Scanning the Journals

A review of current journal articles

Foliar Application of Urea-Nitrogen

Foliar application of urea-N is a common practice in turfgrass management. It is generally thought that a large percentage of the applied nitrogen is rapidly absorbed by leaves. Two western researchers earlier reported that 43% and 35% of applied N was foliar absorbed in Kentucky bluegrass and perennial ryegrass, respectively, in 48 hours. They once again put this assumption to the test, this time using tall fescue ('Mustang') and creeping bentgrass ('Penncross'). The experiment was conducted in pots in an environmental chamber using radioactively labeled urea.

Urea uptake by the two species averaged 55% of the applied N, and occurred almost entirely through the leaves and shoots. Most uptake occurred within 12-24 hours of application. Partitioning of the absorbed N averaged 1/3 in new leaves, 1/2 in old leaves and shoots, with the remainder in roots. The researchers also found about 40% of the applied N in and on new leaves produced during the 72 hours of the experiment, all of which could be lost to mowing if clippings are removed. The researchers note, however, that commercial applicators, due to their larger droplet size, may apply a higher percentage of N to the soil than was the case in this experiment.

These workers conclude that foliar uptake of foliar applied N, and subsequent partitioning within the plant (with the exception of low accumulations found in bentgrass roots), is quite similar between the four turfgrass species. They conclude by recommending that clippings be returned to the turf to avoid substantial losses of applied N.

(From: D.C. Bowman and J.L. Paul. 1990. The Foliar Absorption of Urea-N by Tall Fescue and Creeping Bentgrass Turf. J. Plant Nutrition 13(9): 1095-1113.)

Soil Amendment with Sewage Sludge

Scientists at the University of Nevada investigated the effects of two types of composted sewage sludge — 'city' vs 'county' — on the growth of tall fescue ('Mustang') in a greenhouse pot experiment using 3 desert soils (loamy sand, sandy loam and clay). Results were compared to controls which received a 15-15-15 commercial fertilizer. Sludge treatments were incorporated into the soils at the beginning of the experiment whereas Fertilizer was applied as a topdressing. Five levels of sludge amendment varied from 0-60% by volume. Production of new growth, color, turf density, and elemental composition of leaf tissue were all measured. Several soil parameters such as pH, salinity, redox potential and oxygen diffusion rate were also monitored. The latter two measurements may reflect changes in physical properties, such as soil structure, and soil-air-moisture relations.

No effect on redox potential or ODR was found for any treatment. Soil pH, on the other hand, decreased (from an initial value of 8.0) while soil salinity and water holding capacity increased with increasing sludge amendment in all treatments.

Cumulative plant height, fresh & dry weight of clippings, rate of growth, quality (color) and density of turf, all generally increased with increasing sludge loading and clay content of soil, as compared with controls. The degree of turfgrass response depended on both sludge source and soil type. City sludge out-performed county sludge in all cases, the latter often failing to better the fertilizer controls, except at highest loading rates.

Most macro- and micronutrients increased in tissue concentrations with increasing sludge loading, but results varied with soil type and sludge source. There was no accumulation of heavy metals, reflecting the non-industrial character of the sludge sources. The authors conclude that municipal composted sewage sludge is an effective soil amendment for turfgrass, increasing soil moisture holding capacity and producing healthy turf, but warn of the danger of nitrate leaching at high application rates.

(From: D.A. Devitt, R.L. Morris and D.C. Bowman. 1990. Response of Tall Fescue to Composted Sewage Sludge used as a Soil Amendment. J. Plant Nutrition 13(9): 1115-1139.)

Crabgrass Control with Fenoxaprop

A Cornell researcher, Dr. Joseph C. Neal, studied postemergent crabgrass control in turfgrass using fenoxaprop under varying environmental conditions and with differing application methods. Working on field plots in both Massachussetts and New York, Dr. Neal investigated the effects of soil moisture, plant growth stage, spray volume, application rate, nozzle type, and adjuvants on the control of smooth and large crabgrass in cool-season turf. In some trials, the efficacy of fenoxaprop vs MSMA was also evaluated.

In NY, fenoxaprop gave good control of smooth crabgrass at 0.18 lb/A, when applied

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Researchers recommend that clippings be returned to the turf to avoid substantial losses of applied N.

Municipal composted sewage sludge is an effective soil amendment for turfgrass, increasing soil moisture holding capacity and producing healthy turf.

Dr. Neal concludes that low rates of fenoxaprop can control crabgrass in cool season turfgrass

Unlike Pythium blight, no foliar mycelium is evident during periods favorable for infection and rarely can PRR be diagnosed from field symptoms alone. Only upon microscopic examination of roots and crowns can one effectively determine whether root and crown damage from Pythium species has occurred. Typically, damage is first evident in the crown with the roots largely unaffected. However, on severely infected plants, root systems are greatly reduced in volume and vigor and may be extensively discolored. Crown areas may also appear water-soaked and greatly discolored. If root systems are not well developed prior to infection by Pythium species, the level of damage that a root system can sustain and still function becomes dramatically reduced, and severe plant decline can occur. Heavily infected roots and crowns may also contain abundant oospores of the pathogen. These spores allow the fungus to survive unfavorable environmental conditions in a dormant state. As a result, the disease is insensitive to many control measures, including most fungicidal treatments. Therefore, for fungicides to be effective, the target Pythium species must be in a non-dormant, active state.

Severity of PRR damage can apparently be avoided by maintaining an extensive and vigorous plant root system. In general, any management practices that will reduce plant stress or eliminate prolonged wet periods will help to minimize losses from PRR. If conditions warrant the application of fungicides, it is recommended that a currently labelled Pythium fungicide be carefully chosen and thoroughly watered-in. Although turfgrasses affected with PRR respond to drenches with Pythium-selective fungicides, symptoms may frequently recur, particularly as temperature and precipitation change. Pathogen inoculum levels in soil are rarely suppressed following fungicide applications.

Damage from PRR has also been observed to be enhanced following continuous applications of broad-spectrum fungicides. It is therefore recommended that these types of fungicides be used sparingly on sites with a history of PRR and during periods favorable for Pythium infection.

The currently available Pythium fungicides are listed in the table on page 4. Of the systemic fungicides, Banol or Aliette have been most effective in controlling PRR in the Northeastern U.S. Subdue has been effective in some locations but has failed in others. The granular formulations of Subdue have been more effective than the liquid formulation. Koban and Terrazole are contact fungicides that have also been effective in some locations for the control of PRR. For those sites with a history of early spring PRR problems, a fall application (mid Oct - mid Nov) of an appropriate Pythium fungicide (usually Banol) is most effective in suppressing disease development early in the spring. This should be followed-up by another application in the spring. In order for control to be effective at any time during the season, the fungicide must reach the root zone. We therefore recommend that all fungicides be thoroughly watered-in at the time of application. It is also advisable to avoid continuous application of any one fungicide on the same site since this practice may enhance the development of fungicide-resistant Pythium populations.

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before tillering, but the rate had to be doubled to produce control after tillering. In MA, however, excellent control was seen on tillered crabgrass at the lower rate in plots which were irrigated and fertilized. Control with MSMA at 2.0 lb/A was equal to that obtained with fenoxaprop. Best results in NY were obtained with fenoxaprop plus DCPA applied before tillering at the 0.34 lb/A rate, or fenoxaprop alone applied after 3-5 tillers had formed. Slight and temporary turfgrass injury was seen at some sites at the higher fenoxaprop rates, but none at the lower.

Fenoxaprop efficacy was not affected by spray volume (between 37-296 gal/A) but increased with application rate (0.18 - 0.36 lb/A). Results of nozzle type tests varied by site. Fan nozzles appeared to work better in dense turf or dry conditions. Surfactant results varied but generally were without effect.

Dry conditions, which reduce crabgrass growth, also reduced fenoxaprop efficacy, but had less effect on MSMA. Dr. Neal concludes that low rates of fenoxaprop can control crabgrass in cool season turfgrass, but further research is needed to assess its performance under drought conditions.

(From: J.C. Neal, P.C. Bhowmik, and A.F. Senesac. 1990. Factors Influencing Fenoxaprop Efficacy in Cool-Season Turfgrass. Weed Tech. 4:272-8.)