USING ALTERNATE CARRIERS FOR SEED PIECE TREATMENTS ON RUSSET NORKOTAH POTATOES

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Abstract

An experiment to evaluate various combinations of maple wood flour and sunflower hulls as carriers for seed piece treatments on Russet Norkotah potatoes was planted at the Madras site of the Central Oregon Agricultural Research Center. Plant emergence 28 days after planting ranged from 91 to 100 percent. Stem counts showed a uniform canopy with treatments and standards at 2.1 to 2.5 stems per plant. Differences in emergence and stem counts were not statistically significant. Yields were very high with a large percentage of tubers over 12 oz. The standard seed piece treatment Evolve® had a significantly higher total yield than the standard Tops® and the experimental formulation with soluble fertilizer and a plant growth regulator (F6). Differences in total yield between other experimental formulations and Evolve were not significant. There were no significant differences in U.S. No. 1 yields between Evolve and the experimental formulations.

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. Some treatments serve to enhance wound healing and periderm formation on the cut surface. The fungicides or wounding-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 to enhance wound healing. In addition, bark, talc, and other seed piece treatment carrier materials adhere to the 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 menziesii*) 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 (see Central Oregon Agricultural Research Center 2004 Annual Report, Special Report 1060, pages 37-39). The 2005 study examined various combinations of maple wood flour and sunflower hulls. Three locations were included to expose the formulations to a range of soil and

climatic conditions with potentially differing disease pressures. This report does not include the results from the Klamath Falls or Ontario locations.

Materials and Methods

Six experimental seed piece treatment formulations were compared with commercial standards Evolve® (thiophanate-methyl-mancozeb-cymoxonil, Gustafson) and Tops® (thiophanate-methyl, Gustafson). Experimental formulations evaluated included: F1) maple flour at 24.3 percent; F2) maple flour at 18.2 percent and sunflower hulls at 6.1 percent; F3) maple flour at 12.2 percent and sunflower hulls at 12.2 percent; F4) maple flour at 6.1 percent and sunflower hulls at 18.2 percent; F5) sunflower hulls at 24.3 percent; and F6) maple flour at 17.8 percent, sunflower hulls at 5.9 percent, and GS-48 (8-20-20 plus plant growth regulator at 1 oz per cwt of cut seed) at 1 percent.

Certified Russet Norkotah seed was sorted into 6- to 8-oz tubers and cut into 4 pieces per tuber on May 9. Seed pieces averaged 1.80 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 400 g 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 was 0.75, 0.55, 0.74, 0.66, 0.74, 0.64, 1.27, and 1.09 lb treatment/100 lb seed for treatments one through eight, respectively.

The experiment was planted near Madras, Oregon 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 on May 25 at 151 lb N, 110 lb P_2O_5, 110 lb K_2O/acre and 66 lb S/acre. Admire® (imidicloprid, Bayer) was applied at 0.36 lbs active ingredient/acre at planting to control insects. Eptam® 7-E (s-ethyl dipropylthiocarbamate, Gowen) was applied at 5 pints/acre on May 8 for weed control. The experiment was irrigated with solid-set sprinklers based on AgriMet crop water use calculations. Emergence data were collected on June 22. Stem counts were taken on October 18 prior to harvest.

Vines were rolled on September 14 and plots were harvested on October 18. All tubers were graded to USDA standards in late October.

Results and Discussion

The amount of product that adhered to cut seed ranged from 0.55 to 0.75 lb/cwt of cut seed for the experimental formulations. Evolve and Tops treatments were much higher at 1.27 and 1.09 lb/cwt, respectively. Emergence at 28 days after planting ranged from 91 to 100 percent, with 94 percent emergence for Evolve, 97 percent for Tops, and 100 percent for treatment F6 (Table 1). Stem counts showed a uniform canopy among treatments and standards at 2.1 to 2.5 stems per plant. Differences in emergence and stem counts were not statistically significant.

A favorable growing season resulted in very high total yields. U.S. No. 1 grade yields were also high, with a large percentage of tubers over 12 oz. Some of the large tubers were rough, placing

them in the cull category. The standard seed piece treatment Evolve had a significantly higher total yield than the standard Tops and the experimental formulation (F6) with soluble fertilizer and a plant growth regulator. Differences between other experimental formulations and Evolve were not significant. Total yield of U.S. No. 1 grade potatoes was significantly higher for the standard treatment of Evolve than for Tops but not for any of the experimental formulations. Evolve also produced high yields in the 2004 trial conducted at the Central Oregon Agricultural Research Center. This suggests there may be a disease issue at this site that is being suppressed by the cymoxonil component in this product.

Table 1. Effects of seed piece treatments on yield and emergence of Russet Norkotah potatoes, Madras, Oregon, 2005.

		<----	No. 1s	----->		Total	Stems/	Percent
Treatment	<4oz	4-12	12+	Total	Culls	yield	plant	emergence
	<----------cwt/acre---------->							28 days
F1	27	140	296	436	110	575	2.4	97
F2	19	142	335	474	118	619	2.1	94
F3	22	187	331	518	71	611	2.3	97
F4	22	194	289	484	116	621	2.3	91
F5	22	184	307	490	70	582	2.3	94
F6	26	207	283	491	36	553	2.5	100
Evolve	24	158	371	529	109	665	2.3	94
Tops	25	178	207	385	85	494	2.4	97
LSD (5%)	ns	ns	108	118	65	88	ns	ns

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