What’s Wrong With My Plant—Diagnosing ornamental plant problems
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What's Wrong With My Plant?

Diagnosing ornamental plant problems

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"What's wrong with my plant?" is one of the most common questions asked of a plant specialist. To the layperson the plant specialist is the plant doctor—the expert who solves plant problems. Too often the specialist does not see the plant but is presented with either a specimen or given a description of the problem. The specimen may be atypical,or the description vague. Nevertheless, the specialist must try to solve the problem. Hopefully, the plant specialist will be familiar with the most common problems that are likely to affect plants within a given geographic area and be in a position to provide clinical advice. For answers to the less common problems it may be necessary to forward them to a subject area specialist located at a land-grant university.

The following information is designed to aid plant specialists in diagnosing problems of ornamental plants. A number of the most common symptoms of plant problems are arranged in the diagnostic chart according to plant parts. The symptoms are followed by the most probable causes of the problem along with a reference number to specific information in the descriptive portion that follows the chart.

When making a diagnosis of a plant problem, obtain as much information as possible that is pertinent to the problem. Ask questions about the environment where the plant is or was growing. Determine if there have been any significant changes in the environment. Also, determine if the problem developed suddenly or over a period of time. Inquire if fertilizer or pesticides were recently applied either to or in the vicinity of the plant. Answers to these and other related questions can be a clue to the cause of the problem. It is important that the causal agent be identified so that appropriate remedial action can be taken. It is pointless to recommend an application of a fertilizer to correct a symptom of growth decline if the causal agent is a girdling root or a biologic agent, such as insects or rodents.

There are also certain legal aspects associated with suggesting chemical treatments to correct or prevent various plant problems. Chemicals can be dangerous; they not only affect plants, they can also affect people. If improperly used they can have deleterious affects upon plants and animals. Product knowledge is essential for specialists who are making clinical recommendations. Know the limitations as well as the attributes of any chemical that is suggested for the culture of plants. Do not make recommendations for the use of a product that are not supported by the manufacturer. Read and follow label instructions; to do otherwise is inviting problems.

DIAGNOSTIC CHART FOR PLANT PROBLEMS

Plant Part	Symptom	Possible Causes and Reference
Whole plant	Recently transplanted plant fails to grow	Drought—9 Excess Water—10 Injured prior to planting—1 Insufficient root system—2
	Sudden death of growing plant or plant parts	Excess fertilizer—8 Gas—14 Girdling—15 Lightning—11a Weed killers—12e
	Gradual decline of previously healthy plant, poor growth, yellowing and dropping of foliage, death of individual shoots	Air pollution—12a Construction—3 Disease injury—5 Drought—9 Excess moisture—10 Excess fertilizer—8 Gas—14 Girdling—15 Grade change—3 Insect injury—4 Nutrition—7 pH of soil—6
Main stem or branches	Malformation of growth	Insect injury—4 Weed killers—12e Deicing salts—12d
	Die-back of shoots	Construction—3 Disease injury—5 Excess water—10 Girdling—15 Hail damage—11c Insects (borers)—4 Lack of light Nutrition—7 Winter injury—11d
	Twig or shoots with healthy leaves drop to ground	Insects (twig girdler)—4 Squirrel damage—13
	Bark splits on trunk	Lightning—11a Winter injury—11d
	Pitch on trunk or main branches	Insects (borers)—4
Foliage	Scorched or dry appearance to foliage	Cold temperature—11d Drought—9 Excess fertilizer—8 Excess salt on foliage—12b, c, d High temperature—11f Nutrition—7 Physical injury—3, 11b, c, d, e Spray injury—12d Nearby fire Mites—4

Plant Part	Symptom	Possible Causes and Reference
	Foliage is yellow or mottled; may be less than average in size, distorted, drop prematurely	Air pollution—12a Disease injury—5 Excess water—10 Graft incompatibility—15b Improper pH of soil—6 Insect injury—4 Nutrition—7
	Curled and distorted foliage	Insect (aphids)—4 Weed killer—12e
	Wilted foliage	Disease (anthracnose)—5 Drought—9 Excess fertilizer—8 Excess moisture—10 Gas leak—14
	Skeletonized	Insect (skeletonizer)—4
	Tunnels or mines between leaf surfaces	Insect (leaf miner)—4
	Chewed margins of foliage	Chewing insects—4
	Gray color (sometimes bronze tint) to foliage, especially evergreens, webbing may be present	Mites—4
	Black or brown spotting of foliage	Disease—5 Spray injury—12d
	White leaves or powdery appearance to leaves	Air pollution—12a Disease (mildew)—5 Weed killer—12e
	Rolled leaves	Cold temperature—11d Drought—9 Leaf roller insects—4
	Needles dropping	Natural needle drop Nutrition (lack of potassium)—7
	Rusty areas on leaves	Disease (rust)—5
	Black sooty appearance to leaves and stems	Insects (aphids)—4
Flowers	Plant fails to produce flowers	Improper daylength—16a Improper pruning—16b Juvenility—16a Nutrient imbalance—7 Shade Winter injury—11d
	Fail to open properly	Bacterial blight—5 Drought—9 Insect (weevil)—4 Spray injury—12d Winter injury—11d
	Petals chewed	Insect (grasshopper, Japanese beetles, Rose chafer)—4
	Short flowering period	Drought—9 Temperatures unusually high & low humidity—11f
	Flower buds split	Moisture—16c Temperature—11d Weed killer—12 e, 16c
Fruit	Plant fails to produce fruit	Drought—9 Improper pruning—16b Juvenility—16a Lack of pollination—16b, c Male plant—17a
	Drop at early stage of development	Drought—9 Insect injury—4 Lack of fertilization—17b, c

1. **Could the plant have been injured prior to planting?**

When a recently transplanted plant fails to grow and the cause cannot be associated with drought, excess moisture or insufficient roots, it is possible that the plant might have been injured prior to planting. It might have dehydrated while in storage or in transit, or it might have been subjected to an excessively high temperature.

2. **Did the plant have sufficiently active roots to support the crown?**

Plants that have been recently transplanted may not have a large enough root system to support the crown of the plant. Prune the crown of trees and shrubs that have been transplanted to help reduce the amount of transpiration during the re-establishment period. When pruning trees, do not cut the central leader; rather, thin-out and help shape the tree or shrub in its natural form.

Sometimes trees are dug with a root system that is completely inadequate for the size of the plant. Such plants should not have been planted.

3. **Has there been a change in grade or some construction in the vicinity of the plants?**

A change in grade (level of the soil) or some type of construction work in the vicinity of plants will change the soil environment which for certain species of plants can result in their decline and eventual death. A few inches of clay fill over the roots of a beech tree or dogwood can be disastrous. Disturbing the roots of hard maples will often result in their exhibiting early fall color and eventually the death of branches followed by death of the tree.

When grade changes and construction must be made in the vicinity of valuable plants, measures should be taken to protect the plants from injury.

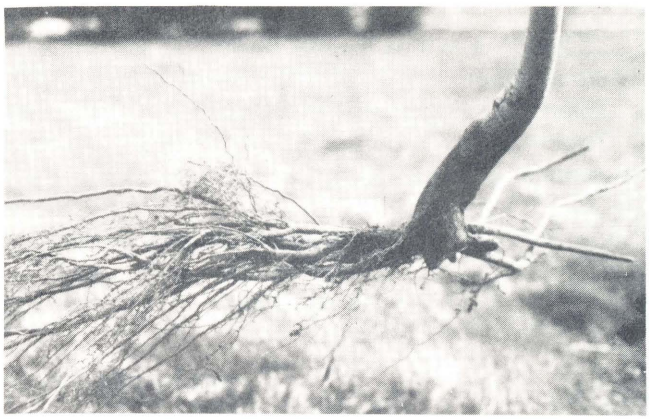
4. **Are insects (or insect-like organisms) responsible for the injury to the plants?**

Insects cause injury to plants in many ways: they suck juices from leaves, stems and roots; they mine into and chew upon these same parts; and they can be vectors of virus and disease. Examine plants carefully for evidence of insect activity; check the leaves for aphids, mites, leaf miners and chewing insects; check the stem for borers, twig girdlers, gall makers and sucking insects; check buds and fascicle scales for mites; and if necessary, pull up dead or dying plants and look for evidence of grubs or sucking insects on the roots.

5. **Are the plants dying as a result of a parasitic disease?**

Plants, like other biological organisms, can be the victims of disease. Plant parasites include: bacteria, fungi, virus, nematodes and a few seed-producing plants such as mistletoe. Diseases are generally rather specific as to the plant species that they attack and the part of the plant. However, healthy plants can withstand an attack better than plants growing under stress. Therefore, the best prevention of disease (or insect attack) is to maintain plants in a healthy condition and to keep the area surrounding desirable plants free of sources of inoculation. The environment in which a plant is growing can greatly influence the life cycle of a disease organism. Some diseases flourish in a warm, damp, relatively dark environment, while others grow best in cool, moist environments. Manipulation of the environment can sometimes be used to avoid injury from disease.

Soil borne disease can be reduced by sterilizing the soil with steam or by the use of various chemical agents prior to planting. Many leaf and stem diseases can be reduced with the aid of various bacteriacides and fungicides. But unfortunately there is no effective control for some diseases, such as Dutch elm disease or Chestnut blight. Where pesticides must be used to gain control, be sure the recommended chemical will control the pest.



This example of poor root development was the result of improper planting at the nursery.

6. **Is soil pH a cause of the problem?**

Plants, in order to make good growth, should be grown in soil with an optimum pH (soil reaction). Most plants grow well in a pH range of 5.5 to 7.5. However, some plants such as blueberry and rhododendron require acid soils (pH 4.5 to 5.5). Trees such as the pin oak and holly will develop iron chlorosis when grown in alkaline soils (pH 7.5 to 8.5). Maple trees may develop manganese chlorosis.

7. **Are plants suffering from malnutrition?**

Plants require elements which are essential for growth and proper development. A sub-minimum supply of a particular element can cause the plant to be stunted, have yellow, mottled or scorched foliage and, if completely lacking, can result in the death of

branches. Four of the more common deficiencies associated with ornamental plants are:

Nitrogen. Yellowing of the foliage. Although the entire plant may show the symptom, it will be expressed in the oldest leaves first.

Potassium. First expressed as chlorosis along the margins of the older leaves, which will become scorched. Older foliage will drop prematurely producing a leggy appearance.

Iron. Chlorosis is commonly associated with certain plants growing in soil with a pH above the optimum for that species. The symptom is a yellowing of the tissue between the veins while the tissue adjacent to the veins remains green, commonly associated with oak trees and rhododendrons. (See No. 6)

Manganese. A chlorosis similar to Iron but most commonly seen on maple trees.

Soil tests can be used to determine the levels and balance of the mineral elements in the soil. Application of the appropriate fertilizer can correct the deficiency. Also iron and manganese capsules can be inserted into tree trunks to correct the chlorosis. However, it should be recognized that similar symptoms may result from other causes and that fertilizer is not a panacea for all the ills of plants.

8. **Has the plant been overfertilized or has an excessive soluble salts condition developed?**

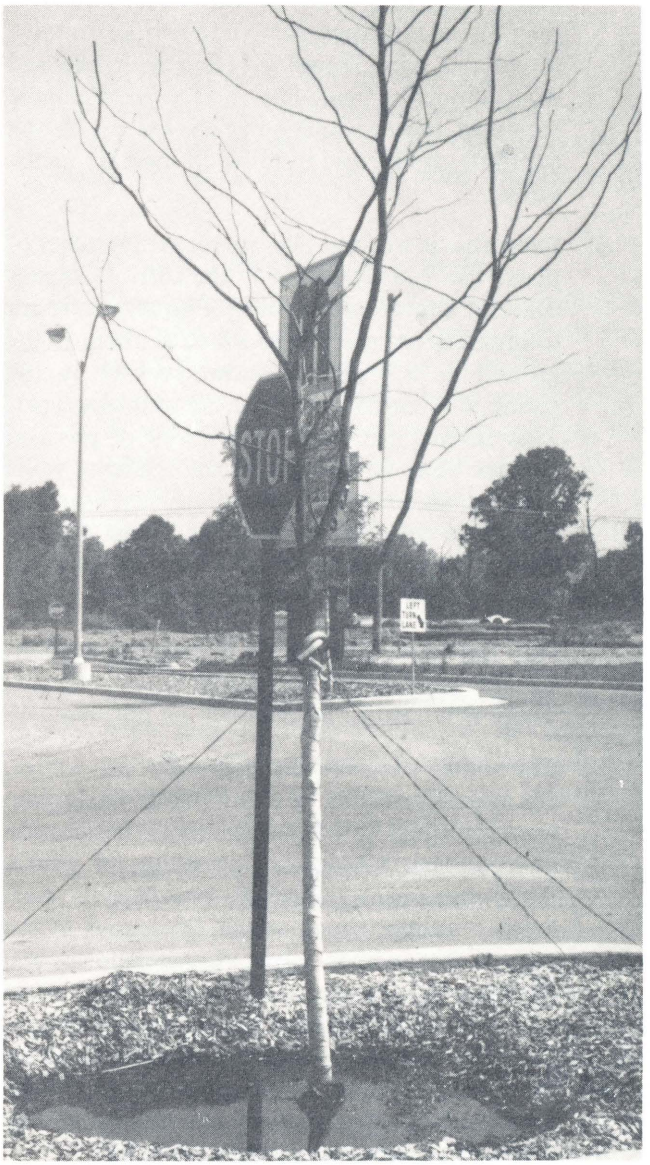
Too much fertilizer, especially soluble forms, can cause problems in the growth and development of plants. Plants growing in containers (pots or planter boxes) without drainage holes can become the victims of a buildup of salt within the container. Plants exposed to either of these conditions will dehydrate. The rapidity of denydration will depend upon the concentration of 'salt'. The condition will develop slowly in containers unless fertilizer was applied, in which case the desiccation will be as rapid and injurious as too much fertilizer applied to plants in the garden. Always follow instructions when using fertilizer on plants and avoid growing plants in containers without drainage holes. If too much fertilizer has been applied, it might be leached out of the root zone by applying liberal quantities of water to the soil. Soluble salt problems can be confirmed by making a conductivity test upon a sample of soil.

9. **Did the plant dehydrate due to lack of water?**

All plants require water and some require large quantities if they are going to grow in a normal manner. Although most plants receive adequate moisture as a result of rainfall or by artificial means, there are times when plants can dehydrate; particularly following transplanting or if they are growing in containers or in adverse sites in a landscape, i.e. under building overhangs. Following transplanting, plants should be watered periodically until well-established. Plants in containers and in adverse sites should be watered on a schedule to assure adequate supplies of water for their growth.

10. **Are the plants drowning?**

Too much water about the roots of the plants can result in their decline and ultimately in their death. Plants require some oxygen in the soil for good growth and development. Planting sites should be well-drained or measures taken to artificially drain the site prior to planting. Rocks or gravel placed in the bottom of a planting hole will not function as adequate drainage. Drainage systems must be connected to free flowing drains to be effective.



Standing water, due to improper drainage, can cause a plant's death.

11. **Were the forces of nature the cause of plant injury?**
The forces of nature can produce some dramatic forms of injury to plants. But they can also produce injury which is more subtle and more difficult to identify as to possible cause.

A. **Lightning injury,** although not too common, can be a most dramatic form of injury. Most trees struck by lightning, but not all, will have large areas of wood exposed with bark hanging in shreds. However, at times there may be no visible symptoms and the diagnosis may have to be made on circumstantial evidence such as: Was there a recent lightning storm and is it probable that the tree might have been struck? Trees struck by lightning may die within a few days or they may live for a number of years and then die or they may survive the strike and live to an old age. However, trees with exposed wood should be treated by an arborist. Valuable specimen trees should be protected by having lightning conductors installed in them by an arborist.

B. **Snow** that is wet and piles up on the branches of plants can cause damage in the form of breakage. But a more subtle form of injury can result to broadleaved evergreens which are bent to the ground as a result of snow, recover in the spring, but commence to die the following year. This delayed symptom is the result of physical damage done to the bark of the branches while under stress from the snow. Damaged branches should be removed by pruning. It can be prevented by providing some means of physical support prior to the onset of winter.

C. **Hail** causes physical injury to leaves and stems. In some cases, branches injured by hail may die. These will need to be removed by pruning.

D. **The winter environment,** especially late winter, can cause problems to many plants, including: freezing injury to buds and shoots, desiccation of evergreen foliage and cracking of stems. Some evergreens (especially broadleaved evergreens) when exposed to the direct rays of the sun in late winter while the ground is still frozen, will winterburn due to the lack of moisture or from extreme temperature changes. Severely damaged branches may have to be removed by pruning. Desiccation injury can be prevented by constructing sun shields on the south side of the evergreens in late Fall.

E. **Wind** can sometimes cause serious problems to plants, particularly when it carries sand that abrades the stem, commonly at the ground line. This form of injury can be prevented by maintaining a cover crop on the ground to stabilize the sand.

The bare branches on these forsythia bushes are the result of extreme cold which killed the blossom buds. Blossoms on the lower part of the bushes indicate the snow line.

F. **High temperature** will often result in a short flowering period and if moisture is in limited supply will contribute to leaf scorch. Fire will scorch foliage and can destroy the cambium which will kill the plants.

12. **Have the plants been injured as a result of a chemical?**
Various types of chemicals applied to or drifting onto plants can cause injury or ultimately their death.

A. **Air pollution.** In industrial or large urban areas, air pollution can cause damage to sensitive species. In such a situation, the problem is widespread and not limited to a single plant or property but will cover a larger geographical area. Avoid planting sensitive species but better yet act to clean up the air.

B. **Animal urine.** Dog urine can be toxic to lawns and ornamental plants. Urine from female dogs causes circular dead spots in the lawn, and the urine of male dogs can cause unsightly brown areas on the lower portion of valuable evergreens. Cats confined to a small area can cause plants to decline due to the excess salt problem

which develops in the site where they urinate. Various repellents are available that are supposed to discourage visits by stray pets. However, repeat applications are necessary.

C. **Septic tanks.** For years tree roots have been a problem to the proper functioning of drain fields. More recently, drain field effluent has been causing problems to trees. Borax and chemical agents used in laundry and cleaning products are leached into the soil where they cause injury to plants growing in close proximity to the drain fields.

D. **Spray injury.** Applying the wrong chemical or improperly applying a pesticide can cause injury to plants. The most common form of spray injury is leaf burn, particularly the margins or tip of the leaf. The propellent in aerosol sprays or the emulsifying agent can be responsible for injury to some plants. Dormant oils applied at the wrong time of the year or to sensitive species can also be responsible for plant injury. Deicing salts used on highways will often drift onto adjacent vegetation causing injury. Evergreens may exhibit desiccation of the needles; deciduous species may exhibit die back of shoot growth and tufting.

E. **Weed killers.** If the new growth of plants is malformed and the leaves cupped and chlorotic (yellow or white), it is possible and highly probable that a weed killer, such as 2,4-D or dicamba has been applied in the vicinity of the plants. Some weed and feed lawn fertilizer contains dicamba, an excellent weed killer, but it should not be applied above the root zone of valuable trees and shrubs. Spray application of 2,4-D type weed killers should be made only on calm days as certain formulations may drift onto valuable plants and cause various malformations of growth. Nonselective herbicides should be used with caution as they may wash into areas where they could kill valuable landscape plants. Spray equipment used to apply weed killers should not be used for other purposes. Many plants are damaged or killed each year by the improper use of weedkillers. Read the label! Instruct others to do likewise and to follow the instructions.

13. **Are pets or other animals responsible for the damage?**

Animals of all kinds can cause considerable damage to plants. Canine urine (See ref. 12b) is one of the more common animal problems. Girdling of the stems of plants by certain rodents is also common (See ref. 15b). In addition, rabbits can decapitate or chew the bark of young plants. Squirrels cut off young branches, for nest building, which many drop to the ground. Deer eat foliage, bark and tender shoots of plants. Other large animals can damage trees by clawing or rubbing the bark off tree trunks, chewing the foliage, compacting the soil (when confined to a small area) and by physically breaking the plants. Much of this type of injury to plants can be prevented by fencing out the animals or by applying various repellents to young plants, especially prior to the onset of winter.

14. **Could a leaking gas line be the cause of death of the plant?**

A leaking gas line can cause a rapid or the slow death of plants. If trees and shrubs have been growing vigorously for a number of years and then suddenly decline in vigor, even die within a matter of days, consider the possibility of gas injury to the plants if they are within 100 feet of a gas line. The gas company can check the area with a gas detection meter. However, before calling the gas company check for girdling roots or other causes of the decline.

15. **Is the plant being strangled to death?**

A. A decline in vigor may be due to the girdling action of a wire or nylon rope encircling the stem or to the action of girdling roots or lianas of some vines. Nylon ropes used to secure the ball of soil during transplanting and guywires that supported newly planted trees should be removed when no longer needed. At the time of planting, be sure that the roots are properly distributed in the planting site and that there are no encircling roots on plants that were produced in containers.

B. Plants can also be girdled by rodents. Rodents do most of their damage during winter months when they are short of their natural food supply. This form of damage can be minimized by the careful use of poison bait and keeping the area clear of weeds and tall grass.

C. Many of the activities of man can also result in girdling valuable plants. Injury caused by mowers, "Lawnmower Blight", has increased considerably with the use of riding mowers. Cultivator or hoeing injury will often cause young plants to die. The activities of children with new hatchets sometimes results in the loss of valuable trees. This type of injury can be avoided by the proper use of equipment and the close supervision of employees and children.

D. Delayed graft incompatibility, although not a girdling action, is somewhat similar in end results. The union of some grafted or budded plants fails to function and the plants die. Very

often this is preceded by a mass floral display. Inarching (grafting) can sometimes be used to save a tree, but normally when the condition is noted it is too late to inarch.

16. **Does the plant fail to bloom?**

A. Perennial plants grown from seed will not bloom during their juvenile stage of growth, which for some species may be 8 to 10 years. Plants grown from cuttings, grafts or buds will flower more readily than seedlings, i.e. lilacs and wisteria. Plants that are making rapid vegetative growth as a result of excessive application of nitrogen may fail to bloom. Some species of plants are biennial by nature; that is, they flower profusely every other year. In addition, environment plays an important part in the flowering of many plants. Cold temperatures of winter may have frozen the flower buds or the plant may be sensitive to the length of the day, i.e. chrysanthemum and poinsettia.

B. Many plants bloom on wood produced the previous season; in pruning plants the flower buds may have been removed. Prior to pruning flowering rees and shrubs, study the flowering habit to avoid removing valuable flower buds.

C. Flower buds will split (blast) for a number of reasons but most commonly the problem is related to temperature, moisture or both. Buds that develop the calyx during cool or dry periods will often result in flowers that blast when the temperature warms or the moisture stress is removed. The developing petals and pistals cause the calyx to split. Forcing plants into bloom in high temperatures can also cause splitting as is seen in lilies forced at too high a temperature. Growth regulators and weed control chemicals can also cause buds to blast. Do not apply herbicides in the vicinity of valuable plants.

17. **Does the plant fail to fruit?**

All plants that flower do not necessarily produce fruits, and plants that have not flowered will not bear fruit. Fruit formation may fail to take place due to any one of a number of reasons:

A. Imperfect flowers. Plants that are dioecious develop separate male (staminate) and female (pistillate) plants. The male plants will never bear fruit and the female requires that it be pollinated by a male plant in order to set fruit, i.e. holly, yews.

B. Lack of pollination. A period of cold, wet weather during flowering usually results in poor fruit set due to a lack of activity of bees and other agents of pollination.

C. Some plants, although they have perfect flowers, require cross pollination in order to have good fruit set. If fruit begins to develop and drops at an early stage of development, a pollinator may be needed.

Summary

Plant specialists are expected to diagnose problems of plants. Before making a diagnosis and a recommendation, obtain the facts; look, ask questions. Correlate the data with the possible causes, then select the most likely cause of the problem. The information in the descriptive section of this bulletin will aid in confirming the diagnosis and in suggesting corrective action or ways to avoid or minimize the problem in the future. Study on your own, the more you learn about plants the better you will become as a plant expert. As a plant specialist you are a professional, you are expected to know the answers. Continue to update your knowledge; the following references should be helpful.

- Insects that Feed on Trees and Shrubs. 1976. Cornell University Press. $38.00
- A Guide to Insect Injury of Conifers in the Lake States. 1977. Agricultural Handbook 501. U.S.D.A., Superintendent of Documents, Washington, D.C. $3.15.
- Diseases of Shade Trees. 1978. Academic Press.
- Cooperative Extension Service Publications:

E 1099 Anthracnose of Shade Trees
E 425 Beautiful Home Grounds
E 353 Christmas Tree Insect Management
E 1078 Cytospora Canker of Spruce
E 964 Diplodia Tip Blight of Pine
E 506 Dutch Elm Disease Control
E 786 Fertilizing Shade and Ornamental Trees
E 841 Fire Blight of Trees and Shrubs
E 1076 How to Keep Your Trees Healthy
E 701 Nematodes and Their Control
E 944 Pesticides for Ornamentals
E 804 Pruning Shade and Ornamental Trees
E 838 Verticillium Wilt of Ornamentals
E 1343 Winter Injuries to Trees and Shrubs in Michigan

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