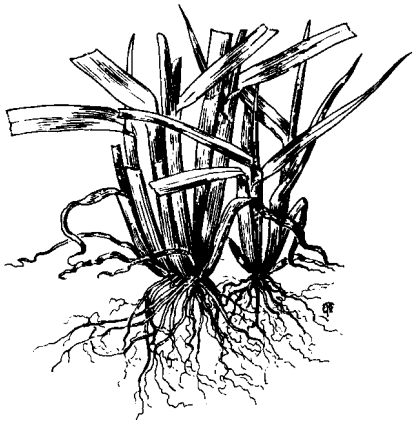
RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

LANDSCAPE, NURSERY & TURF EDITION $1.50 JUNE 14, 2007



INSIDE

Soil Fertility Phosphorus Recommendations for Seeding Cool Season Grasses:

Perennial Ryegrass, Tall Fescue, and Kentucky Bluegrass

Joseph Heckman, Ph.D., Specialist in Soil Fertility

Grass seedlings are often very responsive to phosphorus (P) fertilization because the amount of P in the seed is easily exhausted by the demands for growing new roots and shoots. Also, because P moves very slowly through the soil, it is especially a challenge for seedlings with limited root systems to acquire enough of this vital nutrient from the soil. Thus, it is a common practice to apply P fertilizer at the time of seeding cool season grasses in an effort to hasten establishment. Applying P fertilizers, however, without regard to soil test P level, has come under increased scrutiny.

Excessive P accumulation in soils and its associated problems with runoff, erosion, and water quality deterioration are concerns. In an attempt to limit P nutrient runoff into streams and lakes, some municipalities are regulating P fertilizer application to turf. However, rapid soil coverage by an increasingly dense sod is crucial to the prevention of surface nutrient runoff and erosion. Therefore, the use of P fertilizer may sometimes be justified, even on high P soils, if it hastens grass establishment, which reduces chance of soil erosion.

Based on soil samples received from the public in 2004 by the Rutgers Soil Testing Laboratory (analyzed using Mehlich-3 soil test), 24% of samples had soil test P ratings in the below optimum range (<36 ppm), 37% in the optimum range (36 to 69 ppm), and 39% in the above optimum range (>69 ppm). These soil test P ratings are for general crops and are not specific for grass establishment and the diversity of soils onto which grasses are seeded. To make sound recommendations, it is imperative to know where P fertilization is necessary and where it is inappropriate.

The Mehlich-3 soil test method is used by the Rutgers University Soil Test Laboratory and by most other university and private soil test laboratories that operate within the Mid-Atlantic region. A greenhouse study was recently undertaken using a diversity of New Jersey soils to establish Mehlich-3 soil test levels useful for

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Phosphorus from page 1

predicting when P fertilizer is necessary to ensure rapid turfgrass establishment. Three important cool season grasses were studied: Kentucky bluegrass, tall fescue, and perennial ryegrass.

The findings from this study showed that the Mehlich-3 soil test can aid in making sound P recommendations for new grass seeding. The soil test levels required for grass establishment are higher than soil test P fertility recommendations used for maintenance of existing turfs or for general field crops. This study demonstrated that while grass establishment does take place at the currently defined Mehlich-3 optimum range (P between 36 to 69 ppm), the establishment occurs more slowly than when supplemental P fertilizer is added at the time of seeding.

Soil testing can help to protect water quality by providing a means to identify both sites where P fertilization is not necessary and sites where P fertilizer should be used to accelerate grass establishment and thereby prevent soil erosion. Avoiding P fertilizer application where it is not needed helps to prevent further P enrichment of soil already very high in this nutrient which hopefully reduces the risk of P runoff/erosion.

This study also found that Kentucky bluegrass establishment is more sensitive to low soil P availability than tall fescue or perennial ryegrass. This may be related to the fact that Kentucky bluegrass has a significantly smaller seed size, and therefore storage capacity for P in support of early growth and establishment. Since different grass species have varying critical P levels for establishment, both soil test P and the species should be incorporated into the decision-making process regarding P fertilization.

Recommendations for Grass Seeding Establishment

1) The need for P is determined by soil testing as based on the findings from this new research. In addition to the Mehlich-3 soil test level, the recommendations for P also depend on the grass species. For seeding turfgrass blends, follow the P recommendations for the most sensitive turfgrass species. Kentucky bluegrass has the greatest need for P fertilization, followed by tall fescue, and followed by perennial ryegrass.

The Mehlich-3 soil test P critical level was established as 280 ppm (560 lbs/acre) for tall fescue and 231 ppm (462 lbs/acre) for perennial ryegrass. The Mehlich-3 soil test P critical level has not been firmly established for Kentucky bluegrass but is provisionally estimated to be about 500 ppm (1000 lbs/acre). The soil test critical level is defined as the P level below which P fertilizer is recommended and above which no P fertilizer is recommended because sufficient P is available in the soil. The soil test critical levels were defined with a bias towards protecting against under fertilization. It may be argued that this bias serves to decrease the possibility that turfgrass managers will become dissatisfied with soil test P recommendations and return to the practice of routine P fertilization for grass seeding regardless of soil test P level.

2) Have soil tested well in advance of seeding to determine the need for which nutrients are limiting and what soil amendments, such as limestone, are needed.

3) On strongly acidic soils (pH <6), limestone should ideally be applied and tilled into the soil weeks in advance of seeding because it takes time for limestone to react and neutralize soil acidity. Nevertheless, applying limestone and seeding at the same time is usually successful for turfgrass establishment. The rate of limestone to apply depends on the initial soil pH and the soil texture (or measurement of the lime requirement index by the soil test lab).

4) The need for Nitrogen (N) is not determined by soil testing, and this nutrient is generally recommended at the rate of 1 pound per thousand square feet at time of seeding. Greater rates of N may be applied if the if it is applied as a slowly available form of N.

5) The need for potassium (K) is determined by soil testing. Grass establishment is generally less responsive to K fertilization than N or P. Nevertheless, if the soil K fertility status is less low (below 73 ppm or 146 lbs/acre), K fertilizer should be applied to move the level into the optimum range (73 to 138 ppm or 146 to 277 lbs/acre). Another indication of the soil K fertility status is percent K saturation of the Cation Exchange Capacity; this saturation should be in the range of 4 to 5%.

6) It is important to remember that soil fertility recommendations for turfgrass establishment are separate from soil fertility recommendations for an already established turf. Thus, it is not appropriate to continue time-of-seeding nutrient recommendations beyond the period of establishment. During seeding, for example, it may be appropriate to apply P fertilizer on soils that have Mehlich-3 soil test P levels greater than 86 ppm (171 lbs/acre), but once established no P fertilizer would be recommended. Fertilizer P recommendations for seeding at a range of soil test levels are given in Table 1. Be aware that grasses can be established without adding P fertilizer when the soil test level is in the optimum or above optimum range but that establishment or growth of the grass to provide soil coverage will be slower. Soil fertility recommendations for turfgrass establishment or maintenance may be adjusted based on the good judgment of a well trained agronomist or for special landscape site conditions and requirements.

See Recommendations Table on page 3

Clover and Crabgrass Management in Turf

James Murphy, Ph.D., Specialist in Turf Management

It is turning out to be a good (or bad depending on your perspective) year for clover. Those interested in "organic" turf management may not find this to be objectionable. But it will be a problem for those not wanting a lot of clover in the turf. Note - for those managing and playing on sports turf, clover can dramatically reduce playing surface quality largely because it is very "slippery" compared to turfgrasses. Footing during acceleration, hard cuts and pivots on clover patches can be poor.

Clover is sensitive to (can be controlled by) products that contain clopyralid, MCPP, dicamba, and triclopyr. See FS385 at http://njaes.rutgers.edu/pubs/publication.asp?pid=FS385 for more details on chemical control.

There isn't a viable short term "organic" material to control clover. Since clover is sensitive to acid soil, the best "organic" strategy would be to withhold lime and allow the soil to become acid (lower soil pH). Obviously, this may take several years to have a noticeable effect. Applying elemental sulfur to the soil would speed up the process of acidifying the soil, and would be an acceptable organic practice (This is based on my understanding of the regulatory text in National Organic Programs Standards. See http://www.ams.usda.gov/nop/NOP/standards/ListReg.html for more details.).

Also be aware that summer annual weeds, namely crabgrass, have and will continue to emerge in turf. Generally, crabgrass will emerge earlier in open sparse turf areas compared to denser swards. So it would be useful to scout areas (with emphasis on areas of open sparse turf) to determine if pre-emergence treatment is holding-up and whether crabgrass is emerging in areas that did not receive pre-emergence treatment. If crabgrass is found, assess the number of leaves and tillers on plants; plant maturity influences post-emergence treatment options.

The only effective "organic" option for selective post-emergence control of crabgrass is manual (hand) culling.

The effective chemical options for selective post-emergence control are summarized in E233 Crabgrass and Goosegrass Control in Cool Season Turfgrass. Download at http://njaes.rutgers.edu/pubs/publication.asp?pid=E233

Some highlights:

Postemergence herbicides are used to kill weeds after they germinate and emerge from the soil. Crabgrass and goosegrass are easiest to control with postemergence herbicides when they are small, and in the 2- to 4-leaf stage of growth. This normally occurs in early July in most areas of New Jersey. The most common postemergence herbicides used for annual grass control in turf are organic arsenicals, dithiopyr (early postemergence only), fenoxaprop, and quinclorac. Only fenoxaprop is effective for control of goosegrass.

Organic arsenicals are most effective on seedlings. Two or more treatments 7- to 10-days apart may be needed.

Dithiopyr (Dimension) can be used on 1- to 4- leaf crabgrass. Dithiopyr will also provide pre-emergence activity, which can be good or bad depending on the potential need to re-seed or overseed.

Fenoxaprop (Acclaim Extra) can be used up to the 4 tiller stage crabgrass. Fenoxaprop can discolor Kentucky bluegrass.

Quinclorac (Drive) is best on untillered crabgrass. Inconsistent control on 1- to 5-tillered plants should be expected. There is 20 to 30 days of soil activity, which could be helpful for some pre-emergence control. Later in the summer quinclorac can be used to treat (control) mature multi-tiller plants as a "rescue" strategy; if applied before seed set this can be helpful in reducing future weed pressure (reduced seed dispersal). ❑

Table 1. Recommended P_2O_5 application per thousand square feet based on Melich-3 soil test P for new seedings of perennial ryegrass, tall fescue, or Kentucky bluegrass. These recommendations are specific for turfgrass establishment and are not appropriate for use during turfgrass maintenance.

Soil Test Category	Melich-3 Soil Test P		Grass Species		
	(lbs/acre)	(ppm)	Perennial Ryegrass	Tall Fescue	Kentucky Bluegrass
Below Optimum (very low)	0-24	0-12	5	5	5
Below Optimum (low)	25-45	13-22	4	4	4
Below Optimum (medium)	46-71	23-35	3	3	3
Optimum (high)	72-138	36-69	1	1.5	2
Above Optimum (very high)	139-230	70-115	0.5	1	1
Above Optimum (very high)	231-280	116-140	0	0.5	1
Above Optimum (very high)	281-400	141-200	0	0	0.5
Above Optimum (very high)	>400	>200	0	0	0

Reference: Hamel, S.C. and J.R. Heckman. 2006. Predicting Need for Phosphorus Fertilizer by Soil Testing During Seeding of Cool Season Grasses. HortScience. 41:1690-1697.

Diseases of Turfgrass

Bruce B. Clarke, Ph.D., Specialist in Turfgrass Pathology

Anthracnose

This disease, caused by the fungus Colletotrichum cereale, is causing extensive damage on annual bluegrass greens on several golf courses in the tri-state region. The fungus typically attacks turf growing under stress (i.e., low soil fertility and/or heat and moisture stress). Low cutting height will also enhance symptom development. To identify anthracnose in the field, look for small black fruiting bodies with protruding black spines on leaves or stems. For best results, increase turf vigor with light applications of nitrogen, maintain adequate irrigation, reduce thatch, and raise the cutting height (whenever possible). Since increased mowing frequency does not appear to affect disease development and rolling can actually reduce anthracnose severity, these two management practices can be used by superintendents to maintain desired green speed (i.e., acceptable ball roll distance) while raising the height of cut on golf course greens. In addition to good cultural management, apply Armada, Banner, chlorothalonil, Compass, ConSyst, Disarm, Eagle, Endorse, Headway, Heritage, Insignia, Rubigan, Spectro, Tartan, thiophanate-methyl, or Trinity per manufacturer's recommendations. Recent research has shown that Chipco Signature, Medallion, and Chipco 26GT can also effectively suppress anthracnose when used in tank mixtures with the previously mentioned fungicides. In areas with a prior history of this disease, apply fungicides on a preventive basis at high label rates. For best results, tank mix or alternate fungicides with different modes of action every 14 to 28 days when conditions are conducive for disease development to improve efficacy and to reduce the potential for fungicide resistance.

Brown Patch

This disease, caused by the fungus Rhizoctonia solani, has been observed on golf and landscape turf for the past week. To reduce the incidence and severity of **brown patch,** avoid large applications of quick release nitrogen sources (e.g., not more than ¼ lb actual N/1000 sq. ft/application) during hot weather, irrigate between midnight and 8 a.m. to minimize the leaf wetness period, and spray turf now with Armada, Banner (preventive only), Chipco 26GT, chlorothalonil, Compass, ConSyst, Curalan, Disarm, Eagle, Endorse, Headway, Heritage, Insignia, mancozeb, Medallion, Prostar, Spectro, Tartan, thiophanate-methyl, Trinity, or Touche per manufacturer's recommendations.

Powdery Mildew

In most cases, **powdery mildew** occurs in shaded areas and on lawns with poor air circulation. Although chemical control is usually not required, present infections may be checked with Banner, Bayleton, Eagle, Headway, Heritage, Insignia, Manhandle, or Rubigan if desired.

Pythium Blight

This disease should develop soon on golf and landscape turf with a return to hot muggy weather. **Pythium** thrives in low or poorly drained areas, especially when the night temperatures are above 70^0F. For best results, improve drainage, water in the early morning hours, avoid over-fertilization, and apply Alude, Banol, Chipco Signature, Disarm, Headway, Heritage, Insignia, Koban, Magellan, mancozeb, Prodigy, Quell, Subdue MAXX, or Terrazole, according to the manufacturer's recommendations. Apron may be used as a seed treatment to prevent Pythium damping-off during hot weather. The use of Koban or Terrazole on fairways is prohibited.

Summer Patch

In areas with a previous history of summer patch, now is a good time to apply a second application of a fungicide for the control of this disease. For optimum results, apply Armada, Banner, Bayleton, Compass, Disarm, Eagle, Headway, Heritage, Insignia, Rubigan, Tartan, thiophanate-methyl, or Trinity in 4 to 5 gal of water/1000 ft^2. Repeat every three to four weeks (every two weeks if using thiophanate-methyl) through mid-August. If fungicides cannot be applied with this much water, irrigate immediately into the thatch with 1/16 to 1/8 inch of water. Aerification (when symptoms are absent) and improved drainage will also aid in disease suppression. Soil pH should be maintained at or slightly below 6.0 for optimum disease suppression since the root infecting pathogen Magnaporthe poae prefers alkaline soils.

Turf Field Days

Mark your calendars now for this year's Rutgers Turfgrass Research Field Days which will be held on Tuesday, July 31, 2007 (Golf and Fine Turf Research Field Day at Hort. Farm II, New Brunswick, NJ) and Wednesday, August 1, 2007 (Landscape Turf Research Field Day at the Adelphia Research Farm, Freehold, NJ). Pesticide credits will be available on both days. Additional information and directions to each location will appear in future issues of this newsletter. ❑

Plant Diagnostic Laboratory Update

Richard J Buckley, Laboratory Coordinator

Turfgrass

Along with increasing temperatures, the numbers of turfgrass samples from golf courses is also increasing. Of particular note are the numbers of samples with **annual bluegrass weevils** (ABW). Several central and northern New Jersey golf courses submitted samples from collars and fairway edges with very large infestations of weevil larvae. In one sample later in the week, we also saw a couple pupae. If you have a history of ABW on your course, pay close attention to your clipping baskets for the emergence of the next generation adults. Of course, if you're worrying about monitoring adults now, you missed the boat on the overwintering migration and are likely to have a largely unsuccessful and ongoing battle this summer. We are also seeing plenty of **anthracnose basal crown rot** (ABCR) and **pythium root dysfunction** (PRD). Samples of turf with these diseases were submitted from Pennsylvania, Camden and Ocean Counties (ABCR) and from Maryland, Maine, North Carolina, Pennsylvania, and several New Jersey (PRD) golf courses. There has been plenty of interest in nematode populations in golf turf as well. A series of samples from one south Jersey course had huge populations of **lance nematode**. The superintendent was concerned with the premature wilt on his greens during the heat and thought it was too early in the season for that. If you are reading this, I hope you noticed the underlying theme in my commentary, which is turfgrass with compromised root and crown tissue is under duress from our early heat and drought. All of the issues mentioned are **root zone or soil/thatch interface problems**. If your grass is wilting already, it might be prudent to take a closer look before it gets really hot in a couple weeks!

Other samples worth a mention include: **brown ring patch** (aka: waitea patch), which is caused by a newly described species of Rhizoctonia, Rhizoctonia circinata var. circinata. This disease was identified on a New Jersey and a New York golf course; plain old **brown patch**, Rhizoctonia solani, was diagnosed on turf from a Burlington County baseball field; and dollar spot was found on grass from Maryland and Union County. Speaking of brown patch – we had a moss sample covered with Rhizoctonia. It was very exciting to find out that moss gets brown patch too!

Ornamentals

We also have some fun for those of you who pay attention to plants taller than 3 inches! First off, still plenty of **winter injury** coming into the lab. Several recent samples of spruce and Douglas fir also looked like **frost damage** on the new growth. Boxwood samples are also common and almost all of those submitted to the laboratory had **stem blight**, caused by the fungus Volutella buxi. The fungus Volutella often follows winter or drought damage into the shrub. A couple more arborvitaes samples had active infestations of **arborvitae leafminer**. The symptoms on these, at first glance, appear to be winter damage. **Cytospora canker** was diagnosed on samples of maple from two Atlantic County landscapes and one from Mercer County. Cytospora often follows drought and winter injury too. Last, but never least, were the numbers of very active **spruce spider mites** of several spruce samples. I thought we might not see so many mites this spring because of the wicked cold in February. Maybe the warm and dry May helped the survivors repopulate. Again, might (mite?) be prudent to take a closer look at your conifers. ❑

Weather Summary for the Week Ending 8 am Monday 6/11/07

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
CANOE BROOK	.37	22.15	8.18	92	47	69.	2	773	296	82
CHARLOTTEBURG	.18	16.71	2.78	90	42	68.	4	675	324	78
FLEMINGTON	.14	20.49	7.22	93	44	68.	1	721	223	86
NEWTON	.67	12.38	-.08	91	45	67.	2	632	227	82
FREEHOLD	.20	16.30	3.15	87	49	68.	0	888	314	81
LONG BRANCH	.17	16.14	2.74	83	50	67.	-1	679	161	67
NEW BRUNSWICK	.14	21.03	8.12	88	48	69.	0	786	171	84
TOMS RIVER	.69	14.47	1.38	87	48	68.	2	742	222	64
TRENTON	.12	17.53	5.61	91	51	70.	0	823	169	61
CAPE MAY COURT HOUSE	.83	9.59	-1.97	88	52	70.	2	732	149	68
DOWNSTOWN	.40	14.49	2.66	94	49	70.	0	838	160	66
GLASSBORO	.02	14.90	2.21	93	50	72.	2	948	291	61
HAMMONTON	.80	13.62	1.27	95	49	71.	1	865	217	63
POMONA	2.45	14.23	2.91	89	48	70.	2	817	248	63
SEABROOK	.23	15.10	4.01	93	54	72.	2	962	279	66
SOUTH HARRISON	.16	16.03	2.68	92	54	72.	NA	912	NA	NA

WES KLINE -- GDD BASE 40 PINEY HOLLOW LAST WEEK 232 (Ending 6/04/07) THIS WEEK 215 (Ending 6/11/07)

Landscape IPM Notes

Steven K. Rettke, Ornamental IPM Program Associate

✔ **DESIRABLE IPM INSECTICIDES:** There are several characteristics that ideal IPM insecticides should offer. In reality, it is rare for a particular insecticide to possess all of these characteristics. Nevertheless, appropriate IPM insecticides should still be able to satisfy at least some of the following: 1) It should be as specific as possible for the target pest. 2) It should give adequate control. 3) It should have a short residual 4) It should not eliminate the presence of beneficials for more than a day. 5) It should be low risk to plants, applicators, and the environment. 6) It should be economical.

✔ **IPM SCOUTING FUNDAMENTALS:** Some commentary to consider for improving routine monitoring effectiveness: (1) – Make it a common practice to reverse directions each time you visit a specific property. It is surprising what may be observed when scouting in one direction that is completely overlooked when moving in the opposite direction. (2) – Scouting the same property at different times of the day can uncover possible problems that may be less obvious during a certain time of day. Shadows and sunlight angles change throughout the day that can mask or enhance plant symptoms or signs. (3) – Scouting during overcast days will typically provide ideal visual conditions. The subtle color variations of plant foliage are best observed without the sharp contrasting shadows from bright sunlight.

✔ **APHID PREDATORS:** Foliar predators of aphids, such as ladybeetles and big-eyed bugs, cause aphids to drop off plants as a self-defense mechanism. Researchers in Wisconsin showed that up to 60% of aphids will tuck their legs and drop to the ground within 1 hour of exposure to ladybeetles. Meanwhile, there are ground predators of aphids just waiting for a snack, including ground beetles, spiders, ants, and tiger beetles. This combination effect of predators in different habitats is synergistic. Without the foliar predators causing aphids to drop, the ground predators ate few aphids. Alternatively, when foliar predators were present, ground predators ate many aphids. An experiment caging predators and aphids showed a 50% control of aphids with only ground predators, 75% control with only foliar predators, and almost 100% control with both. (Reference: Losey J., IPM Pract. Sept. 97)

✔ **HONEYDEW AND SOOTY MOLD:** Most landscapers are familiar with the honeydew created by the feeding from aphids, soft scales, whiteflies and mealybugs and the associated black sooty mold that follows soon afterward. Incompletely digested plant fluids (honeydew) are shiny, sticky, and loaded with sugary carbohydrates. This food source becomes an irresistible attractant to an assortment of ants, bees and other stinging and biting insects. When the infestations are light and sprays are required, apply horticultural oils or insecticidal soaps. In heavy infestations, spray a residual insecticide, adding soap to the tank to dislodge the honeydew and sooty mold.

✔ **PREDACEOUS MITES:** Be on the lookout for beneficial mites that can commonly be found in and amongst two-spotted spider mite populations. These "good" mites naturally keep the "bad" two-spotted mites under control. Common predaceous mites are in the family Phytoseiidae. Phytoseiid mites lay their eggs singly in spider mite populations on the bottom surface of leaves along the veins. Their eggs are about the same size as spider mite eggs. All stages of Phytoseiid mites are oval and shiny-white to tan in color. These adult predacious mites can be distinguished from adult spider mites by their shiny, unspotted pear shape with hairs that are less noticeable than spider mites. On a beating tray, they also move much faster than spider mites.

During a lifetime, a predaceous mite can consume an average of 20 pest mites, with some species consuming more than 100 each. Adult females lay about 60 eggs over several days, and even more if a greater number of prey mites are present. Mated females overwinter in deep bark crevices. (Reference: Davidson, J.; Landscape IPM Guidelines for Trees & Shrubs, UMd. Bull. 350)

✔ **SOFT SCALE SPECIES CONTROLS (JUNE & JULY):** Compared to armored scales, the soft scales are relatively easy to suppress with either contact sprays or systemic treatments. Some of the common landscape soft scale species include Calico, Fletcher, Wax, Terrapin, Cottony Maple, Lecanium, Cottony Taxus, Pine Tortoise, Striped Pine, and Spruce Bud. Although large soft scale adult females are more difficult to control, the immature nymphs are highly vulnerable to sprays when good coverage is achieved.

There are numerous windows of control opportunities when applying sprays or systemic treatments against soft scales. (1) The best window for control when using spray treatments is toward the crawler emergence period. With only two major exceptions (Magnolia & Tuliptree scales), all other soft scale species produce crawlers during the months of June or July. Although scale crawlers are only 2 to 3 times the size of spider mites, they are usually clearly visible without magnification. Most crawlers have a yellowish or reddish coloration. (2) Sprays can also be successfully targeted against the settled 1st instar nymph stage feeding on foliage or bark during the growing season. Achieving adequate coverage to foliage is the major challenge with large deciduous shade trees since the settled nymphs feed on the undersides of leaves along major veins. (3) In addition, dormant oil treatments can be applied in the late fall or early spring to the over-wintering 2nd instar nymphs on deciduous hosts. These nymphs have a black or brown

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coloration and are considerably larger than the crawlers and 1st instar nymphs. They can be observed in clusters on the bark of twigs, branches or trunks. (4) Finally, since soft scales are vascular feeders (phloem or xylem), root absorbed systemic insecticides such as imidacloprid (Merit) or dinotefuran (Safari) have provided better than 90% control rates. Root systemic treatments can be applied as a drench or be soil injected any time during the year as long as the ground is not frozen. Fall or spring applications are most typical. Having adequate soil moisture is a key factor to ensure success when applying root systemic treatments.

✔ **SCALES AND BIOLOGICAL CONTROLS:** It is generally understood that wasp parasitoids are capable of providing effective biological controls for reducing scale pest populations. Research has shown this to be particularly true for the suppression of armored scale insects. The larvae of parasitoids feed on the adult scales beneath their protective waxy cover. It is impractical in the field to monitor for the level of suppression by turning over the coves and examining individual insects with a hand-lens. A more effective method is to observe characteristic circular holes in the scale covers that are created by emerging adult wasps. There is usually only one exit hole per scale cover. If irregular or jagged holes are noticed in the covers, then lady beetle predators were probably present.

When inspecting scale infestations, if a large number of covers are seen having circular exit holes, then it is recommended that insecticide sprays not be made. The conservative use of control sprays is especially suggested if scale population densities are low and no plant symptoms are evident. Numerous studies have indicated that the random or non-timed spraying of various insecticides against armored scale populations in the field is often counterproductive. Many times scale populations can be successfully suppressed by wasp parasitoids, but this ability is compromised when sprays are applied. All too often, improperly applied insecticides destroy beneficial parasitoids, have little impact on the scale pest populations, and actually may cause scale populations to increase.

✔ **ANDROMEDA LACEBUGS:** Foliar symptoms caused from this familiar landscape pest are apparent on the new leaves of infested andromeda shrubs. This host specific pest overwinters as eggs inserted into the lower leaf veins. The other lacebug species with evergreen hosts also overwinter as eggs (e.g., azalea & rhododendron lacebugs). Lacebugs with deciduous hosts overwinter as adults (e.g., oak & hawthorn lacebugs). Adult lacebugs that overwinter as eggs have rectangular shaped wings with squared-off wing corners. Alternatively, adult lacebugs with deciduous hosts have oval-shaped wings with rounded corners.

For future consideration it is useful to remember that the eggs of andromeda lacebugs typically hatch at least a week or two earlier than the other evergreen host species (e.g., azalea lacebug). Attempts to control eggs with dormant horticultural oils are futile since most of the eggs are not exposed. However, with good coverage, horticultural oils can successfully suppress lacebug nymphs and adults to a lesser degree. Insecticidal soaps are exceptionally fast acting insecticides and can also be very effective if proper coverage is achieved. If infestations of the andromeda lacebug or any of the other species become a perennial problem, then Merit (imidacloprid) may be the product of choice. Field studies and observations have shown that soil injections of this material can maintain effective controls for at least 1 or 2 years. Therefore it is probably unnecessary to apply Merit every year as a preventative.

✔ **AZALEA LACEBUGS & CUTURAL CONTROLS:** 1) When populations are low and plants are small, simply crush the bugs by pressing leaf parts together between the thumb and forefinger. 2) Dislodge nymphs (no wings) with a strong jet spray of water (syringing). Many may not be capable of crawling back to suitable leaves to feed upon and will soon die. 3) Azaleas are rarely excessively damaged by lacebugs when watered sufficiently and planted in shady areas of the landscape. Lacebugs thrive in sunny locations where predators are less numerous. 4) There are several beneficial insects such as spiders, lacewings, assassin bugs and the minute pirate bug that can be useful for reducing lacebug populations. Encourage and conserve these predators by avoiding unnecessary cover sprays with broad-spectrum insecticides. Syringing may allow time for beneficials to

RUTGERS
New Jersey Agricultural
Experiment Station
Plant & Pest Advisory
Rutgers School of Environmental
and Biological Sciences
ASB II, 57 US Hwy. 1
New Brunswick, N.J. 08901

PLANT & PEST ADVISORY
Landscape, Nursery & Turf Edition Contributors

RCE Specialists and Staff
Bruce B. Clarke, Ph.D., Turf Pathology
Ann B. Gould, Ph.D., Ornamentals Plant Pathology
Steven Hart, Ph.D., Weed Science
Joseph R. Heckman, Ph.D., Soil Fertility
Albrecht Koppenhofer, Ph.D., Turfgrass Entomology
James A. Murphy, Ph.D., Turf Management
Gladis Zinati, Ph.D., Nursery Management
Richard J. Buckley, Coordinator, Plant Diagnostic Laboratory
RCE County Agricultural Agents and Program Associates
Bergen, Joel Flagler (201-336-6780)
Burlington, Raymond J. Samulis (609-265-5050)
Camden, James Willmott (856-566-2900)
Steven Rettke, Program Associate IPM
Cape May, Jenny Carleo (609-465-5115)
Cumberland, James R. Johnson (856-451-2800)
Essex, Jan Zienteck, Program Coordinator (973-353-5958)
Gloucester, Jerome L. Frecon (856-307-6450, ext. 1)
Hunterdon, Winfred P. Cowgill, Jr. (908-788-1338)
Middlesex, William T. Hlubik (732-398-5260)
Monmouth, Richard G. Obal (732-431-7261)
Morris, Pedro Perdomo (973-285-8307)
Passaic, Elaine F. Barbour, Agric. Assistant (973-305-5740)
Somerset, Nick Polanin (908-526-6293)
Sussex, Brian Oleksak, Program Associate (973-948-3040)
Union, Madeline Flahive-DiNardo (908-654-9854)
Warren, William H. Tietjen (908-475-6505)
Newsletter Production
Jack Rabin, Associate Director for Farm Services, NJAES
Cindy Rovins, Agricultural Communications Editor

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