



Fungicide Applications for Control of White Rot in Onions

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Building upon a partially successful trial in 2003 (IREC *Research Progress* #109), an extensive fungicide application trial was conducted in 2004 to evaluate a number of fungicides and fungicide combinations for the control of white rot disease in onions. The trial was conducted on the University of California Intermountain Research and Extension Center in Tulelake, California in a field known to be heavily infested with the white rot fungus (*Sclerotium cepivorum*). Three fungicides were evaluated: Maxium (fludioxonil), Folicur (tebuconazole) and Endura (boscalid). The fungicides were applied pre and post plant, alone and in combination. Application methods included adding fungicides to the coating on pelleted onion seed; spraying fungicide into the seed furrow at planting; layering fungicides with a spray blade 2 inches deep just prior to planting; and broadcast applications of fungicides post plant and post emergence just prior to an irrigation. Our previous studies indicated that the method of soil application may be critical to the efficacy of these materials. A complete listing of the fungicide treatments evaluated, including rates and application methods is presented on Table 1.

Methods

The experiment was conducted on Tulelake Basin mucky silty clay loam soil (approximately 10% organic matter). Dehydrator onions were planted on May 1, 2004 at a seeding rate of approximately 1.8 lbs per acre of raw seed adjusted for pelleted seed. The pelleted seed was prepared by Skaggit Seed Services and included Maxim at 0.08 oz per lb of raw seed. Two seed lines of onions were planted 8 inches apart on raised 36 inch wide planting beds. Planting depth was approximately ½ inch deep for both raw and pelleted seed.

Each fungicide treatment was applied to four replicated plots arranged in a randomized complete block design. Individual plot sizes were 6 foot (two onion beds) by 20 foot. For the in-seed-furrow applications, fungicides were pressure injected with water carriers into the planting shoe just ahead of the planted seed. The seed furrow was then closed by the packer wheels on the planter. The spray blade applications were made just prior to planting. Two, 8 inch wide, tractor mounted sweeps, fitted with flat fan spray nozzles, were used to apply a layer of fungicide 2 inches deep and 16 inches wide across the top of each planting bed.

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Broadcast fungicide applications were applied with a hand held CO₂ pressure sprayer using a spray volume of 20 GPA. Broadcast applications were immediately followed by the application of 1.3 inches of irrigation water through solid-set sprinklers.

Onions were grown to maturity using irrigation, fertilizer and pest management practices consistent with commercial production in the area. White rot symptoms began to appear in the trial area the first week in August. By late September most all of the plots were showing some level of disease. On October 14 and 15, the plots were mechanically harvested. All onion bulbs were weighed and sorted for the presence or absence of white rot disease.

The bulb yield results by treatment are presented on Table 1. While white rot was present throughout the trial area, the infestation was definitely higher in some areas (replications) than others. The bulb yields presented on Table 1 are the actual yields by treatment averaged across all replications. However, the percent control averages have been statistically transformed to better account for the large differences in infection between replications. Infection levels were relatively high in the untreated control plots with approximately 44% of the harvested bulbs infected.

Each of the three fungicides tested exhibited a degree of white rot control; but, in each case, efficacy was affected by the method of application. Broadcast sprinkler incorporated applications of Folicur (treatments 7, 8 and 9), did not appear to be as effective as in-seed-furrow applications; although, mid and late season broadcast treatments of Folicur did appear to boost control when added to Folicur applied in-seed-furrow at planting (treatment 4). The spray blade applications of Folicur were about equally effective to the in-seed-furrow applications. The control gained with Maxim seed coating was nearly the same as exhibited by the Maxim in-seed-furrow applications. However, Maxim was generally ineffective when applied with the spray blade. Endura applied in-seed-furrow or broadcast provided control similar to the best Maxim treatments; but, like Maxim, Endura was less effective applied with the spray blade.

The best overall control (85%) was provided by treatment 4, which included an in-seed-furrow application and two follow-up broadcast applications of Folicur. The next best control (78%) was achieved from the combination of Folicur applied in the seed furrow with Maximium coated seed. Given the high white rot infestation in the trial area, the level of control produced by the top two treatments is particularly encouraging. It is tempting to speculate that these treatments could provide commercially acceptable control under reduced disease pressures normally encountered in commercial onion fields.

Table 1. Fungicide treatments, onion bulb yields and percent white rot control. 2004 Onion Fungicide White Rot Trial

No.	Fungicide	Application Method	Rate	Yield (cwt)			*Percent Control
				Clean	White Rot	Total	
1	Folicur	In seed furrow at planting	1.7 pt/A	268	57	325	65
2	Folicur	In seed furrow at planting	3.4 pt/A	284	42	327	60
3	Folicur	In seed furrow at planting Broadcast before irrigation 60 DAP	1.7 pt/A 1.7 pt/A	274	69	342	60
4	Folicur	In seed furrow at planting Broadcast before irrigation 60 DAP Broadcast before irrigation 90 DAP	1.7 pt/A 1.7 pt/A 1.7 pt/A	309	32	341	85
5	Folicur	Spray blade @ 2"	1.7 pt/A	264	115	378	53
6	Folicur	Spray blade @ 2"	3.4 pt/A	299	80	379	59
7	Folicur	Broadcast prior to first irrigation	1.7 pt/A	232	102	334	34
8	Folicur	Broadcast prior to first irrigation Folicur Broadcast before irrigation 60 DAP	1.7 pt/A 1.7 pt/A	219	111	330	22
9	Folicur	Broadcast prior to first irrigation Folicur Broadcast before irrigation 60 DAP Folicur Broadcast 90 DAP	1.7 pt/A 1.7 pt/A 1.7 pt/A	271	94	365	39
10	Maxim	In seed furrow at planting	0.125 pt/A	260	87	347	45
11	Maxim	In seed furrow at planting	0.25 pt/A	243	101	343	39
12	Maxim	Spray blade @ 2"	0.125 pt/A	173	139	312	0
13	Maxim	Spray blade @ 2"	0.25 pt/A	196	117	313	18
14	Maxim	Coated seed	0.08 oz/cwt	241	111	352	36
15	Maxim Apron	Coated seed Coated seed	0.08 oz/cwt 0.64 oz/cwt	218	105	323	31
16	Folicur Maxim	In seed furrow at planting Coated seed	1.7 pt/A 0.08 oz/cwt	256	50	306	78
17	Folicur Maxim	Spray blade @ 2" Coated seed	1.7 pt/A 0.08 oz/cwt	211	106	317	29
18	Maxim Folicur	Coated seed Broadcast before irrigation 60 DAP	0.08 oz/cwt 1.7 pt/A	226	102	328	26
19	Endura	In seed furrow at planting	10 oz/A	240	94	334	52
20	Endura	Spray blade @ 2"	10 oz/A	185	120	306	25
21	Endura	Broadcast	10 oz/A	227	98	324	39
22	Endura Endura	Broadcast Broadcast before irrigation 60 DAP	10 oz/A 10 oz/A	244	94	338	43
23		Untreated		153	135	288	
24		Untreated		188	129	316	
		Mean		237	95	332	
		CV%		18.0	31.4	8.3	
		LSD(0.05)		60.2	42.2	38.9	

*Average white rot control percentages were statistically weighted to account for the large differences in white rot infestation among replications.