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Ecological Turf Tips . . . To Protect The Chesapeake Bay

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Classic Agronomic Principles Can Reduce Pesticide Need

Few can deny that this is one of the most exciting times to be in the lawn service business. We are enjoying a relatively long period of economic prosperity which has helped fuel the public's interest in having high quality lawns. Agronomically it is an exciting time because many new "tools" have been put at our disposal to meet the public's demand for quality turf and at the same time make a profit. The release of new, improved varieties, systemic fungicides, herbicides for goosegrass and Poa annua control and renovation, and insecticides that penetrate thatch for better grub control have all helped the industry produce higher quality turf.

Demographic pundits indicate that the homeowner of the 90's will definitely be more environmentally conscious. The lawn service industry can respond to this increased environmental consciousness by forming a partnership with the customer to reduce the need for pesticides through the development of good, fundamentally sound management programs.

The implementation of classic agronomic turfgrass management principles into lawn service programs can significantly reduce the need for pesticides. Factors that have a significant impact on lawn quality include; species and variety selection, mowing, fertilization, weed control and irrigation. Factors that can become important in certain situations include; dethatching, aeration, disease and insect control and sometimes supplemental inputs such as iron and biostimulants. Any one of these factors can significantly reduce turfgrass quality if it happens to be the critical management factor in any one year. The challenge for lawn service companies comes in insuring year round turfgrass quality when they are only providing fertilization, weed control and possibly some insect control.

The critical question then becomes... What management factors can realistically be manipulated by the company or the homeowner to significantly reduce the need for pesticides and improve the quality of the lawn? The most likely candidates in this regard are fertilization, mowing, aeration and careful pesticide selection to minimize impact on thatch decomposing macrofauna.

Fertilization

When contrasting late fall fertilization of cool-season turfgrasses with spring fertilization, the former has been shown to produce increased root growth, turf density and drought tolerance as well as decreased summer annual weed problems and summer disease activity. In addition, late fall fertilized turf remains greener throughout the winter and greens up earlier in the spring.

Work by Dr. R. E. Schmidt (8) has demonstrated that on unfertilized Kentucky bluegrass, the application of 1 lb nitrogen(N) per 1000 sq. ft. in April will reduce number of roots measured at the 6 inch depth in May by 22 percent. In situations where the Kentucky bluegrass had received 1 lb N/

1000 sq. ft. in October, December and February, the additional soluble N in the spring reduced root number at the 6 inch depth 40 percent.

Similar observations at Ohio State University by A.J. Koski and J. R. Street (6) have shown that fall fertilization programs increased root number measured in June by 75 percent when contrasted with a program that provided 1 lb of soluble N/ 1000 sq. ft. in April. Their work also showed 25 percent increases in storage carbohydrates in the crown tissue in June as a result of the late fall fertilization program. These stored food reserves are thought to be critical in mobilization of disease resistance mechanisms and generation of recuperative potential in summer damaged turf.

Additional research on tall fescue-Kentucky bluegrass mixtures examining nitrogen timing has shown that September and October fertilized plots produced half as much crabgrass cover as plots fertilized in the late fall and early spring(4). The spring fertilization component definitely enhanced crabgrass competitiveness.

There is no doubt that programming cool season turfgrass lawn service programs to provide moderate amounts of nitrogen in late fall (November 1 to December 15) has significant positive impact on root growth and carbohydrate reserve. If this can be coupled with low or no applications of nitrogen in the spring (March 15 to May 15) the positive impact will be maximized.

Mowing

Education of homeowners is essential to increase their understanding of the importance of mowing to the production of quality turfgrass. Mowing is basically a stress-creating management factor. Decisions that the homeowner makes about frequency, mowing height and disposition of clippings are critical.

Research on Kentucky bluegrass published in 1955 by F. J. Crider (3) has demonstrated that any time more than 40 percent of the existing green tissue is consistently being removed, there is a significant detrimental effect on the root system. When 50 percent of the green tissue was consistently removed (3 clippings per week), after 33 days only 35 percent of the root system was actively growing. Where 60 percent of the existing foliage was removed, all root growth stopped by the 28th day of the experiment. Crider demonstrated that improper mowing frequency could have a significant negative impact on root growth. Therefore, homeowners should be advised to mow with a frequency which never removes more than one-third of the existing green tissue. This mowing frequency will enhance root development, minimize summer need for irrigation and increase drought tolerance.

Work in the late 1960's by Elwyn Deal and A.J. Powell has demonstrated the importance of mowing height in reducing the ability of crabgrass to invade a turf. In their work they showed significantly less crabgrass germination at 2.5 inch mowing heights when contrasted with 1.5 and 0.75 inch mowing heights. This same principle was illustrated in work on tall fescue-Kentucky bluegrass (4) where season long mowing heights of 1, 2 and 3 inches led to 53 percent, 19 percent and 1 percent smooth crabgrass cover in October, respectively.

Increased mowing frequency generally increases stress load on the turf by decreasing shoot, root and rhizome production. This principle was reported by Juska and Hansen in 1961 (5) when they mowed Merion Kentucky bluegrass at one and two inches five times per week and one time per

week and contrasted clipping, root and rhizome production. At the two inch mowing height, clipping, root and rhizome production was reduced 22 percent, 21 percent and 34 percent respectively by the more frequent mowing. At the one inch mowing height this impact was even greater with reductions in clippings, root and rhizome production of 24 percent, 46 percent and 45 percent.

With regard to clipping management, significant impacts on nutrient requirements can be demonstrated. Starr and DeRoo reported in 1981 (10), on a Kentucky bluegrass/Creeping red fescue mixture that returning clippings for three years led to a 38 percent higher growth rate than where clippings were not returned. This suggests that homeowners returning clippings can expect higher turfgrass quality with lower amounts of applied nitrogen fertilizer. Lawn companies need to adjust fertilization levels to accommodate clipping management practices. Failure to do this may push those homeowners returning clippings into management problems related to excessive nitrogen application.

Higher mowing heights have been shown to reduce soil temperatures and therefore implicitly reduce respiration rates in the turfgrass plants. Kentucky bluegrass grown at 0.75, 1.0 and 1.5 inch mowing heights had soil temperatures at the one inch depth of 93^0 F, 90^0 F and 83^0 F, respectively (9). These temperature measurements were made when the ambient temperature 5 feet above the canopy was 98^0 F and the turf canopy temperature was 109^0 F. Convincing the homeowners to raise mowing heights has many advantages beyond the obvious increase in root production. Reduced crown temperatures will reduce the incidence of heat related disease activity.

Aeration

Periodic aeration of home lawns with hollow tine core aeration will alleviate compaction, reinoculate thatch layers with soil, increase water infiltration, rooting and stored food reserves. This practice, if properly timed to coincide with rapid periods of shoot growth, will have a positive impact on the year round quality of the lawn. It has been shown that compaction in Kentucky bluegrass can cut stored food reserves in half (2). Since aeration alleviates compaction and has the positive impact noted above, it is reasonable to expect a decrease in the incidence of compaction related problems such as; high temperature injury, scald, wilt and drought damage, wet wilt, intracellular freezing and winter desiccation.

Pesticide Selection

Work by Dr. Dan Potter at the University of Kentucky has illustrated that earthworms play a major role in the thatch decomposition process (7). Further, he and his colleagues have demonstrated that certain pesticides are particularly toxic to earthworms (1). Single applications of the fungicide benomyl, or the insecticides ethoprop, carbaryl, or bendiocarb at label recommended rates have reduced earthworm populations by 60 to 99 percent, with significant effects lasting for at least 20 weeks. Therefore, lawn service company selection of pesticides can be critical in determining impact on thatch accumulation rates.

As lawn service company executives consider program development and homeowner educational needs for the 1990's, it is extremely important to appreciate that the clientele will be increasingly environmentally conscious. Appreciation of how agronomic and educational programs can minimize the need for pesticides by improving turfgrass health will be increasingly important. It will also be

important to develop a working relationship with homeowners that makes them appreciate that they have an essential role to play in determining the success of your company's lawn service program. Working together as a team, you have the greatest probability of producing the highest quality turfgrass with the minimum use of pesticides.

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