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Pests Seen in August
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Ash – ash yellows
Azalea – lace bugs
Catalpa – catalpa hornworms
Chrysanthemum – pythium root rot
Dogwood – borers, powdery mildew
Euonymus – scale, crown gall
Hawthorn – hawthorn & quince rust
Honeylocust – mimosa webworm
Ivy – pythium root rot & bacterial leaf spot
Juniper – spider mites
Maple – verticillium wilt
Oak – oak lace bugs
Prunus – eastern tent caterpillar egg masses
Rose – powdery mildew, black spot
Rhododendron – lace bugs
Rudebeckia – bacterial leaf spot
Sand cherry – borers
Sweet gum – fall webworm
Turf – brown patch, pythium root rot, take-all patch
Yellowwood - anthracnose

Degree Day Totals through August 24, 2000
Bardstown - 3002
Bowling Green - 3236
Henderson - 3216
Huntington, WV - 2815
Lexington – 2882
London - 2881
Louisville - 3090
Mayfield - 3172
Paducah - 3330
Princeton - 3549
Quicksand – 2897

Top: yellow necked caterpillars  Middle: circular areas of brown patch in turf  Bottom: eastern tent caterpillar egg mass and dogwood borer larva

Last Newsletter for 2000
This will be the last newsletter that we will publish this year. The first edition for next year will be in April. If you have any suggestions/input that you would like to make please let us know.
Clarification
In last month’s newsletter the Ohio State article entitled Iron Chlorosis indicated that you should send samples to their lab in Ohio. We failed to mention that samples from Kentucky need to be send to the disease diagnostic lab and to the soils lab. You can get all the necessary information for doing this at your county extension office.

Lace Bugs
By David J. Shetlar, Ohio State University

Lace bugs are common pests of a variety of ornamental trees and shrubs. The adults have highly ornamented wings and a hood-like structure covering the head. The entire surface is covered with veins that look like lace. The most common lace bug pests in Ohio include the sycamore lace bug (Corythucha ciliata), hawthorn lace bug (C. cydoniae), hackberry lace bug (C. celtidis), oak lace bug (C. arcuata), basswood lace bug (Gargaphia tiliae), azalea lace bug (Stephanitis pyriodes), rhododendron lace bug (S. rhododendri), and andromeda lace bug (S. takeyi). The hawthorn lace bug often attacks cotoneaster, pyracantha, flowering quince, crabapple, mountain ash and shadbush (Amelanchier) as well as hawthorn while the basswood lace bug commonly attacks lindens. The rhododendron lace bug also can be found on mountain laurels. The rest of the species are fairly well restricted to their namesake hosts.

Types of Damage
Most plants react from lace bug feeding by having yellow or whitish spots evident on the upper leaf surface. Heavy feeding from large infestations may result in large, yellow, blistered areas on leaves, totally yellowed leaves and early leaf drop. Broadleaf evergreen plants often keep the damaged leaves from one season to the next.

The under surface of affected leaves should have dark varnish-like spots of excrement scattered about with concentrations along the leaf veins. Concentrations of this excrement along the veins is most evident on broadleaf evergreens. This is because the female lace bugs usually insert their eggs along the leaf veins and coat the exposed surface of the egg with excrement.

Life Cycles and Habits
Lace bugs can be divided into two groups - those that attack deciduous trees and shrubs and those that attack evergreen shrubs. Lace bugs that attack deciduous plants spend the winter in the adult stage by hibernating on the plant under bark or near the plant in leaf litter. Lace bugs that attack evergreens overwinter in the egg stage attached to the leaves.

The hawthorn lace bug is one type that attacks deciduous plants. The adults hibernate under loose bark of their host plants as well as among leaf litter. They become active in early to mid-May and return to the new leaves. The females soon begin to lay eggs along the larger veins on the lower leaf surface. The females may lay eggs for a considerable time, often extending into June. The eggs hatch in a couple of weeks and the nymphs cluster together and feed. Each nymph sheds its skin (molts) five times before the adult stage is reached. Growth to the adult stage usually takes three to four weeks. Peak numbers of this pest are usually present in July. Only one generation occurs per year. Related species of lace bugs such as the oak, sycamore and hackberry lace bugs have two and occasionally three generations in a summer.

The azalea lace bug (an example of a lace bug that attacks evergreens) overwinters in the egg stage. The eggs are partially inserted into the leaf tissues along the midvein and are covered with the resin-like excrement of the female. The nymphs hatch in the spring, usually mid-May, after the danger of frost is over. They feed in small groups on the under surface of leaves and molt five times before becoming adults. The adults mate and lay eggs for a second generation by mid to late-July. Often there is a third generation in the late summer and early fall. The andromeda and rhododendron lace bugs have similar life cycles.

Control Tactics
Plants that attract lace bugs should be monitored early in order to determine if an infestation is building.
Elimination of the first generation of lace bugs is necessary if visual damage is to be avoided. Existing spotting and yellowing of leaves will not disappear once the lace bugs have been controlled.

Option 1: Cultural Control - Planting Site Selection. Most lace bugs seem to prefer bright, sunny areas. Plant lace bug susceptible plants in shady areas of the landscape. The azalea and rhododendron lace bugs are rarely a problem when their host plants are in heavily shaded areas.

Option 2: Cultural Control – Syringing. Use a hard jet of water from a hose to dislodge the young nymphs as they hatch in the spring. The tiny nymphs often die before they can find their way back to suitable leaves.

Option 3: Biological Control - Encourage Predators. Naturally occurring green lacewings, mites and assassin bugs attack lace bugs. However, these predators often arrive after considerable damage has occurred. In order to conserve these beneficial natural predators, use syringing or one of the insecticidal soaps instead of standard insecticides.

Option 4: Chemical Control - "Soft Pesticides". The insecticidal soaps are useful if contact with the nymphs is made. Be sure to cover the underside of the leaves where the nymphs are feeding. Additional applications may be needed to control nymphs hatching out of eggs laid late or if re-infestations occur from surrounding landscapes.

Option 5: Chemical Control - Standard Insecticides. Over-the-counter products include acephate (Orthene), carbaryl (Sevin), chlorpyrifos (Dursban), malathion, and Rotenone plus Pyrethrum. Professional applicators can also use azinphos-methyl (Guthion), bendiocarb (Dycar, Ficam), bifenthrin (Talstar), cyfluthrin (Tempo), dimethoate (Cygon), disulfoton (Di-Syston), fenithrothion (Pestroy), or permethrin (Pounce). Be sure to check each product’s label because not all lace bugs or host plants are listed on each label. Make applications as soon as the eggs hatch in the spring, usually mid to late-May. Monitor the plants and repeat applications if re-infestations occur.

Root Knot Nematode

By Richard M. Riedel, Sally A. Miller, Randall C. Rowe, Ohio State University

Root knot first attracted attention in 1855 when it was found in a greenhouse in England. Since then it has been a cause for concern over much of the world. It affects more than 2,000 species of plants including economically important forage crops, small grains, fruits, vegetables, field crops, nursery crops, and turf grasses. Root knot nematodes are cosmopolitan in distribution and occur widely in the United States.

Symptoms

Root knot is very distinctive because of the galls or swellings produced on roots and underground portions of stems. These deformations can often completely ruin crops for sale. Plants, if infected when young, will be stunted, more susceptible to drought stress, and show symptoms of nutrient deficiency.

Large and small roots may be affected with swellings varying from round sphere-like galls to elongated spindles formed from large numbers of individual galls growing together. Root knot galls involve the entire root in the affected zone. They do not take the form of easily detached galls like those produced by nitrogen-fixing bacteria on the roots of legumes. Root knot galls should not be confused with the fungal disease, club root, on cruciferous crops. In most instances, root knot is characterized by smaller swellings, and more uniformly distributed infection on the lateral feeding roots than is typically seen with clubroot. When the galls formed by the root knot nematode are broken open, shiny white bodies about the size of a pinhead, the enlarged female nematodes, are usually found. Also, glistening white to yellow egg masses are present on the root surface. The galls formed by clubroot do not possess this characteristic and are usually pinkish or brick colored. Phenoxy-type herbicides such as 2,4 D can cause swellings on stems of cruciferous crops which superficially look like root knot galls. Herbicide damage on these crops will not affect the roots, however. On young potato tubers the outer surface appears rough and warty because of the enlarged females underneath the skin.

Causal Organism

Root knot is caused by a small round worm, Meloidogyne spp. There are about 40 species at the present time. Not all plants are susceptible to any one species.

Juveniles emerging from eggs in the soil penetrate between and through cells to a position at the center of the root usually near the growing tip. Feeding by the nematodes causes increases in root cell numbers and size. Enlarged cells, called giant cells, serve as food sources for female root knot nematodes.

During feeding, juveniles which will become females undergo a series of molts and enlarge. The female does not move from the feeding site. Each female deposits 300-500 eggs in a protective, jelly-like matrix at the root surface. Eggs, particularly in the egg mass, can withstand unfavorable environmental conditions. They represent one means of overwintering. Root knot nematodes may also overwinter in the soil in a juvenile stage. Root knot nematodes are often introduced into a growing area in infected planting stock.
Control

Rotate at least 3 years with non-host crops. While the feeding habits of field populations must be determined before crop rotation plans are set, the most common root knot species in Ohio will not reproduce on grasses, small grains, or corn. Clean cultivation to keep down weed hosts of the nematodes is important.

Use transplants and nursery stock certified free of root knot nematode.

Plant resistant varieties wherever possible.

In commercial production, soil can be treated with fumigant-type nematicides. To be effective, fumigants must be applied properly. Contact and systemic insecticides/nematicides also are available for a limited range of crops produced commercially.

Bright and/or Hairy Caterpillars
by Lee Townsend, Extension Entomologist

Orange-striped oakworms are black caterpillars with eight narrow yellow stripes that run the length of the body. There are a pair of long, curved "horns" behind the head. Small larvae feed in groups and skeletonize the leaves, older larvae eat all of the leaf except the main veins. They usually destroy all of the leaves on a branch before moving to a new feeding site. They can be found from August through October. Infestations usually start in the top of the tree and the larvae move down as they feed and destroy foliage.

Yellow-necked caterpillars have black heads and dark bodies with four yellow stripes running the length of the body. A yellow band around the segment behind the head gives these larvae their common name. They feed on oaks, apple and a variety of trees and shrubs.

The hickory tussock moth is a hairy white and black caterpillar that prefers hickory and walnut but will feed on many other shrubs and trees. They are common from July through September.

Sprays of B-t (*Bacillus thuringiensis* - Dipel, etc.) will control these caterpillars. B-t works as a stomach poison so treated leaves must be eaten. Direct spraying of the caterpillars with Bt-based insecticides will not kill them.

Root Rot Diseases Of Holly
Alabama Cooperative Extension

Root rot diseases may heavily damage holly in the nursery. With the exception of low areas prone to flooding, they are rarely a problem in landscapes on well-maintained holly. Two of the more common root rot diseases of holly are described in this publication.

Thielaviopsis Black Root Rot

Black root rot occurs most often on cultivars of Japanese holly as well as the Blue or Meserve (*Ilex x meserveae*) holly and inkberry (Figure 3). This disease has also been occasionally seen on yaupon and American holly. Black root rot is most prevalent in container nurseries but may also be moved into the landscape on diseased hollies. Distribution of this disease is nearly nationwide.

Symptoms of black root rot include yellowing of the leaves followed by a noticeable slowing of plant growth, early leaf drop, and twig dieback. Black bands or rings can be seen along the length of the normally white to buff colored feeder roots. As the disease progresses, much of the root system will darken and die.

Cuttings of Japanese and other root-rot susceptible hollies must be rooted in new containers or flats in a soilless pine bark medium. Some peat-based commercial mixes may be contaminated with the causal fungus, *Thielaviopsis basicola*. Recycled containers must be thoroughly washed and disinfected prior to their reuse. Discard old potting media. In the nursery, preventive fungicide drenches should be routinely applied to cultivars of Japanese, Blue, and other black root-rot susceptible hollies.

Prior to establishing new plantings of holly, pull several plants from their containers and check the roots for typical symptoms of black root rot. Reject shipments of diseased or poor quality plants. Should black root rot be diagnosed in established plantings, remove the damaged plants and install disease resistant hollies or other woody plants. Cultivars of Japanese holly susceptible to this disease are 'Hoogendorn', 'Nigra', 'Green Cushion', 'Mobjack Supreme', 'Hetzii', and 'Helleri'. The holly cv. 'Blue Maid' may be the most susceptible of the Blue or Meserve holly cultivars to this disease. Other trees susceptible to black root rot are catalpa, American elm, and black locust.

Pythium And Phytophthora Root Rot

Pythium and Phytophthora root rots are common diseases of a wide range of woody ornamentals, including most kinds of holly. Generally, Phytophthora root rot is much more damaging in container nurseries than the landscape. Pythium root rot can cause plant loss in both the nursery and the landscape. Development of both diseases is often favored by a poorly drained potting medium or a compacted, poorly drained clay or silt soil. Plant loss may be particularly high in landscape beds where water tends to stand for several hours after watering. Planting too deep and over mulching may also contribute to disease development.

Symptoms of these two diseases and black root rot are similar. Typically, yellowing of the leaves, particularly at the shoot tips, early leaf drop, slowed plant growth, and twig dieback are seen at early stages of these diseases. Later, one or more limbs may wilt and dieback to the main trunk and a brown to black streaks of dead tissue may extend from one area of rotted roots to the damaged limb (Figure 4). Often, the root system will continue to disintegrate until the plant dies.
Holly grown under a combination of heat and/or moisture stress are much more sensitive root rot diseases than are well maintained, vigorous plants. Always choose hollies that are adapted to the local climate and soil conditions. Root rot diseases are often introduced into the landscape on diseased container plants. To avoid introducing these diseases, purchase hollies with white healthy roots and good foliage color. Pythium and Phytophthora root rot are often more prevalent on wet-natured soils. Planting holly and other shallow-rooted shrubs on raised beds is strongly suggested in areas with poorly drained, wet-natured soils. Also, amending landscape beds with plenty of aged pine or hardwood bark will help suppress root rots. Planting too deep is an open invitation for Pythium or Phytophthora root rot. Fertilizing according to soil test recommendations will maintain vigor, thereby reducing the susceptibility of holly to root rot.

Root rot outbreaks in home and commercial nurseries can often be traced to pathogen contaminated potting media or diseased liners. Take cuttings from healthy plants and root them in aged bark or heat-sterilized soil in clean containers on raised benches. Never reuse potting media or containers. Rooting holly in ground beds is discouraged. Discard diseased cuttings and container plants.

In the nursery, fungicide drenches should be applied for the control of root rot disease on susceptible holly cultivars from the time cuttings are rooted until finished container-grown plants are shipped (Table 5). Preventive fungicide applications are rarely needed to control any root rot disease of holly in the landscape. Fungicides will not kill root rot fungi that have already invaded root tissues but will prevent them from attacking healthy roots. See Extension Circular ANR-571, "Phytophthora Root Rot on Woody Ornamentals" for more information on recommended management practices and fungicide use guidelines.

**Brown Patch Disease**

By Paul Vincelli, Extension Plant Pathologist and A. J. Powell, Dept. of Agronomy

Brown Patch, also called Rhizoctonia blight, is a common infectious disease of turfgrass. All turfgrasses grown in Kentucky lawns can be affected by Brown Patch. However, this disease is usually destructive only in tall fescue and perennial ryegrass during warm, humid weather. While Brown Patch can temporarily harm a lawn's appearance, it usually does not cause permanent loss of turf except in plantings less than one-year old.

Brown Patch disease is sometimes responsible for poor turf quality, but it is not the only cause of brown spots or bare patches in lawns. You may need to consider other possible causes of thinning or dead grass. These include: improper fertilization, chemical injury, mower problems, dog or insect injury, localized dry spots, poor soil drainage, excessive thatch, competition from other plants, and buried objects.

Symptoms

Areas affected by Brown Patch are initially roughly circular, varying in size from one to five feet or more. During early morning hours, fine strands of grayish, cobwebby fungal growth (mycelium) may be evident at the margin of actively developing patches. This "smoke ring" disappears quickly as the dew dries. As an outbreak progresses and diseased patches coalesce, affected areas may lose the circular appearance and become irregular or diffuse.

On blades of tall fescue, lesions resulting from very recent infections are olive-green; as they dry, lesions become tan and are surrounded by a thin, brown border. Brown patch in perennial ryegrass causes blades to wither and collapse.

Lesions initially are dark green or grayish green but quickly become tan as decayed leaves dry. In Kentucky bluegrass, infected leaves exhibit elongated, irregular, tan lesions which are surrounded by a yellow or brown border.

**Disease Cycle**

Brown Patch is caused by infection of grass foliage and crowns by Rhizoctonia fungi. *Rhizoctonia solani* is a very common soilborne fungus and is the cause of Brown Patch symptoms in most instances. *Rhizoctonia zeae* can also cause Brown Patch in tall fescue under very hot, humid conditions. Rhizoctonia fungi survive the winter as tiny, brown, resting bodies (sclerotia) in the soil and thatch layer of the lawn. When environmental conditions are favorable for growth, the sclerotia germinate and produce cobwebby fungal mycelium, which is the active phase of the fungi. Rhizoctonia fungi often harmlessly colonize organic matter in the thatch. However, when stressful conditions weaken the grass, Rhizoctonia can infect the plants and cause disease.

Leaf infections are the most common phase of Brown Patch, but infections of crowns and roots sometimes occur, particularly in seedlings. Rhizoctonia colonizes infected tissues and then forms new sclerotia, thus completing its life cycle.

**Factors Affecting Disease Development**

**Host**

Tall fescue and perennial ryegrass are the lawn grasses most susceptible to Brown Patch under Kentucky conditions. Fine fescues (hard fescue, creeping red fescue, chewings fescue, and sheep fescue) and zoysia are all moderately susceptible to the disease. Occasionally, Kentucky bluegrass lawns can be affected by Brown
Patch, although this grass is less susceptible than others. Seedlings of all grasses are more susceptible to infection than established plantings.

Weather

Brown Patch is most destructive when the weather is humid and temperatures are stressful to the grass. Thus, in cool-season grasses such as tall fescue and perennial ryegrass, the disease is most severe under high temperatures (highs above 85 F, lows above 60 F). Conversely, in warm-season grasses such as zoysia, Brown Patch is most severe in humid weather with moderate temperatures (45 - 70 F).

Cultural Conditions

Application of high levels of nitrogen fertilizer, particularly during spring and summer, favors development of Brown Patch by producing lush, succulent growth that is very susceptible to Rhizoctonia infection. Other factors increase disease severity by creating a humid environment favorable for growth of Rhizoctonia fungi. These factors include: overwatering, watering in late afternoon, poor soil drainage, lack of air movement, shade, a high mowing height, and overcrowding of seedlings. Excessive thatch, mowing when wet, and leaf fraying by dull mower blades also can enhance disease severity.

Management

Fertilization

Apply the bulk of nitrogen fertilizer to cool-season turfgrasses in fall and early winter rather than spring or summer. Fall fertilization increases overall root growth of cool-season grasses and reduces their susceptibility to several diseases. A single fall application may be applied in November; if making two applications, October and December are good times to fertilize.

Avoid overfertilizing, particularly with fertilizers high in nitrogen. Maintain adequate levels of phosphorous and potassium in the soil. Do not attempt to cure summertime outbreaks of Brown Patch with nitrogen fertilization, as this will simply aggravate the disease.

Mowing

Set a mower height of no greater than 2 1/2 inches. A mower height greater than this aggravates Brown Patch by reducing air circulation and allowing more leaf-to-leaf contact, conditions which permit greater fungal growth during humid weather. Mow regularly to promote air circulation and rapid drying of the turf, making the lawn environment less favorable for fungal growth. To avoid stressing the grass, mow often enough so that no more than one-third to one-half of the leaf length is removed at any one mowing.

In tall fescue lawns, reducing the mower height to 2 inches or less can further reduce outbreaks of Brown Patch. However, keep in mind that lawns mowed this closely must be mowed frequently. In an actively growing tall fescue lawn mowed at 2 inches, it may be necessary to mow several times a week to prevent removal of more than one-half of the leaf length at one mowing. Never scalp the lawn from 4 inches down to 2 inches or less.

During an active outbreak of Brown Patch in hot, humid weather, clipping removal can help eliminate a food base for the fungus. However, in the absence of an active disease outbreak, returning clippings to the lawn is a beneficial practice that returns nutrients to the soil. Keep the mower blade sharp. A dull blade shreds the leaves, creating an ideal site for infection.

Irrigation

When irrigation is necessary, wet the soil to a depth of at least four inches to promote deep rooting. Check the watering depth by pushing a metal rod or screwdriver into the soil. It will sink easily until it reaches dry soil. Avoid frequent, light waterings. These encourage the grass to develop a shallow root system and frequently provide the surface moisture that Rhizoctonia fungi need to infect the leaves.

If a disease outbreak is evident, water early in the day so that the leaves dry quickly. If the lawn is watered late in the day, the leaves may remain wet until morning, thus providing long periods of leaf wetness favorable for infectious fungi. Removing dew, by dragging a hose across the lawn or by very light irrigation during early morning hours, will reduce prolonged leaf wetness and remove leaf exudates that encourage disease development.

Other Cultural Practices

Avoid using excessive seeding rates when seeding or renovating a lawn, as overcrowding can aggravate an outbreak of Brown Patch. See the UK Extension Publication AGR-52, "Selecting the Right Grass for Your Kentucky Lawn," for information on seeding rates. Selectively prune nearby trees and shrubs to increase air movement and light penetration, thereby allowing leaf surfaces to dry more quickly. Avoid applying herbicides during an active outbreak, as these may aggravate the disease.

Fungicides

In an established lawn, fungicide sprays are not recommended to control Brown Patch. Cultural practices will usually do a great deal to reduce the disease. Even if an outbreak of Brown Patch occurs, crowns and roots of established plants often survive, and blighted turf begins to recover when cooler weather arrives. So an established, well-managed lawn often will recover from Brown Patch without fungicide applications.

Probably the principal situation in Kentucky where judicious use of a fungicide in a home lawn is necessary
is to control Brown Patch in a newly seeded lawn of tall fescue or perennial ryegrass. During the summer following a spring seeding, the immature plants can be easily killed by outbreaks of Brown Patch during hot, humid weather.

Fungicide sprays may be helpful to protect tall fescue or perennial ryegrass lawns seeded the previous spring, to prevent loss of turf during the first season of growth. Under very high disease pressure, a fungicide spray may even be needed during the first summer following a seeding made the previous autumn, especially if the lawn was sown in late autumn. During the first summer of growth in a new lawn, inspect the lawn regularly during hot, humid weather and be prepared to have a certified pesticide applicator treat the yard if necessary.

Fungicide recommendations are described in the UK Extension Publication PPA-1, “Chemical Control of Turfgrass Diseases.” Once the lawn is established, there should be little need for future fungicide applications.

### Chemical Control of Black Root Rot

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Rate per Gallon</th>
<th>Rate per 100 Gallons</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiophanate-methyl</td>
<td></td>
<td></td>
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<tr>
<td>3336 50 W</td>
<td>1 Tablespoon</td>
<td>12-16 ounces</td>
<td>Soil drench. Apply monthly</td>
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<tr>
<td>3336 4.5 F</td>
<td>--------</td>
<td>10-20 fluid ounces</td>
<td></td>
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<tr>
<td>Etridiazole + thiophanate-methyl</td>
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<tr>
<td>Banrot 40W</td>
<td>--------</td>
<td>6-12 ounces</td>
<td>Soil drench. Apply in enough water to saturate soil or potting media. Irrigate immediately. Retreat every 4 to 12 weeks.</td>
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<tr>
<td>Banrot 8G</td>
<td>--------</td>
<td>1 pound/cubic yard media</td>
<td>Dry Soil Media Mix. Retreat after 4 to 12 weeks as needed with a recommended fungicide drench.</td>
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<tr>
<td>Metalaxyl + thiophanate-methyl</td>
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<tr>
<td>Drench Pak</td>
<td>--------</td>
<td>1 pkg. 3336 + 1 pkg. Subdue II</td>
<td>At seedling: mix 1 gallon of stock solution per 100 gallons of drench solution. Agitate gently. Apply 0.5 to 1 pint of solution per square foot of bench or bed area at 21 to 28 day intervals as needed.</td>
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<tr>
<td></td>
<td></td>
<td>1.5 pk. 3336 + 1 pkg. Subdue II</td>
<td>At transplanting: apply 1 to 2 pints of solution per square foot of bench or bed area and repeat at 21 to 28 day intervals as needed. Agitate gently.</td>
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