

BIOLOGICAL MANAGEMENT OF NECROTIC RING SPOT ON KENTUCKY BLUEGRASS

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Necrotic ring spot (N.R.S.), formerly known as Fusarium blight, is a major disease of Kentucky bluegrass (Poa pratensis). This disease is caused by the root infecting fungus Leptosphaeria korrae. This pathogen resides in thatch, and when conditions are favorable the organism is able to attack the plant root system.

N.R.S. patches can range in size from 7 centimeters up to 1 meter in diameter. In cool weather, red and straw colored grass appears in the infected area and during warm weather the turf becomes wilted and turns straw colored. Usually, regrowth of grass or weeds occurs in the center of older patches resulting in a frog-eye pattern.

BIOLOGICAL AMENDMENTS

Biological management of N.R.S. combining irrigation practices with bio-organic turf amendments.

A study was established on a Kentucky bluegrass lawn at the Boy Scouts of America building in Pontiac, Michigan to examine the effect of added nutrition through application of fertilizers and bio-organic products on infected turf. Each treatment was applied to triplicate 6' x 9' test plots in this irrigated, heavily infected turf stand.

The number of ring spots in each plot was taken prior to the first treatments being applied and monitored monthly. Comparison of May and September reading dates in Table 1 represent the percent disease reduction for each treatment.

The quick release fertilizers and bio-organic amendments provided significant turf recovery when compared to the untreated control. Turf recovery occurred during a period of only slight disease activity, as indicated by the small increase of disease in the control plots. Since no new symptoms occurred during this period in the control plots, turf recovery could have been due to fertility alone, rather than actual biological control. This study will be continued next year to determine if disease reduction is the result of increased nutrition or actual control of the pathogen through the use of bio-organic amendments.

IRRIGATION STUDY

Soil moisture has a significant influence on the activity of the biological amendments. Effect of inadequate moisture levels on the performance of bio-organic amendments was evident in studies done on a N.R.S. infected Kentucky bluegrass stand at Oakwood Mercy Hospital in Dearborn, Michigan. This area was irrigated with an automatic sprinkler system which did not provide an even irrigation pattern. This uneven pattern gave mixed results from several of the turf amendments. Poorly irrigated plots resulted in heavily damaged turf, while well irrigated plots, in the same turf stand treated with the same amendment, gave very good disease management.

Besides having a pronounced effect on bio-organic amendments irrigation also plays an important role in thatch build-up. Since thatch has been associated with N.R.S., several bio-organic products were examined for their effect on thatch reduction under three different soil moisture conditions.

Bio-Groundskeeper, Green Magic, Lawn Restore and two experimental products, A-199 and A-299 were applied to diseased turf stands receiving 1) 0.1"/day irrigation, 2) 80% open pan irrigation, 80% of water lost through evaporation from an open pan was applied to the turf on Mondays and Fridays (1" evaporated = 0.8" applied) and 3) no supplemental irrigation.

The bio-organic amendments were applied to triplicate 6' x 6' plots in each irrigation regime. On September 25, 1987, following monthly applications of the bio-organic amendments, the thatch was measured. Thickness of thatch was determined by measuring three plugs of turf from each plot. Averaged measurements are presented in Table 2.

From the data collected this season, we see that the Bio-Groundskeeper, treated plots significantly reduced the thatch under all three irrigation regimes compared to the control. Green Magic, and A-199 gave significant thatch reduction only in the 80% irrigation regime when compared to the control.

Most of the daily irrigation blocks had less thatch (1.0 cm or less) than other irrigation blocks. Thatch increases in the 80% block and becomes thickest in the rain only block. This indicates that drier conditions favor thatch build-up whereas moist conditions favor its degradation. This may be due to the increased microbes observed in the daily irrigated treatments, which are present in soil and bio-organic amendments.

To determine if a relationship exists between bacterial numbers and thatch decomposition, bacterial plate counts were performed on each irrigation block. Plate counts of the three untreated control plots were averaged. The daily irrigation block averaged 7.97×10^4 bacteria/gram of soil, the 80% pan irrigation block averaged 5.55×10^4 bacteria/gram of soil, and the rain only block averaged 4.29×10^4 bacteria/gram of soil. Comparison of bacterial plate counts with results of the thatch reduction study suggest that constant moisture levels result in greater bacterial decomposition. The daily irrigation plots had 30% more bacteria and 26% less thatch than the 80% pan irrigation plots. And when compared to the rain only plots, the daily irrigation plots had 46% more bacteria and 37% less thatch. These higher microbial number may explain why less thatch occurred in the daily irrigation block.

Irrigation has a significant influence on activity of bio-organic amendments. These treatments work by stimulating the microbes present in the thatch and soil, and/or through direct introduction of organisms. The microbes are able to use the fertilizer and/or proteins present in the turf amendment as food, but require relatively moist soil conditions in order to metabolize this food source.

SUMMARY

Nectrotic ring spot may be controlled with regular applications of a bio-organic turf amendment. Nutrition provided through a complete and regular fertilization program has shown to promote disease recovery. The importance of irrigation cannot be overstressed, like any organism the microbes present in the bio-organic treatments require moisture if they are expected to remain active. Cultural and biological management of N.R.S. is possible, but patience is necessary because microbes do not work overnight.

LITERATURE CITED

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Table 1. Necrotic ring spot percent disease reduction from 5/27/87 to 9/21/87. Treatments applied in May, June and September.

Treatment	Oakland County N.R.S. Study Rate/1000 ft ²	Ave. % reduction
1. Urea + KCl + 0-46-0	2.16#, 0.65# and 0.72#	85.0
2. Urea + 0-46-0	2.16# each	76.7
3. Urea + KCl	2.16, 0.27#	75.7
4. Strengthen & Renew	64 oz	69.0
5. Lawn Restore	10#	66.7
6. Green Magic	64 oz	61.7
7. A-199	10#	58.3
8. Agrilite	28.5#	49.7
9. A-299	10#	45.3
10. Bio-Groundskeeper*	1.7 oz ea A,B,C	42.7
11. Control Plot		- 2.0

LSD = 35.0

* Received 1# nitrogen in August and September

Table 2. Percent thatch reduction. Treatments applied monthly, June-September, 1987.

Treatment	Irrigation Regime		
	Daily	80% Pan	Rain only
1. Lawn Restore	0.91 cm	1.38	1.39
2. Green Magic	0.99	<u>1.07*</u>	1.44
3. Bio Groundskeeper	<u>0.66*</u>	<u>0.82*</u>	<u>1.12*</u>
4. A-199	1.05	<u>0.82*</u>	1.58
5. A-299	0.91	1.26	1.38
6. Control	<u>0.92</u>	<u>1.24</u>	<u>1.45</u>

* Significantly different from the untreated control.