1990 Seedpiece Treatment Studies

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ABSTRACT

Seven experimental seedpiece treatments were compared to Topsin 2.5D and Captan 7.5D standard treatments (1 lbs dust/ 100 lbs cut seed) and an untreated check. The standards did not contain Douglas fir bark which is reported to aid in seedpiece wound-healing. All treatments and rates used in the study were selected by research and development personnel or were applied according to label directions.

Results showed there were slight effects of some seedpiece treatments on plant emergence rate with no effect on final stand. Treatments 1, 2 and 3 (MNH, MNM and MNL, respectively) had a tendency to reduce emergence rates. This treatment effect did not appear to depend on the concentration of the active ingredient applied to seedpieces. There were no measurable treatment effects on plant height ($P<0.05$).

Data also showed there were no measurable treatment effects on the average number of stems per hill, the estimated percentage of stem surface area cankered on August 2 and the estimated percentage of tuber surface area covered with sclerotia at harvest on September 18 ($P<0.05$). However, when the surface area of the stem cankered was estimated on July 11, data showed treatments 1-3 had significantly less stem cankering present than the untreated check or Captan 7.5D ($P<0.05$). Only treatment 1 (MNH) was significantly better than Topsin 2.5D ($P<0.05$). There was no significant treatment effect on tuber yield and grade ($P<0.05$).

All infection measured during the study was the result of naturally occurring inoculum and no inoculations were done in the field. Increased disease pressure may change the relative effect of the treatments included in this study. Because these compounds are new, their potential to reduce emergence rate should be tested further.

MATERIALS AND METHODS

Field trials were conducted at the Colorado State University Research Center located in the San Luis Valley, near Center, Colorado. The SLV is classified as a high desert valley (ca. 7600 ft msl) with abundant irrigation water. At least 90% of Colorado's potato crop is produced in the SLV with an estimated 65,000 A planted in 1990. Most of the crop is stored in large warehouses and sold on the fresh market.

Research plots were located within a certified seed field. The soil type was a gravelly sandy loam and plots were irrigated throughout the growing season using furrow irrigation. Normal cultural practices were followed throughout the study. The cultivar used in the study was Sangre. Sangre is an early to medium maturing red-skinned white-fleshed cultivar grown for the fresh market.

All data were collected from the center two rows of the 4 row field plots. Each field plot consisted of 40 treated seedpieces planted at 12 inch spacings (i.e., 2 treated rows each 20 ft long) planted between two border rows (seedpieces in border rows were not treated). A randomized complete block design of 10 treatments was used for the study with 5 replications. Data was analyzed using *MSTAT-C* (subprogram: *ANOVA-2*) and means were separated using Duncan's Multiple Range Test at alpha=0.05 (subprogram: *RANGE*). All data collected using the Horsfall-Barratt scale were analyzed directly and converted to percentage for presentation in the tables.

RESULTS

Data for the 10 seedpiece treatments are shown in Tables 1-4. Treatments applied to recently cut seedpieces, prior to planting on May 22, are shown in column 1. Treatments 8 and 9 are standard compounds commonly applied to seedpieces by San Luis Valley growers and treatment 10 had no treatment applied. It should be emphasized that the carrier used in Topsin 2.5D and Captan 7.5D treatments (treatments 8 and 9) was not Douglas fir bark. Douglas fir bark is also used as a carrier and is reported to aid in seedpiece wound-healing. Therefore, it is possible that Topsin and Captan with a fir-bark carrier could have different treatment effects when compared to treatments lacking fir bark. All treatments and rates used in the study were selected by research and development personnel or according to label directions. Treatments 8 and 9 were applied at the rate of 1 lbs dust per 100 lbs cut seed.

Table 1 shows that there were slight effects of seedpiece treatment on plant emergence rate with no effect on final stand counts taken on July 2. Treatments 1, 2 and 3 (MNH, MNM and MNL, respectively) had a tendency to reduce emergence rates. On June 18, treatment 3 (MNL) had significantly fewer plants emerged when compared to the untreated check (treatment 10) ($P<0.05$). Even though treatments 1-3 appeared to have a weak tendency to reduce emergence rates, this potential treatment effect did not appear to depend on the concentration of the active ingredient applied to seedpieces. Further evidence that this treatment effect is weak is seen in Table 2. This data shows that there were no measurable treatment effects on plant height. However, because these compounds are new, the potential for these compounds to reduce emergence rate should be tested further.

Data in Table 3 shows there were no measurable treatment effects on the average number of stems per hill, the estimated percentage of stem surface area cankered on August 2 and the estimated percentage of tuber surface area covered with sclerotia at harvest on September 18. However, when the surface area of the stem cankered was estimated on July 11, data showed treatments 1-3 had significantly less stem cankering present than the untreated check or Captan 7.5D ($P<0.05$). Only treatment 1 (MNH) was significantly better than Topsin 2.5D (treatment 8) ($P<0.05$).

Data in Table 4 shows there was no significant treatment effect on tuber yield and grade ($P<0.05$). A high incidence of decay (assumed to be caused by Phytophthora erythroseptica; Western Leak or Pink Rot organism) was noted in the plots at the time of harvest. The weight of tubers decayed was determined and analyzed along with other yield data. None of the treatments had a statistically significant effect on the weight of tubers rotted ($P<0.05$).

DISCUSSION

There was relatively low disease pressure in the research plots during 1990. All infection measured during the study was the result of naturally occurring inoculum and no inoculations were done in the field. Potatoes have been continuously grown in these plots for over 5 yr to encourage the natural increase of potato pathogens. Increased disease pressure may change the relative effect of the treatments included in this study.

Table 1. Effect of seedpiece treatment on plant emergence and plant population for cv. Sangre, G.D. Franc and K. W. Knutson, Colorado State Cooperative Extension, Center, CO 1990.

		Average number of plants emerged (40 plants maximum) on:											
	Treatment	Jun 11	Jun 13	Jun 14	Jun 15	Jun 18	Jun 19	Jun 20	Jun 21	Jun 22	Jun 25	Jun 27	Jul 2
1	MNH	0.0	0.2	0.8	3.4	15.6 CD	22.4	25.6 BC	30.0	34.4	33.0	35.8	37.0
2	MNM	0.0	0.0	0.6	2.2	15.2 CD	22.2	29.2 ABC	32.0	33.6	33.0	36.6	37.0
3	MNL	0.0	0.0	1.2	5.4	13.8 D	19.8	25.2 C	28.8	33.6	34.4	36.0	37.6
4	AC101	0.0	0.2	1.6	6.0	19.2 ABC	25.4	30.0 AB	32.6	36.2	36.6	38.4	39.2
5	AC201	0.0	0.2	0.6	4.0	17.8 ABCD	25.4	28.0 ABC	33.2	37.6	35.4	36.6	38.0
6	CAL	0.0	0.0	3.0	6.8	20.2 ABC	25.2	29.8 ABC	32.8	35.2	34.4	37.0	37.4
7	CAH	0.0	0.6	2.0	7.2	22.8 A	29.2	32.4 A	34.2	35.0	36.0	36.8	38.4
8	TOPSIN 2.5D	0.0	0.6	0.6	4.8	16.2 BCD	22.4	28.4 ABC	31.2	32.2	33.6	36.4	37.4
9	CAPTAN 7.5D	0.0	0.4	1.8	5.8	21.0 AB	26.2	30.6 A	32.0	36.6	36.0	38.2	38.4
10	CONTROL	0.0	0.2	1.4	5.6	20.0 ABC	25.8	29.2 ABC	31.4	35.8	33.8	37.4	38.2
	SIGNIFICANCE	NSD	NSD	NSD	NSD	P≤0.05	NSD	P≤0.05	NSD	NSD	NSD	NSD	NSD

All plots were planted on May 22, 1990. All seed treatments were applied to cut seed pieces and 40 seeds were planted pe treatment plot X 5 replications for each treatment.

Table 2. Effect of seedpiece treatment on plant height for cv. Sangre. G.D. Franc and K. W. Knutson, Colorado State Cooperative Extension, Center, CO 1990.

		Plant Height On (inches):					
	Treatment	July 2	July 9	July 12	July 18	July 26	August 9
1	MNH	5.4	8.7	10.3	13.4	15.9	15.9
2	MNM	4.9	8.4	10.0	13.0	15.4	15.3
3	MNL	4.6	8.3	10.1	13.0	16.1	16.0
4	AC101	5.0	8.6	10.5	14.0	17.3	16.9
5	AC201	5.5	9.1	15.5	13.4	17.1	16.3
6	CAL	5.2	9.4	10.6	13.9	16.5	16.2
7	CAH	5.2	9.6	10.8	13.8	17.1	16.9
8	TOPSIN 2.5D	5.0	8.8	10.2	12.5	16.0	15.3
9	CAPTAN 7.5D	5.6	8.9	10.3	13.9	17.2	24.1
10	CONTROL	5.1	9.0	10.5	14.3	17.2	17.4
	SIGNIFICANCE	NSD	NSD	NSD	NSD	NSD	NSD

Table 3. Effect of seedpiece treatment on stem numbers, *Rhizoctonia* stem cankering and tuber surface are covered with sclerotia at harvest. G.D. Franc and K. W. Knutson, Colorado State Cooperative Extension, Center, CO 1990.

Treatment		Average Number of Stems/Hill	Estimated Percentage of:		
			Stem Surface-Area Cankered on:		Tuber Surface-Area Cankered
		July 11	July 11	August 2	September 18
1	MNH	4.85	1.3 C	3.0	0.8
2	MNM	4.70	1.7 BC	4.0	0.4
3	MNL	5.30	1.5 BC	4.5	0.6
4	AC101	4.05	4.0 AB	7.5	1.0
5	AC201	4.15	2.5 ABC	3.5	1.3
6	CAL	5.00	3.5 AB	6.5	0.9
7	CAH	4.70	2.5 ABC	5.0	1.1
8	TOPSIN 2.5D	4.60	3.5 AB	6.0	0.4
9	CAPTAN 7.5D	5.00	4.5 A	5.0	1.2
10	CONTROL	4.90	5.0 A	5.5	0.7
	SIGNIFICANCE	NSD	P≥0.05	NSD	NSD

Table 4. Effect of seedpiece treatment on cv. Sangre yield and grade. G.D. Franc and K. W. Knutson, Colorado State Cooperative Extension, Center, CO 1990.

TREATMENT		SANGRE YIELD (CWT/A)							
		US#1 (>10 OZ)	US#1 (<10 OZ)	US#1 (Total)	US#2	B SIZE	CULLS	ROTTED (LEAK)	TOTAL
1	MNH	14.3	145.8	160.1	1.8	12.5	6.6	22.4	203.2
2	MNM	12.4	120.2	132.5	1.8	11.1	6.1	37.7	189.2
3	MNL	17.5	128.1	145.6	2.6	8.5	5.8	41.5	204.0
4	AC101	22.3	145.8	168.0	3.8	10.0	10.1	38.8	230.8
5	AC201	25.4	132.4	157.7	2.0	10.8	7.8	34.6	213.0
6	CAL	13.3	137.8	151.1	3.2	11.5	11.6	42.1	219.5
7	CAH	17.1	155.4	172.6	4.7	9.2	8.3	34.1	228.9
8	TOPSIN 2.5D	15.4	132.4	147.7	1.9	10.1	14.2	33.0	206.9
9	CAPTAN 7.5D	24.1	151.1	175.2	1.8	9.4	13.6	33.6	233.6
10	CONTROL	21.6	152.0	173.6	3.0	8.8	13.1	24.9	223.4
	SIGNIFICANCE	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD