## Evaluation of Fungicides for Control of Metalaxyl-resistant Pythium Blight on Creeping Bentgrass, 1994-1995

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The object of the trial was to evaluate the efficacy of various fungicide applications on turf that was typed resistant to metalaxyl in 1991. The trial was conducted on the fairway of hole #11 at Elmcrest Country Club, Cedar Rapids, Iowa. The fairway is composed of 80% "Penncross" creeping bentgrass (*Agrostis palustris*) and 20% *Poa annua*, and has had severe outbreaks of pythium blight over the last 12 years. The fairway is a lightly modified native soil, the soil type is a Tama silty clay loam. Drainage is average to poor. Nutrient levels are average to high. The fairway is maintained at a height of 0.5 inches.

From 1986 through 1990, the fairway received six Banol applications at 2 oz/1000 ft<sup>2</sup>, six applications of Aliette at 4 oz/1000 ft<sup>2</sup>, and eight applications of Subdue at 2 oz/1000 ft<sup>2</sup>. Rick Tegtmeier, course superintendent, noticed decreased intervals of control after the Subdue applications in 1990; from 14-21 days of control down to 7-14 days. Control of Pythium in 1990 required six fungicide applications due to the shortened control interval. The decision was made to switch to a tank mix of Subdue at 2 oz. and Mancozeb at 6 oz/1000 ft<sup>2</sup> for 1991 to try and maximize control intervals. An application was made on 6/5/91 and breakthrough was noticed by 6/11. A sample of diseased turf was taken on 6/12/91 and sent to the Novartis research lab in Vero Beach, FL. The sample arrived on 6/13 in very good condition and one fast-growing Pythium was recovered and typed as *Pythium aphanidermatum*. A sensitivity test was done comparing this sample to a known sensitive *P. Aphanidermatum* control. The EC 50 of the sample to metalaxyl was greater than 100 ppm versus an EC 50 of 0.53 for the control. The sample was classified as resistant to Subdue.

In 1994, the superintendent expressed an interest in finding out what his control options would be after three years of no Subdue applications. An experimental plot was designed using a randomized series of treatment strips down the fairway with the most pressure historically. The size of each strip was 7 ft x 100 ft (the width of the fairway), and the treatments were replicated four times. The applications were made with a "Grounds Wheelie" push sprayer with 2 gallons/1000 ft<sup>2</sup> of carrier using flat fan nozzles. An application was made on 7/1/94 with a second application on 8/5/94. Cool weather during this time frame resulted in no disease pressure.

The trial was continued in 1995 with an application made on 7/15. The temperature was 89° F with winds of 5-10 mph and full sun. Hot, humid weather developed subsequently and *Pythium* was noticed in the plots on 7/31. Data was taken on 8/1 by counting the number of disease centers in each plot by the superintendent and his assistant, Jeff Schmidt. A separate rating of the phytotoxicity to the turf by the various fungicide treatments was made at the same time when differences were noticed while counting the disease centers. The individuals doing the rating did not know which products had been applied to each plot. Results are compiled below.

		Mean number	of disease
Treatment	Rate/1000 $ft^2$	centers/trea	tment
Subdue 2E	2 oz	5.25	a
Banol	2 oz	5.13	a
Untreated check		4.63	а
Aliette	4 oz	3.75	ab
Subdue 2E + Banol	2 oz. + 2 oz	3.00	ab
Subdue + Mancozeb	2 oz. + 6 oz	1.38	b

Mean of 4 replications. Mean with the same letter are not significantly different. (LSD = 2.43, P=0.05)

It is interesting that the best treatment was a tank mix that included Subdue. That tank mix has been included in the Pythium disease program during the summers of 1995 and 1996 and seems to be performing well, as the data would indicate. It would also be interesting to take a sample of disease off the fairways now and run the same sensitivity trial on it to see if there has been any change in the pathogen since 1991. More research is necessary to determine if these results would be applicable to any other sites with metalaxyl resistance. The results would seem to confirm the theory that tank mixes are an appropriate strategy in response to resistance concerns.

Below is the data rating the damage to the turf from the various applications to the fairway. It should be noted again that the temperature was 89° F and sunny during the applications. The rating used was 10 for no phyto down to 1 for dead turf. The superintendent expected that Subdue 2E would cause the most damage due to the xylene inert (carrier) and was surprised that Aliette wettable powder actually caused the most phyto problem.

Treatment	Rate 1000 $ft^2$	Rating
Untreated check		9.75 a
Subdue 2E + Banol	2 oz. + 2 oz	9.50 ab
Banol	2 oz	9.50 ab
Subdue + Mancozeb	2 oz. + 6 oz	9.13 b
Subdue 2E	2 oz	8.50 c
Aliette	4 oz	7.88 d

Mean of 4 replications. Mean with the same letter are not significantly different. (LSD=0.54, P=0.05)