted each time the plant is watered. Always empty the drainage water from the catch basin beneath your plant container after each watering. This will reduce the possibility of waterlogged soil and prevent the dissolved salts in the water from being drawn back into the soil. Soil should dry to the point that the plant approaches moisture stress between watering intervals.

Do not use water that is unusually high in salts or that has been run through a water softener to water plants. Rain or melted snow are good alternate sources of water for house plants. Some plants are sensitive to the chlorine gas in city water systems. Letting a container of tap water sit overnight before use will allow most of the gas to escape.

Feeding

Many brands of fertilizers are designed for house plants. Follow the manufacturer's directions and do not assume that twice the recommended amount is better than the recommended amount; overfeeding may damage your plants.

Plant injury can be reduced by leaching or rinsing out part of the dissolved fertilizer with clear water if overfertilization occurs. Use a container with holes in the bottom to allow thorough drainage. Place the pot in a sink and water liberally three to four times at half-hour intervals, allowing the water to flush out the dissolved fertilizer and other accumulated salts.

A white, flaky material on the soil surface of potted plants is often observed one to several months after potting. These are mineral salts that accumulate in the soil. Well water in North Dakota contains varying amounts of dissolved salts, as does

the fertilizer you apply. With continuous watering, these dissolved salts accumulate in the soil and appear on the soil surface. The salts can be flushed out of the soil from time to time to prevent salt injury to your plants. Leaching (rinsing) the soil of most house plants every three to six months is a good cultural practice and will reduce the accumulation of salts in the soil. Clay pots which have accumulated salts should be soaked in hot water for 24 hours before reuse.

Fertilizer will not cure all ills. Fertilizer will not help a plant that is suffering from poor drainage, insect infestation, disease or over-watering.

Interstate Transport of Plants

If plants are to be transported across state lines, determine the regulations of the states en route to avoid possible transport of harmful plant pests to areas not previously infested. For more information on interstate transportation of plants, contact the North Dakota State Entomologist, North Dakota Department of Agriculture, Bismarck, ND 58501, or the Department of Entomology, North Dakota State University, Fargo, ND 58105.

House Plant Trouble Signs

Wilting or partial wilting will often be the result of improper water relations in the plant. If sudden wilting is diagnosed, check the roots, pot or soil for the trouble. Some common causes are a lack of water, excess water, root rot, too much fertilizer and/or a salt buildup. Check the cause by pressing your finger, up to the first knuckle, into the soil. If the soil is dry to this depth, the plant needs water. If the soil is wet, too much water in the root area may be the problem. The roots may be saturated or rotting and incapable of absorbing water from the soil and supplying it to the leaves. Overwatered plants should be repotted into fresh soil. (Refer to the section on yellowing and death of all leaves and poor growth for more information on root rot.)

Plants which are pot bound may wilt because the roots are strangling each other. Don't be afraid to remove the plant from the pot and examine the roots to see if they are too dry, too wet or diseased. To remove, merely invert the plant and lightly tap the edge of the container on a solid object while holding the plant and soil ball (Figure 2). You may find the soil mass is completely enveloped in roots and the plant needs repotting.



Figure 2. Removing plant from container.

Sudden loss of leaves is frequently caused by a rapid temperature change. It may also be caused by such factors as prolonged hot or cold drafts, dry air, exposure to gas or furnace fumes or by changing the location of the plant from a sunny to a dark location. *Ficus benjamina*, commonly called weeping fig, frequently has sudden leaf drop when moved to a location with lower light intensity.

Yellowing or death of leaves may indicate a nutrient deficiency, usually nitrogen or iron. First apply a nitrogen fertilizer. If the foliage does not appear greener after three to four days, do not add additional nitrogen. Instead apply a chelated iron product. Iron is essential to healthy green leaves and may be present in the soil but in a form which the plant cannot use. Chelated iron is in a form which is readily available to the plant roots.

The yellowing and death of lower leaves may occur if plants become pot bound because of extensive root development. Rubber plant, *Dracena*, *Diffenbachia* and other woody plants are especially prone to this problem. When the lower leaves first start to yellow, apply extra nitrogen fertilizer or consider repotting. Occasional lower leaf drop may be normal. The length of time a plant will hold its leaves varies from species to species.

Yellowing of all leaves and poor growth may be due to excessive soil moisture and/or to root rot. If the drainage hole in the pot or plant box is plugged or if the plants constantly stand in water, the soil will be waterlogged and lack sufficient oxygen.

If a root rot problem is suspected, remove the rootball and check the roots. Healthy roots and root tips will be white or cream-colored. Rotted roots are a brown-black color and may appear slimy. Severely rotted roots may be hollow and easily broken between the thumb and index fingers.

Destruction of the roots by soilborne fungi and nematodes may cause a yellowing of the entire plant. Severe infestations of mites, aphids and scale insects, fertilizer burn, improper light and temperature, or improper pH all may cause plant yellowing. Soil pH prefers to the acidity or alkalinity of a soil measured on a scale of one to 14 with seven being neutral. Anything below seven is acid and anything above seven is alkaline.

Some plants such as the Norfolk island pine and Boston fern require an acid soil medium. This can be achieved by using a

potting mixture high in peat and by using an acid fertilizer. Acid fertilizers help to reduce the pH of the soil. Most North Dakota well and river water is alkaline, so regular use of an acidifying fertilizer would be advantageous to plant growth .

Finely specked leaves with a faint mottled, lighter color may be infested with spider mites. When the mites are plentiful, the upper and sometimes the lower surface of the leaves may appear dusty due to their webbing. To check plants for spider mites, shake several suspect leaves or branches over a sheet of white paper. Look closely at the specks which have fallen on the paper. If they are moving, they are spider mites. More information on mites and their control is give in the chart that follows.

Bronzed or abnormally reddened leaves indicate cold temperature damage or a deficiency of phosphorus or potassium. Check the recommended temperature range for the plant. If a nutrient deficiency is suspected, fertilize with a complete fertilizer or repot in new soil.

Unnaturally small pale leaves and spindly plants are most generally the result of insufficient light. This is especially common during the winter or when outdoor or greenhouse grown plants are brought into the home. Small leaves might also indicate a need for fertilizer.



Figure 3. Soluble salt injury on fern. Courtesy of R.W. Stack.

Brown leaf tips and margins can be caused by exposure to hot dry air, improper watering, insect feeding, salt accumulations (Figure 3) or objects rubbing against the leaves. Water which is chlorinated or contains added or natural amounts of fluoride can harm sensitive plants. Perlite (the white material in many potting mixes) and fertilizer products containing fluoride may release enough fluoride to harm sensitive plants. Spider plants, especially the variegated variety, are very sensitive to fluoride and are often seen with leaf-tip burn. Occasionally flushing the soil should help to reduce a fluoride salt buildup.

Bleached or faced spots on leaves are sometimes caused by direct sunlight burning plants that require shade or are not yet accustomed to large doses of direct sunlight. Chemicals and plant cleaning products can also injure leaves.

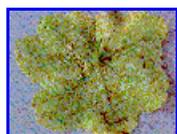


Figure 4. Oedema on geranium leaf. Courtesy of H.A. Lamey.

Other leaf spots, varying in description, may be caused by aerosol products, hot grease in the kitchen area, cold water (especially on African violets and gloxinias) or the sun shining on wet leaves. In rare cases a pathogen may be involved. For more information on plant pathogens see the table that follows.

Plant distortion (leaf thickening, curling, leaf and flower drop) accompanied by leaf yellowing and browning may be due to gas fumes or pesticides which are toxic to the plant. Plants are very sensitive to gases and will show symptoms before the gas concentration is at a level detectable to humans. Garden soil that is contaminated with agricultural chemicals and used for potting house plants can result in chemical injury to the house plants.

White substances on the soil surface may indicate two things. If crusty or crystalline, it's probably an accumulation of salts. The crusty surface layer of soil can be removed and replaced with fresh soil between repottings. Refer to the previous section on "Feeding" for more information.

A white or light yellow mold-like growth may indicate the presence of a saprophytic soil fungus, a fungus that lives on dead or decaying matter. The fungus will not harm the plant but may indicate unsterile potting medium or an overwatered plant.

Light brown corky scabs, usually occurring on the underside of leaves and along stems, are the result of excess water (Figure 4). This condition is known as oedema. Careful watering and good drainage will minimize this problem.

Disease and Insect Control

Control Measures Without Chemicals

1. Examine plants thoroughly for insects before purchasing. Avoid buying plants that are not healthy. Isolate newly purchased plants for two to three weeks before placing them near plants known to be free of insects and disease.
2. House plants taken outside during warm weather can become infested with insects. Before bringing plants back into the home in the fall, examine each closely for insects.
3. If a plant is heavily infested, disposing of it may be the best solution.
4. Potting soil should be pasteurized to prevent disease and insect problems. See the section on soil pasteurization.

5. Some insects can be removed by using a small artist's brush or cotton swab dipped in alcohol, a toothpick or tweezers or by thoroughly washing the leaves with a mild detergent solution (two teaspoons solution per gallon of water). If the last method is used, care should be taken to avoid wetting the soil. This method should be repeated several times.

6. Avoid misting plants as this can contribute to and spread infectious diseases.

Control Measures With Chemicals

To insure the safest and most effective results from a pesticide, READ THE ENTIRE LABEL on the container.

Some plant species may be injured by certain chemicals (phytotoxic reaction), so read the precaution section on the pesticide label before applying. If in doubt about the reaction of a certain pesticide on a specific plant, treat a small portion of the plant at the recommended rate to determine if there is a phytotoxic reaction. If there is a reaction, use another pesticide.

Treat the underside of leaves too, since this is frequently where infestations of mites, aphids and whiteflies are heavily concentrated.

Control of mites, mealybugs, whiteflies, scales and aphids can be a problem indoors because of the difficulty in applying insecticides to the target area. For treating smaller plants, place them in a 20 to 30 gallon tightly closed plastic bag for 12 to 24 hours with a no-pest-strip insecticide. Repeat at weekly intervals for about three treatments and then repeat at intervals of a month or two. The active ingredient in the no-pest-strip, vapona, can be quite toxic, so be sure to read all label precautions before using. It is difficult to attain a complete eradication. Do not treat velvet plants (*Gynura*), Boston ferns and their varieties, zebra plants (*Aphelandra*) and *Peperomias* because of possible injury.



Figure 5. Citrus mealybug.
Courtesy of D.D. Kopp.



Figure 6. Scale Insects on foliage plant.
Courtesy of D.D. Kopp.

Insects and Related Pests of House Plants

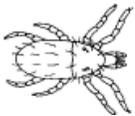
| Insect | Pest Description and Damage | Control |
|---|--|--|
|  | <p>Aphids Minute, soft-bodied insects (1/8") easily recognized by their pearlike body shape. Most species are green; however, some are brown, reddish or black. Adults may be winged or wingless. They cluster on undersides of leaves, buds and other tender plant parts. Damage is caused by sucking plant juices, causing which a black, sooty mold may develop.</p> | <p>Dip or spray plants using malathion.** May also use nicotine, pyrethrin, rotenone or resmethrin (combinations) as a spray. Apply granules to the soil as a systemic using Di-Syston.*</p> |
|  | <p>Fungus Gnats Adults (1/8") often seen flying over soil in pots. Rather feeble flyers and usually stay near soil surface or under leaves of plants. Adults do not cause damage, but can be a nuisance. Larvae, white with a shiny, black head capsule, feed on decaying organic matter; and under certain conditions, some species feed on root hairs or roots of seedlings.</p> | <p>Adults: A pyrethrin or nicotine spray may be used. Larvae: Drench soil with 2% malathion** water emulsion. Apply granules to the soil as a systemic using Di-Syston.*</p> |



Mealybugs Soft-bodied, scale-like insects (3/16"), Dip or spray plants using covered by a white, cottony wax layer malathion.** To insure which extends out from the body as short wetting of mealybugs, add filaments. Damage is caused by sucking mild household detergent plant sap which causes plants to (not soap) at a rate of 1/2 become stunted and distorted, or teaspoon per gallon of water eventually die. These insects secrete with solution. May also use honeydew on which a black, sooty mold pyrethrin, rotenone or may develop (Figure 5). resmethrin (combinations) as a spray. Apply granules to the soil as a systemic using Di-Syston.*

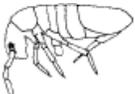


Scales Adult scales are protected by a black, Same as for Mealybugs. brown or tan hard covering. Immature scales or crawlers emerge from eggs deposited under the female's protective scale. Once crawlers establish a feeding site, they begin to secrete the hardened covering over their body. Scale damage is caused by sucking plant sap which will greatly reduce the vigor as populations build. These insects secrete honeydew on which black, sooty mold may develop (Figure 6).



Spider Mites Very minute spider-like mites barely seen Same as for aphids. Dip or with the naked eye. Common pest is the spray plants using dicofol two-spotted spider mite which can be (Kelthane) or malathion.** recognized by two dark spots on the back. Found most often within silky webbing on underside of leaf. All stages remove sap (usually feeding on underside of leaves). Feeding injury shows up first as pale, yellowish blotches on leaves which cause foliage to have a speckled appearance. Heavy infestations will cause leaf distortion, wilting and stunting of the plant.

Cyclamen Mites Adult mites are too small to be seen with Houseplants lightly infested the naked eye. Adults are amber or can be immersed pot and ali, tan-colored and semitransparent while the for 15 minutes in water at young stages are white. They are found 110oF. May also use Kelthane mostly in protected places on young, as a spray. tender leaves, buds and flowers. Damage, caused by removal of plant sap, will result in leaves becoming twisted curled and brittle. Buds may become deformed and have a streaked and blotchy appearance. Blackening of injured leaves, buds and flowers is common.



Spring-tails Very minute (1/16-3/16"), generally whitish Drench soil with malathion.** in color, wingless insects. Can thrust On sensitive plants, water themselves an inch or more in the air with soil to bring insects to the aid of a forked appendate (tail-like surface and then use a structure). Most often seen after watering pyrethrin spray. which forces them to the surface. Feed

mainly on decaying organic matter, but some species may feed on root systems to cause wilting.



Thrips Very small, cream to dark brown winged insects. Immature forms are wingless. If disturbed, adults fly readily. Damage results in the leaf surfaces becoming whitened and speckled. Leaf tips wither, curl up and die. Buds will fail to open normally. Same as for aphids.



Whiteflies Adults (1/16") are snow-white in color with four wings and resemble a small moth. Both adults and larvae cause damage by sucking sap from the foliage. Infested leaves yellow and may drop off. These insects secrete honeydew on which a sooty mold may develop. Same as for aphids.

*Household Formulation WARNING Poisoning may occur as a result of exposure AVOID contact with skin, eyes or clothing

**Do not use on Boston, Maidenhair and Pteris ferns, some species of Crassula, Gloxinia, Saintpaulia (African violets), and begonias.

Common Infectious House Plant Diseases

| Diseases | Plants Affected | Symptoms | Control |
|--|-----------------------------|---|---|
| ANTHRACNOSE (Collectotrichum and Gleosporium species) | Dieffenbachia Ficus sp.* | Rusty spots on stems, leaves, or fruits, usually accompanied by a dieback of the plant. When wet the spots may be pinkish and produce an ooze. | Remove diseased leaves. Do not mist leaves. Spray plant with benomyl 50% wettable powder (WP) at a rate of one tablespoon per gallon. |
| CERCOSPORA LEAF SPOT (Cercospora sp.) | Schefflera Ficus sp.* | Pin point swellings are produced on the underside of the leaf. Symptoms resemble oedema and spider mite feeding. Eventually the leaf turns yellow and falls from the plant. | Remove diseased leaves. Do not mist leaves. Spray plant with benomyl 50% WP at a rate of one tablespoon per gallon. |
| BACTERIAL LEAF SPOT (Erwinia chrysanthemi) | Philodendron | Water-soaked spots which spread rapidly to the entire leaf under wet conditions. (Brown lesions with a yellow border may be present under drier conditions.) | Remove diseased leaves and spray with Streptomycin at 200 ppm. See label for mixing directions. (This will not control a systemic infection). |

*The genus Ficus includes many commonly grown houseplants such as the rubber plant, F. elaeagnifolia and the weeping fig, F. benjamina.

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North Dakota State University Agriculture and University Extension
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