

## POTATO SEED PIECE TREATMENT STUDY

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### Abstract

An experiment designed to evaluate the efficacy of various potato seed piece treatments was planted at the Powell Butte site of Central Oregon Agricultural Research Center. Seed piece treatments included an untreated check, Maxim 5D, Maxim 4FS, Captan 5D, Tops 2.5D, fir bark, gypsum flour, and untreated suberized seed. Because of the rapid emergence and ideal soil moisture conditions, there were no statistically significant stand differences among the treatments tested. Significantly fewer stems per hill were observed for the suberized treatment than for any other treatment. The suberized treatment produced the highest yield of No. 1 grade potatoes, the largest tuber size, and the fewest number of tubers per hill among all treatments tested. The lowest yields of No. 1 grade potatoes were observed for the Maxim treatments.

### Introduction

Various pathogens have the potential to cause serious problems some years in cut potato seed. Poor stands caused by seed piece decay may be especially troublesome in years characterized by unfavorable soil moisture and weather conditions. Although seed piece treatments may not be necessary every year, many growers annually benefit from the insurance seed piece treatments provide (4).

The cut tuber used as a seed piece is very susceptible to pathogen infection when placed in a favorable soil environment (2). Rapid formation of suberin and periderm under the cut surfaces greatly inhibits infection by some wound pathogens (1). Seed piece treatments also provide benefits. Some treatments eliminate most fungal pathogens from the surface of the seed tubers and protect them from infection by fungi in the soil while other treatments (barks) enhance wound healing and periderm formation under the cut surface

(3).

A wide spectrum of seed piece treatments are employed in central Oregon including gypsum, various fungicides, and suberization of cut seed. This study was designed to evaluate the common seed piece treatments currently in use in central Oregon.

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## Materials and Methods

An experiment designed to evaluate the efficacy of various potato seed piece treatments was planted June 8, 1993, at the Powell Butte site of Central Oregon Agricultural Research Center. The experiment was arranged in a randomized complete block design with four replications. Individual plots were 15 feet long by three rows wide (12 feet), separated by an unplanted 5-foot border. Sixty Russet Burbank seed pieces were planted 9 inches apart in each plot; 20 seed pieces were planted in each of the three rows. Oregon Generation III certified seed provided by a Culver, Oregon, seed grower was planted in the trial.

Seed piece treatments included an untreated check, Maxim 5D at 8 ounces of product per 100 pounds of cut seed, Maxim 4FS at 0.08 fluid ounces of product per 100 pounds of cut seed, Captan 5D at 1 pound of product per 100 pounds of cut seed, Tops 2.5D at 1 pound of product per 100 pounds of cut seed, fir bark at 1 pound of product per 100 pounds of cut seed, gypsum flour at 1 pound of product per 100 pounds of cut seed, and untreated suberized seed. Tubers were cut and treatments applied 2 to 3 hours prior to planting. The Maxim 4FS concentrate was diluted with 10 milliliters of water per 100 pounds of seed and the solution was applied by airbrush to seed pieces rotating in a drum. The seed for the suberized treatment was cut and allowed to suberize for 7 days at 65°F prior to planting; whole tubers for the other treatments were stored under the same conditions prior to cutting. Seed pieces were not inoculated with any pathogens prior to treatment.

The experiment was fertilized, cultivated, sprinkler irrigated, and managed according to practices commonly used in central Oregon.

The total number of plants that emerged in the middle plot row were counted 43 days after planting. A weak plant was scored if the plant was less than one-third the height of normal plants. In addition, 20 seed pieces (10 from each outside row of each plot) were removed from the soil and evaluated for *Rhizoctonia solani* and *Fusarium* spp. The number of stems per plant was also obtained at that time.

A 15-foot section from the middle row was harvested October 6-7, 1993. Plots were weighed and graded into three grade and four size categories. The total number of tubers per plot was determined and used to calculate the average tuber size. Specific gravity was evaluated by the air/water method.

## Results

The seed piece treatment experiment was planted three weeks later than normal because of wet soils, but after planting, soil moisture and temperature conditions were ideal for rapid emergence. Because of the rapid emergence and ideal soil conditions, there were no statistically significant stand differences among the treatments tested (Table 1).

Seed piece decay and *Rhizoctonia* infection are summarized in Table 2. Although some seed piece decay was noted, it had no effect on final stand. Evidently, the plants emerged and established themselves prior to any seed piece decay or the decay was not severe enough to inhibit emergence and growth. On the average, less than one *Rhizoctonia* lesion was observed per plant examined.

Table 1. The effect of seed piece treatments on stand and stem number of Russet Burbank Potatoes planted at Powell Butte, Oregon, 1993

Treatment	Rat&	Final Stand %	Weak Plants %	Stems Per Hill no.
Untreated Check		100	0	4.25
Maxim 5D	8 oz	96	6	4.80
Maxim 4FS	0.08 fl oz	96	2	4.55
Captan 5D	1 lb	96	1	4.25
Tops 2.5D	1 lb	98	1	4.05
Fir Bark	1 lb	94	1	4.07
Gypsum Flour	1 lb	91	9	4.25
Suberized		99	2	2.95
LSD 5%		NS	NS	0.64

1--rate of product per 100 pounds of cut seed

Table 2. The effect of seed piece treatments on *Rhizoctonia* and seed piece decay of Russet Burbank potatoes planted at Powell Butte, Oregon, 1993

Treatment	Rate <sup>1</sup>	Seed Piece Surface Decay	Seed Piece Total Decay	Rhizoc <sup>2</sup>
Untreated Check		30	30	0.60
Maxim 5D	8 oz	48	47	0.25
Maxim 4FS	0.08 fl oz	57	54	0.18
Captan 5D	1 lb	32	29	0.25
Tops 2.5D	1 lb	32	29	0.25
Fir Bark	1 lb	54	53	0.48
Gypsum Flour	1 lb	42	38	0.78
Suberized		33	31	0.68
LSD 5%		NS	NS	NS

1--rate of product per 100 pounds of cut seed.

2--rating Scale: 0=no lesions, 1=one stem lesion, 2=more than one stem lesion but stem not girdled, 3=stem girdled, 4=many lesions and stem girdled

Significantly fewer stems per hill were observed for the suberized treatment than for either the untreated check or the various chemical seed treatments. The suberized treatment produced the highest yield of No. 1 grade potatoes, the largest tuber size, and the fewest number of tubers per hill among all treatments tested. The number of stems per hill for both Maxim treatments was greater than all other treatments. The lowest yields of No. 1 grade potatoes were also observed for the Maxim treatments (Table 3).

Table 3. Seed piece treatment effects on yield, specific gravity, tuber weight, and the number of tubers per hill for Russet Burbank potatoes planted at Powell Butte, Oregon, 1993.

Treatment	Rate <sup>1</sup>	Total Yield cwt/a	No. 1 Yield cwt/a	Specific Gravity	Tuber Weight oz	Tubers Per Hill number
Untreated Check		526	389	1.080	5.06	8.63
Maxim 5D	8 oz	472	350	1.080	5.02	8.10
Maxim 4FS	0.08 fl oz	446	323	1.082	4.78	8.00
Captan 5D	1 lb	506	373	1.079	4.90	8.89
Tops 2.5D	1 lb	520	366	1.080	4.87	9.08
Fir Bark	1 lb	528	390	1.081	5.39	8.74
Gypsum Flour	1 lb	497	395	1.081	5.82	7.72
Suberized		526	436	1.081	6.11	7.25
LSD 5%		NS	62	NS	0.59	NS

<sup>1</sup>--rate of product per 100 pounds of cut seed

#### References

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