

EVALUATION OF CHEMICAL CONTROL OF WHITE MOLD ON SNAP BEAN - HANCOCK, 2000: A trial was established June 15 at the Hancock Research Station, Hancock, Wisconsin to evaluate treatments to control white mold. Seeds of WI 124 (a root rot tolerant bean breeding line) were planted in a randomized complete block design with four replications. Each plot consisted of four 21-foot-long rows spaced 16 inches apart with seeds planted approximately 10 per foot. The design included additional adjacent drive rows so that soil in treatment rows would not be compacted by pesticide application equipment. Soil type was a Sparta loamy sand with pH 6.7. Sunflowers grown in the field the previous season were inoculated with *Sclerotinia sclerotiorum* and infected debris and sclerotia were disked into the soil in the fall. Apothecia growing from these sclerotia produced a natural source of ascospore inoculum for this experiment. The field was fertilized with 0-0-60, 100 lb/A, broadcast preplant, April 10, and a sidedress application of 34-0-0, 30 lb/A, August 29. Herbicide applications included: Eptam 7E, 3.0 pt/A, June 13 and Poast, 1.5 pt/A + Basagran, 1.5 pt/A + Crop Oil, 1 qt/A on July 7. Diazinon 50WP, 3.0 lb/A, June 13, and Orthene 75S, 1 lb/A, July 31 were applied for insect control. Fungicide treatments were applied to all four rows of each plot with a plot sprayer consisting of a tractor-mounted boom pressurized with an air compressor. Treatments were applied at a rate equivalent to 35 gal water/A at 40 psi, using Tee Jet Hollow Disc Cone D3-23 nozzles (8 nozzles at 8-inch spacing). Application dates were: July 28 (bud break); July 31 (10% bloom); August 4 (10% bloom + 4 days); August 7 (10% bloom + 7 days); August 14 (10% bloom + 14 days) (see schedules in Table 1). A number of commercial growers add supplemental nitrogen to their bean crop by applying 28% UAN through center pivot systems near the time of plant bloom. In our 1996 and 1997 field trials, we observed that treatment with 28% UAN appeared to increase disease severity and potentially decreased fungicide efficacy for some products. Some of the treatments in this trial were designed to provide additional data on the potential effect of 28% UAN. To simulate application of UAN (45 lb N) applied during irrigation, 41 ml of 28% UAN was mixed in 1 gallon of water and this was applied to a 21-foot-long row, using a sprinkling can, as the irrigation was running. Other treatments of UAN (3.0 lb N) were applied as tank mixes with fungicides using a boom sprayer. Rainfall (inches) was June (15-30), 3.4; July, 2.3; August (1-21), 3.1. An additional 8 inches of irrigation was applied in 16 applications during June-August

Two five-foot sections from each plot were rated for pod infection and disease severity August 21. The number of infected pods and the percent infection was determined for each of these plants. The two center rows of each plot (a total of 32 feet of row) were mechanically harvested on August 22 and pods were graded to determine yield of size grades 1-3, 4 and 5 (Tables 1-2).

Frequent rainfall and warm, but not hot, weather conditions during July and August was generally favorable for white mold in Wisconsin commercial snap bean fields. Weather conditions during the bloom period of this field trial, however, were less favorable for disease development. Consequently, disease incidence and severity were low when compared with previous years and grower reports from the 2000 cropping season. In spite of low amounts of disease in this trial, some conclusions can be drawn. The application of CaSO₄ alone or mixed with either Auxigro or Topsin-M did not help to control white mold. The application of Topsin-M alone provided control similar to Topsin-M plus CaSO₄. F24 applied once either at full bud or 14 days after 10% bloom appears to provide a modest level of white mold control. Two applications of TD-2389-01 during the bloom period were ineffective for control. A single application of Elevate 50W 1.0 lb/A appeared to provide slightly better disease control than the 1.5 lb/A rate of this product. The application of 28% UAN at bud break without subsequent application of fungicide appeared to increase the level of white mold present in these trials, whereas two applications of Topsin-M after the UAN treatment at bud break provided acceptable control of white mold. Plots treated with a single application of 28% UAN plus either Topsin-M, Benlate, or Ronilan had slightly more white mold than plots treated once with these same fungicides in the absence of 28% UAN. Based on these data and data collected in 1998 and 1999, it appears that the application of 28% UAN at the time of fungicide application or near the time of bud break and bloom has a negative impact on white mold control. Yields in this experiment were variable, but lowest in the untreated control plots. There was no evidence of phytotoxicity in any of the treated plots. All but a few treatments

had a positive impact on the net crop value when compared with the untreated control plots. Highest net crop values were observed in plots treated with UAN, Topsin M, and UAN plus Topsin M.

Footnotes for Table 1.

- 1 A ten-foot section of row was rated in each plot. Severity of disease on the entire plant was estimated for each plant on a 0-10 scale (0 = no infection, 1 = 10% infected, 2 = 20 % infected . . . 10 = 100% infected). Numbers are the means of all plants rated (expressed as percentages).
- 2 The percentage of plants (out of the 10 ft of row rated) with any level of infection.
- 3 The percentage of plants (out of the 10 feet of row rated), where the only part of the plant that was infected was a leaf.
- 4 The total number of infected pods from the 10 ft of row rated, divided by the estimated total number of pods from 10 ft of row (number of plants x avg. number of pods/plant) (multiplied by 100 to express as a percentage).
- 5 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at $P = 0.10$. * = Differences between treatments were significant at $P = 0.10$, but not at $P = 0.05$.

Footnotes for Table 2.

- 1 Season-long cost of chemicals/Acre (rate, number of applications and retail cost are included in calculation). Retail prices used include: 28% UAN = \$.54/gal, Auxigro = \$49.50/lb, Benlate 50 WP = \$15.60/lb, Elevate = \$33.57/lb, Flo-Gyp = \$12.50/gal, Nufilm = \$ 23.50/gal, Ronilan 50 DF = \$20.40/lb, Topsin M WSB (70 WP), = \$15.35/lb. No price information was available for experimental or unlabeled products.
- 2 Based on typical 1999 contract pricing for beans from Central WI, according to the sieve size percentage of the yield. Price per ton is: <25 % #5 sieve - \$ 125.12; 25-29% - \$ 121.24; 30-34% - \$ 119.30; 35-39% - \$ 117.36; 40-44% - \$ 113.48; 45-49% - \$ 106.70; 50-54% - \$ 102.82; 55-59% - \$ 98.94; 60-64% - \$ 93.12; 65-69% - \$ 91.18; 70-74% - \$ 86.32; 75-79% - \$ 82.44; 80-84% - \$ 77.60; >84% - \$ 69.84.
- 3 Gross value minus cost of chemicals applied (calculated only for treatments with known chemical cost).
- 4 Net value of untreated control minus net value for the treatment.
- 5 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at the $P = 0.05$ (or $P = 0.10$) level. * = differences between treatments were significant at the $P = 0.10$ level, but not at $P = 0.05$.

Table 1. Effect of treatment on incidence and severity of white mold infection of snap beans.

Treatment and rate - formulated product and active ingredient, (in [])	Number of sprays & application schedule	Disease severity (%) ¹	Incidence of infected			Avg. no. infected pods/ plant	% of plants with				
			Plants ²	Leaf ³	Pods ⁴		0	1	2	3	4
							infected pods/plant				
1 Untreated Control	0	3.5	6.9	0.7	1.4	0.07	96.1	1.9	1.4	0.6	0.0
2 Auxigro, 4 oz +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	3.4	7.4	0.0	1.3	0.08	95.7	1.7	1.7	0.5	0.5
3 Auxigro, 4 oz +Nufilm-17 (0.125%)	1 Initial pod fill (10% bloom + 14 days)	3.1	6.4	0.3	0.5	0.03	97.0	3.0	0.0	0.0	0.0
4 Auxigro, 4 oz +CaSO ₄ (Flo-Gyp, 12.5 pt) +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	3.1	5.6	0.0	0.4	0.02	97.9	2.1	0.0	0.0	0.0
5 F24, 4 oz +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	0.5	2.1	0.0	0.1	0.01	99.3	0.7	0.0	0.0	0.0
6 F24, 4 oz +Nufilm-17 (0.125%)	1 Initial pod fill (10% bloom + 14 days)	1.4	2.3	0.0	0.1	0.00	99.7	0.3	0.0	0.0	0.0
7 CaSO ₄ (Flo-Gyp, 12.5 pt) + Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	4.1	10.1	0.0	1.1	0.06	95.2	3.7	1.1	0.0	0.0
8 TD-2389-01, 4.0 lb	2 10% bloom and 10% + 7 days	5.7	9.7	0.0	1.2	0.06	95.2	3.7	1.1	0.0	0.0
9 Topsin-M WSB, 1.5 lb [1.05 lb]	2 10% bloom and 10% + 7 days	0.6	1.0	0.0	0.1	0.01	99.3	0.7	0.0	0.0	0.0
10 Topsin-M WSB 1.0 lb [0.7 lb] + CaSO ₄ (Flo-Gyp, 12.5 pt)	2 10% bloom and 10% + 7 days	0.4	0.7	0.0	0.1	0.00	99.6	0.4	0.0	0.0	0.0
11 Elevate 50 WDG, 1.0 lb [0.5 lb]	1 10% bloom + 4 days	1.9	2.8	0.0	0.2	0.02	98.9	0.8	0.4	0.0	0.0
12 Elevate 50 WDG, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	2.6	6.9	0.4	0.7	0.05	96.9	1.5	1.2	0.4	0.0
13 Topsin-M WSB, 1.5 lb	1 10% bloom + 4 days	7.0	15.2	0.4	2.0	0.11	91.5	6.5	1.6	0.4	0.0
14 Benlate 50 WP, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	3.9	7.7	0.4	0.8	0.05	97.0	1.7	0.6	0.7	0.0
15 Benlate 50 WP, 1.5 lb [0.75 lb]	2 10% bloom and 10% + 7 days	0.8	1.1	0.0	0.1	0.00	99.6	0.4	0.0	0.0	0.0
16 28% UAN, 14.9 gal [45 lb N]	1 Bud break	5.2	11.4	0.4	1.5	0.09	94.3	3.4	1.1	1.1	0.0
17 28% UAN, 14.9 gal [45 lb N] Topsin-M WSB, 1.5 lb [1.05 lb]	1 Bud break 2 10% bloom and 10% + 7 days	0.6	1.0	0.0	0.1	0.01	99.4	0.6	0.0	0.0	0.0
18 28% UAN, 14.9 gal [45 lb N] Topsin-M WSB, 2.0 lb [1.4 lb]	1 Bud break 1 10% bloom + 4 days	4.7	8.4	0.0	0.8	0.05	95.8	3.5	0.7	0.0	0.0
19 Topsin-M WSB, 2.0 lb [1.4 lb]	1 10% bloom + 4 days	2.2	3.2	0.0	0.3	0.02	98.2	1.1	0.7	0.0	0.0
20 28% UAN, 4.0 qt [3.0 lb N] + Topsin-M WSB, 1.5 lb [1.05 lb]	2 10% bloom and 10% + 7 days	1.1	3.2	0.0	0.7	0.04	96.8	2.6	0.3	0.0	0.3
21 28% UAN, 4.0 qt [3.0 lb N] + Topsin-M WSB, 2.0 lb [1.4 lb]	1 10% bloom + 4 days	2.2	5.1	0.0	0.4	0.03	97.8	1.8	0.0	0.4	0.0
22 28% UAN, 4.0 qt [3.0 lb N] + Benlate 50 WP, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	1.9	4.4	0.3	0.5	0.03	98.0	1.4	0.6	0.0	0.0
23 28% UAN, 4.0 qt [3.0 lb N] + Ronilan 50 DF, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	2.8	4.5	0.0	0.4	0.02	97.6	2.4	0.0	0.0	0.0
24 Ronilan 50 DF, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	0.2	0.8	0.0	0.2	0.01	99.2	0.4	0.4	0.0	0.0
	Pr>F ⁵	0.11	0.06	0.73	0.19	0.28	0.16	0.07	0.66	0.10	0.54
	Lsd ⁵	NS	8.4*	NS	NS	NS	NS	3.3*	NS	0.7*	NS

Table 2. Effect of treatment on yield and value of snap beans.

Treatment and rate	Number of sprays & application schedule	Total yield (ton/A)	% of yield in size class			Cost of Chemicals per Acre ¹	Gross Value of Yield ²	Net Value of Yield ³	Effect of Treatment on Value ⁴
			1-3	4	5				
1 Untreated Control	0	3.8	1.8	3.9	94.3	0	267.14	267.14	0.00
2 Auxigro, 4 oz +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	4.2	3.9	4.3	91.9	13.40	291.71	278.30	11.17
3 Auxigro, 4 oz +Nufilm-17 (0.125%)	1 Initial pod fill (10% bloom + 14 days)	3.9	3.3	5.3	91.4	13.40	271.10	257.69	-9.44
4 Auxigro, 4 oz +CaSO ₄ (Flo-Gyp, 12.5 pt) +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	4.2	3.0	4.2	92.8	32.90	293.29	260.39	-6.75
5 F24, 4 oz +Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	3.9	2.2	3.7	94.2	---	275.85	---	---
6 F24, 4 oz +Nufilm-17 (0.125%)	1 Initial pod fill (10% bloom + 14 days)	4.8	2.9	3.8	93.3	---	332.14	---	---
7 CaSO ₄ (Flo-Gyp, 12.5 pt) + Nufilm-17 (0.125%)	1 Full bud (<10% bloom)	4.8	3.5	3.6	92.9	20.53	332.14	311.61	44.47
8 TD-2389-01, 4.0 lb	2 10% bloom and 10% + 7 days	4.4	2.5	4.2	93.3	---	304.39	---	---
9 Topsin-M WSB, 1.5 lb [1.05 lb]	2 10% bloom and 10% + 7 days	5.2	2.2	3.3	94.5	46.05	360.67	314.62	47.49
10 Topsin-M WSB 1.0 lb [0.7 lb] + CaSO ₄ (Flo-Gyp, 12.5 pt)	2 10% bloom and 10% + 7 days	4.6	2.5	3.2	94.3	69.70	324.21	254.51	-12.63
11 Elevate 50 WDG, 1.0 lb [0.5 lb]	1 10% bloom + 4 days	4.5	2.5	3.3	94.2	33.57	316.28	282.71	15.58
12 Elevate 50 WDG, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	4.1	2.8	5.3	91.9	50.36	285.37	235.01	-32.12
13 Topsin-M WSB, 1.5 lb	1 10% bloom + 4 days	5.5	2.5	3.6	93.9	23.03	382.87	359.84	92.71
14 Benlate 50 WP, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	4.0	6.3	4.2	89.4	23.40	285.10	261.70	-5.43
15 Benlate 50 WP, 1.5 lb [0.75 lb]	2 10% bloom and 10% + 7 days	5.1	2.0	3.2	94.8	46.80	356.71	309.91	42.77
16 28% UAN, 14.9 gal [45 lb N]	1 Bud break	5.5	3.1	3.8	93.1	8.05	387.62	379.58	112.44
17 28% UAN, 14.9 gal [45 lb N] Topsin-M WSB, 1.5 lb [1.05 lb]	1 Bud break 2 10% bloom and 10% + 7 days	6.2	2.8	7.5	89.8	54.10	451.31	397.21	130.08
18 28% UAN, 14.9 gal [45 lb N] Topsin-M WSB, 2.0 lb [1.4 lb]	1 Bud break 1 10% bloom + 4 days	5.4	3.6	3.6	92.8	38.75	376.53	337.78	70.64
19 Topsin-M WSB, 2.0 lb [1.4 lb]	1 10% bloom + 4 days	4.9	2.8	4.6	92.6	30.70	344.03	313.33	46.19
20 28% UAN, 4.0 qt [3.0 lb N] + Topsin-M WSB, 1.5 lb [1.05 lb]	2 10% bloom and 10% + 7 days	4.9	2.1	3.2	94.8	47.13	344.03	296.90	29.76
21 28% UAN, 4.0 qt [3.0 lb N] + Topsin-M WSB, 2.0 lb [1.4 lb]	1 10% bloom + 4 days	4.9	3.4	4.2	92.4	31.24	339.27	308.03	40.89
22 28% UAN, 4.0 qt [3.0 lb N] + Benlate 50 WP, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	4.7	2.2	3.7	94.0	23.94	328.96	305.02	37.89
23 28% UAN, 4.0 qt [3.0 lb N] + Ronilan 50 DF, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	4.6	2.3	3.4	94.3	31.14	322.62	291.48	24.35
24 Ronilan 50 DF, 1.5 lb [0.75 lb]	1 10% bloom + 4 days	4.6	2.4	3.4	94.2	30.60	323.42	292.82	25.68
	Pr>F ⁵	<0.01	0.23	0.68	0.35	---	<0.01	<0.01	<0.01
	Lsd ⁵	1.0	NS	NS	NS	---	73.29	74.72	74.72