A COMPARISON OF STANDARD AND DRILLBOX SEED TREATMENT CHEMICALS[1]

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Introduction

Thirteen standard and eleven drillbox seed-treatment chemicals were tested in 1965 against bunt of wheat (Tilletia foetida (Wallr.) Liro), covered smut of oats (Ustilago kolleri Wille), covered smut of barley (U. hordei (Pers.) Lagerh.) and seed rot of flax, rye and durum wheat caused by a complex of soil-borne and seed-borne microorganisms.

The object of this experiment was to compare standard and drillbox seed-treatment chemicals applied aweek or more prior to seeding, with the same chemicals applied an hour or more before seeding. The differences are in the concentration of the formulation and the dosages applied to the seed. Since concentration and dosage are interdependent, the results should be the same if the seed is treated at the same time.

Standard seed-treatment chemicals may be applied at any time from early fall to the seeding day, whereas drill box seed-treatment chemicals are applied within an hour or two of seeding.

Materials and methods

The seeds used in these trials were as follows:

Wheat - Variety 'Red Bobs'. Seed artificially contaminated (1:200 by weight) with spores of T. foetida.

Oats - Variety 'Vanguard'. Seed naturally contaminated by covered smut (U. avenae).

Barley - Variety 'Plush'. Seed naturally contaminated by covered smut (U. hordei).

Flax - Variety 'Marine'.

Rye - Variety 'Antelope', a fall rye.

Durum - Variety not known. Obtained from Saskatchewan Wheat Pool, Regina, Sask.

The pesticides used and the P. C. P. No. of each are shown in Table 2. Treatments numbered 2 to 5, 7, and 9 to 18 were collected by the Production and Marketing Branch, Canada Department of Agriculture, analysed by the Pesticide Unit, and a portion of each sent to us for these trials. Formulations 6 and 8 were no longer available so that old stocks in our laboratory wereused. Formulations 19 - 25 were products developed for drillbox application whose registration was anticipated.

The sources of these materials were: F. W. Berk and Co. Ltd., P. O. Box 500, No. 8, Baker St., London W. 1., England whose Canadian representative is Leytosan (Canada) Limited, 345 Higgins Ave., Winnipeg, Manitoba; Chipman Chemicals Ltd., 519 Parkdale Ave., N. Hamilton, Ontario; Interprovincial Co-Operatives Ltd., 1700 Portage Ave., Winnipeg, Manitoba; Dupont Company of Canada Ltd., P. O. Box 660, Montreal, Quebec; Morton Chemical Co., 11710 Lake Ave., Woodstock, Ill., U. S. A.; Niagara Brand Chemicals, 1274 Plains Rd. E., Burlington, Ontario and Sherwin-Williams Co. of Canada Ltd., (Green Cross Products), 2875 Centre St., Montreal, Quebec.

Two hundred grams of seed were used for each treatment. The required amount of seed-treatment chemical was applied to the seed in a sealer and then well shaken. The time lapse (storage period) between dates of treatment and dates of seeding are shown in Table 1. The "A" treatments were made 7 - 30 days prior to seeding, The "B" treatments were made on the spot an hour or two before seeding. Rye and durum wheat were subjected to the "A" treatments only.

The plots, which were 12 feet long and 9 inches apart were replicated 4 times at each station. Two hundred seeds per plot were sown and all emerged plants counted. The percentages of smutty heads (Table 3) is based on counts of all heads in the row.

Table 1. Time lapse in days between dates of treatment and dates of seeding.

	"A"		"B"	
	Brandon	Morden	Brandon	Morden
Common wheat	8	7	0	0
Oats	12	25	0	0
Barley	17	14	0	0
Flax	30	28	0	0
Rye	28	20		
Durum wheat	7	20		

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Table 2. 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					
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	" "	Drillbox San	Du	MMO	1.83%	0.75%	
8	6337	" "	Dual Purpose Bunt-No-More	Pd	HCB	16.0%		ALD 40.0%
9	9205	" "	Drillbox Dual Purpose Bunt-No-More	Du	HCB	6.7% CAP 13.4%		ALD 16.7%
10	3633	Chipman	Agrox C	Du	PMA	7.15% EMC 1.00%	5.0%	
11	9209		Agrox DB	Du	PMA	1.79% EMC 0.25%	1.25%	
12	6595		Mergamma C Dual Purpose	WP	PMA	2.86% EMC 0.40%	2.0%	LIN 30.0%
13	9219		Mergamma DB Dual Purpose	Pd	PMA	1.79% EMC 0.25%	1.25%	LIN 18.75%
14	9130	co-op	MMH Liquid Dual Purpose	Li	MMH	1.36 oz/gal	0.75 oz/gal	HEP 2.5 lb/gal
15	9128		MMH Liquid Mercury	Li	MMH	2.25%	1.25%	
16	9120		Liquid Wireworm Seed Treatment	Sn				HEP 2.5 lb/gal
17	7208	Morton	Pandrinox	Sn	MMD	1.33 oz/gal	0.89 oz/gal	HEP 42.0 oz/gal
18	989	Berk	Half-Ounce Leytosan	Du	PMU	8.1%	4.5%	
19	--		Leytosan 1.	Du	PMA***		1.25%	
20	9289	Morton	Drinox PX	WP				HEP 25.0%
21	9421	Niagara	Puraseed DB	Pd	PMA	1.55%	0.95%	
					PAC	1.55% CDE 0.44%		
22	--	co-op	Metasol MMH-DB	Du	MMH	1.43%	0.80%	
23	9205	Green Cross	Drillbox Dual Purpose Bunt-No-More	Du	HCB	10.0% CAP 20%		ALD 25.0%
24		" "	Drillbox Merlane	Du	MMD	1.83%	0.75%	ALD 25.0%
25		" "	Drillbox Wireworm Killer	Du				ALD 25.0%

* 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; PMU = phenylmercuric urea.

*** Data not available.

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Table 3. Standard and Drillbox Treatments 1965.

Exp. No.	Formulation	Dosage Cereals oz/bu	Dosage Flax oz/bu	Disease Rating (%) Bunt A	Bunt B	Oat smut A	Oat smut B	Barley smut A	Barley smut B	Germination (%) Flax A	Flax B	Rye A	Durum A
1	Untreated	--	--	30.31	21.20	1.91	2.09	8.39	7.43	66.6	55.8	51.1	87.4
2	Panogen 15B	0.75	1.50	0.09	0.00	0.00	0.00	0.15	0.77	84.3	80.2	65.9	90.9
3	Panogen PX	2.00	4.00	0.22	0.48	0.00	0.04	0.57	0.91	80.1	79.6	62.2	91.1
4	Ceresan M	0.50	1.50	0.12	0.00	0.00	0.08	0.49	0.31	79.6	82.9	62.3	89.9
5	Ceresan M-DB	2.00	4.00	0.51	0.00	0.00	0.07	0.05	0.25	82.6	82.3	61.5	91.0
6	San	0.50	1.50	0.17	0.00	0.00	0.15	0.53	0.59	80.2	83.0	65.3	91.1
7	Drillbox San	2.00	4.00	0.48	0.12	0.00	0.22	0.35	0.27	78.4	83.3	62.9	91.4
8	Dual Purpose Bunt-No-More	1.25	2.50	0.14	0.05	1.33	1.69	6.46	3.96	62.4	61.4	41.8	87.4
9	DB-Dual Purpose BNM	3.00	6.00	0.00	0.09	0.33	0.23	3.64	2.09	82.6	77.5	59.3	89.3
10	Agrox C	0.50	1.50	0.08	0.00	0.00	0.00	0.05	0.21	80.1	80.3	59.0	93.3
11	Agrox DB	2.00	4.00	0.00	0.04	0.00	0.04	0.24	0.44	81.4	80.8	59.4	90.3
12	Mergamma C Dual Purpose	1.25	2.50	0.08	0.00	0.00	0.07	0.10	0.15	77.4	79.4	57.9	90.4
13	Mergamma DB Dual Purpose	2.00	4.00	0.00	0.00	0.00	0.00	0.41	0.10	79.8	78.5	56.5	93.3
14	MMH Liquid Dual Purpose	2.00	4.00	1.72	0.45	0.00	0.25	0.80	0.59	75.4	78.7	60.1	91.3
15	MMH Liquid Mercury	0.75	1.50	0.05	0.17	0.00	0.00	0.36	0.48	79.3	78.1	66.8	92.4
15	Liquid Wireworm Seed Treatment	2.00	4.00	12.47	16.98	2.57	1.97	7.80	6.56	62.5	59.9	43.1	86.4
17	Pandrinox	2.00	4.00	0.27	0.66	0.00	0.07	0.68	0.98	79.6	77.0	64.4	89.5
18	Half-Ounce Leytosan	0.50	1.50	0.00	0.00	0.00	0.11	1.02	0.98	79.1	79.1	64.5	90.7
19	Leytosan 1.	2.00	4.00	0.05	0.00	0.00	0.00	0.15	0.37	81.9	78.8	59.6	92.4
20	Drinox PX	*3.00	*3.00	15.83	19.38	2.26	2.96	8.29	4.58	62.1	64.9	42.1	83.5
21	Puraseed DB	2.00	4.00	0.00	0.00	0.11	0.15	0.80	0.82	72.2	77.8	58.1	90.2
22	Metasol MMH-DB	2.00	4.00	0.34	0.56	0.00	0.00	0.05	0.18	80.0	81.5	65.5	87.4
23	Drillbox Dual Purpose Bunt-No-More	2.00	4.00	0.00	0.00	0.41	0.37	2.35	1.44	81.6	80.0	60.8	93.6
24	Drillbox Merlane	2.00	4.00	0.34	0.00	0.00	0.15	0.24	0.18	79.3	82.4	66.6	92.8
25	Drillbox Wireworm Killer	2.00	4.00	31.18	24.91	1.86	4.18	6.05	7.73	68.6	59.5	38.9	88.3
	Min. Sign. Diff			3.59	4.39	0.51	1.61	1.84	2.25	5.8	6.0	4.5	5.0

* 1.50 oz on oats 2.50 oz on barley 3.00 oz on wheat

Experimental results

The field data collectedin 1965 are summarized in Table 3. Considering that it is difficult to obtain good bunt infections in this region, the degree of infection achieved in these experiments was exceptionally good. The incidence of oat smut was exceptionally low, and that of barley smut was somewhat below average. The oat and barley smut tests should be repeated another year. There were significant increases in emergence when flax and rye seed were treated, but durum wheat generally showed little effect of treatment on emergence. The weather was ideal for germination and seedling development.

No significant differences were obtained between standard treatment chemicals and drillbox treatment chemicals or between seed treated prior to seeding and seed treated and sown the same day.

All wireworm-treatment chemicals (Nos. 16, 20 and 25) significantly lowered the emergence of rye below that of the check. While Drillbox dual purpose bunt-no-more (No. 9) and Drillbox bunt-no-more (No. 23) significantly increased emergence of flax and rye and were about equal to the mercurial seed dressings, Dual purpose bunt-no-more (No. 8) significantly lowered rye emergence below the check.

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