

# Evaluation of Snow Mold Fungicides - 76

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Snow Mold in Minnesota is caused by a complex of low temperature fungi. We know that at least two species of Typhula are present in the entire state. In addition to the previous report of Fusarium nivale, Sclerotinia borealis is common in the northern section. The Typhula species are Typhula incarnata and Typhula ishikariensis.

The testing of registered and experimental compounds at the St. Paul Campus location and in test plots throughout the state was begun in cooperation with the Minnesota Golf Course Superintendents Association in 1971. Research plot data and field observation indicate that Typhula incarnata is the easiest organism to control while Typhula ishikariensis is not as easy to control. Further that Sclerotinia borealis is not controlled by the same treatments that control the Typhula species. Fusarium nivale, although present in the state, has seldom been a problem in the turf snow mold research plots. Damage has been observed from Fusarium nivale prior to establishment of snow mold plots, but not during the snow mold plot season. The goal and purpose of this program is to test and evaluate snow mold control materials and recommend disease control programs. Appreciation is expressed to the superintendents who have provided test plot areas and the Department of Horticulture for maintenance of the St. Paul campus test plot. The following companies have also assisted this research effort: Mallinckrodt Chemical Works, E. I. du Pont de Nemours and Company, Inc., Rhodia Chemical Company, The Upjohn Company and Scotts Company.

## Materials and Methods

Snow mold control trials were conducted at seven locations in Minnesota where Typhula incited snow mold is common and difficult to control. The northern locations also have Sclerotinia borealis which responds to snow mold control chemicals somewhat differently. Primary emphasis was on chloroneb (Tersan SP), Pentachloronitrobenzene (PCNB) and Mercury (Caloclor) or combinations containing these compounds. The investigations reported here were conducted on golf green nurseries or golf practice putting greens and in one case, on a fairway bent grass turf. The golf greens and putting greens were maintained at approximately 3/16's inch height of cut. Experimental plot design was a completely randomized block with four replications. Each fungicide plot measured 4 x 11 feet. Fungicides were applied in 5 gallons of water per thousand feet square using a carbon dioxide powered wheel mounted boom sprayer at 40 PSI pressure. Treatments were made at Bemidji 10-15, Roseau 10-17, Duluth 10-22, Mendota 10-29, Rochester 11-5, St. Paul Campus 11-10 through 12 and Minneapolis 11-17. Data were recorded as percent of plot area diseased, averaged together and statistically analyzed.

The 1975-1976 winter season was one that will be remembered for a long time as many golf greens did not survive the winter. The winter disease research program was also affected by this "winter kill". No meaningful data was recorded at five of the seven locations and one plot was read so early in the season (February 27) that little confidence can be placed in the data.

The test plot at Duluth was the one bright spot for this pathologist. The check plots averaged nearly 90% disease and the other treatments were well spread out. Fifteen significant subsets were recorded i.e., no statistical difference in treatments followed by a common letter. In general, combinations again performed better than any other single material. Combinations of fungicides with fertilizers did not improve disease control but growth responses were evident. The color and amount of growth indicate late fall fertilization may improve spring growth and thus hasten healing.

TABLE 1

SOMERSET COUNTRY CLUB ST. PAUL

Treatment	Rate/1000 ft <sup>2</sup>	Percent Disease on 27 Feb. 76 Mean of Four Replicates			
M F 582	12 oz.	0.0 <sup>A</sup>	a		
PCNB + Thiram	4 + 8 oz.	0.25	a		
Caloclor + PCNB	3 + 4 oz.	0.25	a		
Upjohn AT-SP	40 lbs.	0.5	a		
Tersan SP + Thiram	4 + 8 oz.	0.75	a		
Caloclor	3 oz.	0.75	a		
Caloclor	5 oz.	1.75	a		
Upjohn ARZ-2	8 oz.	2.25	a		
Scotts FF II	DR	2.5	a		
Caloclor + Tersan SP	3 + 4 oz.	2.5	a		
PCNB	8 oz.	2.5	a		
Thiram	8 oz.	3.0	a		
MF 582	6 oz.	3.25	a	b	
Tersan SP + PCNB	4 + 4 oz.	4.75	a	b	
Scotts LDC	DR	5.0	a	b	
Upjohn ARZ-3	8 oz.	5.25	a	b	
Tersan SP	8 oz.	7.5	a	b	
MF 582	9 oz.	8.0	a	b	
Upjohn ARZ-2	4 oz.	9.25	a	b	
Actidione RZ	8 oz.	9.25	a	b	
Calogron	10 lbs.	12.75	a	b	c
RP 26019	8 oz.	13.0	a	b	c
Actidione RZ	4 oz.	13.25	a	b	c
Tersan SP	4 oz.	13.75	a	b	c
Upjohn RZ-3	4 oz.	15.0	a	b	c
RP 26019	2 oz.	15.0	a	b	c
Tersan SP	2 oz.	15.75	a	b	c
Scotts F II	DR	16.0	a	b	c
RP 26019	4 oz.	17.25	a	b	c
Sno Chek	8 lbs.	20.0	a	b	c
Turfside	4 lbs.	23.0	a	b	c
PCNB	1 oz.	31.25	a	b	c
PCNB	2 oz.	36.25		b	c
PCNB	4 oz.	43.75			c
Check		71.5			d

<sup>A</sup>Any two figures followed by the same letter do not differ significantly, P=0.05, according to Duncan's new multiple range test. All homogeneous subsets are presented.

TABLE 2

NORTHLAND COUNTRY CLUB

DULUTH

Treatment	Rate/1000 ft <sup>2</sup>	Percent Disease on 13 April 76 Mean of Four Replicates	
Upjohn AT-SP	40 lbs.	2.75 <sup>A</sup>	a
Caloclor + Tersan SP	3 + 4 oz.	6.0	a b
Calogron	10 lbs.	7.5	a b
Caloclor + PCNB	3 + 4 Oz.	8.0	a b
Upjohn AT-SP	80 lbs.	10.75	a b
Tersan SP + PCNB	4 + 4 oz.	10.75	a b
Caloclor	5 oz.	13.0	a b c
Tersan SP + Thiram	4 + 8 oz.	22.5	a b c d
Tersan SP	8 oz.	23.75	a b c d e
Scotts F II	DR	26.25	b c d e f
Scotts F II	NR	27.5	b c d e f
Caloclor	3 oz.	33.75	c d e f g
Calogron	6 lbs.	37.5	d e f g
PCNB	8 oz.	41.25	d e f g h
Tersan SP	4 oz.	42.5	d e f g h
MF 582	9 oz.	45.0	e f g h i
PCNB + Thiram	4 + 8 oz.	47.5	f g h i
Actidione RZ	8 oz.	47.5	f g h i j
Scotts LDC	DR	50.0	g h i j k
Scotts FF II	NR	51.25	g h i j k
Actidione RZ	4 oz.	52.5	g h i j k l
Tersan SP	2 oz.	52.5	g h i j k l
Scotts LDC	NR	53.75	g h i j k l
Upjohn ARZ-2	8 oz.	62.5	h i j k l m
Scotts FF II	DR	65.0	i j k l m n
Turfside	4 lbs.	68.75	j k l m n o
Turfside	2 lbs.	70.0	k l m n o
MF 582	6 oz.	72.5	l m n o
MF 582	12 oz.	73.75	l m n o
RP 26019	8 oz.	73.75	l m n o
PCNB	4 oz.	73.75	l m n o
Upjohn ARZ-3	8 oz.	76.25	m n o
Upjohn ARZ-2	4 oz.	81.25	m n o
PCNB	1 oz.	82.5	m n o
RP 26019	4 oz.	83.75	m n o
PCNB	2 oz.	83.75	m n o
Ammon Nitrate	4 lbs. N	85.0	m n o
Milorganite	4 lbs. N	85.0	m n o
RP 26019	2 oz.	86.25	n o
Thiram	8 oz.	86.25	n o
Check		89.5	o
Upjohn ARZ-3	4 oz.	91.25	o

<sup>A</sup>As before.