

Controlled Application of Fungicide onto Onion Seed

In August 1973, through arrangements by C.E. Peterson of the University of Wisconsin, WARF became aware of work being pursued to develop control of white rot on sweet white Spanish onion: Previous work had indicated that 5-15 lbs/acre of fungicide in the furrow is required to control white rot.

Benlate (E.I. DuPont) was selected for the initial testing. The WARF Institute Coating Department* tested the fungicide for use as a coating material and found that the product as commercially available has film forming properties and can be applied without modification. 300 grams of onion seed were loaded into the 6" laboratory Wurster unit and the fungicide coating applied. Samples were taken at Benlate: seed ratios of 2:1, 4:1, 6:1, and 8:1. Processing time was four hours for preparation of all the above samples. The coated seeds were sent to Peter Adams of USDA, Maryland and Otis Maloy of USDA, Washington for evaluation. We wish to express our gratitude for permission to use this data.

Samples of seed were planted in both greenhouses and field plots in southern New Jersey on September 17, 1973. For undetermined reasons the field plots had very low germination; however the seeds at 2:1 ratio compared favorably with the control seeds.

TABLE 1 Field Data, 20 day emergence (planted Sept. 17, 1973)

Control	6.5% emergence
2:1 Benlate:Seed	7.3%
8:1 Benlate:Seed	2.7%

Note: Benlate is 50% Benomyl

The greenhouse data (8 hours at 80 degrees F. with lights, 16 hours at 70 degrees F. without lights indicates better germination.

TABLE 2 Greenhouse Data, 14 day emergence

	Sterile <u>Soil</u>	10% <u>Infested</u>	100% <u>Infested</u>
Control	42.5%	42.5%	62.5%
2:1	82.5	47.5	65.0
4:1	90.0	45.0	67.5
6:1	35.0	17.5	10.0
8:1	0	45.0	15.0

Both the greenhouse and field plots were exposed to white rot pathogen, Sclerotium cepivorum, to determine the degree of protection afforded by the coating. The greenhouse plants were examined after three months.

TABLE 3

	<u>% Soil Infestation</u>	<u>Bulbs % White Rot</u>
Control	0	0
2:1	0	0
4:1	0	0
6:1	0	0
8:1	0	0
Control	10	90
2:1	10	8
4:1	10	3
6:1	10	0
8:1	10	0
Control	100	100
2:1	100	31
4:1	100	23
6:1	100	0
8:1	100	0

The 100% infested soil contained 250 Sclerotium cepivorum per 100 grams soil, a level estimated to be 100 times that found in test fields. The 10% infested soil is a mixture of nine parts sterile soil and one part 100% infested soil.

Because of the poor emergence of the field test plots above, the plots were not maintained by the field staff. In spite of this, yield data was collected from the test plots with the following results.

TABLE 4

	<u>% Plants Infected</u>	<u>Number of Plants</u>	<u>Yield</u>
Control	33%	24	634 g
2:1	7	46	2683
8:1	8	13	696

At the same time that the above tests were being conducted in New Jersey additional tests were being conducted on a selected farm in the state of Washington. Three different seed treatments were tested as follows:

1. Fungicide placed directly in the furrow;
2. Seeds wetted with methylcellulose and mixed with an equal volume of fungicide and dried;
3. Seed coated with fungicide as described above.

All seeds were hand planted in plots consisting of two rows ten feet long, replicated fifteen times in the field. In the first two treatments the seeds were planted at approximately 200 seeds per plot (20 seeds/ft). The seed which had been coated was easier to handle because of its larger size and was planted at two to three inch intervals, a density of 80 to 100 seeds per plot. The seeds were planted on September 11th, 1973 and harvested July 18th, 1974.

TABLE 5 Field Data, Washington

		<u>Lbs/Acre</u>	<u>Germin.</u>	<u># Bulbs</u>	<u>Wt. Bulbs</u>	
	Control	0	3%	6	1.0 lbs	
Treat #1	(furrow)					
	Botran	15	45	89	8.6	
	Benlate	10	89	177	16.0	
	Benlate	5	67	133	13.3	
	Topsin	10	89	177	18.3	
Treat #2	(mixed)					
	Topsin	5	77	154	15.5	
	Botran		10	20	3.3	
	Benlate		38	75	8.1	
Treat #3	(coating)					
	Benlate	2:1	0.4	30	59	9.4
		4:1	0.8	21	41	9.1
		6:1	1.2	23	46	10.2
		8:1	1.6	26	52	11.9

The data indicate a reduced germination for those samples which are coated with fungicide but also an average weight per bulb twice that for the other treatments. Fresh samples have been prepared for the current season. The procedure has been changed to prevent the fungicide from being in direct contact with the seed and the fungicide Topsin-M (Pennwalt) has been used in place of Benlate because it is reported to be less phytotoxic.

REFERENCES

1. Encapsulation of Solid Particles; Abrams and Hinkes, September, 1974, Controlled Release Pesticide Symposium.

2. Acceptability and Performance of Encapsulated Warfarin, reprinted from Pest Control, May, 1974.
3. Air Suspension Encapsulation of Moisture Sensitive Particles Using Aqueous Systems; Hall and Hinkes, reprinted from Microencapsulation: Processes and Applications, Edited by J.E. Vandegaer, 1974.

* WARF Institute Coating Department was purchased by the employees and became Coating Place, Inc. in December, 1976.

This paper is an expert of the original paper presented at the Controlled Release Pesticide Symposium, 1975, Dayton, Ohio.