# THE VALUE OF SEED PROTECTION FOR VEGETABLE CROPS IN EASTERN CANADA[1]

V. R. Wallen[2], G.C. Chamberlain3 and L. Cinq-Mars[4]

## Abstract

The results of vegetable seed treatment trials with fungicides and fungicide-insecticide combinations for the improvement of emergence and the prevention of damping-off in pea, bean, corn, cucumber and squash seed are summarized. The trials were held at St. Catharines and Ottawa, Ontario and St. Jean, Quebec during the summers of 1957, 1958 and 1959. The significant increases in emergence resulting from treatments containing thiram, captan, and dichlone are proof that vegetable seed treatment is essential in these areas.

For the past three summers, 1957, 1958, and 1959, vegetable seed treatment trials comprising fungicide and fungicide-insecticide combinations have been held at Ottawa and St. Catharines in Ontario and St. Jean, Quebec. Although conditions of soil temperature and moisture differ somewhat in these areas, the conditions at Ottawa and St. Jean are comparable. Year to year observations have shown that the mean soil temperature at Ottawa and St. Jean is approximately two degrees lower in May than at St. Catharines. Although the precipitation at the three locations is approximately the same, snow cover remains for a longer period in the spring at Ottawa and St. Jean.

Over the past years it has been found that stands produced from untreated vegetable seeds were often low in emergence. Because of high soil moisture and cool soil temperatures at planting time, in the areas where the trials were carried on, vegetable seeds germinate slowly and there is a long period of susceptibility to attack by soil-borne organisms.

The tests were made on seed of peas, beans, cucumber, squash and corn. All seed was sound and had a germination rate of over 80 per cent with the exception of corn. Corn seed used in 1957 and 1958 had a germination rate of between 50 and 60 per cent.

Seed was treated in two ounce lots for the small seeded vegetables and up to one pound lots for the larger seeded kinds at the rates indicated in

[1]Joint contribution from the Plant Research Institute, Ottawa, Ontario (Contribution No. 70), the Plant Pathology Laboratory, St. Catharines, Ontario and the Research Laboratory, St. Jean, Quebec, Research Branch, Canada Department of Agriculture.

[2]Plant Research Institute, Ottawa, Ontario.
[3]Plant Pathology Laboratory, St. Catharines, Ontario.
[4]Research Laboratory, St. Jean, Quebec.

Table 1. All treated seed was stored at 70°F. for two to four weeks before being sown in the field. The seed of each treated lot was replicated four times at each location and sown in rod row plots in randomized blocks. The plot arrangement was identical at each location. Emergence counts were taken when the first true leaves had unfolded or as soon as possible after that time. The counts expressed as percentages are shown in Tables 2, 3 and 4. Results at St. Jean are only available for 1958 and 1959.

For peas each year some of the treatments caused significant increases in emergence at all locations and all treatments were beneficial at Ottawa and St. Jean. Significant increases were recorded in beans only at St. Catharines in 1957, at Ottawa and St. Catharines in 1958, and at Ottawa in 1959. Corn seed treatments produced significant increases all three years at Ottawa, in two years at St. Catharines and one year at St. Jean. Significant increases were recorded each year at all locations for squash and cucumber seed treatments; however, the only treatments producing significant increases in emergence for squash seed at St. Catharines in 1957 and 1958 were compounds containing dichlone or captan.

The addition of an insecticide had been shown to be beneficial in controlling the seed corn maggot in a former trial (1). Although insecticides were incorporated in the trials reported here no evidence of injury by this insect was noted,, However, the use of an insecticide is recommended where injury from seed corn maggot is a problem.

## Literature Cited

1. WALLEN, V.R., J.K. RICHARDSON, L. CINQ-MARS and W. BELL. 1957. Treatments of vegetable seed for improved emergence - '1956. Plant Dis. Reptr. 41: 468-473.

PLANT RESEARCH INSTITUTE, OTTAWA, ONTARIO; PLANT PATHOLOGY LABORATORY, ST. CATHARINES, ONTARIO, AND RESEARCH LABORATORY, ST. JEAN, QUEBEC, RESEARCH BRANCH, CANADA DEPARTMENT OF AGRICULTURE.

Table 1. Dosages of seed treatment materials per 100 lb. of seed.

| Treatments | Dosage oz. per 100 lb. of seed | | | | |
|---|---|---|---|---|---|
| | Peas | Beans | Corn | Cucumber | Squash |
| Arasan SF-M --(75% thiram t 2% methoxychlor) | 2 | 1 1/3 | 3 | 3 | 3 |
| Arasan 75 --(75% thiram) | 3 | 2 | 5 1/3 | 3 | 3 |
| Arasan 75 t lindane (1:1)(37.5% thiram t 12.5% lindane) | 4 | 4 | 4 | 6 | 4 |
| Arasan 75 t aldrin (2:1)(50% thiram + 6.66% aldrin) | 3 | 3 | 3 | 4 1/2 | 3 |
| Arasan 75 + dieldrin (2:1)(50% thiram t 16.66% dieldrin) | 3 | 3 | 3 | 4 1/2 | 3 |
| Captan 75 --(75% captan) | 2 1/2 | 2 1/2 | 1 1/2 | 3 | 2 |
| Captan 75 t aldrin (2:1)(50% captan t 6.66% aldrin) | 2 1/2 | 2 1/2 | 1 1/2 | 3 | 2 |
| Captan 75 t dieldrin (2:1)(50% captan t 16.66% dieldrin) | 2 1/2 | 2 1/2 | 2 | 3 | 2 |
| Delsan AD -- (60% thiram t 12.75% technical dieldrin) | 3 | 3 | 4 1/2 | 3 | 3 |
| Orotho Seed Guard --(50% captan + 16.5% lindane) | 3 | 3 | 3 | 3 | 3 |
| Ortho 75 --(75% captan) | 2 1/2 | 2 1/2 | 1 1/2 | 3 | 3 |
| Phygon XL --(50% dichlone) | 2 | 2 | 1 1/2 | 4 | 4 |
| Phygon XL t lindane (1:1)(25% dichlone t 12.5% lindane) | 4 | 4 | 3 | 8 | 8 |
| Phygon XL t aldrin (2:1)(33.33% dichlone t 6.66% aldrin) | 3 | 3 | 2 1/4 | 6 | 6 |
| Phygon XL t dieldrin (2:1)(33.33% dichlone + 16.66% dieldrin) | 3 | 3 | 2 1/4 | 6 | 6 |
| Thioneb 50W --(50% polyethylene thiram sulphides) | 4 | 4 | 3 | 4 | 8 |
| Thioneb 50W t lindane (2:1)(33.33% p. t. s. t 8.33% lindane) | 6 | 6 | 4 1/2 | 12 | 12 |
| Thioneb 50W + aldrin (4:1)(40.0% p.t.s. + 4.0% aldrin) | 5 | 5 | 3 2/3 | 10 | 10 |
| Thioneb 50W t dieldrin (4:1)(40.0% p. t. s. t 10% dieldrin) | 5 | 5 | 3 2/3 | 10 | 10 |

Tabla 2. Mean percentage field emergence from vegetable seed treated with various seed treatments, based on four replicates of 100 seeds each. (St. Jean)

| Treatment | 1958 | | | | | 1959 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Peas | Beans | Corn | Cucumber | Squash | Peas | Beans | Corn | Cucumber | Squash |
| Control | 49.2 | 85.8 | 7.2 | 11.0 | 41.2 | 59.8 | 83.2 | 85.0 | **20.2** | 72.8 |
| Arasan SF-M | 83.8[c] | 87.2 | **31.2** | 36.5 | 30.0 | **86.8** | 84.8 | 76.8 | 34.0 | 81.8 |
| Arasan 75 | 89.8 | 86.0 | **40.8** | **46.5** | 46.5 | 89.5 | 83.8 | 65.8 | **34.5** | 75.8 |
| Arasan 75 t lindane | 86.2 | 75.2 | **24.5** | 37.2 | 36.8 | 86.8 | 84.2 | 75.8 | **36.0** | 80.8 |
| Arasan 75 + aldrin | 87.2 | 80.8 | **29.5** | **35.2** | 37.0 | 85.8 | 81.8 | 72.5 | **41.0** | 67.2 |
| Arasan 75 + dieldrin | 77.5 | 86.2 | **29.8** | 45.2 | 34.5 | 86.2 | 84.2 | 69.2 | **35.0** | 80.2 |
| Captan 75 | 91.8 | 86.2 | **40.2** | 45.0 | 59.5 | 85.5 | 80.2 | 75.2 | **35.2** | 70.5 |
| Captan 75 + aldrin | 85.0 | 87.0 | 34.0 | 48.5 | 41.2 | **81.0** | 83.5 | 79.8 | **38.5** | 71.0 |
| Captan 75 + dieldrin | 74.5 | 87.2 | **28.2** | 47.0 | 39.8 | 84.8 | 78.0 | 79.2 | **34.5** | 68.0 |
| Delsan A. D. | 85.5 | 83.0 | **46.8** | 43.8 | 54.5 | **80.2** | 80.5 | 82.5 | 43.0 | 74.8 |
| Ortho Seed Guard | 79.0 | 80.0 | 25.2 | 43.2 | 44.0 | 74.0 | 85.2 | 73.0 | **40.5** | 66.5 |
| Ortho 75 | 94.0 | 86.2 | 37.5 | 44.0 | 61.0 | 91.0 | 88.0 | 83.5 | 44.8 | 79.5 |
| Phygon XL | 85.0 | 81.2 | 32.0 | 45.0 | 62.0 | 89.5 | 84.8 | 78.2 | 33.0 | 72.5 |
| Phygon XL t lindane | 85.5 | 84.0 | **29.8** | 40.8 | 59.8 | 90.8 | 76.8 | 69.2 | 38.2 | 81.5 |
| Phygon XL + aldrin | 83.0 | 80.8 | 29.5 | 39.0 | 56.5 | 85.5 | 88.0 | 78.8 | 27.8 | 79.0 |
| Phygon XL t dieldrin | 87.8 | 81.2 | **33.0** | 40.5 | 54.5 | 85.5 | 84.2 | 86.8 | **41.2** | 69.8 |
| Thioneb 50W | 93.2 | 79.8 | **18.0** | 44.2 | 47.0 | 70.5 | 84.5 | 78.8 | **44.5** | 79.8 |
| Thioneb 50W + lindane | 81.5 | 81.5 | **19.8** | 36.2 | 37.0 | 89.5 | 84.2 | 75.2 | 31.0 | 72.5 |
| Thioneb 50 W t aldrin | 76.7 | 82.0 | **17.0** | 38.2 | 38.0 | 88.8 | 83.0 | 86.0 | 30.5 | 68.8 |
| Thioneb 50W + dieldrin | 82.2 | 85.8 | **21.0** | 40.5 | 30.5 | **86.8** | 86.0 | 78.0 | **35.8** | 82.0 |
| | | | | | | 7.4 | ---b | ---b | 12.8 | 8.6 |

[a] L.S.D. at the 5% level

---b No significant increase between treatments.

c Underlined numbers indicate significant increase in emergence at 5% level.

Table 3. Mean percentage field cmergtnce from vegetable seed treated with various seed treatments, based on four replicates of 100 seeds each. (Ottawa)

| | 1957 | | | | | 1958 | | | | | 1959 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Peas | Beans | Corn | Cucumber | Squasl | Peas | Beans | Corn | Cucumber | Squas | Peas | Beans | Corn | Cu-cumber | Squash |
| Control | 10.0 | 82.0 | 23.0 | 23.0 | 77.5 | 56.0 | 78.2 | 4.2 | 14.8 | 48.5 | 29.8 | 65.0 | 78.5 | 23.8 | 71.5 |
| **Arasan SF-M** | 66.2[c] | 79.0 | 53.0 | 53.0 | 92.5 | 91.2 | 89.2 | 27.0 | 64.2 | 53.5 | 81.2 | 84.5 | 90.2 | 72.0 | 88.2 |
| Arasan 75 | 72.2 | 84.8 | 56.0 | 56.0 | 92.5 | 87.5 | 88.8 | 35.0 | 59.8 | 62.0 | 87.8 | 83.8 | 93.8 | 84.5 | 89.2 |
| Arasan 75 + lindane | 60.8 | 83.8 | 52.0 | 52.0 | 90.2 | 86.0 | 80.2 | 20.5 | 66.0 | 62.8 | 79.2 | 82.5 | 90.2 | 80.0 | 88.2 |
| Arasan 75 t aldrin | 62.8 | 83.8 | 51.8 | 79.2 | 89.5 | 82.8 | 86.8 | 28.2 | 63.5 | 57.2 | 83.0 | 82.5 | 87.2 | 78.2 | 87.2 |
| Arasan 75 + dieldrin | 60.8 | 88.0 | 52.0 | 75.2 | 90.2 | 90.5 | 78.8 | 37.2 | 69.2 | 50.0 | 82.2 | 78.0 | 92.2 | 84.0 | 85.0 |
| Captan 75 | 69.0 | 86.2 | 50.2 | 80.5 | 92.0 | 93.2 | 87.0 | 18.0 | 73.8 | 57.8 | 90.5 | 85.2 | 90.5 | 80.5 | 92.0 |
| Captan 75 + aldrin | 50.5 | 87.5 | 45.2 | 77.5 | 85.0 | 86.0 | 85.2 | 16.5 | 56.0 | 56.5 | 84.2 | 85.0 | 88.5 | 77.2 | 88.5 |
| Captan 75 + dieldrin | 59.0 | 87.2 | 44.5 | 81.0 | 87.0 | 84.5 | 83.2 | 16,0 | 59,5 | 62.5 | 77.5 | 85.2 | 88.5 | 73.2 | 92.2 |
| Delsan A. D. | 66.2 | 86.8 | 55.0 | 54.0 | 92.5 | 94.0 | 80.8 | 41,5 | 70.0 | 72.5 | 87.0 | 86,8 | 92,5 | 85.0 | 95.8 |
| Ortho Seed Guard | 58.2 | 81.0 | 42.5 | 42.5 | 85.8 | 91.8 | 83.5 | 14,8 | 51.8 | 55.0 | 71.5 | 80,2 | 90,8 | 79.8 | 88.5 |
| Ortho 75 | 75.5 | 82.2 | 50,0 | 78,8 | 86.8 | 88.5 | 86.0 | 17.5 | 63.0 | 66.5 | 90.5 | 87.0 | 90.2 | 85.2 | 84.5 |
| Phygon XL | 70.5 | 85.5 | 44.8 | 74.5 | 95.2 | 89.2 | 84.2 | 15,5 | 65,5 | 82.8 | 83.2 | 78.2 | 89.2 | 76.8 | 94.2 |
| Phygon XL t lindane | 63.5 | 85.0 | 44.0 | 77.8 | 93.0 | 88.5 | 80.5 | 15,2 | 64,2 | 75.8 | 77.0 | 79.5 | 88.0 | 69.8 | 93.8 |
| Phygon XL + aldrin | 68.8 | 85.8 | 40.5 | 78.8 | 92.5 | 88.2 | 85.8 | 17.0 | 60.8 | 73.8 | 82.2 | 82.0 | 86.8 | 75.0 | 95.5 |
| Phygon XL + dieldrin | 61.5 | 86.8 | 44.2 | 78.2 | 94.0 | 86.2 | 81.2 | 18,0 | 66,2 | 68.0 | 80.0 | 82,0 | 87,0 | 80,0 | 93.2 |
| Thioncb 50 W | 62.0 | 83.8 | 37.2 | 37.2 | 86.8 | 85.2 | 88.5 | 16.0 | 64.8 | 50.8 | 73.5 | 80,5 | 92,2 | 80,0 | 95.8 |
| Thioncb 50W t lindane | 45.5 | 82.0 | 41.0 | 79,5 | 79.5 | 79.5 | 85,5 | 10.2 | 57.5 | 52.2 | 75.8 | 80,5 | 89,2 | 78.2 | 93.8 |
| Thioneb 50W t aldrin | 51.0 | 80.2 | 40.7 | 78.2 | 70.2 | 84.5 | 79.8 | 13,5 | 66.2 | 55.0 | 69.8 | 86,2 | 86,5 | 77.2 | 93.0 |
| Thioneb 50W t dieldrin | 50.8 | 86.8 | 35.0 | 81.0 | 75.0 | 82.2 | 84.5 | 11,2 | 56.2 | 58.8 | 73.2 | 81.2 | 89.0 | 75.8 | 94.0 |
| L. S.D.[a] | 8.4 | ---[b] | 7.0 | 8.5 | 9.5 | 10.6 | 6.8 | 6.7 | 9.9 | 8.8 | 13.7 | 7.1 | 6.0 | 7.8 | 8.9 |

a L.S.D. at the 5% level.
---b No significant increase between treatments.
c Underlinded numbers indicate significant increase in emergence at 5% level.

Table 4. Mean Percentage field emergence from vegetable seed treated With various seed treatments, based on four replicates of 100 seeds each. (St. Catharines)

| | 1958 | | | | | 1959 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Peas | Beans | Corn | Cucumber | Squad | Peas | Beans | Corn | Cucumber | Squas | Peas | Beans | Corn | Cu-cum-ber | Squash |
| Control | 26.2 | 59.2 | 16.8 | 15.2 | 54.8 | 53.2 | 71.5 | 8.2 | 34.8 | 56.0 | 56.8 | 78.5 | 66.5 | 35.0 | 56.0 |
| Arasan SF-M | 46.8[c] | 56.2 | 38.2 | 20.8 | 61.0 | 75.5 | 82.2 | 19.0 | 46.2 | 52.2 | 84.5 | 79.2 | 68.0 | 67.2 | 78.2 |
| Arasan 75 | 46.8 | 48.0 | 21.2 | 17.0 | 67.8 | 76.5 | 81.2 | 28.5 | 50.5 | 54.4 | 89.0 | 81.5 | 79.8 | 67.2 | 76.0 |
| Arasan 75 + lindane | 42.2 | 44.5 | 48.2 | 10.0 | 62.8 | 68.0 | 82.2 | 22.0 | 48.8 | 39.8 | 81.8 | 84.0 | 72.5 | 64.8 | 71.8 |
| Arasan 75 + aldrin | 54.5 | 79.8 | 52.0 | 27.2 | 65.0 | 75.0 | 81.0 | 32.0 | 49.8 | 34.5 | 86.5 | 84.8 | 73.8 | 74.5 | 83.2 |
| Arasan 75 t dieldrin | 54.8 | 82.5 | 36.5 | 51.0 | 62.2 | 69.2 | 84.0 | 26.0 | 46.0 | 46.5 | 79.0 | 85.8 | 84.2 | 69.5 | 74.2 |
| Captan 75 | 43.2 | 50.2 | 51.0 | 17.0 | 77.2 | 79.0 | 82.2 | 29.8 | 50.2 | 71.8 | 86.5 | 79.5 | 62.2 | 77.2 | 84.5 |
| Captan 75 t aldrin | 64.5 | 76.0 | 58.8 | 40.0 | 80.8 | 70.0 | 82.2 | 26.5 | 58.8 | 52.2 | 86.8 | 84.2 | 79.5 | 68.8 | 83.8 |
| Captan 75 t dieldrin | 61.2 | 91.5 | 36.8 | 59.2 | 77.0 | 80.5 | 81.5 | 25.0 | 58.5 | 60.5 | 82.0 | 79.0 | 79.8 | 66.2 | 77.0 |
| Delsan A. D. | 47.0 | 84.2 | 41.0 | 46.0 | 61.8 | 82.2 | 78.2 | 26.0 | 71.7 | 66.5 | 87.5 | 84.2 | 79.8 | 68.5 | 78.0 |
| Ortho Seed Guard | 35.8 | 59.5 | 35.8 | 20.8 | 67.0 | 75.5 | 83.5 | 17.0 | 63.0 | 59.2 | 92.2 | 83.2 | 84.2 | 70.5 | 79.0 |
| Ortho 75 | 39.2 | 39.5 | 30.0 | 20.5 | 82.8 | 83.8 | 86.8 | 32.0 | 60.5 | 77.8 | 85.8 | 84.2 | 79.5 | 70.5 | 80.2 |
| Phygon XL | 31.2 | 40.5 | 43.8 | 17.5 | 80.0 | 75.0 | 81.0 | 17.0 | 50.5 | 76.0 | 86.8 | 80.5 | 57.8 | 72.5 | 81.5 |
| Phygon XL + lindane | 52.2 | 59.5 | 34.2 | 13.5 | 85.8 | 73.0 | 76.0 | 23.8 | 45.0 | 63.2 | 84.0 | 79.8 | 86.8 | 68.8 | 87.2 |
| Phygon XL t aldrin | 47.0 | 80.0 | 42.0 | 29.2 | 85.5 | 79.2 | 78.8 | 20.2 | 55.5 | 69.8 | 81.2 | 77.5 | 72.8 | 66.2 | 78.0 |
| Phygon XL dieldrin | 62.2 | 82.5 | 60.2 | 54.2 | 89.8 | 71.5 | 82.0 | 25.5 | 51.8 | 71.0 | 86.5 | 84.0 | 73.0 | 64.5 | 81.0 |
| Thioneb 50W | 30.5 | 45.0 | 29.5 | 18.0 | 31.0 | 72.2 | 70.0 | 10.8 | 48.2 | 41.0 | 75.2 | 79.0 | 77.0 | 64.0 | 89.0 |
| Thioneb 50W lindane | 34.8 | 65.8 | 28.0 | 6.8 | 28.8 | 74.0 | 75.5 | 14.2 | 40.0 | 49.0 | 86.2 | 85.0 | 79.2 | 64.0 | 84.0 |
| Thioneb 50W aldrin | 44.5 | 70.5 | 43.8 | 20.5 | 48.8 | 65.5 | 86.5 | 14.5 | 51.5 | 48.5 | 86.2 | 80.8 | 88.0 | 61.8 | 73.1 |
| Thioneb 50W dieldrin | 41.5 | 81.8 | 40.8 | 32.5 | 46.8 | 68.8 | 76.8 | 18.5 | 41.0 | 38.5 | 83.5 | 81.5 | 68.0 | 63.0 | 78.8 |
| L.S.D.[a] | 18.0 | 17.0 | 21.0 | 16.2 | 17.0 | 15.9 | 10.4 | 9.9 | 16.8 | 11.6 | 12.2 | ---b | ---b | 10.8 | 14.7 |

a L. S. D. at the 5% level.
---b No significant increase between treatments.
c Underlined numbers indicate significant increase in emergence at 5% level.