Novel Carriers for Potato Seed Piece Fungicides

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Abstract

Various combinations of wood flours and sunflower hulls were tested as carriers for seed-piece fungicides on 'Shepody' potatoes at the Madras site of the Central Oregon Agricultural Research Center. The experimental treatments all included the same fungicide ingredients contained in MonCoat® MZ. Emergence for the experimental carrier treatments generally trended lower than for the commercial products, although the differences were not statistically significant. The number of tubers per plant was relatively constant among the treatments. There were no significant differences among the total and U.S. No. One yields. The data suggest that the experimental fungicide carriers tested in this experiment offer results comparable to commercially available products.

Introduction

It is a common practice in the western United States to cut whole potatoes into seed pieces prior to planting. This process produces open wounds that are subject to invasion by a number of pathogens. Cut seed pieces heal or form a crust on the cut surfaces when subjected to the proper environment, but this process takes time. Commercial operations generally do not have the facilities or the time to allow for this natural wound-healing process to occur. Instead, cut seed pieces are usually treated with a fungicide to minimize the potential for infection and decay or enhance wound healing and periderm formation on the cut surface. The fungicides or wound-healing compounds are added to carrier materials to facilitate uniform coverage over the entire surface of the seed pieces.

Wood or bark flours are typically used in seed-piece treatment formulations and serve both as carriers for fungicides and enhance wound healing. In addition, bark, talc, and other seed-piece treatment carrier materials adhere to moist surfaces of cut tubers and promote a smooth flow of seed pieces in planting equipment. Potato seed-piece treatment formulations with bark typically have used Douglas fir (*Pseudotsuga*) or alder (*Alnus rubra*) bark because this material was readily available. Western juniper (*Juniperus occidentalis*) is a nuisance species that has invaded millions of acres in the western states. Extensive efforts are underway to develop markets for products from this species. Other low-value products such as hulls from seeds may be useful as carriers for seed-piece treatments.

A similar study in 2004 was initiated to determine whether wood flour from western juniper could be a suitable alternative to alder or fir bark as a carrier for potato seed treatment products (Central Oregon Agricultural Research Center [COARC] 2004 Annual Report, Special Report 1060, pages 37-39). A 2005 study examined various combinations of maple wood flour and sunflower hulls (COARC 2005 Annual Report, Special Report 1066, pages 45-47). The 2006 study included various hardwood and softwood flours as well as combinations with finely ground sunflower hulls.

Materials and Methods

Five experimental seed-piece treatment formulations were compared with commercial standards Tops® MZ® (thiophanate-methyl/mancozeb, Bayer CropScience), MonCoat® MZ (flutolanil/mancozeb, Nachino America, Inc.) and Maxim® MZ (fludioxonil/mancozeb, Syngenta). The experimental treatments all included the active ingredients in Moncoat MZ but differed in the carrier used. The carrier treatments included hardwood flour, hardwood flour plus sunflower hulls, sunflower hulls, softwood flour plus sunflower hulls and GS-48 (hardwood flour plus sunflower hulls plus 8-20-20 fertilizer plus a plant growth regulator).

Certified 'Shepody' seed was sorted into 6- to 8-oz tubers and cut into 4 pieces per tuber on May 9, 2006. Seed pieces averaged 1.68 oz. For each of the 8 treatments, 128 freshly cut seed pieces (32 per replicate) were weighed and placed into a clean, dry bucket along with approximately 0.5 lb of treatment material. The seed pieces and treatment material were mixed and transferred several times between two buckets. Seed pieces were allowed to air-dry and any remaining treatment material was collected and weighed. Treatment material adhering to seed pieces were 0.96, 1.09, 1.34, 1.18, 1.45, 1.06, 1.41 and 1.33 lb treatment/100 lb seed for treatments one through eight, respectively.

The experiment was planted near Madras, Oregon on May 10, 2006 and included four replications of single-row, 32-hill plots arranged in a randomized complete block design. Seed was spaced at 9 inches in 36-inch rows. Fertilizer was banded at planting at 182 lb N/acre, 182 lb P_2O_5/acre, 182 lb K_2O/acre, and 80 lb S/acre. Admire® (imidicloprid, Bayer CropScience) was applied at 0.26 lbs active ingredient (a.i.)/acre at planting to control insects. Eptam® 7-E (s-ethyl dipropylthiocarbamate, Gowen) was applied before planting at 5 pt/acre on May 5 for weed control. Additionally, a tank mixture of 1.5 oz/acre of Matrix® (rimsulfuron, DuPont), 1 pt/acre of Eptam, methylated seed oil adjuvant (1 percent by volume), and liquid ammonium sulfate (4 percent by volume) was applied for post-emergence weed control on July 14 after hilling. The experiment was irrigated with solid-set sprinklers based on AgriMet (http://www.usbr.gov/pn/agrimet/) crop water use calculations for Madras potatoes. Emergence data were collected on June 22.

Vines were rolled on September 13 and plots were harvested on October 4. All tubers were graded to USDA standards on October 5.

Results and Discussion

Plant emergence 42 days after planting ranged from 91 to 98 percent with the standard commercial products Tops MZ, MonCoat MZ, and Maxim MZ at 97, 98, and 95 percent, respectively. Emergence for the experimental carrier treatments generally trended lower than the commercial products, although the differences were not statistically significant. The number of tubers per plant was relatively constant among the treatments.

Yields were in the normal range for the local area (Table 1.). Total yields ranged from 483 to 543 cwt/acre; U.S. No. One yields ranged from 361 to 433 cwt/acre. There were no significant

differences among the total and U.S. No. One yields. The data suggest that the experimental fungicide carriers tested in this experiment offer results comparable to commercially available products.

Table 1. Effect of seed-piece carriers on 'Shepody' potatoes, Madras, Oregon, 2006.

Seed-piece carrier	<4oz	<---- 4-12	Ones 12+	-----> Total	Culls	Total yield	Tubers/ plant	Emergence
	<----------cwt/acre---------->							42 Days
Hardwood	30	170	219	390	115	535	5.0	91
HW/Sun Hulls	29	198	163	361	93	483	4.6	96
Sun Hulls	26	185	204	389	77	492	4.6	92
Softwood/Sun	20	177	256	433	90	543	4.5	91
GS-48	38	198	165	363	85	486	5.0	94
Tops MZ	27	177	213	390	110	527	4.7	97
MonCoat MZ	25	203	216	419	50	494	4.4	98
Maxim MZ	37	205	191	397	69	503	4.9	95
LSD (5%)	ns	ns	ns	ns	ns	ns	ns	ns

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