A COMPARISON OF STANDARD AND DRILLBOX SEED TREATMENT CHEMICALS FOR COVERED SMUT OF OATS AND BARLEY[1]

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Introduction

Standard seed treatment chemicals may be applied at any time from early fall to the day of seeding the following spring. In contrast, drillbox seed-treatment chemicals are applied within an hour or two of seeding. Since the amount of active ingredient per bushel is the same for the two types of treatment any variation in disease control is a reflection of the contact time between seed and chemical. Although tests in 1965 (1) showed no significant differences in control effected by standard and drillbox treatment chemicals or between seed treated prior to the day of seeding and that treated and sown the same day, the incidence of smut in untreated oats was only 2 percent and that in untreated barley 8 percent. In 1966, eight standard and seventeen drillbox seed treatment chemicals were tested against oats and barley artificially infected with the covered smuts, Ustilago kolleri Wille and U. hordei Lagerh., respectively.

Materials and methods

The pesticides used and the P. C. P. No. (Pesticide Control Product Number) of each are shown in Table 1, together with the formulations and active ingredients. Chemicals 2 to 19 are mercurials, and 20 to 25 non-mercurials. "Non-mercurial" does not necessarily mean "non-poisonous", however, for of the products tested only Drillbox Bunt - No - More does not carry the "poison" symbol on the label.

The, pesticides were obtained from Morton Chemical Co., 11710 Lake Ave., Woodstock, Ill., U. S. A.; Dupont Co. of Canada Ltd., P. O. Box 660, Montreal, Quebec; Sherwin-Williams Co. of Canada Ltd., (Green Cross Products), 2875 Centre Street, Montreal, Quebec; Chipman Chemicals Ltd., 519 Parkdale Ave., N. Hamilton, Ontario; Interprovincial Co-operatives Ltd., 1700 Portage Ave., Winnipeg, Manitoba and Niagara Brand Chemicals, 1274 Plains Rd. E., Burlington, Ontario.

One gram of spores of U. kolleri and U. hordei were applied to the 200 grams of naturally smutty oats and barley seed, respectively.

The treatment procedure consisted of adding the required amount of chemical to the 200 grams of smutty seed in a one-quart sealer and shaking well. The storage periods between date of treatment and date of seeding for series "A" treatments ranged from 27 to 41 days. The "B" treatments were made an hour or two before seeding.

The plots, which were 12 feet long and 9 inches apart were replicated 4 times at each of three stations. Two hundred seeds per plot were sown. The percentage of smutty heads (Tables 2 and 3) is based on counts of all heads in the row.

Results

The barley test at Winnipeg failed to head, possibly because the soil was waterlogged. Hence, the values presented in Table 2 for oats are overall averages of the three stations, whereas those for barley are based on results from the Morden and Brandon nurseries only.

The mercurials gave good control of oat and barley smuts, but the non-mercurials were less effective.

The mean disease rating (%) of seven standard mercurial seed treatments (#2, 4, 6, 8, 10, 12, 14) and seven similar drillbox treatments (#3, 5, 7, 9, 11, 13. 15) are shown in Table 3. Comparable average disease ratings for 1965 after treatment with six of the mercurials are shown in brackets.

Table 3. Mean disease rating of some standard and drillbox formulations applied 3 or 4 weeks prior to seeding (Series A) and immediately before seeding (Series B).

	Disease Rating (%)			
	Oat Smut		Barley Smut	
Series A				
Untreated check	8. 64	(1. 91)*	6. 50	(8. 39)
Standard treatments	0.03	(0.00)	0.80	(3.12)
Drillbox treatments	0.07	(0.00)	1. 10	(1. 98)
Series B				
Untreated check	8. 66	(2.09)	9.00	(7.43)
Standard treatments	0.47	(0.55)	1.29	(2.62)
Drillbox treatments	0.52	(0.37)	1.01	(2.46)

*Mean disease ratings 1965

Results obtained in 1965 and 1966 were similar, except for higher oat smut infection in the check in 1966. There was no significant difference between standard and drillbox treatments when the chemicals were applied at the same time. However, treatment of seed four weeks or more prior to seeding (Series A) improved the control of oat smut slightly, but did not alter control of barley smut relative to the one- or-two hour post-treatment period before seeding (Series B).

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Table 1. P. C.P. No., source and formulations of pesticides

Exp. No.	P.C.P. No.	Source		Form		Active Ingredients Fungicide	HGE	Insecticide
1			Untreated Check					
			Mercurials					
2	8448	Morton	Panogen 15B	Sn*	MMD**	3.7 oz./gal.	2.5 oz./gal.	
3	9201		Panogen PX	Du	MMD	0.9%	0. 6%	
4	2521	Dupont	Ceresan M	WP	EMS	7.7%	3. 2%	
5	9134		Ceresan M-DB	Du	EMS	1.93%	0. 8%	
6	8754	Green Cross	San	Du	MMO	7. 3%	3.0%	
7	9229	" "	San DB	Du	MMO	1.83%	0.75%	
8	3633	Chipman	Agrox C	Du	PMA	7.15% EMC 1.00%	5.00%	
9	9209		Agrox DB	Du	PMA	1.79% EMC 0.25%	1.25%	
10	6595		Mergarnma C Dual Purpose	WP	PMA	2.86% EMC 0.40%	2.00%	LIN 30.0%
11	9219		Mergamma DB Dual Purpose	PD	PMA	1.79% EMC 0.25%	1. 25%	LIN 18.75%
12	9128	Co-op	MMH Liquid Mercury	Li	MMH	2.25%	1. 25%	
13	9458		Metasol MMH-DB	Du	MMH	1.43%	0. 80%	
14	9424	Morton	Pandrinox A	Sn	MMD	1.32 oz./gal.	0. 88 oz./gal.	ALD 2.5 lb./gal.
15	9472		Pandrinox A-PX	Du	MMD	0.72%	0.48%	ALD 20.0%
16	9325		Pandrinox PX	Wp	MMD	0.72%	0.48%	HEP 20.0%
17	9421	Niagara	Puraseed DB	Pd	PAC	1.55% PMF 1.55% CDE 0.44	0.95%	
18	9451		Puradrin DB	Du	PAC	1.55% PMF 1.55% CDE 0.44	0.95%	ALD 25.0%
19	---	Green Cross	Drillbox Merlane	Du	MMO	1.83%	0.75%	
			Non-Mercurials					
20	9480	Morton	Pentadrin A	Sn	PCN	1.6 lb./gal.		ALD 2.6 lb./gal.
21	9489		Pentadrin A PX	Du	PCN	13.2%		ALD 20.0%
22	9432		Pentadrin PX	Du	PCN	13.2%		HEP 20.0%
23	9429	Green Cross	Drillbox Bunt-No-More	Pd	HCB	10.0% CAP 20%		
24	9205	" "	Drillbox Dual Purpose Bunt-No-More	Pd	HCB	10.0% CAP 20%		ALD 25.0%
25	6337	" "	Dual Purpose Bunt-No-More	Pd	HCB	16.0%		ALD 40.0%

*Formulation Code: Du = dust; Li = liquid: Pd = powder: Sn = solution; WP = wettable powder.

**Active ingredients code: ALD = aldrin: CAP = captan; CDE = cadmium equivalent; EMC ethylmercuric chloride: EMS = ethyl mercury p-toluene sulfonanilide; HCB = hexachlorobenzene: HEP = heptachlor; HGE = mercury equivalent: LIN = gamma BHC (from lindane); MMD = Methyl mercuric dicyandiamide; MMH = oxine-methylmercury; MMO = methylmercury pentachlorophenolate; PAC = phenylamino cadmium dilactate: PMA = phenylmercuric acetate: PCN = quintozene (pentachloronitrobeneene),

Table 2. Standard and Drillbox Treatments 1966

Exp. No.	Formulation	Dosage oz./bu.	Disease Rating (%) Oat Smut A	Oat Smut B	Barley Smut A	Barley Smut B
1	Untreated		8.64	8.66	6.50	9.00
	Mercurials					
2	Panogen 15B	0.75	0.00	0.72	0. 63	1.81
3	Panogen PX	2.00	0.00	0. 63	0.88	2. 13
4	Ceresan M	0.50	0.00	0.08	0.50	1.86
5	Ceresan M-DB	2.00	0.33	0.46	0.83	0.75
6	San	0.50	0.00	0.13	1.44	1. 13
7	San DB	2.00	0.04	0.13	1.38	0.88
8	Agrox C	0.50	0.00	0. 13	0.75	0.56
9	Agrox DB	2.00	0.00	0.58	1.69	0. 25
10	Mergamma C Dual Purpose	1. 25	0. 17	0.33	0.63	1. 31
11	Mergamma DB Dual Purpose	2.00	0.00	0.52	0.53	0.75
12	MMH Liquid Mercury	0.75	0.00	1.08	0.94	1. 69
13	Metasol MMH-DB	2.00	0.00	0.71	1.00	1.00
14	Pandrinox A	2.00	0.04	0.85	0.74	0. 69
15	Pandrinox A-PX	2. 50	0.08	1.00	1. 38	1. 31
16	Pandrinox PX	2. 50	0.00	0.29	0.88	0. 69
17	Puraseed DB	2.00	0.25	1.83	2.00	3. 19
18	Puradrin DB	2.00	0.71	1. 82	1.44	3. 94
19	Drillbox Merlane	2.00	0.17	1.63	1.00	2. 69
	Non-Mercurials					
20	Pentadrin A	2.00	2. 50	4. 31	3.90	4.94
21	Pentadrin A PX	2.50	5.43	3. 92'	7. 23	9.06
22	Pentadrin PX	2.50	4.58	3.53	6. 27	9. 31
23	Drillbox Bunt-No-More	2.00	2.75	2.84	5.88	5. 81
24	Drillbox Dual Purpose Bunt-No-More	2.00	2. 78	3. 38	5.88	4. 63
25	Dual Purpose Bunt-No-More	1.25	9.12	8.48	7. 51	6.41
	Min. Sign. Diff.		2.08	2. 11	2. 63	2. 72

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literature cited

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