COOPERATIVE SEED TREATMENT TRIALS - 1973

J.T. Mills[2]

Abstract

Twenty-one seed treatment chemicals were tested for their efficacy in controlling bunt of wheat (Tilletia caries and T. foetida), covered smut of oats (Ustilago kolleri), and covered smut of barley (U. hordei) and for their effects on the emergence of flax. Heavy bunt infection permitted a good evaluation of seed treatments and showed that hunt may be readily controlled by chemical seed treatments applied as dusts, wettable powders, or liquids. Effectiveness of treatments on oats and barley was difficult to assess because of low smut infections. None of the treatments gave a significant increase in flax emerqence.

Introduction

In 1973, 21 seed treatment chemicals were tested for their efficacy in controlling common bunt of wheat [Tilletia foetida (Wallr.) Liro and T. caries (DC.) Tul.], covered smut of oats (Ustilago kolleri Wille), and covered smut of barley (U. hordei (Pers.) Lagerh.] and for their effects on the emergence of flax under Manitoba conditions.

Materials and methods

Table 1 lists the chemical composition, where available, and the product name and source of the materials used. Panogen 15B was included as a comparison standard.

Seeds of CT 931 wheat (Triticum aestivum L.), 'Random' oats (Avena sativa L.), and 'Herta' barley (Hordeum distichon L.) were used in the smut tests. 'Redwood' flax (Linum usitatissimum L.) was used for emergence tests.

Prior to chemical treatment the cereals were inoculated with the appropriate dry smut spores at the rate of 1 g per 200 g of wheat, oats, or barley seed. The chemical dosaqes used were those suggested by the manufacturer (Table 2). Each sample was hand-shaken in a glass jar to cover the seed uniformly with the chemical.

After 3 days or more, 200 seeds were removed from each jar and placed in a paper envelope. Envelopes that contained seed of the same treatment were stored in polyethylene baqs at 15 C for up to 4 weeks before seeding.

Tests were carried out at Brandon and duplicated at Morden, Manitoba. There were four replicates at each location. Each replicate consisted of 200 seeds planted in a row 12 ft long: all rows were planted 9 inches apart: plots were arranqed in a randomized block design. Emergence of flax was recorded 3–4 weeks after seeding.

Wheat, oats, barley, and flax were sown at Brandon on 11 April, 8 May, and 15 Flay and at Morden on 13 April, 10 May, and 14 May, respectively.

The number of smutted heads in each row was recorded after the crop had headed and was expressed as a percentage of the number of heads in the untreated rows. The results are given as means of four replicates, at each planting site. The "LSD-05" was determined from the means of the treatments at each station.

Results and discussion

Smut infection of untreated seed varied from 39% to 51% for wheat, from 5% to 8% for oats, and from 1% to 3% for barley.

Bunt infection was very hiqh and no treatment gave complete control at either station. Products that gave less than 1% infection at both stations were: for dusts TF 3219; for wettable powders BAS 3293F, BAS 3304F, and NF 48 (1 oz rate): and for solutions Me 112a, Panogen 15B and RHC 364. The effectiveness of the treatments on oats and barley was difficult to assess because of the low smut infections on these crops. Sn 513 was ineffective against all smut diseases.

mergence of untreated flax checks varied from 63% to 77% (Table 2). None of the treatments qave a siqnificant increase in flax emerqence, but the highest dosaqes of Me 112a and RHC 364 significantly reduced emergence at both stations.

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[1] Contribution No. 582, Research Station, Agriculture Canada, Winnipeg, Manitoba R3T 2M9.

[2] Plant Pathologist.

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Table 1. Seed treatment materials used in the cooperative tests

Treatment no.	Source*	Product name	Chemical name
1		Untreated check	
2	BASF	BAS 3293-F	2,5-dimethyl-3-furylanilide (50%) + maneb (32%)
3	BASF	BAS 3304-F	N-cyclo-hexyl-2,5-dimethyl-furane-3-carbonic acid amide (50%) + maneb (32%)
4	Chipman	TF 3222	identity not available
5	Chipman	TF 3219	identity not available
6	Chipman	TF 3235	identity not available
7	Ciba-Geigy	NF 48	methyl 4-(2-aminophenyl)-3-thioallophanate (80%)
8	Ciba-Geigy	A 4759 A	identity not available
9	Ciba-Geigy	A 4743 A	identity not available
10	Dow	Dowco 263	identity not available
11	DuPont	Benlate T	benomyl [methyl 1-(butylcarbamoyl)-2-benzimidazole carbamate] (30%) + thiram (30%)
12	Fisons	NC 5936	2,3,5-trichloromuconononitrile (5%)
13	Hoechst	Hoe 6053 + maneb	2-methyl-5,6 dihydro-4-H-pyran-3-carboxylic anhydride (75%) + maneb (50%)
14	Interprovincial	Busan 30 IP	2-(thiocyanomethylthio) benzothiazole (30%)
15	Interprovincial	Busan 30	2-(thiocyanomethylthio) benzothiazole (30%)
16	Merck	Me 112a	identity not available
17	Niagara	Polyram liquid	zinc activated polyethylene thiuram disulfide (22.5%)
18	Nor-Am	Panogen 15B	methylmercuric dicyandiamide (3.7 oz/gal)
19	Nor-Am	Sn 513	9-aza-1,17-diguanidinoheptadecane triacetate (30%)
20	Rohm & Haas	RHC 364	identity not available
21	Uniroyal	Uni 2001	identity not available
22	Uniroyal	Uni 2036	identity not available
23		Untreated check	

* BASF Canada Ltd., Montréal, Qubbec; Chipman Chemicals Ltd., Hamilton, Ontario; Ciba-Geigy Canada Ltd., Montréal, Qubbec; Dow Chemical of Canada Ltd., Sarnia, Ontario; E.I. DuPont de Nemours & Co., Inc., Wilmington, Delaware; Fisons (Canada) Ltd., Don Mills, Ontario; Hoechst Chemicals Canada Ltd., Montrbal, Qubbec; Interprovincial Cooperatives Ltd., Winnipeg, Manitoba; Merck & Co., Inc., Rahway, New Jersey; Niagara Chemicals, Burlington, Ontario; Nor-Am Agricultural Products Inc., Woodstock, Illinois; Rohm & Haas Co. of Canada Ltd., West Hill, Ontario: Uniroyal Chemical Division, Elmira, Ontario.

Table 2. Effects of seed-treatment chemicals on smuts in wheat, oats and barley and emergence of flax

Treatment no.	Product name	Formulation*	Dosage (oz/bu)	% Smutted heads						% Emergence	
				Wheat		Oats		Barley		Flax	
				B	M	B	M	B	M	B	M
1	Untreated check			51.1	40.0	7.8	6.2	2.6	1.6	63.0	73.8
2	BAS 3293-F	WP+	3.95	0.3	0.3	0.0	0.0	0.0	0.0	56.8	75.8
3	BAS 3304-F	wP+	3.95	0.0	0.2	0.0	0.0	0.0	0.0	59.8	73.3
4	TF 3222	D	1.50	0.9	1.2						
			2.00			*0.0*	0.0	0.0	0.0	51.0	81.8
5	TF 3219	D	1.50	0.4	0.7						
6	TF 3235	D	2.00			***0.0***	0.0	0.0	0.0	63.8	75.8
7	NF 48	WP	0.50	1.3	2.6						
			1.00	0.0	0.1						
8	A 4759 A	D	0.75			0.1	0.3				
			0.79					0.0	0.1		
			1.00							49.0	72.5
9	A 4743 A	D	0.75			0.3	0.1				
			0.79					***0.0***	***0.0***		
			1.00							62.5	77.8
10	Dowco 263	D	0.30	20.8	15.6						
			0.60	19.6	16.4						
			1.70			0.1	***0.0***				
			3.40			0.0	*0.0*				
			2.40					*0.0*	***0.0***		
			4.80					***0.0***	0.0		
			2.80							64.8	76.5
			5.60							56.8	70.5
11	Benlate T	WP	0.60	0.6	3.1						
			0.75	0.4	2.7						
			0.80			***0.0***	*0.0*	***0.0***	***0.0***		
			1.00			*0.0*	***0.0***	*0.0*	***0.0***		
			1.50							61.5	74.8
			2.00							49.5	78.8
12	NC 5936	D	2.88	34.0	30.2	0.3	***0.0***	*0.0*	***0.0***		
			5.76	35.1	29.3	0.0	***0.0***	***0.0***	***0.0***	57.8	56.0
			11.52							53.0	67.0
13	Hoechst 6053 t maneb	D	1.50	0.1	1.4	***0.0***	*0.0*	***0.0***	***0.0***	54.8	65.8
			2.00	0.2	1.3	***0.0***	***0.0***	*0.0*	***0.0***	70.5	75.3
14	Busan 30 IP	SN	0.75	6.4	3.3	***0.0***	***0.0***	***0.0***	***0.0***	60.3	74.5
15	Busan 30	SN	0.75	9.1	5.9	***0.0***	***0.0***	***0.0***	***0.0***	55.8	68.0
			1.00	5.6	2.2	***0.0***	***0.0***	***0.0***	***0.0***	53.3	70.3
16	Me 112a	SN	2.00	0.7	0.0	***0.0***	*0.0*	***0.0***	***0.0***	63.3	58.5
			4.00	0.1	0.0	***0.0***	***0.0***	***0.0***	***0.0***	42.3	47.0
17	Polyram	SL	2.00	0.8	4.2	0.9	2.7	0.0	0.1	69.0	74.8
			3.00	0.0	2.2	0.4	1.3	0.0	0.0	56.3	73.3
18	Panogen 15B	SN	0.75	0.5	0.2	0.0	***0.0***	*0.0*	***0.0***		
			1.50							66.0	82.0
19	SN 513	SN	1.33	5.8	5.7	3.2	5.1	2.0	0.5	63.5	74.3
			1.67	7.2	6.7	3.6	6.7	0.6	0.4	57.8	76.0
20	RHC 364	SN	1.60	0.4	0.0	0.0	1.5	0.0	0.0		
			3.20	0.1	0.1	0.1	0.1	0.0	0.1	61.8	75.8
			6.40							42.8	62.8
21	uni 2001	SL	1.50	2.2	5.4	*0.0*	***0.0***	*0.0*	***0.0***		
			3.00							62.3	74.8

Table 2. (Cont'd)

Treatment no.	Product name	Formulation*	Dosage (oz/bu)	% Smutted heads*** Wheat B**	Wheat M**	Oats B**	Oats M**	Barley B**	Barley M**	% Emergence Flax B**	Flax M**
22	Uni 2036	D	0.75	4.0	6.6						
			1.50			*0.0*	*0.0*	0.0	0.0		
			3.00							63.0	79.0
23	Untreated check			40.1	38.9	5.3	5.2	2.5	1.1	66.3	77.0
LSD (0.05)										15.9	10.9

* Formulation code: D = dust, SN = solution, SL = slurry, WP = wettable powder, WP+ = wettable powder but applied as a slurry.

** B = Brandon, M = Morden.

*** $\frac{\text{number of smutted heads}}{\text{number of heads in control}} \times 100.$