ANTHRACNOSE FERTILITY - FUNGICIDE INTERACTION STUDY

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Materials, Methods and Objectives

Anthracnose (Collectotrichum graminicola) study #1 was conducted at the Dearborn Country Club in Dearborn, Michigan on a fairway which was predominantly Poa annua maintained at a one-half inch height of cut. The site had severe anthracnose infestation the previous year.

The first stage of the study involved the monthly application of 0, 1/2, and 1 lb. of actual nitrogen (urea)/1000 ft^2 to determine the effect of various fertility levels on the severity of anthracnose. The treatments were replicated three times in a randomized block design. The plots were 9' x 60' and received the first nitrogen fertility treatments on May 14, prior to any manifestation of anthracnose symptoms. Subsequent fertility treatments were applied at monthly intervals on June 9, July 12, August 9, and September 13. The urea was applied with a 3' Scotts drop-type spreader and was irrigated into the soil immediately after application.

The fungicides were applied on July 21 to each fertility level in a modified randomized block design and replicated 3 times. On August 9, a second fungicide treatment was applied to the three nitrogen fertility levels. The liquid fungicides were applied foliarly with a CO_2 small-plot sprayer at a volume of 40 gallons per acre. The granular fungicide was applied with a Scotts drop-type spreader. The fungicide plots were 6' x 9' in dimension. The readings shown in Tables 1-3 were taken on August 30.

TIMING OF NITROGEN APPLICATION

Materials, Methods and Objectives

To determine the effect of timing of nitrogen application on anthracnose development, 0 lb, 1/2 lb, and 1 lb actual nitrogen/1000 ft^2 rates were applied once on either May 14, June 9, July 12 or August 9. The plots were 6' x 9' and each treatment was replicated 3 times in a randomized block design. The nitrogen was applied as urea (45-0-0) with a Scotts drop-type spreader. The readings were taken on June 9, June 22, July 21, and August 30.

Results - Dearborn Anthracnose

Anthracnose in 1976 was not as severe as in 1975, mainly due to the lack of prolonged periods of hot, humid weather. However, the disease was severe enough to require treatment to prevent the loss of Poa annua. Tables 1-4 show the importance of nitrogen in reducing the amount of anthracnose injury in a year of moderate disease pressure. There was a 30% thinning at the 0 lb. N/month rate, an 18% thinning at the 1 lb. N/month rate, and only a 5% thinning at the 1/2 lb. N/month rate. Loss of turf was also encountered at the 1 lb. N/month rate in August due to fertilizer burn. Thinning caused by fertilizer burn was not included in these data.

Fungicide - Nitrogen Interaction

1/2 lb. nitrogen/month

At the 1/2 lb. nitrogen rate, all the fungicides except Tersan SP gave excellent control of the disease. Much of the control can be attributed to the

nitrogen itself. There was only 5% turf loss, where 1/2 lb. of nitrogen was applied.

0 lb. nitrogen/month

It can be seen that the disease is more difficult to control where no nitrogen is applied. While this is an impractical level of nitrogen, it does show the importance of nitrogen fertility in anthracnose control. Dollar spot was also a severe problem at this nitrogen level, especially in the Maneb-Zineb, Tersan LSR and Tersan SP plots. It should be pointed out that the Scotts Fertilizer + DSB fungicide treatment at the 1X rate was applying .9 lb. of nitrogen, which explains its' excellent showing.

1 lb. nitrogen/month

The 1 lb. N/month rate gave better anthracnose control than the 0 lb. N/month rate. The 1 lb. N/month rate is not practical because the "Poa" was injured at this rate during the warm weather of August. The fungicide giving the poorest results at the 1 lb. nitrogen level was Tersan SP.

Results - Timing of Nitrogen Application

The first reading after application of each treatment showed good turf quality at the 1/2 and 1 lb. N/mo rates on a quality scale of 1-9 (1-best, 9-worst). The August 30 readings showed that the May 14, 1/2 lb. nitrogen treatment comparable to the 1/2 lb. nitrogen treatments which had been applied only 3 weeks earlier on August 9. This suggests that early nitrogen fertilization may be important in controlling anthracnose (Table 5).

Conclusion

Nitrogen fertility plays an important role in the reduction of anthracnose, at least in years of moderate disease levels. The 1/2 lb. nitrogen/month rate was the best rate in the study for anthracnose control. The 1 lb. rate caused severe injury to the turf when applied during the warm weather of August. Even if the 1 lb. rate had not been injurious, it is not economically sound to apply 1 lb. of nitrogen where 1/2 lb. is sufficient. Water-soluble urea was the only fertilizer included in the study due to the size of the experiment. The effects of both the water insoluble nitrogen carriers, as well as blends of soluble and insoluble forms of nitrogen still need to be studied.

Table 1

Dearborn Anthracnose Study
% infection - 0 lb.N/mo.

Treatment	Rate/1000ft^2	I	II	III	AVE	DMR[a]
Scotts Fert. +DSB	1X	0	0	0	0	A
Fungo	1 oz	10	10	0	6.7	AB
Acti-dione Thiram	2 oz	10	10	0	6.7	AB
Daconil 2787	6 oz	20	5	0	8.3	AB
Cleary's 3336	1 oz	20	10	0	10.0	ABC
Tersan 1991	1 oz	30	5	0	11.7	ABC
Scotts Fert. + DSB	1/2X	25	5	5	11.7	ABC
Fungo	1/2 oz	25	10	5	13.3	ABC
Maneb-Zineb	8 oz	30	2	10	14.0	ABC
Tersan LSR	4 oz	40	0	10	16.7	ABC
Tersan 1991	1/2 oz	40	10	5	18.3	ABC
RP 26019	2 oz	35	20	0	18.3	ABC
Tersan 75	6 oz	40	10	15	21.7	BC
Cleary's 3336	1/2 oz	25	40	5	23.3	BC
EL 222	2 oz	20	50	20	30.0	C
Tersan SP	6 oz	60	20	10	30.0	C
Check	-	40	30	20	30.0	C

[a]Treatments followed by the same letter are not significantly different from each other at the 5% level.

Table 2

Dearborn Anthracnose Study
% infection - 1/2 lb N/mo.

Treatment	Rate/1000ft^2	I	II	III	AVE	DMR[a]
Cleary's 3336	1/2 oz	0	0	0	0	A
Tersan 1991	1/2 oz	0	0	0	0	A
Tersan 1991	1 oz	0	0	0	0	A
Cleary's 3336	1 oz	5	0	0	1.7	AB
Fungo	1/2 oz	0	0	5	1.7	AB
Tersan LSR	4 oz	5	0	0	1.7	AB
Acti-dione Thiram	2 oz	5	0	0	1.7	AB
Daconil 2787	6 oz	0	0	5	1.7	AB
Scotts Fert. + DSB	1/2X	0	0	5	1.7	AB
Scotts Fert. + DSB	1X	5	0	0	1.7	AB
Tersan 75	6 oz	0	0	5	1.7	AB
Maneb-Zineb	8 oz	0	0	10	3.3	AB
EL 222	2 oz	2	0	10	4.0	AB
RP 26019	2 oz	15	0	0	5.0	AB
Check	-	5	10	0	5.0	AB
Fungo	1 oz	20	0	5	8.3	AB
Tersan SP	6 oz	15	5	10	10.0	B

[a]Treatments followed by the same letter are not significantly different from each other at the 5% level.

Table 3

Dearborn Anthracnose Study
% infection - 1 lb N/mo.

Treatment	Rate/1000ft^2	I	II	III	AVE	DMR[a]
Cleary's 3336	1/2 oz	0	0	0	0	A
Tersan 1991	1 oz	0	0	0	0	A
Daconil 2787	6 oz	0	0	0	0	A
Scotts Fert. + DSB	1/2X	0	0	0	0	A
Tersan 75	6 oz	0	0	0	0	A
Tersan 1991	1/2 oz	0	0	2	.7	A
EL 222	2 oz	0	0	5	1.7	A
Tersan LSR	4 oz	5	0	0	1.7	A
Acti-dione Thiram	2 oz	5	0	0	1.7	A
Maneb-Zineb	8 oz	5	2	0	2.3	A
Fungo	1/2 oz	0	10	0	3.3	A
Scotts Fert. + DSB	1X	5	0	5	3.3	A
RP 26019	2 oz	10	0	0	3.3	A
Cleary's 3336	1 oz	20	0	0	6.7	AB
Fungo	1 oz	20	0	0	6.7	AB
Tersan SP	6 oz	10	20	20	13.3	AB
Check	-	10	40	5	18.3	B

[a]Treatments followed by the same letter are not significantly different from each other at the 5% level.

Table 4

Comparison of fungicide rates as they relate to nitrogen fertility levels showing percent thinning. Readings are averages of 3 repetitions.

Benzimidazole systemic fungicides

Treatments	lbs of nitrogen/month 0 lb	1/2 lb	1 lb
Fungo 1 oz	6.7	8.3	6.7
Fungo 1/2 oz	13.3	1.7	3.3
T 1991 1 oz	11.7	0	0
T 1991 1/2 oz	18.3	0	0
CL 3336 1 oz	10.0	1.7	6.7
Cl 3336 1/2 oz	23.3	0	0
Check	30.0	0	0

Other fungicides

Daconil 2787 6 oz	8.3	1.7	0
Tersan 75	21.7	1.7	0
Tersan LSR	16.7	1.7	1.7
Maneb-Zineb	14.0	3.3	2.3
RP 26019	18.3	5.0	3.3
EL-222	30.0	4.0	1.7
Tersan SP	30.0	10.0	13.3
Acti-dione Thiram	6.7	1.7	1.7

Table 5

Timing of Nitrogen Fertility and Its Relationship to Anthracnose Control.

	Reading Dates			
	6/9	6/22	7/21	8/30
Application Date				
May 14				
0 N	7	8	5	8
1/2 N	3	5	3	3
1 N	2	5	5	8
June 9				
0 N		5	5	8
1/2 N		2	3	5
1 N		4	2	5
July 12				
0 N			3	5
1/2 N			4	4
1 N			4	4
August 9				
0 N				5
1/2 N				3
1 N				3

Note: All readings represent average of 3 repetitions.
1 - no disease
9 - most disease

Fungicides were necessary to have the best fairways. Combining the fungicide treatments with the 1/2 lb. nitrogen/month gave the best result. Benzimidazole systemic fungicide rates could be reduced from 1 oz/1000 sq ft to 1/2 oz/1000 sq ft where the fungicide treatment was combined with 1/2 lb. N/month. Such a program should cut in half the cost of treating fairways with fungicides.

There is an indication that timing of nitrogen fertilizer application might also be important. The quality of the plots receiving only the May nitrogen treatments were equal to the quality of the plots which received nitrogen in June, July, or August, 2 to 3 weeks prior to reading. This was probably due to the fact that the May nitrogen application prevented the development of anthracnose and dollar spot early in the season.

These results should be viewed for what they are, one year's data. It is dangerous to draw strong conclusions or to make recommendations on one year's field data. There are simply too many variables in field research. These results should be viewed as blocks to build upon and trends to follow in successfully growing "Poa". However, as stated last year, I do believe that controlling anthracnose is the key to growing healthy annual bluegrass in the northern regions of the cool season grass belt.

Meadowbrook Anthracnose - Fungicide Studies

Material, Methods and Objectives

Anthracnose (Colletotrichum graminicola) study #2 and #3 were conducted on the Meadowbrook Golf Course in Novi, Michigan on a fairway which was primarily Poa annua maintained at a one-half inch height of cut. The objectives of these studies were 1) to determine the optimum time intervals between applications of fungicides, 2) to determine the effect of Exhalt 800, a fungicide sticker-extender at prolonging the control given by the fungicides, and 3) to shed further light on the role of fertility in the control of anthracnose. Liquid fungicide treatments were applied with a CO_2 small plot sprayer at a rate of 40 gallons per acre while the granular fungicide and fertilizer treatments were applied with a Scotts drop-type spreader. The plots (6' x 9') were established on a fairway which had already suffered extensive turf loss due to anthracnose.

Study 1 consisted of treatments applied at three different time intervals: weekly, tri-weekly, and every six weeks. The treatments were replicated three times in a randomized block design. The first treatments were applied on July 15 and continued until August 19.

Study 2 consisted of two tri-weekly applications applied on July 21 and August 12. The treatments were replicated three times in a random block design.

At the conclusion of the season, all six week plots had received one fungicide application, all tri-weekly plots had received two fungicide applications and all weekly plots had received six fungicide applications. The readings in Tables 6 - 9 were taken on August 23.

Results, Anthracnose - Meadowbrook

Study 2

Daconil 2787 at the 3 and 6 oz/1000 sq ft rate and Tersan LSR at the 2 and 4 oz/1000 sq ft rate gave good control of anthracnose when applied on a weekly basis. The degree of control was improved slightly, although not significantly, where the sticker-extender Exhalt 800 was used with Daconil 2787 at the 6 oz rate and with Tersan LSR at the 2 oz rate, when the fungicides were applied on a weekly basis. When Tersan 1991 was applied only once and the plots were read 6 weeks later, Exhalt