TURFGRASS TRENDS

WEED CONTROL

Goosegrass Shows No Tolerance to Compaction

By Claudia Arrieta

Goosegrass is a serious weed problem in golf and sports bermudagrass turf in warm climates. Bermudagrass turf can be susceptible to infestation by seed-dispersal weeds, such as goosegrass, especially when turf stands are thinned because of traffic, drought or other stresses.

Goosegrass is a prolific seed producer; most of the seed germinates in the first year and little thereafter (Holm et al, 1977; Hawton and Drennan, 1980). Since goosegrass seed germination responds to fluctuating temperatures, greatest emergence of goosegrass occurs on bare ground, in scalped and thin turf (Fig.1), where maximum diurnal fluctuating temperatures would be expected (Nishimoto and McCarty, 1997).

Goosegrass control relies on the use of pre- and post-emergence herbicides, and there is little documentation on cultural management practices to prevent goosegrass infestation. It is not known if compaction in these traffic areas enhances goosegrass growth while decreasing bermudagrass growth.

FIGURE 1

Goosegrass thrives on scalped turf, where temperatures most fluctuate.

Control

The different options in goosegrass control are:

1) Pre-emergence herbicides: These kill goosegrass seedlings after they have germinated but before they have emerged from the ground. The common goosegrass pre-emergence herbicides products have these active ingredients: dithiopyr (Dimension), metolachlor (Pennant), oxadiazon (Ronstar), oryzalin (Surflan), pendimethalin (Halts, Pre-M, Pendulum,

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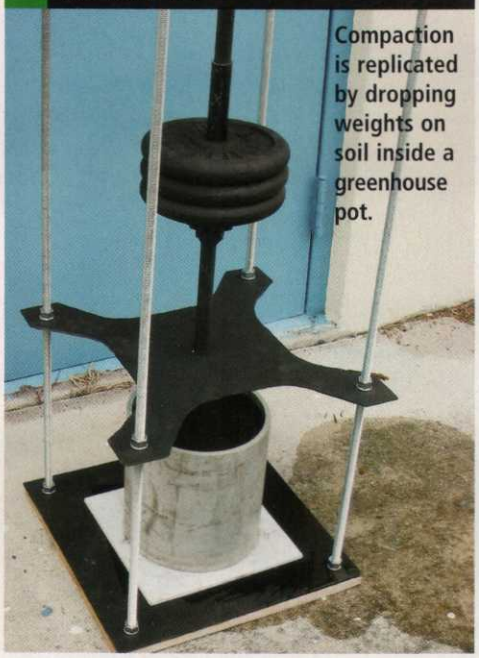
FIGURE 2



Compaction is replicated by dropping weights on soil inside a greenhouse pot.

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Southern Weedgrass Control), prodiamine (Barricade, RegalKade) and their combinations.

Application begins in spring (March in northern temperate areas) and continues through summer depending on the rate of application, the half-life of the herbicide and considerations of economics and goosegrass population density (Busey, 2004).

2) Mechanical removal: This involves hand weeding, where roots are cut below the ground to avoid disturbance of the surface appearance. It is impractical on a large turfgrass area, but it is useful in controlling mature goosegrass plants.

3) Broadcast post-emergence herbicides: These kill weed plants after they have germinated. However, post-emergence herbicides have some disadvantages in goosegrass control since they are less effective on mature plants and they may weaken the turf. The common product options are MSMA or monosodium methanearsonate (many brands), diclofop-methyl (Illoxan), metribuzin (Sencor) and foramsulfuron (Revolver) and their combinations.

4) Spot treatment: This is the application of nonselective herbicides such as glyphosate (Roundup) post-emergence herbicides on the center of individual plants. As well as mechanical removal alternative, it is impractical on large turfgrass area, but it is useful in controlling mature goosegrass plants.

Since high concentrations of arsenic have been detected in soils and water of some South Florida golf courses, there is concern over the use of arsenic-containing herbicides (MSMA) and older inorganic arsenicals. Studies have shown that arsenic in these soils is mobile and mobilizable, which may contaminate groundwater (Cai et al, 2002). However, the substrate composition significantly influences arsenic mobility and arsenic species transformation in the substrate and in percolate water.

It has not been proven that the arsenic in these ground waters is attributable to arsenical herbicides applied to the golf courses. In comparison to uncoated sand and uncoated sand and peat, naturally coated sand and peat showed a higher capacity of preventing arsenic from leaching into percolate water (Feng, et al, 2005).

There is pressure to reduce the use of arsenic herbicides, particularly involving municipal sports fields, and regulatory agencies are studying the association of arsenic in groundwater near golf courses.

Prevention

Cultural management of weeds in turfgrass is poorly documented, and more research is needed (Busey, 2003). Periodic cultural practices that can contribute to control of goosegrass are the use of fertilization, irrigation cultivation and traffic control.

1) Fertilization: Bermudagrass is a relatively rapid growing grass, and its growth responds strongly to increased fertilization. One pound of nitrogen per 1,000 square feet per growing month helps regrow turf canopy into areas damaged by traffic, and higher rates are used. A closed-leaf canopy can potentially shade the soil and reduce goosegrass seed germination (Busey, 2004).

2) Irrigation: I have observed (Arrieta, unpublished data, 2004) concentrated patches of goosegrass plants in dry spots in the field where the turf stand is thinned. There are no studies documenting the growth of goosegrass in dry conditions. Uniform irrigation

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FIGURE 3

High-compaction treatment results in an increase of roots in the first centimeters of soil.

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distribution should be achieved to avoid having areas that are too dry or too wet.

3) Traffic: Recreational turf areas are exposed to frequent vehicular and foot traffic, which results in soil compaction and wear of the turf. Core aeration is the procedure used to alleviate compaction while wear is decreased by spreading and/or avoiding in some circumstances (after rain) traffic. It is known that goosegrass infects trafficked areas, and the reason for that is still unclear.

Compaction studies

Goosegrass infestation in trafficked areas may be due to greater germination because of fluctuating temperatures on thinner bermudagrass turf, and goosegrass plants may grow better than bermudagrass in compacted areas.

Soil compaction decreases pore space and air in the soil and increases soil density, which affects root growth, soil aeration and water infiltration. The Waddington and Baker study (1964) proved that goosegrass roots grow well under conditions of low oxygen diffusion, but Kentucky bluegrass root growth is reduced when oxygen diffusion decreases. However, this study involved limiting aeration while mechanical impedance has not been evaluated as an effect on goosegrass grows on compacted soil.

It is not known if a differential reduction in the growth of bermudagrass exists, or whether it is caused by compaction or wear or both. A few studies have shown good tolerance of bermudagrass cultivars to traffic where turf coverage and visual quality was evaluated (Dunn et al, 1994; Carrow et al, 2001), but no studies have evaluated the

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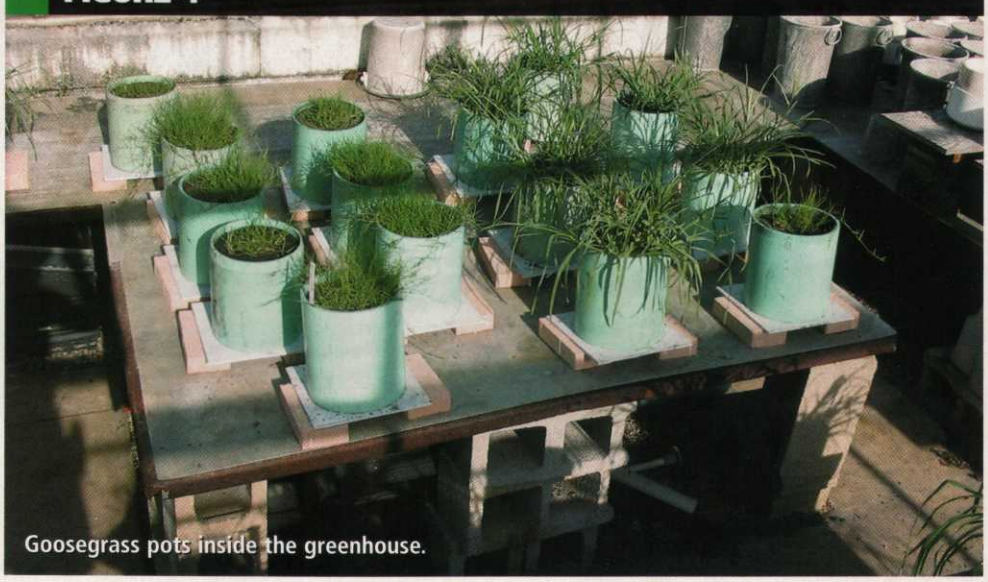
FIGURE 4



Goosegrass pots inside the greenhouse.

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effect of compaction on bermudagrass.

Because compaction and wear occur concurrently in trafficked areas, procedures are needed to examine their separate effects. At present, the author is conducting studies to understand the infestation of goosegrass on compacted areas.

Compaction effect on shoot and root growth of different grasses has been evaluated on containers on greenhouse studies. Compaction has been done by dropping certain weight from certain height onto the pot to achieve different compaction levels (Fig.2).

Interpretation

The study on perennial ryegrass (O'Neil and Carrow, 1983) showed that visual quality and clippings were reduced under compaction. However, total root growth was not affected by compaction, but after 12 weeks roots were distributed in the first 5 centimeters (cm) of the soil surface.

Another study on Kentucky bluegrass (Agnew and Carrow, 1985) showed the same results — rooting increase in the 5 cm of soil surface — but the total root growth did not decrease. In the Arrieta and Busey study, the increase of roots in the first centimeters of soil was observed on goosegrass roots (Fig. 3), but the total root growth decreased, too. Maybe bermudagrass stolons didn't have enough time to develop for all the compaction treatments, which could have showed a different result.

On this preliminary study, goosegrass shows no tolerance to compaction as commonly believed. Under soil compaction, root and shoot growth decrease. There are other factors that probably enhance goosegrass infestation in trafficked areas, such as greater seed germination and canopy gaps on the turf.

Claudia Arrieta is a graduate student at the University of Florida, Fort Lauderdale Research and Education Center. She is studying the relationship between goosegrass and soil compaction in turfgrass. She is from Uruguay where she earned her bachelor's degree in natural sciences. She worked there as an extension agent for three and a half years. Currently, she is working as a senior biologist with Dr. Philip Busey, an associate professor on environmental horticultural department at FLREC.

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