

PLANT & PEST ADVISORY

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INSIDE

Organic Matter and Field Nurseries 1

Halloween Lady Beetles Bothersome 2

Plant Diagnostic Lab Highlights 3

Problems with Over-Mulching 3

Fall Lawn Fertilization and Pest Management Implications 5

Organic Matter and Field Nurseries

Raul I. Cabrera, Extension Specialist in Nursery Crops Management

The maintenance of organic matter (OM) in soils is a critical soil management consideration for field nurseries. With the removal of topsoil with B&B plants and with the use of clean cultivation practices and lots of herbicides, OM content in many nurseries is gradually being depleted. Some soils, like those in southern New Jersey, have an extremely low initial OM content due to geological and weather imposed factors.

Organic matter is of value because it directly influences the physical, chemical and biological properties of the soil, thus leading to poor plant quality and increased production costs when it is found in low concentrations. OM improves tilth and soil structure, aeration & water infiltration rates in clay soils, and the water- and nutrient-holding capacity in sandy soils, all of which improve root distribution patterns and plant quality. Furthermore, OM also serves as a source of energy for microorganisms that are responsible for the conversion of mineral elements into forms available for plant growth.

If your soil analyses results indicate that your soils have low OM contents, make it your priority to improve and maintain higher levels. You have several options to accomplish this task, including the application animal manures and various other organic amendments (by-products), and the cultivation and incorporation (plowing under) of sod or green manures.

Animal manures have long been used as a source of organic matter and plant nutrients. Properly composted or aged cow manure may be applied at rates as high as 30 tons/acre, although more frequent smaller applications (5-10 tons/acre) are more effective. Manure applications are commonly practiced in late winter and cultivated into the soil as soon as it can be worked in the spring. AVOID using fresh manure, as it can be very toxic to plants due to the release of ammonia gas. The same applies to the use of other manures like poultry or swine. Manure thoroughly mixed with soil or sawdust it is less likely to cause injury. Be aware that weed problems are commonly associated with the use of animal manures.

Organic by-products like pine or hardwood bark and sawdust have been found to be economical soil amendments in some situations, but only when they have been supplemented with nitrogen (N) fertilizer.

SEE ORGANIC MATTER ON PAGE 2

When relatively fresh bark or sawdust materials are applied to or mixed with soil in which plants are growing, N deficiency can and often does develop. This is because microorganisms that begin to break down these organic materials require high N levels for growth, and thus compete aggressively for available N with the crop resulting in N deficiency. A supplemental application of approximately 2% available N per unit weight of sawdust will help minimize this problem. The use of well-aged or composted bark or sawdust will avoid the necessity of adding supplemental N.

A more common alternative used to add OM and improve structure of soils is the use of sod and green manure crops grown in rotation with nursery crops. Grasses in combination with legumes are excellent crops for improving nursery soils. Grasses supply organic matter, especially by their dense root system, while taprooted legumes (e.g., alfalfa) improve the internal drainage and provide N. If you use sods, they should be grown for 2 years to maximize production of OM. On the other hand, green manure crops can offer improvements in OM content of nursery soils on shorter rotation cycles. Green manure crops are typically grown for less than a growing season and are plowed under while in a succulent state and before they set seed. Some crops that are used as green manure include annual ryegrass, alfalfa, field corn, foxtail millet, soybeans, sorghum and sudangrass, and sorghum-sudan hybrids. Sudangrass and sorghum-sudan hybrids produce OM yields at rates equal to or greater than densely planted corn. They are more drought resistant than corn and can be worked into the soil with greater ease. These crops can be mowed when they start to head out, causing them to grow denser. Several cycles of growth and mowing can be repeated during the year, greatly increasing yield. Keep in mind that fertilizing green manure and cover crops is an excellent way to improve soil fertility, soil structure, and to reduce weed populations.

Finally, field nursery growers should consider the use of cover crops, as they not only aid in maintaining the OM content of the soil but also protect it against the forces of erosion. In those areas of the nursery where plants have recently been removed, or where it is too late to sow a green manure crop, it may be desirable to sow a winter annual such as winter rye or ryegrass in the late summer or early fall. The crop is plowed under in the spring before it goes to seed. However, where land costs are high, a cash crop such as field corn may be grown. The grain provides a financial return from the land and at the same time the stubble adds OM to the soil, improving the tilth for the next nursery crop. In extensive plantings, where trees are planted on wide spacings, consider using grass aisles as companion plantings. Grasses, such as perennial ryegrass, hard fescues, and bluegrass, make an excellent sod cover that can be used as access routes for heavy equipment, especially when the soil is wet. In addition, the sod will control erosion, modify the soil environment, add OM when plowed under, reduce the quantity of herbicide application, and reduce time requirements for harvesting the plants.

Please consult with your local county agricultural agent or extension specialist on advice regarding the use of manures, organic amendments and the selection and culture of green crop & cover crop species. □

Halloween Lady Beetles Bothersome

Deborah Smith-Fiola, Ocean County Agricultural Agent

Homeowners across New Jersey have been reporting large numbers of lady beetles around their homes the last few weeks. The insects in question are called Asian Lady Beetles, which appear similar to common lady beetles, but may have varied color patterns: from solid orange (hence its nickname the Halloween beetle) to dark orange with a few spots, to red with many spots. **They are beneficial insects, like most lady beetles,** feeding primarily on aphids in trees. They do not bite, sting, nor feed on wood, clothing or food. The problem is that high population levels have made them a nuisance in many areas.

The Asian lady beetle is originally from Japan, and was successfully introduced into the Southern U.S. in 1991. It has spread northward ever since, migrating into new habitat with a plentiful food source, so populations have been increasing. Huge numbers of lady beetles (hundreds to even thousands) may mass together this time of year on windows, porches, doors, decks and walls, in preparation for hibernation. They fly on sunny days in the fall, and are attracted to light colors and southern exposures.

Although this clustering of lady beetles may cause great concern and anguish, it is temporary. They will hibernate in safe, warm locations — such as your home, attic, shed, or outbuildings. If beetles find their way into the house, most likely they are entering through cracks and openings around windows, doors, siding, etc. Attempt to seal all obvious cracks/openings with a high quality caulk. Replace damaged door and window screens, as well. Remember, these are beneficial insects and should not be killed. Lady beetles can be removed alive by using a broom and dust pan, or by vacuuming them up and releasing them outdoors.

Lastly, be patient. Lady beetles may settle down on the side of your house, and often leave on their own in a few days. □

Plant Diagnostic Laboratory Highlights

Richard Buckley, Coordinator, Plant Diagnostic Lab

Turfgrass

Once Again, **Gray leaf spot**, caused by the fungus *Pyricularia grisea*, continues to be the most common disease of turf submitted to the Plant Diagnostic Laboratory. The disease was diagnosed on samples of ryegrass fairways from golf courses in Monmouth and Morris counties, as well as, from several courses on Staten Island and Long Island. **Copper spot**, caused by the fungus *Gloeocercospora sorghi*, was diagnosed on samples of bentgrass from golf greens in Pennsylvania, Ohio, and Maryland. This follows a submission from a course in Somerset County. In each case the greens were less than a year old, with a sand root zone mix, and with L-93 bentgrass. Other diseases of note this period include **fairy rings** on golf turf from Mercer County, and **anthracnose basal crown rot** from courses in Burlington County and Delaware.

Landscape and Nursery

Oak leaf scorch, caused by the bacterium *Xylella fastidiosa*, also remains as the disease of note on landscape plants this September. The disease was confirmed in numerous samples of red and pin oak from Mercer, Gloucester, Salem, and Somerset counties. Other problems on oaks in the landscape include: **obscure scale** on samples from Atlantic County; **anthracnose** on oaks from Hunterdon and Mercer counties; **powdery mildew** from Mercer County; **actinopelte leaf spot** from Hunterdon; and oak **lacebugs** on a Bergen County tree. Other landscape plants also had disease and insect problems this month. A Morris County resident submitted a juniper and a boxwood sample that were diagnosed with **juniper tip blight** and **macrophoma leaf blight**, respectively. **Phyllosticta leaf spot** was identified on leucothoe from a Mercer County landscape, and **botryosphaeria conker** caused significant dieback on a Rhododendron in a Sussex County landscape. **Cytospora canker** was active on spruce samples from Passaic County. Finally, **lacebugs** were still active on cotoneaster from a Mercer County landscape.

In the nursery, **root diseases** caused by the fungi Thielaviopsis and Pythium caused the decline of leucothoe and mountain laurel in two Cumberland County operations. One of these nurseries also submitted Rhododendron with dieback caused by **botryosphaeria canker**. An Atlantic County nursery sent black pine to the lab that was diagnosed with **brown spot needle blight**. □

Problems with Over-Mulching

Deborah Smith-Fiola, Ocean County Agricultural Agent

Mulching trees and shrubs is a recommended cultural maintenance method with many benefits — yet, mulch can literally kill if applied improperly. The widespread mountains of mulch, piled high against tree trunks, does not kill a tree immediately — it results in a slow death. Over-mulching is a waste of mulch (and money!). It is a leading cause of death of azalea, rhododendron, dogwood, boxwood, mountain laurel, hollies, cherry trees, ash, birch, linden, spruce, and many other landscape plants.

How does over-mulching kill trees and shrubs? The most common cause is from oxygen starvation, or suffocation of the tree roots. Repeated applications can contribute to waterlogged soil/root zone by slowing soil water loss via evaporation. Roots must transpire (breathe) and take in oxygen (leaves, on the other hand, give off oxygen). When soil oxygen levels drop below 10%, root growth declines. Once too many roots decline and die, the plant dies.

When shallow-rooted plants (such as those listed above) are planted in mounds of mulch, needed oxygen levels can begin to decline. This is especially common during wet periods, and in the spring and the fall, which are critical periods for root growth. Oxygen deprivation is also prevalent in soils which do not have good drainage.

Symptoms may take 3-5 years to show, and sometimes longer, depending on the plant and the soil type. Symptoms include off-color, yellowing foliage (chlorosis), abnormally small leaves, poor twig growth, and dieback of older branches. Unfortunately, by the time the symptoms are noticed, it is generally too late to correct the problem. Usually at this point, the plant is in an irreversible decline, and will most likely die.

Another major cause of plant dieback from overmulching is from inner bark death of above ground root flares. This comes from the piles of mulch placed directly against the stems/trunks of trees and shrubs. The root flare stem and trunk tissue is quite different from root tissue — it cannot survive a continually moist environment, and must be able to 'breathe' through lenticels. When mulch is piled near trunks, gas exchange decreases, stressing and ultimately killing the inner bark (phloem) tissue. This also occurs when trees are planted too deep (the root flare is buried). Phloem death may also occur when 'pop-up' sprinkler heads continually saturate the mulch placed against the plants' trunk.

Once the inner bark dies, roots become malnour-
SEE OVER-MULCHING ON PAGE 4

ished and weakened, with a subsequent reduction in water and nutrient intake. The entire health of the plant is thus affected. If such wet conditions continue long enough, the phloem tissue may die, starving the roots since they then receive none of the essential photosynthates produced by the leaves.

A third cause of plant death from overmulching involves disease. Most fungal and bacterial diseases require moisture to spread and reproduce. Trunk diseases gain a foothold into the moist, decaying bark tissue under the mulch. Once established, the disease organisms ultimately affect the inner bark, starving the plant, and finally kill the tree. Often this scenario is accompanied by bark beetles and borers, which are attracted to stressed plants, expedite the decline, and also allow other fungal pathogens entrance into the plant.

Plant decline from overmulching is also caused by excess heat. The wet mulch layers piled up next to the trunk may begin to heat up when the bark begins to decompose. This is similar to composting, where temperatures within inner mulch layers may reach 120° to 140 ° F. This high heat may directly kill the inner bark/phloem of young plants, or may prevent the natural 'hardening off period' that plants must go through in the fall, in preparation for the winter. If the trunk flare tissue is not sufficiently hardened off before freezing weather arrives, the tissue may die, the roots starve, and the plant will decline.

The soil pH, or acidity level, may also be changed by the continuous use of the same type of mulch. Mulches like pine bark are quite acid (pH 3.5-4.5), and can cause the soil to become acid with constant use year after year. Once the soil is acidified, some micronutrients are not available to the plant, and others, such as iron, manganese, and zinc, become readily available at high, toxic levels. Symptoms of micronutrient toxicity mimic those of *Phytophthora* wilt. Sometimes, plants cannot tolerate micronutrient toxicity, and become stressed and killed by secondary disease organisms and insects. On the other hand, hardwood bark is initially acidic, but ultimately may cause the soil to become too alkaline (basic), causing acid loving plants (such as azaleas and rhododendron) to decline because of micronutrient deficiencies of iron, manganese and zinc. Symptoms appear as yellowing of foliage, often with prominent green veins. To avoid the above mentioned problems, regularly check the soil pH and rotate the type of mulch used.

Piles of mulch next to the trunk may also provide cover for chewing rodents such as mice and meadow voles. These rodents live under the warm mulch in the winter and chew on the nutritious inner bark. This often goes unnoticed until the following spring when "the tree doesn't look good." If the trunk is girdles (>50% chewed

around the trunk), there is little that can be done to save the plant, outside of bridge grafting.

Finally, 'fresh' or non-aged (uncomposted mulches may cause nitrogen deficiencies in many young plants. Decomposing bacteria need an ample supply of nitrogen to break down the mulch — and since bark mulches have little nitrogen available, the bacteria utilize the soil nitrogen. This process may cause nutrient deficiencies, especially if the mulch is 'mixed down' into the soil and is of a fine texture. Look for symptoms of leaf yellowing on new growth. This is considered to be a temporary condition.

Mulch may thus be one of the best or one of the worst things you can do for your plants. Mulch depth should standardly not exceed 3 inches. However, on poorly drained soils, mulch depths should not exceed 2 inches, especially for shallow-rooted plants. Wet soils may not need mulch at all. Coarser textured mulches, such as large nuggets, can be layered a bit deeper due to better oxygen diffusion into the soil. Finer textured mulch, such as double shredded mulch, may need only a 1-2 inch layer.

If you have a problem with excess mulch, dig through the landscape to see how deep the mulch really is. A light raking of existing mulch may be all that is needed to break through the crusted or compacted layers that can repel water. Pull mulch back from plant stems and trunks — a rule of thumb is 3-5 inches away from young plants, and 8-12 inches away from mature tree trunks. Visually look for the presence of a root flare; if not visible, at least some may be partially buried and must be exposed. Remove all soil or mulch up to the junction of the roots and trunk collar (taking care not to damage the tender bark) to expose the root collar. Leave the resulting well open and exposed to air, and lightly fertilize with a slow release fertilizer. Research by the Bartlett Tree Company has shown that an amazing number of plants have rapidly improved in color and vigor within months of root collar excavations.

In conclusion, mulch may be 'worth its weight in gold,' but you have to know how to apply it properly for it to pay off. □

IPM Landscaping for the 90's Annual Symposium

Thursday, November 19, 1998 — 8:30 a.m. to 3:45 p.m.
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This program will be repeated on Friday, Nov. 20 in Bergen County. Call (201) 599-6162.

Fall Lawn Fertilization and Pest Management Implications

By Jim Willmott, Camden County Agricultural Agent

Fall lawn fertilization has significant pest management implications: It either promotes or detracts from turf health. Misapplication of fertilizer predisposes turf to infectious and non-infectious diseases, and increases damage from insect pests and weed infestations. What is the best way to fertilize? There is no single best way! One must first consider several things including soil chemistry, grass species, cultural practices, desired turf quality and use before selecting the best fertilizer ratios, rates and application times. This article focuses on soil chemistry and fertilization.

It is not possible to generalize about landscape soil qualities, including chemistry. First, New Jersey's native soils are highly variable and, second, turf is often planted in soils modified by construction and turfgrass cultural practices. To understand chemistry, one must perform standard fertility tests to measure pH, phosphorous, potassium, calcium, magnesium and micronutrients. Contact your County Extension Office for soil testing information.

Soil pH is a critical chemical properly measured by the standard fertility test. For turf, it should be between 6.0 and 6.5. Optimal readings not only help turf, but favor beneficial organisms that are helpful in thatch decomposition and in suppressing insect pests and pathogens. Most professionals know lime is needed when pH is low, but most don't realize that lime chemistry varies. Generally there are two types - dolomitic and calcitic. Apply dolomitic lime when soil magnesium is low and calcitic when it is high. **The biggest mistakes made with lime are habitual applications** without regard for soil pH and application of dolomitic lime to soils high in magnesium. Too many soil tests show high pH and magnesium. Usually when pH is good, calcium is sufficient, but not always. Calcium is supplied by lime, but this is not appropriate when pH is in the desirable range. The best solution is gypsum, which contains calcium sulfate. Apply at rates between 25 and 50 lbs./1000 sq. ft.

Standard fertility tests often show low soil potassium. Fall is an excellent time to make applications since potash, the most economical source of potassium, has high burn potential. During the cooler fall conditions, the risk of burning is greatly reduced. While its benefits are not obvious, potassium increases tolerance to pests and environmental factors, such as desiccation and low temperatures. Potassium is necessary for endurance of winter conditions. Apply it now if tests show low soil levels.

Tests also give phosphorous measurements. Many believe that phosphorous fertilization is necessary for good root growth in fall. However, on established turf, soil levels are almost always sufficient. This does not mean that phosphorous is not important, just that soil levels are sufficient most of the time and phosphorous fertilization is not necessary. When it comes to root growth, the most limiting elements are oxygen and nitrogen. While we cannot apply oxygen, we must ensure adequate soil aeration or fertilization will be in vain. Be sure to practice core aeration on compacted sites since oxygen is necessary for root function (including nutrient absorption)!

Now, let's consider the trickiest nutrient, nitrogen. Nitrogen is not measured in standard fertility tests since inorganic forms are short-lived.

It is not possible to give accurate fertilization recommendations based on soil nitrogen. Generally, turf needs from 2 to 5 lbs. of nitrogen per 1000 sq. ft. per year. Low maintenance species such as fine fescues require the least, while higher maintenance Kentucky bluegrass cultivars and perennial ryegrasses require the most — especially on irrigated sites. Generally, it is best to split applications and apply in late spring, late summer and late fall.

However, nitrogen fertilization is complicated by the availability of many different sources (slow release forms or water-insoluble nitrogen [WIN], and quickly available or water-soluble). Nitrogen sources and time of application can have a large impact on disease damage. For example, when nitrogen is available in large amounts during warm fall conditions, vegetative or top growth is stimulated. Excessive lush growth preceding winter conditions predisposes turf to damage from infectious diseases such as gray and pink snow mold and non-infectious problems such as desiccation. Generally, nitrogen is best applied in late summer and again in late fall or when fall air temperatures are consistently in the lower 50's. This allows for abundant carbohydrate production, which is then utilized for root growth in relatively warm soils. Most fertilizers contain sufficient soluble nitrogen for effective late fall response. However, 100% slow release products such as natural organics will give limited results since they require warmer soil temperatures for microbial breakdown.

Remember, well planned and executed fertilization programs maximize turf health. Rely on standard fertility tests when choosing lime sources and various fertilizer sources and ratios. Fertilization based on test results will limit the occurrence of many pests and their damage. Fertilization is a key element in a turf IPM program. □

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