

mon areas of regulation and the regulatory self audit.

The self audit is a book containing more than 500 questions that allows the superintendent to easily and concisely report his practices in an answer booklet.

Completion of the self audit generally requires about eight hours of a superintendent's time. Most have found it better to split the time over a week or so rather than attempt to move through it from start to finish in one session.

The answer booklet is forwarded to Hall-Kimbrell, where it is scanned by a computer to summarize and sort the data provided by the superintendent.

Hall-Kimbrell scientists and environmental experts then review the data and compile a detailed report on the course's practices and how well they meet the applicable regulations. The report also contains concise overviews of regulations, phone numbers and addresses for federal and state agencies that issue and enforce the regulations and information on state programs that vary significantly from federal requirements.

The response report not only tells superintendents if they are in compliance, it also helps them evaluate procedures and management practices.

The self audit is not a fault-finding tool, but rather a fact-finding tool, explains Hall-Kimbrell Project Manager Steve Wharton. "People may have natural tendency to provide what they expect are the 'desired responses' rather than the honest answers. The value of the package is in the superintendent's review of the resulting reports based on actual situations."

The self-audit and regulatory compliance efforts are not a "one-shot" effort. Existing regulations are often modified and stress periodic review of management practices as new regulations continue to be introduced.

One of GCSAA's considerations in selecting Hall-Kimbrell was the firm's commitment to an ongoing effort. The self audit serves as a prerequisite for follow-up services that include annual update procedures. By periodically updating the audit, it becomes a dynamic management tool for continual evaluation of practices, taking into account new products, regulations and training requirements.

The entire program and its follow-up mechanisms designed to help superintendents become better managers. For more information or details on ordering the self-audit package, contact the GCSAA Membership Department.

THE EXTENSION LINE

Hole Notes welcomes the addition of Bob Mugaas of the University of Minnesota Extension Service as a regular contributor. As Hennepin County Extension Agent, Mr. Mugaas will compile various articles related to the golf field for our information. Bob is an excellent source for answers to many questions on horticultural problems. He may be reached at 542-1420. Written requests should be sent to:

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This month's articles cover Tree Fertilization, Rhizosphaera Needlecast, Lyme Disease and other offers from the Extension Service.

RHIZOSPHAERA NEEDLECAST CAN BE CONFUSED WITH ENVIRONMENTAL PROBLEMS

by **Cynthia L. Ash**
Assistant Extension Specialist, Plant Pathology
Minnesota Extension Service

Rhizosphaera needlecast, caused by the fungus Rhizosphaera kalkhoffii, can seriously damage spruce trees. The needle discoloration caused by this disease can be confused with the discoloration caused by adverse environmental conditions.

First let's talk about Rhizosphaera needlecast, a fungus attacking individual needles and turning them a reddish-brown. Newly developing needles are susceptible and become infected in May and June but do not discolor until the next June. The fungus produces reproductive structures on infected needles and visible under a magnifying glass or hand lens. These structures are black and fuzzy and replace the white stomata (tiny spores) on the needles. These structures will help to distinguish this from other problems.

Needlecast develops first on the lower branches of the tree and works its way up the tree. The tips of the branches are almost always green. Yet, environmental desiccation (winter injury, sunscald, drought, etc.) affects the most exposed portions of the tree, that is the tips of the branches and the needles on the top side of the branch. Needles in this area of the tree turn brown and fall off. When conditions are severe the branch will be killed. You can check for this by bending the branch, if it snaps easily it's dead. Rhizosphaera needlecast does

not kill the branch. However, after several years of needle infection and needle loss the branch may die on its own.

To control *Rhizosphaera* needlecast, apply chlorothalonil or bordeaux mixture when the new needles are 1/2 to 2 inches long and again in three to four weeks. To minimize the impact of adverse environmental conditions on spruce trees, keep the trees well watered during dry periods and do not plant young trees too close together.

Note: An excellent color brochure on "How to Identify and Control Rhizosphaera Needlecast" can be obtained by writing to: North central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, MN 55108.

DEER TICK / LYME DISEASE SEASON DRAWS NEAR

by **Jeffrey D. Hahn**
Extension Educator, Entomology
Minnesota Extension Service

Memorial weekend marks the beginning of the high risk season for Lyme disease which is vectored by the deer tick. Although infected ticks are present from April through November, most Lyme disease reports come in June or July.

The deer tick is small with a brownish body and black legs. The tick is found in tall grass and underbrush and can be readily picked up by campers and hunters. The adults feed from March to June and August to November, while the nymphs feed from June to August.

Avoid heavily wooded areas when you can. If this is not possible, take these appropriate safety precautions. Wear protective clothing, such as long-sleeved shirts and pants tucked into heavy socks. Apply repellents to clothing for further protection. A new, effective repellent, called Permanone will be available to homeowners this summer. Check yourself carefully after returning from areas when deer ticks may be present. Nymphal deer ticks are very small and can be difficult to detect.

See a doctor immediately if you believe that you have been bitten by a tick carrying Lyme disease. The first sign of Lyme disease is a red skin lesion accompanied by flu-like symptoms, although there are other indications. Save the tick that bit you as an expert can identify it. correct identification of the tick is very important for a proper diagnosis of lyme disease.

TREE FERTILIZATION

by **Bert T. Swanson and Carl Rosen**
Horticulture Science and Landscape Architecture
Minnesota Extension Service

The following article was excerpted from a newly revised Extension Folder entitled "Tree Fertilization" AG-FO-2421 by Bert T. Swanson and Carl Rosen. This publication is now available from your local County Extension Office.

Most trees in Minnesota have a single flush of growth in the spring and spring is the time when trees have the greatest need for nutrients. Early spring, consequently, is the time when nutrients must be available. Fall application is the easiest and probably the most effective, because the ground is easier to work and the nutrients will be available to the tree very early in the spring when growth begins. Fertilizer may be applied from late September until about mid-November. Spring applications may be made as soon as the ground is workable until late April or early May. if soil conditions are extremely dry, water the soil prior to and after fertilization. Nitrogen should be applied to sandy soils only in the spring or much of it can be leached out in the late fall and early spring.

If a tree is showing symptoms of deficiency, fertilizer may be applied at any time during the growing season to correct the problem. Care must be taken, however, to provide sufficient water for absorption of the nutrients by the plant and prevent fertilizer burn of the roots. During periods of hot, dry weather, two to three inches of water should be applied every two to three weeks to wet the top 12 to 18 inches of an average soil. Heavy clay soils require more water at less frequent intervals while light, sandy soils require less water at more frequent intervals. Do not apply fertilizer in late August as plants may force a new flush of growth in early September. Likewise do not allow plants to go into the winter under a nutrient stress as this will also increase winter injury.

Fertilizers require moisture and oxygen to dissolve and be absorbed by the plant. If excess moisture or lack of oxygen exists, nutrient uptake cannot take place even with adequate nutrients available. Continued fertilization under such conditions will result in excess fertilizer levels. Then as the soil dries or becomes aerated, excess uptake may occur. Excess uptake will stimulate excessive succulent growth that is structurally weak, less likely to produce flowers, and more susceptible to disease and insects, such as fire blight or aphids. The high soluble salt concentrations of excessive fertilizer may also damage the tree causing root or leaf burn. Newly planted trees generally should be fertilized at planting time, providing that certain precautions are followed. Fertilization at this time allows deep placement of phosphorus and potassium. Because these nutrients do not move readily in the

soil, deep placement will make them immediately available to the new plant to enhance root and top growth. It is extremely important, however, that the fertilizer be mixed into the backfill and not placed in direct contact with the roots. A slow release fertilizer is not desirable for mixing with the backfill. Slow release fertilizers supply only small amounts of nutrients at any one time, so the possibility of root damage is minimized and a longer term response is obtained.

Of the nutrients in a complete fertilizer, nitrogen gives the most pronounced effect. Phosphate and potassium, on the other hand, generally produce little visible growth response unless soil levels are extremely low. Since certain soils may be deficient in these two nutrients, and since phosphorus is essential for root growth, it is usually beneficial to use a complete fertilizer (N,P,K).

The recommended rates of fertilization are four pounds actual nitrogen (N) per 1,000 square feet per year. When needed, 3.6 pounds of phosphate (P205) per 1,000 square feet and six pounds of potassium (K90) per 1,000 square feet should be applied every two to four years. These quantities of fertilizer cannot be applied to the turf under trees. It must be applied to a non-turf area or placed in holes drilled in the soil around the tree. The recommended rate for turf is 1 lb. N/1,000 ft² at one time and any rate greater than two pounds of nitrogen per 1,000 ft² in one application will result in injury to the turf.

Products that combine fertilizers and herbicides ("week and feed") should not be used on or around trees and shrubs. Such products will injure or kill trees in the same way that they kill weeds.

NEW DROUGHT FOLDER AVAILABLE

The Dial-U Insect and Plant Information Service has written a follow-up folder to last year's "Drought and the Urban Landscape". The new publication is called "Restoring the Urban Landscape: Methods for Recovering from Hot, Dry Weather". It deals with lawn repairs, tree and shrub care, and offers gardening tips for coping with dry conditions. It also alerts to insect and disease problems expected this year.

Order your copy of "Restoring the Urban Landscape" by contacting your local County Extension Office. Ask for AG-FO-3727.

FILL IN EXTENSION SERVICE AGENT

Phil Allen has been hired as turf extension assistant for the state of Minnesota from now through September 30,

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