

Control of seed-borne *Fusarium* dry rot with seed treatments and in-furrow applied fungicides in potatoes, 2003.

Potato seed cv. Pike was prepared for planting by cutting and inoculating with *Fusarium sambucinum* (dry rot) and treating with fungicidal seed treatments two days prior to planting. Two controls, either inoculated with *F. sambucinum* or non-inoculated were included in the trial. Potatoes free from dry rot were selected for the trials and disinfested by immersion in a 3% Clorox (sodium hypochlorite) solution for 30 min. The seed potatoes were cut into two pieces and inoculated with an aggressive isolate of *F. sambucinum* which was grown on potato-dextrose agar for 14 days. Conidia were harvested from the plates and concentration, determined by hemacytometer was adjusted to 3.4×10^3 conidia/fl oz. The seed pieces (160/treatment) were sprayed with 4 fl oz of the pathogen suspension, for a final dosage of about 0.03 fl oz applied per tuber. Dust formulations of seed treatments were measured and added to cut seed pieces in a Gustafson revolving drum seed treater and mixed for 2 min to ensure even spread of the fungicide. Fungicides applied as pre-planting potato seed liquid treatments were applied in water suspension at a rate of 0.02pt/cwt onto the exposed seed tuber surfaces, with the entire seed surface being coated in the seed treater. In furrow applications were made over the seed at planting, applied with a single nozzle R&D spray boom delivering 5 gal/A (50 psi) and using one XR11003VS nozzle per row. Seed was planted at the Michigan State University Montcalm Potato Research Farm, Edmore, MI on 15 May into single-row by 30-ft plots (ca. 9-in. between plants to give a target population of 40 plants at 34-in. row spacing) replicated four times in a randomized complete block design. Fertilizer was drilled into plots before planting, formulated according to results of soil tests. Additional nitrogen (final N 28 lb/A) was applied to the growing crop with irrigation 45 DAP (days after planting). Bravo WS 6SC was applied at 1.5 pt/A on a seven-day interval (eight applications), starting after the canopy was about 50% closed. A permanent irrigation system was established prior to the commencement of fungicide sprays and the fields were maintained at soil moisture capacity throughout the season by frequent (minimum 5 day) irrigations. Weeds were controlled by hilling and with Dual 8E at 2 pt/A 10 DAP and Poast at 1.5 pt/A 58 DAP. Insects were controlled with Admire 2F at 1.25 pt/A at planting, Sevin 80S at 1.25 lb/A 31 and 55 DAP, Thiodan 3 EC at 2.33 pt/A 65 and 87 DAP and Pounce 3.2EC at 8 fl oz/A 48 DAP. Seed-piece samples from each treatment (n = 25) were incubated at 50°F (95% RH) in controlled environment chambers for 14 days and the total number of healthy and dry rot affected sprouts was calculated in addition to the development of dry rot on the seed piece measured as percent decay. Emergence was rated as the cumulative number of plants breaking the soil surface or fully emerged after planting. The rate of emergence was estimated as the relative area under the plant emergence curve (RAUEPC; max=100) from the day of planting until 22 DAP. The rate of canopy development was measured as the relative area under the canopy development curve (RAUCDC; max = 100) calculated from day of planting to a key reference point taken as 58 DAP (about 100% canopy closure), (max = 100). Vines were killed with Reglone 2EC (1 pt/A on 5 Sep). Plots (40-ft row) were harvested on 9 Oct and individual treatments were weighed and graded. Maximum and minimum air temperature (°F) were 91.7 and 60.9 (Jun), 89.8 and 69.4 (Jul), 93.8 and 64.8 (Aug) and 85.5 and 61.7 (Sep). Maximum and minimum soil temperature (°F) were 82.3 and 70.1 (Jun), 79.9 and 73.3 (Jul), 82.7 and 75.4 (Aug) and 77.4 and 68.4 (Sep). Precipitation was 0.8" (Jun), 0.37" (Jul), 0.56" (Aug) and 0.98" (Sep).

There was no significant difference among treatments and inoculated/non-treated control (positive control) or the non-inoculated/non-treated (negative control) in total number of developing sprouts per tuber. All treatments had significantly fewer diseased sprouts per tuber than the positive control except treatments 6 and 8 which received no seed treatment. All other treatments were not significantly different from the negative control. All treatments had significantly less seed piece decay than the positive control except treatment 6 and 8 which received no seed treatment. All other treatments were not significantly different from the negative control. Treatments with 79% or greater plant stand were not significantly different from the negative control and those with less than 79% were not significantly different from the negative control. There was no significant difference among treatments in terms of final percent plant stand. Treatments with RAUEPC values 4.65 or greater plant stand were not significantly different. Treatment 6 had the lowest RAUEPC value (4.38) and emerged at a significantly lower rate than treatment 7. All treatments had a significantly greater rate of canopy closure (RAUCC) than the positive control except treatment 6. No treatments had a significantly different rate of canopy closure (RAUCC) than the negative control except treatment 6 and the positive control. There were no differences in marketable yield among any treatments. The negative control had a significantly greater total yield than the positive control but there were no differences in total yield among any other treatments.

Treatment rate/cwt (seed treatment) rate/1000 ft. row (in furrow)		Total number of developing sprouts ^z		Diseased sprouts (%) ^y		Seed piece decay (%) ^x		Final plant stand (%)		Rate of emergence RAUEPC ^w		Rate of canopy closure RAUCDC ^v		Yield (cwt/A) US1 ^u Total			
1 Maxim MZ 0.5 lb	ST ^t	4.16	a ^s	7.3	a	0.6	c	79	abc	5.78	ab	34.1	a	350	a	378	ab
2 None (inoculated, positive)	NA	4.64	a	57.4	c	18.3	a	64	bc	4.65	abc	13.4	b	295	a	317	b
3 None (non-inoculated, negative)	NA	3.52	a	0.0	a	0.7	c	96	a	6.84	ab	34.1	a	384	a	411	a
4 Moncoat MZ 0.5 lb	ST	4.04	a	9.3	a	1.8	c	95	a	6.79	ab	35.4	a	349	a	372	ab
5 Headsup 3WDG 0.1 lb	ST	3.32	a	4.8	a	0.6	c	71	abc	4.38	bc	14.3	b	338	a	365	ab
6 Moncut 70DF 1.18 oz/1000 ft	IF	4.36	a	44.9	bc	16.7	ab	91	ab	6.58	ab	35.8	a	329	a	355	ab
7 Maxim 4 FS 0.08 floz	ST	3.64	a	2.1	a	0.7	c	94	a	7.25	a	33.0	a	345	a	369	ab
8 Scholar 3.4 oz/1000 ft	IF	4.36	a	41.1	bc	14.3	ab	93	a	6.06	ab	33.9	a	363	a	389	ab

^zTotal number of developing sprouts per seed piece (n = 20) after 14 days incubation at 50°F.

^yPercentage dry rot affected sprouts per seed piece (n = 20) after 14 days incubation at 50°F.

^xPercentage development of dry rot on the seed piece (n = 20) after 14 days incubation at 50°F.

^wRAUEPC, relative area under the plant emergence progress curve calculated from the day of planting to full emergence at 29 days after planting (max = 100).

^vRAUCPC, relative area under the canopy development curve calculated from day of planting to key reference point taken as 50 days after planting (about 100% canopy closure)

^uMarketable yield, tubers greater than 2.5" in any plane (US1 grade).

^tApplication type, ST = seed treatment; dust formulations of seed treatments were measured and added to cut seed pieces in a Gustafson revolving drum seed treater and mixed for two minutes to ensure even spread of the fungicide. Fungicides applied as pre-planting potato seed liquid treatments were applied in water suspension at a rate of 0.02pt/cwt onto the exposed seed tuber surfaces. IF = In-furrow applications, made over the seed at planting, applied with a single nozzle R&D spray boom delivering 5 gal/A (50 p.s.i.) and using one XR11003VS nozzle per row.

^sMeans followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).