

FUNGICIDE SEED-PIECE TREATMENT OF POTATOES
FOR CONTROL OF RHIZOCTONIA DISEASE

Frederick J. Crowe and Steven R. James¹

ABSTRACT

Artificial infestation of seed pieces resulted in increased and more uniform Rhizoctonia disease. No statistical differences among fungicide seed treatments were found; however, trends toward differing performance of fungicides were seen.

Decay of potato seed pieces from Rhizoctonia and fusarium fungi can result in reduced stand, weak stems, and reduced yield, both in weight, tuber size, and tuber quality. Testing fungicides for control of these diseases frequently is complicated by field conditions which do not favor the diseases, or by nonuniformity of natural disease among test plots. This trial was designed to accomplish three objectives:

1. Compare commonly available seed treatment products for their influence on potato performance, in particular with respect to Rhizoctonia disease.
2. Determine if an artificial infestation technique might result in increased and more uniform Rhizoctonia disease, in an effort to provide a uniform test of products.
3. Assess the effectiveness of the Rhone-Poulenc product Rovral (active ingredient = iprodione), which has no potato seed treatment label.

Materials and Methods

Materials utilized, manufacturers, and rates of application are shown in Table 1.

On May 22, 1985, Russet Burbank potato seed was cut, sized to approximately 2 oz./seed piece. Some seed was treated with fungicide and some seed was surface-infested with Rhizoctonia as described below. Planting was by hand on the same day as treatment. In 30 bed-foot plots, 40 seed pieces were placed evenly in open planting lines and were then covered by machine. The entire test area received 1,000 lbs/ac 16-16-16 before planting.

¹ Superintendent/associate professor and research assistant, respectively, Central Oregon Experiment Station, P.O. Box 246, Redmond, OR 97756.

Table 1. Products used in seed treatment trial

Product	Formulation	Active Ingredient	Rate lbs product/ 100 lbs seed
Tops	2.5% Dust	thiophanate-methyl	1
Captan	5% Dust	captan	1 1/2
Manzate 200	using Manzate 200 80% WP, a 8% ai mancozeb dust was created by mixing with talcum powder		1 (of Manzate 200 80WP)
TBZ	1 1/2% Dust (+ bark)	thiabendazole	1
Rovral	using Rovral 50% WP, a 5% ai iprodione dust was created by mixing with talcum powder		1 (of Rovral 50WP)

Preparation of *Rhizoctonia* was begun 6 weeks ahead of planting. *Rhizoctonia solani* isolated from a potato tuber was cultured in the laboratory on sterilized barley, which was then air-dried and ground in a Wiley mill. For surface infestation, 15 gm of the inoculum was placed into paper bags with freshly cut potato seed pieces which were shaken until cut surfaces were coated. The appropriate amount of seed treatment materials were then added to the bags which were reshaken until potato surfaces were well coated. Seed was planted on the same day as cutting, infestation, and seed treatment. Soil was dry at planting time and the first irrigation was delayed 2 additional days. Treatments were in a randomized block experimental design, with the data analyzed by analysis of variance.

Stand counts were taken on July 18, 1985, the plots were harvested on October 16, 1985, and graded on October 23, 1985. A soil-penetrating freeze occurred before harvest, but freeze damage was ignored in rating of tuber sizes and weights during the post-harvest grading process.

Results

Stand and harvest data are shown in Table 2.

Table 2. Effect on potato performance of surface infestation of potato seed pieces with *Rhizoctonia*, followed by fungicide seed treatment

Seed Treatment*	Stand on 5/22/85 %	Tuber numbers by grade				Harvest weight by grade			
		Under	Twos	Ones	Total	Under	Twos	Ones	Total
----- cwt/A -----									
Tops 2.5% Dust + R	90.6	156	10	127	295	126.2	25.3	248.1	408.9
Captan 5% Dust + R	93.3	141	10	114	264	115.5	24.3	235.0	378.3
Manzate 200 8% Dust + R	79.4	126	9	110	248	101.6	21.9	234.5	367.6
TBZ 1 1/2% Dust + R	83.8	143	13	114	273	111.5	33.6	233.9	387.6
Rovral 5% Dust + R	84.4	146	6	101	253	113.1	16.5	215.0	347.6
No Fungicide + R	77.5	118	9	105	235	90.4	27.5	230.7	359.3
Average Trts. 1 thru 6	84.8	138.3	9.5	118.8	261.3	109.7	24.8	232.9	374.9
Tops 2.5% Dust	98.8	151	16	132	300	123.0	34.1	266.8	426.3
Captan 5% Dust	97.5	164	12	141	318	124.8	25.3	281.7	439.1
Manzate 200 8% Dust	90.6	128	13	121	264	106.7	29.1	238.7	380.1
TBZ 1 1/2% Dust	92.3	167	10	121	298	132.3	22.7	245.6	399.6
Rovral 5% Dust	93.1	171	13	115	300	136.0	28.3	214.5	384.4
No Fungicide	90.0	144	10	133	288	114.7	22.7	268.1	406.8
Average Trts. 7 thru 12	93.7	154.2	12.3	127.2	294.7	122.9	27.0	252.6	406.1
Statistical Significance (P = 0.05)									
a. among fungicides	No	No	No	No	No	No	No	No	No
b. infestation with Rhizoctonia	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes

* Fungicide is listed, without or with prior infestation with *Rhizoctonia* (R). Rates used were labeled rates, or (for Rovral) rates suggested by the product supplier. Manzate 200 and Rovral were reformulated by mixing manufactured product and talcum powder.

Infestation of seed pieces with Rhizoctonia resulted in statistically significantly lower stands, tuber numbers, and harvest weights (for most grades). However, within infested and noninfested groups, fungicide seed treatments did not result in significant differences from untreated (no fungicide) checks. Fungicides may have had small effects not measurable in this test, because for stand counts there was a trend for untreated checks to be lower than fungicide treated checks. Also for infested treatments, the untreated check had the lowest or nearly the lowest tuber number and harvest weight in each harvest grade. Tops and Captan treated potatoes tended to have the best performances in the trial.

Discussion

Although surface infestation of potato seed pieces with Rhizoctonia resulted in lowered potato performance, differences among seed treatment materials in overcoming this lowered performance were not enough for statistical significance at the 5% level. Tops and Captan performed the best, but were not greatly different from other products. Conditions for Rhizoctonia activity were not pronounced -- treatment differences might be more easily tested under higher than optimal soil moisture, and this test was not overwatered. Nevertheless, the surface infestation technique appears promising for inducing uniform disease for fungicide evaluation. Because the infestation technique is artificial, it might result in different disease ingress than the seed treatment materials are designed to control; however, we feel it does simulate realistic disease conditions and will prove useful in the future.