1960

OHIO

AGRICULTURAL EXPERIMENT STATION

RECOMMENDATIONS

FOR-
NURSERY STOCK
TREES
SHRUBS
TURF

DEPARTMENT OF HORTICULTURE
MIMEOGRAPH PUBLICATION NO. 195
Recommendations for nursery stock, trees, shrubs, turf
This publication is prepared in connection with the 31st Annual Short Course for Arborists, Landscape Gardeners, Garden Center Operators, and Nurserymen. It contains brief recommendations on (1) Protection of Nursery Stock in Containers, (2) Chemical Control of Weeds in Nursery Areas, (3) Selected Taxus (4) Turf Problems, and (5) Insect and Disease Control.

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Winter Protection Practices for Container Grown Nursery Stock

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Winter injury is probably the most important limiting factor in the culture of container grown nursery stock in Ohio and to profitably produce plants in containers, some form of winter protection must be included in the production program. Excepting unusual conditions such as floods or ice storms, winter injury may be directly attributed to either drying out of above ground portions of plants, formation of ice within the plant, or both. Factors which effect the success of winter protection practices include the severity and rate of change of winter temperatures; precipitation; amount, extent, and height of snow cover; exposure of the plant area; and the physiological condition of the plant. The protection methods which have been and are being used may be divided into five types: (1) Mulch cover over top of the containers (2) Screen protection over or around plants (3) Temporary or permanent structure over plants (4) Plunging containers below ground level (5) Placing containers can-to-can. Regardless of the method used, the first step in any protection program is to have the plants in the best possible condition prior to winter. Comments on some of the specific methods follow.

1. Mulch - (Ground corn cobs, crushed stone, straw, wood chips, etc.)

Mulches insulate the soil medium against rapid temperature change, maintain higher temperatures within the container, are relatively low in cost, retain moisture in the medium, and are easy to apply. A major problem is the cost and mess involved when the material is removed in the spring. The use of crushed limestone chips or pea gravel eliminates the disagreeable residue of organic mulches and this material can be left to build up the bed area. Mulching is a very effective technique for protecting the root system from damage; however, on 'top-sensitive' plants, such as some narrow and broadleaf evergreens, the value is limited.

2. Screen Protection - (Snowfence, Baled straw, trees, etc.)

The use of snowfence in tee-pee fashion over beds of container stock gives some protection from wind and winter sun and is easy to apply and remove; however, little if any insulating effect is provided around the container and foliage near the openings in the fence may be burned. This technique has not provided sufficient top protection for plants such as Abelia and Pyracantha.

Baled straw, two bales high, was used on the West side and around beds of stock. This also was not effective in protecting plants such as Abelia, Pyracantha, and Cotoneaster. On the basis of results and observations it is not possible to recommend these methods as excellent means of protection except during mild winters, with hardier plant types, or in areas where normal winters are less severe. Also, it is advisable to use a mulch in conjunction with the top protection.
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3. **Temporary or permanent structures over the plants** -(Greenhouses, coldframes, hotbeds, polyethylene tent, etc.)

It is obvious that maximum protection could be provided with permanent structures; however, stuctural and maintenance costs would be high. One of the most effective temporary means of protection yet developed is a polyethylene tent cover placed over beds of container stock. Maximum protection is provided, cost is relatively low, plants do not dry out, and application and removal are easy. No maintenance is required except regulating internal temperatures by venting the cover during warm days in the spring. Some means of support is necessary and this may be of any type such as a simple pipe and wire framework or more elaborate, 'quonset-hut' shaped reinforcing wire.

Four mil translucent polyethylene was placed over beds of container stock in mid November of 1957, 1958, and 1959 at the Ohio Agricultural Experiment Station. The poly was held down at the ends and sides with limestone chips and was left sealed until warm days in the spring. A wide variety of plants, including Abelia and Pyracantha, were included in the studies and were undamaged during these winters. This was significant during the severe winter of 1958-59 when many similar plant types were killed in field and landscape plantings. To economize on space, it is possible to stack some plants two and three layers high.

4. **Plunging Containers**

This technique is laborious and impractical although it does provide an excellent means of protection for the plant roots. In heavy soils drainage and heaving may be serious problems.

5. **Placing Plants Can-To-Can**

This method of protection, although mininum, is superior to spaced plants and affords good protection to plants in the interior rows of the beds. Mulching around the sides of the beds provides added protection for the outside rows of plants. Drying out is a problem and some watering may be necessary during the winter. During mild winters this technique is adequate with plants such as Forsythia, Juniper, and Deutzia; however, during the winter of 1958-59, these plants were severely damaged when protected in this manner. This technique is impractical with larger, spreading plant types.

**Summary**

Winter damage is the greatest limiting factor in the culture of plants in containers in Ohio and, regardless of the protection method employed, partial success is not acceptable. Undamaged plants of healthy appearance and condition should be the goal of any winter protection program.

Great variations in hardiness exist among plants and therefore, varying degrees of protection are necessary. Unfortunately, plants such as Pyracantha and Cotoneasters, which are ideal types for containers, are rather tender and maximum protection is required. The problem of protection is not complex but simply means using some
technique to assure optimum condition of the plant in the spring. This may range from a simple placement of plants can-to-can to a temporary structure constructed over the bed.

Variations in winter temperatures and weather from year to year indicate that methods which are effective one year may not be the next; therefore, to assure plants of consistent high quality and value, a standard, maximum protection program should be set up for your area and for the types of plants you are producing.

CHEMICAL CONTROL OF WEEDS IN NURSERY AREAS
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The prevention or control of weeds either in seed or transplant beds, containers or in field production, is a problem confronting all nurserymen. Any method that can be employed that will reduce weed population will mean a reduction in labor required and in the cost of production.

Successful weed control programs consist of a weed free area previous to planting and employing cultural or chemical methods for weed prevention. Every effort should be made to eliminate noxious weeds such as quack grass, thistle and bindweed before the crop is planted. Control is much easier at this stage of the rotation since chemicals can be used at concentrations that might be toxic to the nursery stock if applied after planting. Many annual broadleaf weeds can be readily controlled with herbicides in planted areas without injury to crops.

The great number of ornamental plant species grown by nurserymen and the variable tolerance of these species to herbicides has been an important reason for the slow development of chemical control of weeds in nursery areas. However, with added knowledge gained during the past few seasons some herbicides can be recommended for nursery use. Directions as to the herbicide to use, the rate per acre and the method and time of application should be followed carefully.

Many herbicides are non-toxic to many types of nursery stock if used correctly. In general, large established plants will be more tolerant than young liners. Herbicides containing 2,4-D should not be used in areas where plants are layered. Below are suggested uses of herbicides in nursery areas based on experiments at the Ohio State University and the Ohio Agricultural Experiment Station.
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<table>
<thead>
<tr>
<th>Type of Control</th>
<th>Rates and Chemicals</th>
<th>Comments</th>
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<tbody>
<tr>
<td><strong>I Noxious Weeds</strong></td>
<td></td>
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<tr>
<td>A. Canada Thistle</td>
<td>Amino triazole, 4-6#/acre In 50 gals. of water</td>
<td>Use previous to planting of nursery stock. Two applications first when thistles are in bloom, second regrowth is 6-8&quot; high. Spray to wet the foliage of the thistle. This has also been applied at 4 pound rate as a directed spray in established Taxus.</td>
</tr>
<tr>
<td>B. Quack grass</td>
<td>Dowpon (Dalapon) 5-10#/acre</td>
<td>Use previous to planting nursery stock. Apply when grass is growing vigorously.</td>
</tr>
<tr>
<td>C. Bindweed</td>
<td>2,4-D (Amine salt) ½-1#/acre</td>
<td>Recommended for use previous to planting nursery stock. Can be used as a directed spray in Taxus but only as a last resort measure when weed problem is particularly difficult.</td>
</tr>
<tr>
<td><strong>II Broadleaf Weeds and Grasses in Shade Tree Blocks.</strong></td>
<td>Amino triazole, 4-6#/acre</td>
<td>To retard and partially prevent weeds and grasses in blocks of large trees. Use with caution on shallow rooted plants.</td>
</tr>
<tr>
<td><strong>III General Clean-Up, between frames, walks, buildings, etc.</strong></td>
<td>Combination of: Dowpon (Dalapon) at 7½#/acre and Amino triazole at 5#/acre. Atrazine or Simazine at 2-5½ per acre</td>
<td>Combination of chemicals applied in 100 gallons of water per acre. For annual weed (crabgrass, foxtail, etc.) control during a season. Be sure the soil that is treated is not used in compost and be sure run-off does not get into seed beds or liner beds.</td>
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* Rates Based on Commercial Formulations not Actual Formulations.
**HERBICIDES FOR NURSERY AREAS (cont.)**

<table>
<thead>
<tr>
<th>Type of Control</th>
<th>Rates and Chemicals</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV General Weed Control in Nursery Stock</td>
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<tr>
<td>A. Fall applications to prevent early spring growth of weeds.</td>
<td>Simazine, 3-lb/#/acre</td>
<td>Clean cultivated areas. Effective when used in Taxus and other evergreens. When applied from mid-late fall the areas are nearly free of weeds until mid-May. Does not control quack grass, thistle or bindweed but does cause considerable stunting. More work needed with this chemical in soil incorporation and build up.</td>
</tr>
<tr>
<td>B. Early Spring Applications</td>
<td>CIPC 8#/acre</td>
<td>Satisfactory but variable and less effective than Simazine. Particularly effective in clean cultivated areas where purslane is a major weed.</td>
</tr>
<tr>
<td>C. Spring or Summer Applications</td>
<td>Combination of: Sesone (SES) at 1#/acre and Telvar (Monuron, Karmex W) at ½#/acre.</td>
<td>Directed sprays in Taxus blocks have been effective in controlling most weeds for approximately 6 weeks. The area must be clean cultivated before herbicide application.</td>
</tr>
<tr>
<td></td>
<td>Simazine, 3-lb/#/acre</td>
<td>Has proven effective in limited tests.</td>
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Lawn Recommendations for 1960

Dr. R. R. Davis
Department of Agronomy
Ohio Agricultural Experiment Station

I. Grasses and Mixtures

There are no "miracle" grasses available for 1960 and they are not likely to become available in the near future. A good lawn will continue to result from selecting the best available grass or grasses to fit the need and managing to suit the grass. The improvement of grasses is a slow business and a new grass variety does not necessarily represent improvement.

A. Bluegrasses - Merion Kentucky bluegrass is still the only recommended named variety. There is considerable doubt as to the adaptability of Merion to the southern one-third of the state. New observation plots at the Southern Substation in Brown County should throw some light on the subject. It has been obvious for several years that the advantages of Merion over Common Kentucky bluegrass decrease in southern Ohio as compared to northern Ohio. Park Kentucky bluegrass was released by Minnesota and has been tested at Wooster for several years. Germination and seedling growth of Park is faster than the average lot of common bluegrass, but no faster than some common lots. In appearance and reaction to diseases observed at Wooster, it cannot be distinguished from common. Delta Kentucky bluegrass is available, but it has not shown any advantage over common bluegrass in tests at Wooster, Newport Kentucky bluegrass is a recent commercial release. It was introduced into the bluegrass variety test at Wooster in 1959.

B. Fescues - Pennlawn is the newest variety of red fescue. In tests at Wooster there has been no clear-cut distinction between varieties of red fescue. In addition, to Pennlawn, Illahee, Chewings and Common Creeping red fescues have been used and they have performed satisfactorily in their place. Kentucky 31 and Alta are old varieties of tall fescue, but there is nothing in sight to replace them.

C. Bentgrasses - Penncross is being widely used on new golf greens. In Wooster tests, it has been far superior to other seeded bents for this purpose. Numerous vegetatively propagated varieties of creeping bentgrass have performed satisfactorily. The Astoria and Highland varieties of colonial bent appear satisfactory under lawn management.
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D. Mixtures - Lawn mixtures should be kept simple if mixtures are used. Either Merion or Common Kentucky bluegrass should be the basic grass in most lawn mixtures. Red fescue should be used with the bluegrass for shaded areas. A mixture of 40% bluegrass and 60% red fescue has worked well in Wooster tests. Bentgrass should never be used in mixtures since it will take over the entire sod. Fast growing temporary grasses should seldom be used and if used the rates should be kept to a minimum.

II. Weed Control

A. Crabgrass - If bluegrass is cut 2 inches high or higher and given moderate fertilization, crabgrass is not likely to be a serious problem. Where crabgrass is a problem several chemicals have given good results if properly used.

(a) Pre-emergence - Arsenates are gaining wide use as a crabgrass herbicide for use before crabgrass germinates. They may be applied in the fall or in early spring. Some soils require more arsenate for a toxic dose than others. In general, the more organic matter, clay and phosphorus in a soil the more arsenate is required. Calcium arsenate is available in granular form under several trade names. Twelve to 18 pounds (depending on the concentration in the brand used) per 1000 square feet will give good but not perfect control on most soil. Lead arsenate and commercial mixtures of arsenicals are also available. Twenty to 25 pounds of lead arsenate per 1000 square feet will usually give control. All the arsenates must be applied before there is any germination of crabgrass for good results. Chlordane is also available commercially for crabgrass control. Results have generally been better with arsenicals. When used, chlordane should be applied in early spring at the rate of 1½ to 2 pounds of active ingredient per 1000 square feet. Two new experimental materials that have looked good in tests are 0,2,4-dichlorophenyl 0-methyl isoproplyphosphoroamidothioate (Zytron, Dow Chemical) and dimethyl 2,3,5,6-tetrachloroterephthalate (Dacthol, Diamond Alkali). The Zytron worked well in early post emergence tests as well as pre-emergence.

(b) Post-emergence - Disodium methyl arsonate (DMS) and Octyl-dodecyl ammonium methyl arsonate (AMA) are the recommended material for killing crabgrass after it is up and growing. Two or three applications a week apart are necessary for kill. There is no experimental material under test that looks better than these two.
B. Weeds not easily controlled with 2,4-D - Chickweed, clover and ground ivy can be controlled with silvex. More than one application may be needed for the perennial mouse-ear chickweed, but common and meadow chickweed have been killed with one application at the rate of 1 1/2 pounds per acre. Ground ivy and clover can be killed with the same rate in August or September. Bentgrass is injured at the above rate, but there has been no injury to bluegrass in Wooster tests. Other weeds reported to be controlled with silvex are wood sorrel and yarrow. Most weeds that are killed with 2,4-D would also be killed with silvex, but 2,4-D should be used where weeds like dandelion and plantain are the principal weeds.

Neburon has given excellent kill of common chickweed, but it does not kill other weeds.

III. Fertilizer - As far as the grass is concerned there are no "new" fertilizers. Regardless of the type of package, liquid or solid, organic or chemical, slowly available or quickly available, minor elements or not, the plant will continue to take most of the needed elements through the roots in exactly the same form it has been absorbing for millions of years. Applying the major elements (nitrogen, phosphorus, potassium) in adequate but not excessive quantities will help the grass to grow better. There is no known minor element problem on grass in Ohio except for iron with some very special conditions on golf greens. Three years of research with ammonium nitrate, activated sewage sludge and urea - formaldehyde types of nitrogen have shown that equally good grass can be grown with either type. Nitrogen is the most critical fertilizer element needed by grass. The amount needed depends on the grass being grown. Approximate requirements of actual nitrogen per 1000 square feet per season for best results are:

- Common Kentucky bluegrass - 2 to 3 Lb. - 2 applications
- Merion Kentucky bluegrass - 5 to 7 Lb. - 2 to 3 applications
- Red fescue - 0 to 2 Lb. - 0 to 2 applications

Some phosphorus and potash is needed in addition to nitrogen. See Extension bulletin 271, Your Lawn, for fertilizer recommendations.

INSECT AND MITE PESTS OF ORNAMENTALS

Dr. R. B. Neiswander and Dr. Ralph H. Davidson

Three species of Mites were among the most troublesome pests in Ohio nurseries during 1959. These are the Two-Spotted Spider Mite, the Spruce Spider Mite, and the Southern Red Mite. They are similar in appearance and all cause a gray stippling of the foliage. The two-spotted spider mite occurs on herbaceous plants and deciduous ornamentals, and hibernates in the adult stage. The other two species live over winter in the egg stage on infested plants. The spruce spider mite feeds primarily on arborvitaes, spruce, and juniper and the southern red mite on various species of holly and azalea. Ovex or Ovotran is effective in control of the spruce spider mite, but may defoliate roses. Aramite may be used safely...
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and effectively in control of each of the three species, but the following new miticides have somewhat longer residual action:

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Quantity in 100 gallons</th>
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<tbody>
<tr>
<td>Tedion, 25% powder</td>
<td>2 pounds</td>
</tr>
<tr>
<td>Kelthane, 18.5% powder</td>
<td>1.5 pounds</td>
</tr>
<tr>
<td>Kelthane, 18.5% emulsion</td>
<td>1.5 pints</td>
</tr>
<tr>
<td>Trithion 37% emulsion</td>
<td>1 pint</td>
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The Taxus Mealybug continues to be one of the most troublesome insect pests in Ohio nurseries and attacks all types of yews. Its presence is indicated by the conspicuous masses of white fibers on the branches where eggs are deposited. Parathion at the rate of 3 pounds of 15% powder per 100 gallons is perhaps the most effective material readily available for the control of this pest, but it must be used with caution. Malathion at 1 quart of the 57% emulsion or 4 pounds of 25% powder may also be used. Two applications with an interval of 10 days may be needed to control heavy infestations. Sprays are most effective in late May and early June.

The Eastern Spruce Gall Aphid causes the common pineapple shaped galls, approximately one inch in length, at the base of the current season's growth on Norway and white spruce. The Cooley Spruce Gall Aphid occurs primarily on blue, Sitka, and Engleman spruce. The galls resemble those caused by the eastern spruce gall aphid, but are longer and occur on the ends of the twigs. This pest is most troublesome when Douglas fir grows in the vicinity of susceptible spruce trees. Galls were more abundant than usual in 1959. The following materials will kill the over-wintering forms of both gall makers and prevent the formation of galls if applied in the spring before growth starts:

- Liquid lime sulfur, 1 part in 24 parts water.
- Lindane, 1 pint of 20% emulsion or 1 pound of 25% powder in 100 gallons.
- Nicotine sulfate, 1 1/2 pints in 100 gallons plus a sticker-spreader or soap.

Several species of Lecanium scale insects were more abundant than usual in 1959. The species that caused most trouble for nurserymen was L. fletcheri known as the Fletcher scale or Taxus lecanium. It occurs primarily on Taxus and arborvitae. The adult female is hemispherical in shape, about one-sixth inch in diameter, and light brown in color. It can be controlled by spraying infested plants with malathion at the rate of 1 quart of the 57% emulsion per 100 gallons between the 10th and 15th of July, or after all eggs have hatched.

The Juniper Scale has been one of the seven most common pests in Ohio nurseries during each of the past nine years. It occurs on various species of junipers, and is a tiny white scale that is barely visible without magnification. The materials suggested for the control of the Taxus mealybug may be used in control of this pest. They can be applied at any time during the summer, but appear somewhat less effective in June when eggs are present. Two or three applications of malathion at 7 to 10 day intervals may be needed. A rather severe winter mortality of the scale insects
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commonly occurs, and a spray application in late September or October may further weaken the overwintering insects to the extent that none will survive.

The European Pine Shoot Moth is a severe pest of red pine in northern Ohio. The brown larvae burrow into the new shoots during April and May and either kill or distort them. A liberal application of DDT at the rate of 4 pounds of 50% powder in 100 gallons will control this pest. The spray should be applied in mid-April when the buds are swelling or between June 25 and July 5 when the eggs are hatching.

Bagworms cause most damage to arborvitae and juniper. Each newly hatched larva immediately constructs a bag in which it lives. The bag is made of small pieces of the host plant firmly tied together with silken fibers, and is enlarged as the insect grows. Sprays for the control of bagworms should be applied in late June or early July when the larva are small. At that time lead arsenate at the rate of 4 pounds, or dieldrin at the rate of 2 pounds of the 50% powder per 100 gallons of water is effective. When the larvae are nearly full grown malathion at the rate of 1 quart of the 57% emulsion per 100 gallons is more effective.

Borers in newly transplanted shade trees can be controlled by maintaining a deposit of insecticide on the trunks during the period in which eggs are being deposited. Recent tests indicate that this can be done with one application. During each of the past two seasons 1 application of dieldrin has prevented borer injury when the insecticide was diluted at the rate of 2 gallons of the 18.5% emulsion per 100 gallons of water and applied during the latter part of May. Sevin used at the rate of 10 pounds of the 50% powder, and Thiodan at the rate of 1 gallon of the 25% emulsion also appear effective. However, a commercial tree wrap saturated with 5% DDT may constitute a simple and effective treatment if the wraps are in place by the end of May.

Two species of Eriophyid mites that are common pests in Ohio nurseries are the maple bladder gall mite which occurs primarily on silver maple, and the tip dwarf mite which attacks arborvitae and juniper. Both can be controlled with a dormant spray of lime-sulfur. The latter species can also be controlled with summer sprays of malathion, but the maple bladder gall mite is protected from the action of insecticides after the galls are formed.

Birch Leaf Miner. Damage principally to white, gray, and paper birches is caused by the white larvae of this insect mining between the upper and lower surfaces of the leaves. The adult is a small black-bodied sawfly. Use one of the following chemicals in 100 gallons of water:

1 qt. 57% EC malathion
2 lbs. 50% WP malathion
1 pt. 20% EC lindane
1 lb. 25% WP lindane

The first treatment should be made about May 15 (when the adults are emerging from the overwintering pupae) or when the leaves are fairly well developed. Second brood sprays should be applied in late June and early July. A repeat spray may be needed 10 days later.
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Oyster Shell Scale. This insect sucks sap from the twigs and smaller branches of many trees and shrubs, but particularly lilac, ash, poplar, and willow. Overwintering is in the egg stage under the female scale coverings. Apply one of the following chemicals in 100 gallons of water:

2 lbs. 50% WP or 1 qt. 57% EC malathion
2 lbs. 25% WP or 1 qt. 25% EC parathion
2 lbs. 50% WP or 2 qts. 25% EC, DDT
1 gal. Elgetol or Krenite (apply only in dormant period)

Malathion and parathion are more effective when the eggs are hatching, and DDT is only effective during this period. Combination sprays of DDT and malathion or parathion have been used with success.

Azalea Mite. Plants are rosetted in appearance and often yellowed or bronzed by these very tiny mites feeding on the undersides of newly developing leaves. Stunting and rolled under leaf margins are other symptoms of the presence of this pest. Spray thoroughly with malathion, 2 lbs. 50% W.P./100 gallons water, when the damage is evident.

Leafhoppers. Many species of leafhoppers suck the sap from plant leaves. Many leafhoppers are green, yellow to nearly white in color, often with some mottling or stripes of red, yellow, or black. Symptoms of damage are indicated by leaf distortion and discoloration; browning of the margins and tiny light spots over the leaf surface resulting in a stippled effect are other manifestations. Control can be accomplished with DDT sprays or dusts applied when the insects are present. Use 5% dust or 2 lbs. 50% W.P./100 gallons water when spraying.

Holly Leaf Miner. Tiny maggots mine inside the leaves of American holly. Each mine is winding and narrow at first but is gradually increased in width as the maggots develop. Overwintering is in the larval stage within the mines. Pupation takes place in early spring and adults begin emerging about a month later. Successful control is dependent upon timing spray applications to kill the new adults before they lay eggs. The adult emergence date is approximately May 15 for northern Ohio. Control has been achieved by applying one of the following materials in 100 gallons of water:

DDT, 2 lbs. 50% WP or 2 qts. 25% EC
Dieldrin, 1½ lbs. 25% WP or 1 qt. 15% EC

Inkberry Leaf Miner. This species is closely related to the holly leaf miner but attacks Ilex glabra, or inkberry. It differs from holly leaf miner in having 2 or 3 generations each year and the adults begin emerging earlier in the spring, usually late April and early May. The same chemicals suggested for control of holly leaf miner are recommended but the applications should be made about May 1 and repeated 10 days later.
Arbor Vitae Leaf Miner. Tips of arbor vitae twigs become discolored and gradually turn brown due to the interior of the leaves being eaten or mined by tiny red-green caterpillars about 1/8 inch long. Winter is passed in this stage and adult moths begin emerging in late May and early June, with oviposition taking place soon afterwards. Control may be achieved by applying one of the following materials per 100 gallons water:

- Malathion, 2 lbs. 50% WP or 1 qt. 57% EC
- Parathion, 2 lbs. 15% WP
- DDT, 2 lbs. 50% WP or 2 qts. 25% EC

Malathion or parathion may be applied to infested plants in spring, summer, or autumn, but DDT is effective in control only when adults are emerging. *Mimosa Webworm.* This insect attacks honey locust, the gray-brown larvae webbing the foliage and skeletonizing the leaves. Moths begin emerging from overwintering pupae early in June and oviposit on the leaves. There are two broods of larvae, one in mid-June and the other in mid-August. Spraying at these periods with one of the following materials in 100 gallons of water is recommended:

- Lead arsenate, 4 lbs.
- DDT, 2 lbs. 50% WP or 2 qts. 25% EC
- Malathion, 2 lbs. 50% WP

*Aphids.* Many species of aphids attack trees and shrubs, causing damage by removal of sap. All parts of the plant may be affected, i.e., foliage, branches, roots. Most aphids are quite small and colored either green, pink, red, purple, black or brown. Some are covered with white or gray woolly filaments. Many have complex life cycles and alternate their hosts during the year; others may breed continuously on the same host throughout the summer. Control chemicals are applied when the population becomes abundant. Some effective materials are lindane, malathion, parathion, Systox, or TEPP. Follow the manufacturer’s directions.

*Lace Bugs.* These are small, flat, lace-winged bugs that suck sap from the lower side of the leaves of many plants, such as Azalea, chrysanthemum, cotoneaster, hawthorn, mountain laurel, rhododendron, and sycamore. The leaves have a white stippled appearance similar to that produced by leafhoppers. Two sprays about 10 days apart are recommended, using malathion, parathion, DDT or lindane as suggested for arbor vitae leaf miner and birch leaf miner.

*Honey Locust Mite.* This yellow-green mite occurs on honey locust, feeding mainly on the undersides of the leaves, causing them to turn yellow and drop prematurely. Adult mites overwinter and can be seen in autumn sometimes in large groups on the bark of infested trees, since they become orange-red at this time of the year. Recommended control chemicals are Kelthane, chlorobenzilate, malathion, or Aramite at dosages indicated by the manufacturer.

*Euonymus Alatus Scale.* This scale resembles oyster shell scale but has been found only on Euonymus alatus, *E. alatus compacta,* and *E. radicans vegetus.* Mature females overwinter under the scale covering on the twigs and begin depositing eggs from early June.
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through early July. Crawlers appear by mid-June and individuals of all stages encrust the twigs from July to cold weather. Elgetol, Krenite, or DN-289 applied in early April at the rate of 6 pints per 100 gallons of water are recommended. Parathion or malathion applied early in May at the dosages recommended for oyster shell scale, or these same materials in combination with DDT (as recommended for oyster shell scale) and applied in late June with a repeat application 10 days later have given good control.

Plant Diseases of Ornamentals
Dr. C. C. Ellett
Department of Botany and Plant Pathology
Ohio State University

Flowering Crab and Hawthorn Rusts. There are three of these rust diseases and the alternate hosts of all three are species and varieties of Juniper. Spray with ferban or zineb 1 1/2 to 2 pounds per 100 gallons. Apply 2 to 4 times at 7 to 10 day intervals. Apply the first spray as the flower buds open. The removal of the gall stage of the disease on nearby junipers by April 15 will reduce the amount of disease on the flowering crabs and hawthorns.

Juniper Twig Blight. Prune and destroy diseased twigs and branches. Spray at 7 to 10 day intervals, beginning when growth starts, with a phenyl mercury such as Furitized Agricultural Spray 1 pint per 100 gallons or try Actidione according to manufacturer's recommendation.

Hawthorn Leaf Blight. English hawthorn and Paul's Scarlet are most susceptible. Use zineb 1 1/2 - 100 or ferban 2-100. Apply 3 sprays at 10 day intervals beginning when leaves unfold.

Pyracantha Soap. Ferban 2-100 or captan 2-100. The first spray should be applied before flowers appear and additional sprays at 10 day intervals.

Azalea Angular Leaf Spot. Zineb 1 1/2 to 2-100.

Pachysandra Leaf and Stem Blight. Ferban 2-100 or captan 2-100.

Rose Black Spot and Powdery Mildew. For black spot - captan or ferban or zineb or maneb 2-100 or Phalan (75%) 1/4-100. Apply 37 weekly intervals, or oftener when growth is rapid. For powdery mildew use wettable sulfur or Mildex or Karathane. In limited tests Phalan has been effective for both powdery mildew and black spot. Actidione PH at manufacturer's recommendation may also be tried for powdery mildew.

Anthracoidea Blight of Sycamore and Oak. Use a phenyl mercury spray such as Furitized Agr. Spray. Recent tests indicate that a single spray at bud break may be effective.
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Taxus Die-Back and Root Rot. Recent studies in Indiana indicate that a Phytophthora fungus causes this disease. Unfavorable environmental conditions, particularly high soil moisture, are necessary before the fungus ordinarily becomes damaging to Taxus. Once this fungus has been introduced into the soil it is difficult to eliminate. Do everything possible to insure good drainage.

Vorticillium Wilt. Maple, Elm, Redbud, Berberry, Catalpa, Chrysanthemum, and many other hosts - both woody and herbaceous. Sprays or dusts are of no value. May be spread by pruning - so take proper precautions. Destroy diseased plants where feasible. Propagate only from disease-free plants.

Iris Leaf Spot. Zineb or captan 2-100 or Phalan (75%) 1½-100 at 7 to 10 day intervals.

Chrysanthemum: Septoria Leaf Spot. Use ferbam or captan 1½-100 until flowering. After flowers start to open try zineb 3/4-100. Phalan has proven effective in tests in New York.

Virus Diseases. Stunt (Dahlia and Chrysanthemum) Mosaics, Yellows, etc. on many different hosts - mostly herbaceous. Destroy diseased plants. Propagate only from virus-free plants. Follow entomologists recommendations for control of aphids and leafhoppers as many viruses are transmitted by these insects.

Note: The effectiveness of most sprays on plants with glossy or waxy surfaces, like rose, tulip, iris, laurel, etc., will be improved by the addition of wetting and spreading agents and stickers. These materials should be used according to manufacturer's recommendations. Often detergents of the Dreyf, Swirl, or Tide type may be satisfactory -- used at about 1/3 tsp./gallon. Wheat flour at one tablespoon/gallon is an effective sticker.

The Best of the Taxus
Dr. L. C. Chadwick

I. Low Types, 1-4 feet

1. Dwarf, Spreading Types
   Taxus baccata repandens - Spreading English Yew
   Taxus media 'Chadwick' - Chadwick Anglojap Yew

2. Slow Growing, Compact, Rounded Types
   Taxus cuspidata densa - Cushion Japanese Yew
   Taxus media 'Flexer' - Flexer Anglojap Yew

3. Slow Growing, Horizontal Spreading Types
   Taxus cuspidata nana - Dwarf Japanese Yew
   Taxus media 'Ward' - Ward Anglojap Yew

II. Small Types, 4-6 feet

1. Slow Growing, Compact, Rounded or Globose Types
   Taxus media 'Brown' - Brown Anglojap Yew
   Taxus media 'Halloran' - Halloran Anglojap Yew

2. Slow Growing, Spreading Types
   Taxus media '/8 - '/8 Anglojap Yew
   Taxus media 'Amherst' - Amherst Anglojap Yew

III. Medium Types, 6-10 feet

1. Compact, Rounded or Globose Types
   Taxus media 'Dutweiler' - Dutweiler Anglojap Yew

2. Horizontal Spreading Types
   Taxus cuspidata 'Thayer' - Thayer Anglojap Yew

3. Narrow, Upright Types
   Taxus media 'Costich' - Costich Anglojap Yew
   Taxus media 'Fastigiata' - Upright Anglojap Yew
   Taxus media 'Hicks' - Hicks Anglojap Yew
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4. **Broad Fastigiate, Columnar, or Pyramidal Types**

- *Taxus media, 'Andorra'* - Andorra Anglojap Yew
- *Taxus media, 'Cole'* - Cole Anglojap Yew
- *Taxus media, 'Hatfield'* - Hatfield Anglojap Yew (Selected)
- *Taxus media, 'Kelsey'* - Kelsey Anglojap Yew

IV. **Upright Tree Types, 10-25 feet**

- *Taxus cuspidata capitata* - Upright Japanese Yew
- *Taxus media, 'Adams'* - Adams Anglojap Yew