

COOPERATIVE SEED TREATMENT TRIALS - 1967¹

H. A. H. Wallace²

Abstract

Sixty seed treatment chemicals were tested for their efficacy in controlling bunt of wheat (*Tilletia foetida*), covered smut of oats (*Ustilago kolleri*), covered smut of barley (*U. hordei*), and seed rots of flax and wheat caused by a complex of soil- and seed-borne microorganisms. The best treatments for control of the three smuts were Ceresan M, Panogen 15B, UniRoyal G 696-75, Merck FV-XI-122A, and Chemagro 14-67 and 15-67. Generally, the emergence of flax and wheat was not increased by seed treatment.

Introduction

In 1967 sixty seed treatment chemicals were tested for their efficacy in controlling common bunt of wheat (*Tilletia foetida* (Wallr.) Liro), covered smut of oats (*Ustilago kolleri* Wille), covered smut of barley (*U. hordei* (Pers.) Lagerh.), and seed rots of flax and wheat caused by a complex of soil- and seed-borne microorganisms.

Materials and methods

Clean seed of 'Red Bobs' wheat (*Triticum aestivum* L.), naturally smutted seed of 'Vanguard' oat (*Avena sativa* L.), and naturally smutted seed of 'Plush' barley (*Hordeum vulgare* L.) were used in field tests. To insure heavy infection, 1 g of the appropriate smut spores was added to each 200 g of seed. 'Marine' flax (*Linum usitatissimum* L.) and a sample of 'Manitou' wheat of low viability were used for emergence tests to measure phytotoxic action of the chemicals.

The source, product name, and chemical name of the seed treatment materials are given in Tables 1 and 2. Ceresan M, Panogen 15B, and Pandrinol in the Cooperative Test, and Panogen PX and Polyrax in the Drillbox Test were included as standards. For both the Cooperative and Drillbox Tests, each chemical was applied to 200 g of seed at the dosages shown in Tables 3 and 4 by shaking the seed and chemical in a glass jar until the seed was uniformly covered. Seed for the Cooperative Test was removed from the jar after 2 days and samples of 200 seeds in paper envelopes were stored in polyethylene bags at 15 C for several weeks prior to seeding. For the Drillbox Test, seed was treated as described and sown within 2 hours.

Both tests were carried out at Brandon, Morden, and Winnipeg. Each experimental plot consisted of a row 12 ft long containing 200 seeds: all rows were planted 9 inches apart and were arranged in a randomized block design. Emergence of flax and 'Manitou' wheat was determined 4 to 6 weeks after seeding, and the percentages of smutty heads, based on counts of 200 heads per row, were recorded after the crop had headed. The results are given as means of 12 replicates, four from each planting site, and the data were subjected to an analysis of variance.

Results and discussion

Bunt infections from the untreated seed in the Cooperative Test were 35%, 20%, and 4% at Brandon, Morden, and Winnipeg, respectively. Although the same seed lot was used in both tests and seeding was done on the same day, the percentage bunt infection in the untreated plots in the Drillbox test was only about half that of the untreated plots in the Cooperative test. However the incidence of smut from untreated oats and barley was similar in the two tests, averaging 8% and 7% in the Cooperative test and 7% and 4% in the Drillbox test. Generally emergence of flax and 'Manitou' wheat was only slightly higher from treated than from untreated seed.

The best treatments for smut control were Ceresan M, Panogen 15B, UniRoyal G696-75 (1 oz/bu), Merck FV-XI-122A (Table 3), Vitavax (Tables 3 and 4), and Chemagro 14-67 and 15-67 (Table 4). Chemagro 4497 t Dexon, and Terracoat gave acceptable control of all three smuts only at the highest dosages used (Table 3). Chemagro 4497 alone, and Merck FV-XI-126A, FV-XI-131A and FV-XI-146A did not control smut. Terraclor (6 oz/bu) and UniRoyal F849-75ST appeared to be phytotoxic to wheat seed, but not to flax.

Acknowledgments

The writer thanks members of the staff of the Morden Research Station and the Brandon Experimental Farm for their cooperation and assistance.

¹ Contribution No. 307, Research Station, Canada Department of Agriculture, Winnipeg, Manitoba.

² Plant Pathologist.

Table 1. Source, product name, and chemical name of seed treatment materials used in the Cooperative Test

Treatment no.	Source*	Product name	Chemical name
1		Untreated check	
2	Dupont	Ceresan M	7.7% ethyl mercury-p-toluene sulfonanilide
3	Morton	Panogen 15B	3.7 oz/gal methyl mercuric dicyandiamide
4-13	Morton	"EP-"	Identities not available
14	Morton	Pandrinox A	1.32 oz/gal methyl mercuric dicyandiamide plus 2.5 lb/gal aldrin
15-20	Chemagro	4497	bis (1,2,2-trichloroethyl) sulfoxide
18-20	Chemagro	Dexon	p (dimethylamino) benzenediazo sodium sulfonate
21-24	UniRoyal	Vitavax	2, 3-dihydro-5-carboxanilido-6-methyl-1, 4-oxathiin
25-26	UniRoyal	G696	2, 4-dimethyl-5-carboxanilido thiazole
27-28	Niagara	Niadual	Identity not available
29	Niagara	Polyram	zinc activated polyethylene thiuram disulfide (applied as slurry)
30-32	Hoechst	2844	Identity not available
33	Niagara	Cufram Z	Identity not available
34-42	Merck	"FV-"	Identity not available
43-45	Olin	Terraclor	quintozene
46-48	Olin	Terraclor Super X	quintozene (2%) + 5-ethoxy-3-trichloromethyl-1, 2, 4 thiadiazole (0.5%)
49-51	Olin	Terracoat	quintozene (2%) + 5-ethoxy-3-trichloromethyl-1, 2, 4 thiadiazole (1.0%)
52	UniRoyal	F849-75ST	2-amino-4-methyl-5-carboxanilido thiazole
53		Untreated check	

* E. I. Dupont de Nemours & Co. Inc., Wilmington, Delaware; Morton Chemical Company, Woodstock, Illinois; Chemagro Corporation, Kansas City, Missouri; United States Rubber Co., Naugatuk, Connecticut; Niagara Brand Chemicals, Burlington, Ont.; American Hoechst Corp., North Hollywood, California; Merck Chemical Division, Hawthorne, New Jersey; Olin-Mathieson Chemical Corp., Agricultural Division, Little Rock, Arkansas.

Table 2. Source, product name, and chemical name of seed treatment materials used in the Drillbox Test

Treatment no.	Source"	Product name	Chemical name
1		Untreated check	
2-11	Green Cross	"SWF-"	Identities not available
12	UniRoyal	Vitavax 10%	2, 3-dihydro-5 ^m carboxanilido-6-methyl-1, 4 ^m oxathiin
13-22	Chipman	"-67"	Identities not available
23-25	Morton	"EP-"	Identities not available
26	Morton	Panogen PX	0.9% methyl mercuric dicyandiamide
27-29	Niagara	Polyram Seed Protectant	53.5% zinc activated polyethylene thiuram disulfide
30	co-op	Seed Treatment	Identity not available
31	co-op	Dual Purpose Treatment	Identity not available
32	Niagara	Polyram Dual Purpose	Polyram + 16.7% aldrin
33-34	Chipman	"-67"	Identities not available
35		Untreated check	

* Green Cross Products, Montreal, P. Q.; United States Rubber Co., Naugatuk, Connecticut; Chipman Chemical Limited, Hamilton, Ontario; Morton Chemical Company, Woodstock, Illinois; Niagara Brand Chemicals, Burlington, Ontario; Interprovincial Co-operatives Limited, Winnipeg, Manitoba.

Table 3. Results of cooperative seed treatment trials

Treatment no.	Product name and Formulation"	Dosage (oz/bu)		Smutted heads**(%)			Emergence(%)		
		Cereals	Flax	Bunt	Oat smut	Barley smut	Flax	Wheat	
1	Untreated check			17.77	7.13	6.80	75.2	21.4	
2	Ceresan M	WP	0.50	1.00	0.13	0.13	0.17	83.7	24.4
3	Panogen 15B	Sn	0.75	1.50	0.00	0.00	0.29	81.9	25.2
4	EP-277	WP	1.00	1.00	0.63	0.80	2.23	77.8	22.4
5	EP-277	WP	2.00	2.00	0.04	0.87	2.31	82.8	27.3
6	EP-277	WP	3.00	3.00	0.50	0.47, 1.21		82.2	21.3
7	EP-277 (40%)	Sn	1.00	1.00	1.30	2.04	2.17	78.3	23.2
8	EP-277 (40%)	Sn	2.00	2.00	1.10	0.63	2.33	76.5	27.8
9	EP-277 (40%)	Sn	3.00	3.00	0.17	1.27	1.90	76.0	25.0
10	EP-368	D	1.50	1.50	0.00	0.73	0.88	78.6	25.1
11	EP-368	D	3.00	3.00	0.00	0.51	0.79	78.0	27.1
12	EP-369	D	1.50	1.50	0.33	0.95	1.04	73.3	21.7
13	EP-369	D	3.00	3.00	0.13	0.73	1.14	76.3	24.4

Table 3 (continued)

Treatment no.	Product name and Formulation ²²	Dosage (oz/bu)		Smutted heads ²³ (%)			Emergence(%)	
		Cereals	Flax	Runt	Oat smut	Barley smut	Flax	Wheat
14	Pandrinox Sn	2.50	2.50	0.17	1.01	0.13	77.1	25.5
15	Chemagro 4497 (50%) WP	0.30	0.60	8.33	3.23	4.38	59.6	19.9
16	Chemagro 4497 (50%) WP	0.60	1.20	7.25	1.92	2.19	62.9	20.7
17	Chemagro 4497 (50%) WP	1.20	2.40	2.38	0.21	1.18	59.2	20.7
18	Chemagro 4497 t WP	0.30	0.60	0.17	3.00	3.67	71.2	19.1
	Dexon (70%) WP	0.20	0.40					
19	Cheinagro 4497 t WP	0.60	1.20					
	Drxon (70%) WP	0.42	0.84	0.33	0.68	1.27	68.4	20.8
20	Chemagro 4497 t WP	1.20	2.40					
	Dexon (70%) WP	0.84	1.68	0.04	0.08	0.33	65.5	22.8
21	Vitavax 75 W	2.00	2.00	0.08	0.04	0.08	74.4	19.3
22	Vitavax 75 W	4.00	4.00	0.13	0.00	0.25	72.9	17.6
23	Vitavax Conc. L	1.25	1.25	0.00	0.04	0.13	71.9	17.2
24	Vitavax Conc. L	2.50	2.50	0.00	0.00	0.00	74.6	19.7
25	G696-75 WP	0.50	1.00	1.04	0.00	0.21	64.2	16.4
26	G696-75 WP	1.00	2.00	0.08	0.13	0.00	68.7	16.5
27	Niadual MP L	2.00	4.00	2.03	1.18	0.75	76.3	26.0
28	Niadual Conc. L	0.75	1.50	0.84	0.93	0.50	74.1	23.9
29	Polyram - 80 WP	2.00	4.00	0.17	0.44	0.24	76.5	20.2
30	Hoechst 2844 D	1.50	3.00	1.67	1.97	5.04	65.4	18.6
31	Hoechst 2844 D	2.00	4.00	1.20	1.78	2.66	67.0	18.4
32	Hoechst 2844 D	2.50	5.00	0.88	0.96	1.48	64.5	18.5
33	Cufram Z 80 WP	2.00	4.00	0.00	0.67	0.25	74.7	18.7
34	FV-XI-122A D	3.00	5.00	0.00	0.13	0.08	81.6	19.5
35	FV-XI-127A D	4.00	7.00	0.00	2.66	1.53	62.2	15.1
36	FV-XI-124A D	3.00	6.00	0.13	0.67	0.25	80.0	21.7
37	FV-XI-123A D	2.00	4.00	0.17	0.90	1.54	67.3	13.7
38	FV-XI-128A D	3.00	6.00	0.00	0.67	0.13	78.7	22.3
39	FV-XI-126A D	4.00	8.00	3.80	1.26	0.83	74.8	16.3
40	FV-129A D	4.00	8.00	0.00	3.42	4.32	66.8	10.7
41	FV-XI-131A L	4.00	8.00	10.19	5.55	8.57	64.1	12.6
42	FV-XI-146A L	4.00	8.00	2.71	3.73	6.96	61.9	13.4
43	Terraclor L	2.00	2.00	0.13	4.70	2.58	65.6	12.5
44	Terraclor L	4.00	4.00	0.00	2.47	0.50	66.5	14.4
45	Terraclor L	6.00	8.00	0.00	1.12	0.38	61.2	9.7
46	Terraclor Suprr X L	2.00	2.00	0.00	5.23	4.20	69.6	18.0
47	Terraclor Super X L	4.00	4.00	0.00	2.12	0.47	64.6	15.9
48	Terraclor Super X L	6.00	8.00	0.04	0.93	0.63	65.3	15.9
49	Terracoat L	2.00	2.00	0.04	4.16	2.83	67.5	16.5
50	Terracoat L	4.00	4.00	0.00	2.23	1.04	66.4	16.2
51	Terracoat L	6.00	6.00	0.00	0.45	0.38	64.3	17.0
52	F849-75ST WP	2.50	2.50	0.54	0.13	0.08	66.0	9.0
53	Untreated check			21.61	8.08	7.08	73.9	19.9
LSD (5%)				9.25	1.85	1.75	8.4	5.0

²² Formulation code: D = dust; L = liquid; Sn = solution; WP = wettable powder

²³ Mean of 200 heads grown in field plots at Brandon, Morden, and Winnipeg

Table 4. Results of drillbox seed treatment trials

Treatment no.	Product name and Formulation	Dosage (oz/bu)		Smutted heads (%)*			Emergence (%)	
		Cereals	Flax	Bunt	Oat smut	Barley smut	Flax	Wheat
1	Untreated check			10.00	6.70	4.37	68.2	10.8
2	SWF 510	2.0	4.0	0.00	0.50	0.04	73.3	14.5
3	SWF 520	2.0	4.0	0.13	0.79	0.13	73.5	15.8
4	SWF 530	2.0	4.0	0.00	0.17	0.17	79.5	13.5
5	SWF 540	2.0	4.0	0.00	0.79	1.43	82.9	16.5
6	SWF 550	2.0	4.0	0.00	0.50	0.75	73.1	17.4
7	SWF 560	2.0	4.0	0.00	0.46	0.08	71.3	16.2
8	SWF 570	2.0	4.0	0.00	0.17	0.04	72.4	15.2
9	SWF 580	2.0	4.0	0.04	0.54	0.08	75.9	16.3
10	SWF 610	2.0	4.0	0.08	0.87	1.03	75.3	13.2
11	SWF 3944 x (3-2-4)	2.0	4.0	0.00	1.00	0.58	74.2	16.9
12	Vitavax 10%	8.0	8.0	0.33	0.00	0.00	67.4	9.0
13	10-67	1.5	3.0	0.00	0.79	0.21	74.6	12.7
14	10-67	2.0	4.0	0.08	0.54	0.04	71.7	12.4
15	11-67	2.0	4.0	0.00	0.38	0.13	75.3	14.5
16	14-67	4.0	8.0	0.04	0.00	0.00	72.0	12.9
17	15-67	4.0	8.0	0.04	0.00	0.00	67.9	12.0
18	17-67	2.0	4.0	0.82	0.54	0.88	74.8	16.5
19	18-67	3.0	6.0	0.00	0.50	0.04	69.1	11.7
20	19-67	2.0	4.0	0.04	1.63	0.00	75.0	13.0
21	26-67	2.0	4.0	0.08	1.08	0.04	71.1	15.0
22	27-67	2.0	4.0	0.00	0.67	0.13	74.1	12.5
23	EP-277 WP	2.0	4.0	0.33	0.49	0.13	72.8	15.0
24	EP-368	2.0	4.0	0.00	1.05	1.02	67.9	12.3
25	EP-369	2.0	4.0	0.04	1.13	0.92	70.3	12.5
26	Panogen PX	2.0	4.0	0.08	0.33	1.21	73.9	13.1
27	Polyram	1.0	2.0	0.00	1.52	0.21	69.6	13.6
28	Polyram	2.0	4.0	0.00	0.83	0.08	75.8	15.1
29	Polyram	3.0	6.0	0.00	0.40	0.21	76.4	12.3
30	S. P.	2.0	4.0	0.17	0.29	0.04	76.1	15.0
31	D. P.	2.0	4.0	0.54	1.13	1.30	66.1	15.4
32	Polyram DP	3.0	6.0	0.00	0.83	0.17	74.1	14.2
33	12-67	2.0	4.0	0.04	1.37	1.63	75.0	18.2
34	13-67	2.0	4.0	0.00	2.21	3.25	79.5	15.8
35	Untreated check			9.36	7.30	4.59	67.6	10.6
LSD (5%)				3.00	1.87	1.47	10.7	5.1

* Means of 200 heads grown in field plots at Brandon, Morden, and Winnipeg.