# Cooperative seed treatment trials - 1976[1]

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Twenty-two seed treatment chemicals were tested at four stations for their efficacy in controlling bunt of wheat [*Tilletia caries* and *T. foetida],* loose smut of oats *[Ustilago avenae],* and false loose smut of barley [*U. nigra].* Smut infection of untreated seed was high with the exception of 1.6% barley smut at Ste-Foy, Quebec. Eight treatments gave significantly less control of bunt and oat smut at two stations and of barley smut at one station than the standard Vitaflo 280 but the remaining treatments were not significantly better.

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On a évalué a quatre stations l'efficacite de vingt-deux fongicides (traitement des semences) dans la lutte contre la carie du ble (*Tilletia caries* et *T. foetida),* le charbon nu de l'avoine *(Ustilago avenae)* et le faux charbon nu de l'orge (U. *nigra).* Le taux d'infection au charbon des semences non traitées était élevé, a l'exception du charbon de l'orge a Sainte-Foy (1.6%). En ce qui a trait a la carie du blé et au charbon de l'avoine a deux stations, et au charbon de l'orge a une station, huit traitements ont donne des resultats significativement moins probants que le Vitaflo 280, mais les autres traitements n'ont pas été significativement meilleurs.

In 1976, 22 seed treatment chemicals were tested for their efficacy in controlling common bunt of wheat [*Tilletia foetida* (Wallr.) Liro and *T. caries* (DC.) Tul.], loose smut of oats *[Ustilago avenae* (Pers.) Rostr.], and false loose smut of barley [*U. nigra* Tapke]. There were two main changes in the 1976 trials as compared to those of 1975. These were the use of a vacuum inoculation technique to improve smut infection of oats and barley, and the use of a much wider range of test locations across Canada.

## Materials and methods

Table 1 lists the chemical composition, where available, and the product name and source of the materials used. Vitaflo 280 was included as a comparison standard.

Seeds of 'Norteno M67' wheat *(Triticum aestivum* L.), 'Random' oats *(Avena sativa* L.), and 'Herta' barley *(Hordeum distichon* L.) were used in the smut tests.

Before treatment with chemicals, wheat was inoculated with dry bunt spores at the rate of 1 g spores per 200 g of seed. The technique for inoculation of oats and barley was described by Nielsen (1976). The chemical dosages 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 bags at 15°C for up to 8 weeks before seeding.

The tests on bunt were planted at Beaverlodge, Alberta, (April 30) and at Lacombe, Alberta, (May 6); those on the smuts of oats and barley at Ste. Foy, Quebec, (June 3) and Winnipeg, Manitoba (June 22). There were four replicates per test at each location. Each replicate consisted of 200 seeds planted in a row 4 m long; all rows were planted 25 cm apart; plots were arranged in a randomized block design.

The total heads in the untreated rows and the number of smutted heads in all rows was recorded after the crop had headed. The % smut in the treatment rows was obtained by dividing the mean no. of smutted heads by the mean no. of heads in untreated rows then multiplying the result by 100.

For a particular crop and location the mean of the total heads in the treated rows was assumed to be the same as the mean of the total heads in the untreated rows. The results are given as means of four replicates at each planting site. Significance at the 0.95 level was determined from the means of the treatments at each station.

## Results and discussion

Smut infection of untreated seed was 1.6% in barley and varied from 16.1% to 35.8% in wheat, and from 12.9% to 13.9% in oats.

Eight treatments gave significantly less control of bunt and oat smut at two stations and of barley smut at one station than the standard Vitaflo 280 but the remaining treatments were not significantly better (Table 2). The barley test at Winnipeg was lost because of flooding.

No obvious symptoms of phytotoxicity were observed in plants originating from treated seeds at any of the test locations.

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Table 1. Seed treatment materials used in the cooperative tests

| Treatment no. | Source* | Product name | Active ingredient |
|---|---|---|---|
| 1 | | Untreated check | |
| 2 | ACP | AG 304 | identity not available |
| 3 | Chemagro | Bay–meb 6447 | 1–(4–chlorophenoxy)–3,3–dimethyl–1 (1H–1,2,4–triazol–1–yl)–2–butanone (25%) |
| 4 | Chipman | TF 3350 | identity not available |
| 5 | Chipman | TF 3355 | identity not available |
| 6 | Ciba–Geigy | A 5581A | identity not available |
| 7 | Dupont | DPX 14 | identity not available |
| 8 | Dupont | DPX 1991T | benomyl 30% + thiram 30% |
| 9 | FMC | Polyram liquid | metiram 22.5% |
| 10 | FMC | BEG 3 | identity not available |
| 11 | FMC | BEG 4 | identity not available |
| 12 | Interprovincial | Busan 30 | 2–(thiocyanomethylthio) benzothiazole (30%) |
| 13 | Nor–Am | SN 43410 | identity not available |
| 14 | Rohm & Haas | RH 2161 | identity not available |
| 15 | Uniroyal | Vitaflo 280 | carbathiin 14.9% + thiram 13.2% |
| 16 | Uniroyal | UNI 2036 | identity not available |
| 17 | Uniroyal | UNI 2067 | identity not available |
| 18 | Uniroyal | UBI 2078 | identity not available |
| 19 | Uniroyal | UBI 2085 | identity not available |
| 20 | Uniroyal | UBI 2099 | identity not available |
| 21 | Uniroyal | UBI 2100 | identity not available |
| 22 | Uniroyal | UBI 2101 | identity not available |
| 23 | Uniroyal | UBI 2102 | identity not available |

* ACP Ltd., London, Ontario; Chemagro Ltd., Mississauga, Ontario; Chipman Chemicals Ltd., Hamilton, Ontario; Ciba–Geigy Canada Ltd., Cambridge (Galt), Ontario; E.I. DuPont de Nemours & Co. Inc., Wilmington, Delaware; FMC of Canada Ltd., Burlington, Ontario; Interprovincial Cooperatives Ltd., Winnipeg, Manitoba; 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 at Beaverlodge (B), Lacombe (L), Ste. Foy (SF), and Winnipeg (W)

| Treatment no. | Product name | Formulation* | Dosage g or ml/kg | %smutted heads + Wheat B | Wheat L | Barley SF | Oats SF | Oats W |
|---|---|---|---|---|---|---|---|---|
| **1** | Untreated check | | | 35.8 | 16.1 | 1.6 | 12.9 | 13.9 |
| **2** | AG 304 | SL | 2.00 | 1.2 | 1.4 | 1.5 | | |
| **3** | Bay–meb 6447 | WP | 5.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | | | 10.00 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| **4** | TF 3350 | SN | 0.50 | 3.9 | 1.2 | | | |
| | | | 0.94 | | | ***0.0*** | | |
| | | | 1.30 | | | | 1.8 | 0.3 |
| **5** | TF 3355 | SL | 1.82 | 6.4 | 0.1 | | | |
| | | | 3.25 | | | ***0.0*** | | |
| | | | 4.60 | | | | ***0.0*** | **0.4** |
| **6** | A 5581A | SL | 1.60 | 1.5 | 0.4 | | | |
| | | | 1.80 | 1.4 | 0.7 | | | |
| | | | 2.00 | | | ***0.0*** | | |
| | | | 2.30 | | | ***0.0*** | | |
| | | | 2.80 | | | | 0.4 | ***0.0*** |
| | | | 3.20 | | | | 0.9 | ***0.0*** |
| 7 | DPX 14 | WP | 2.10 | 0.2 | 0.0 | | | |
| | | | 2.60 | | | ***0.0*** | | |
| | | | 3.70 | | | | **0.1** | ***0.7*** |

Table 2. (Cont.)

| Treatment no. | Product name | Formulation* | Dosage g or ml/kg | % smutted heads + Wheat B | Wheat L | Barley SF | Oats SF | Oats W |
|---|---|---|---|---|---|---|---|---|
| 8 | DPX 1991T | WP | 2.10 | 0.3 | 0.0 | | | |
| | | | 2.60 | | | 0.0 | | |
| | | | 3.70 | | | | 0.0 | 0.0 |
| 9 | Polyram liquid | SL | 3.10 | 4.7 | 0.3 | | | |
| | | | 3.90 | | | 0.4 | | |
| | | | 4.20 | 1.6 | 0.0 | | | |
| | | | 5.20 | | | 0.1 | | |
| | | | 5.50 | | | | 9.5 | 0.4 |
| | | | 7.40 | | | | 11.3 | 0.1 |
| 10 | BEG 3 | SL | 3.10 | 1.7 | 0.4 | | | |
| | | | 3.90 | | | 0.0 | | |
| | | | 5.50 | | | | 1.6 | 0.0 |
| 11 | BEG 4 | SL | 3.10 | 4.6 | 2.4 | | | |
| | | | 3.90 | | | 0.0 | | |
| | | | 5.50 | | | | 0.7 | 0.0 |
| 12 | Busan 30 | SN | 0.39 | 1.8 | 0.8 | | | |
| | | | 0.48 | | | 0.0 | | |
| | | | 0.68 | | | | 0.2 | 0.0 |
| | | | 0.78 | 1.8 | 1.6 | | | |
| | | | 0.97 | | | 0.0 | | |
| | | | 1.37 | | | | 0.2 | 0.0 |
| 13 | SN 43410 | SN | 0.68 | 18.6 | 4.2 | | | |
| | | | 0.85 | | | 1.0 | | |
| | | | 1.28 | | | | 5.6 | 0.0 |
| | | | 1.36 | 12.4 | 6.6 | | | |
| | | | 1.70 | | | 0.2 | | |
| | | | 2.55 | | | | 3.8 | 0.0 |
| 14 | RHC 2161 | SN | 0.33 | 19.6 | 6.3 | | | |
| | | | 0.41 | | | 0.1 | | |
| | | | 0.58 | | | | 7.7 | 2.1 |
| | | | 0.66 | 13.8 | 1.8 | | | |
| | | | 0.82 | | | 0.0 | | |
| | | | 1.16 | | | | 4.8 | 1.1 |
| | | | 1.30 | 5.9 | 2.2 | | | |
| | | | 1.63 | | | 0.0 | | |
| | | | 2.29 | | | | 1.4 | 0.0 |
| 15 | Vitaflo 280 | SL | 1.82 | 1.5 | 0.1 | | | |
| | | | 2.28 | | | 0.0 | | |
| | | | 3.22 | | | | 1.6 | 0.0 |
| 16 | UNI 2036 | WP | 1.56 | 0.9 | 0.1 | | | |
| | | | 1.95 | | | 0.0 | | |
| | | | 2.75 | | | | 0.6 | 0.0 |
| 17 | UNI 2067 | WP | 1.56 | 0.4 | 0.0 | | | |
| | | | 1.95 | | | 0.0 | | |
| | | | 2.75 | | | | 0.6 | 0.4 |
| 18 | UBI 2078 | SL | 1.56 | 0.1 | 0.0 | | | |
| | | | 1.95 | | | 0.0 | | |
| | | | 2.75 | | | | 0.3 | 0.0 |
| 19 | UBI 2085 | SL | 3.22 | | | | 0.9 | 0.0 |
| 20 | UBI 2099 | WP | 1.56 | 0.2 | 0.0 | | | |
| | | | 1.95 | | | 0.0 | | |
| | | | 2.75 | | | | 0.2 | 0.0 |
| 21 | UBI 2100 | SN | 1.82 | 1.2 | 0.3 | | | |
| | | | 2.28 | | | 0.0 | | |
| | | | 3.22 | | | | 0.3 | 0.0 |
| 22 | UBI 2101 | SN | 2.08 | 0.2 | 0.0 | | | |
| | | | 2.61 | | | 0.0 | | |
| | | | 3.68 | | | | 0.0 | 0.0 |

Table 2. cont.

| Treatment no. | Product name | Formulation* | Dosage g or ml/kg | % smutted heads + | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Wheat | | Barley | Oats | |
| | | | | B | L | SF | SF | W |
| 23 | UBI 2102 | SN | 2.08 | 0.7 | 0.0 | | | |
| | | | 2.61 | | | 0.0 | | |
| | | | 3.68 | | | | 0.1 | 0.0 |
| Upper significance limit (0.95)** | | | | 4.4 | 0.7 | 0.3 | 3.4 | 0.4 |
| Mean no. of heads | | | | 276 | 190 | 395 | 239 | 186 |

* Formulation code: SN = solution, SL = slurry, WP = wettable powder

$$+\%\ \text{smut} = \frac{\text{mean no. of smutted heads}}{\text{mean no. of heads in untreated rows}} \times 100$$

** Treatments significantly inferior to Vitaflo 280 have values higher than the upper significance limit.

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## Literature cited

Nielsen, J. 1976. Note on a method of artificial inoculation of oats and barley for seed treatment trials on seedling-infecting smuts. Can. Plant Dis. Surv. 56: 114-116.