Stop 6. Managing Necrotic Ring Spot on Kentucky Bluegrass

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Necrotic ring spot is a turf disease caused by the fungus *Leptosphaeria korrae*, which attacks the roots of the turfgrass plant. Kentucky bluegrass is the primary host of this disease. In the cool weather of the spring and fall in Michigan, the fungus actively infects the plants which produce characteristic red- to purple-colored leaves. As the disease progresses, infected plants with injured or depleted roots begin to wilt during stress periods and droughty conditions in the summer. Eventually, severely infected plants turn straw-colored and die in a characteristic circular ring, and over time, weeds or weedy grasses grow in the center. This is referred to as a "frog-eye" symptom. The disease is worse in areas with low fertility and frequent drought periods.

An integrated approach to management of this disease is very successful. Light, daily irrigation helps to alleviate stress due to depleted roots which function poorly in taking up water. It is a key component of this management regime. Slow release fertilizers, or spoon feeding on shorter intervals, are effective in producing uniform nutrient availability for the plants. In addition to fungicides, necrotic ring spot-resistant cultivars of Kentucky bluegrass are available.

Stop 7. Cultural Practices to Prevent Grub and European Crane Fly Damage to Lawns and Sports Fields

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We have recently completed a research project supported by Project GREEEN: "A New Approach to Grub Tolerance for Growing Healthy Lawns Without Insecticides". Michigan residents treat their lawns with approximately $20 million of insecticides each year (TurfTrends Survey). They apply insecticides because of real or perceived turf damage caused by insects. Nearly all (>90%) of the insect injury to home lawns in Michigan is caused by European chafer grubs consuming turf roots. No turf types have yet been discovered that are resistant to white grubs (Potter and Held 2002, Bughrara et al. 2003). Recent research at MSU has shown that if turfgrass in home lawns has an adequate root biomass it is very tolerant to infestations of white grubs. This proposal meshes these new findings with previous research in turf management to propose and test a practical way for homeowners to maintain a healthy lawn without insecticides.

Objectives:
(1) Under low maintenance conditions, determine the root mass produced by 3 cultivars each of tall fescue, perennial ryegrass, Kentucky bluegrass and fine fescue.

(2) For the same 12 cultivars in objective (1), and also under low maintenance conditions, determine how much the turf root mass increases when a minimal rate of N fertilizer is used and if the mowing height is raised from 2.5" to 3.5".
(3) Under natural home lawn conditions determine how much turf tolerance to European chafer grubs is conferred by raising the mowing height from 2.5" to 3.5".

Results:

Table 1. Mean root mass (g) of turf cores collected from replicated plots at the Hancock Turfgass Research Center, Michigan State University. Data are means of 6 replicated plots. Data analysis is in Table 2. KBG = Kentucky bluegrass, TF = tall fescue, RF = red fescue, PR = perennial ryegrass.

Turf type	**Root mass when mowed at 2.5"**		**Root mass when mowed at 4.0"**	
	No nitrogen	**1.0 lbs N per year**	**No nitrogen**	**1.0 lb N per year**
KBG 'America'	8.4	18.1	12.2	13.2
KBG 'Arcadia'	12.4	13.6	12.2	13.1
KBG 'Champagne'	8.6	9.6	18.0	13.2
TF 'Fawn'	4.6	4.0	4.0	4.5
TF 'Grande'	7.3	6.1	6.4	8.9
TF 'KY31'	5.0	8.2	4.0	7.4
RF 'JasperII'	8.0	10.2	8.1	15.1
RF 'Navigator'	8.0	12.7	7.4	10.0
RF 'Shoreline'	9.4	16.4	9.5	11.3
PR 'Manhattan 5'	4.5	6.2	4.3	4.6
PR 'SR 4600'	4.0	6.5	4.4	4.6
PR 'Bucaneer'	4.8	7.2	4.2	6.8

Table 2. Relationship of turf type, fertility, and mowing height to the weight of turf roots collected from core samples. Each of the 48 treatments (12 turf types × 2 fertility levels × 2 mowing heights) were replicated 6 times for a total of 288 plots maintained at the Hancock Turfgrass Research Center.

Turf type	Species 'cultivar'	N	Root mass ± SD	F	P-value
	KBG 'America'	24	13.0 ± 6.4	7.4	0.0001
	KBG 'Arcadia'	24	12.9 ± 9.1		
	KBG 'Champagne'	24	12.4 ± 8.8		
	TF 'Fawn'	24	5.7 ± 2.7		
	TF 'Grande'	24	7.2 ± 3.4		
	TF 'KY31'	24	6.2 ± 5.9		
	RF 'Jasper'	24	10.5 ± 7.6		
	RF 'Navigator'	24	9.5 ± 5.5		
	RF 'Shoreline'	24	11.7 ± 7.3		
	PR 'Manhattan'	24	4.9 ± 2.4		
	PR 'SR4600'	24	4.9 ± 2.4		
	PR 'Bucaneer'	24	5.8 ± 3.6		
Fertility	None	144	6.4 ± 5.2	8.5	0.0037
	1.0 lb N per year	144	8.8 ± 6.2		
Mowing Height	2.5"	144	7.6 ± 5.8	0.05	0.82
	4.0"	144	7.4 ± 5.7		

Because most of the previous research on how cultural practices impact turf root mass was conducted on irrigated turf or with pasture grass, this work provides a new framework for making recommendations to homeowners and lawn care professionals on how to maintain a large root mass that will be highly tolerant of grub feeding damage. When results of this project are combined with recent research conducted at MSU on the tolerance of turfgrass to grubs, we can now make the following recommendation:

In Michigan and most of Midwest, low maintenance home lawns can be managed to produce a large root system that is tolerant of grubs and is unlikely to need an insecticide application if homeowners and lawn care professionals-

- ***Grow Kentucky bluegrass or red fescue***
- ***Water during dry periods***
- ***Apply a minimal amount of fertilizer (1.0 lbs of N per year)***
- ***Mow at a height of 3.5", or at the highest setting on your lawn mower***

Homeowners following these recommendations are unlikely to see damage to their lawns caused by grubs or by skunks and raccoons searching for grubs. Following these tips could reduce the use of insecticides on Michigan lawns by more than 50%, saving an estimated

$10 million per year, and significantly reducing the risk of trace amounts of insecticides appearing in ground water or in nearby streams and ponds.

European Crane Fly Damage Observed in Detroit Area and Grand Rapids. New European crane fly damage appeared on home lawns and on some golf courses in mid April this year. Because crane fly larvae need moist soil, the damage is usually on irrigated turf. Turf on the infested lawns was extremely thin or dead in patches, with large crane fly larvae being found in the soil and on the surface. The large 'leather jacket' larvae complete development in May before pupating in the soil and emerging in June as an adult crane fly, which looks like a 1.0 inch-long mosquito. The thin turf and accompanying excavation by skunks and raccoons looks like grub damage, but can be easily distinguished by the presence of the gray to tan-colored leather jackets (see photo below). Infested lawns can be treated in April with Sevin (or another turf product containing carbaryl). However, to prevent damage this fall and in spring of 2013, lawn care professionals or golf course superintendents will need use one of the following products and the indicated timing below. Timing is critical, as Kevin Timmer in Grand Rapids reported damage to several lawns that had been treated with imidacloprid in May last year (2011).

For images of European Crane Fly please visit the MSUE news website:
http://msue.anr.msu.edu/news/european_crane_fly_damage_appearing_now_in_grand_rapids

Product	Correct Timing for European Crane Fly
Sevin (carbaryl)	**In May or late fall when turf damage is discovered**
The following treatments are preventive:	
Acelepryn (Chlorantraniliprole)	**May (also protects against grubs and other turf pests)**
Arena (clothianidin)	**Late July and August (also protects against grubs)**
Merit (imidacloprid)	**Should provide protection when applied from late July to mid August (also protects against grubs)**
Allectus (imidacloprid + bifenthrin)	
Aloft (clothianidin + bifenthrin)	
Meridian (thiamethoxam)	