# Sugar Beet Root Maggot Control

By W. L. Gojmerac[1]

In 1955 sugar beet seed treated with insecticides was not effective for control of the sugar beet root maggot, *Tetanops myopaeformis* (von Roder). Wettable powders applied directly to the seed were of no value in protecting the beet seedlings from maggot injury. The tests described here were designed to study further the use of seed treatments for maggot control, using a slightly different approach.

Several recently developed organic phosphates were incorporated into this experimental plot. These insecticides were mixed with fertilizer and applied in a furrow along with beet seed. These two phases will be described separately, although they were handled as one unit throughout this entire study.

## Materials and Methods

The field plan consisted of single row treatments 50 feet long, replicated four times. A powered garden planter was redesigned so that seed and fertilizer were placed into the same furrow and covered. This was done so the method of planting would correspond closely to commercial planting practices.

Treated seed was prepared by mixing the insecticide with a 5 percent solution of methylcellulose[2]. Approximately 110 milliliters were used to treat 1 pound of seed.

Fertilizer (0 - 43 - 0) was used throughout the tests at 100 pounds per acre. When the insecticides were mixed with fertilizer it was assumed that the bulk of the fertilizer did not change, so the machine settings were not altered throughout the plot. Orthocide treated seed selected from the same lot was used throughout the experiment, unless otherwise specifically stated.

At harvest time representative samples were selected from each row for chemical analysis.[3]

## Results

**Seed treatments:** Stand counts were made before thinning. Beets were counted in two representative 100 inch segments of each treatment. These data are summarized in table I. It should be noted that germination was drastically reduced. American Cyanamid 3911 as an emulsion concentrate was more phytotoxic than when it was placed on carbon.

All treatments were hand thinned by the same individual. At harvest time a 35-foot segment of each row was selected for yield data. The beets were counted and weighed.

[1]Former Assistant Entomologist.
[2]Furnished by Dow Chemical Company, Midland, Michigan.
[3]Analysis performed by American Crystal Sugar Company.

TABLE I.—**Seed Treatments to Control the Sugar Beet Root Maggot.**

| Treatment | Avg. stand count | Avg. no. merchantable beets | Avg. weight (lbs.) | Tons per acre | Percent Sucrose | Percent Sodium | Percent Calcium | Percent Potassium | Percent Phosphate |
|---|---|---|---|---|---|---|---|---|---|
| Aldrin (CH)[1] 25% w.p. 1 lb./100 lbs seed | 53 | 26 | 40.3 | 15.0 | 15.3 | .074 | .013 | .182 | .0469 |
| Heptachlor (CH) 25% w.p. 1 lb./100 lbs. seed | 60 | 26 | 37.1 | 14.0 | 15.6 | .070 | .011 | .179 | .0432 |
| Dieldrin (CH) 25% w.p. 1 lb./100 lbs. seed* | 59 | 24 | 34.7 | 13.0 | 15.6 | .065 | .015 | .169 | .0411 |
| Check for dieldrin treated seed* | 64 | 20 | 20.7 | 7.6 | 15.6 | .069 | .018 | .175 | .0432 |
| American Cyanamid 3911[2] (P)[3] 50% on carbon 1 lb./100 lbs. seed | 80 | 19 | 26.1 | 9.5 | 14.7 | .081 | .013 | .189 | .0426 |
| American Cyanamid 3911 (P) 90% emul. conc. 1 lb./100 lbs. seed | 25 | 18 | 25.2 | 9.4 | 15.2 | .072 | .014 | .178 | .0405 |
| American Cyanamid 3911 (P) 90% emul. conc. 2 lbs./100 lbs. seed | 25 | 22 | 24.0 | 9.0 | 16.1 | .056 | .018 | .188 | .0389 |
| Hercules AC 528[4] (P) 25% w.p. 1 lb./100 lbs. seed | 68 | 23 | 29.6 | 11.0 | 15.8 | .066 | .013 | .169 | .0401 |
| Check—no insecticide | 103 | 21 | 21.2 | 8.0 | 15.9 | .064 | .017 | .177 | .0441 |
| Check—no insecticide | 112 | 24 | 20.9 | 7.8 | 16.2 | .053 | .018 | .176 | .0425 |
| L.S.D. at 1 percent level | ---- | --- | 12.81 | --- | --- | .024 | --- | ---- | ---- |
| L.S.D. at 5 percent level | ---- | --- | 9.6 | --- | ---- | .018 | --- | ---- | ---- |

[1]Chlorinated hydrocarbon insecticide.
[2]An experimental insecticide produced by American Cyanamid Co.
[3]Organic phosphate insecticide.
[4]An experimental insecticide produced by Hercules Powder Co.

*Separate variety.

These data are also summarized in table I. Significantly higher yields were obtained where seed was treated with aldrin, heptachlor, dieldrin and Hercules AC 528. Increases in yield were as high as six tons per acre.

Chemical analysis of the beets indicated that the sucrose, calcium, potassium and phosphate contents were not affected by the insecticides. However, the percent of sodium was significantly higher in rows where the seed was treated with American Cyanamid 3911 and aldrin.

Previous experiments in 1955 found seed treatments of no value in controlling the sugar beet root maggot. No sticker was added to the insecticides. Since the insecticides employed were powders, it is possible that much of the insecticide was lost in handling. The sticker employed in 1956 tests firmly coated each seed with a thin layer of insecticide which remained on the seed until it was in the ground. Since these tests were conducted on a very limited scale, however, it is felt that more extensive tests should be conducted before recommendations can safely be made. If seed treatments should prove practical, a considerable saving will be realized by the farmer. The amount of insecticide could be reduced to 5 percent of what is currently being recommended and used.

**Organic phosphate insecticides mixed with fertilizer:** Aldrin, dieldrin and heptachlor mixed with fertilizer and placed directly in the row with beet seed were shown to control the sugar beet root maggot effectively in 1955. Although a reduction in stand was noted, the differences were eliminated by proper thinning. In a search for less phytotoxic chemicals, a series of relatively new organic phosphate insecticides was mixed with fertilizer and employed as soil insecticides. Phosphates as a rule have not been employed extensively as soil insecticides. These preliminary experiments should give additional information relative to phosphate insecticides and their possible use as soil insecticides.

Stand counts were made prior to thinning. These data are summarized in table II. It should be noted that germination and emergence were drastically reduced. American Cyanamid 3911 and malathion reduced germination and emergence less than did the other insecticides; however, even here the reduction was greater than 50 percent.

The number of merchantable beets is summarized in table II also. These data indicate thinning eliminates some of the differences between treatments caused by the insecticides; however, a very poor stand resulted in fewer merchantable beets.

The weights of beets obtained from each treatment are also summarized in table II. Although increases in yields were noted in several treatments, statistically significant higher yields were obtained only from rows where American Cyanamid 3911 was mixed with fertilizer.

Chemical analysis of the beets indicated that the sucrose, calcium, potassium and phosphate contents were not affected by the insecticides. However, the percent sodium was significantly higher in rows where American Cyanamid 3911 and Dow ET-14 were mixed with fertilizer.

## Summary and Conclusions

Preliminary tests employing seed treatments to control the sugar beet root maggot have proved successful when methylcellulose was used as a sticker. If seed treatment proves satisfactory, the amount of insecti-

TABLE II.—**Organic Phosphate Insecticides Mixed With Fertilizer to Control the Sugar Beet Root Maggot.**

| Treatment | Avg. stand count | Avg. no. merchantable beets | Avg. weight (lbs.) | Tons per acre | Percent Sucrose | Percent Sodium | Percent Calcium | Percent Potassium | Percent Phosphate |
|---|---|---|---|---|---|---|---|---|---|
| Dow ET-14[1] 25% w.p. mixed with fertilizer 1 lb./acre | 26 | 17 | 26.6 | 10.0 | 15.9 | .069 | .015 | .179 | .0423 |
| Dow ET-14 25% w.p. mixed with fertilizer 2 lbs./acre | 12 | 13 | 22.5 | 8.5 | 14.9 | .083 | .017 | .190 | .0410 |
| Dow ET-15[1] 25% w.p. mixed with fertilizer 1 lb./acre | 15 | 14 | 16.2 | 6.1 | 15.6 | .070 | .016 | .175 | .0408 |
| Dow ET-15 25% w.p. mixed with fertilizer 2 lbs./acre | 15 | 13 | 14.9 | 5.6 | 15.6 | .060 | .017 | .186 | .0398 |
| American Cyanamid 3911[2] 50% on carbon mixed with fertilizer 1 lb./acre | 34 | 19 | 31.0 | 11.6 | 15.3 | .081 | .015 | .187 | .0439 |
| American Cyanamid 3911 50% on carbon mixed with fertilizer 2 lbs./acre | 24 | 15 | 28.0 | 10.5 | 14.7 | .093 | .013 | .178 | .0408 |
| Malathion 25% w.p. mixed with fertilizer 1 lb./acre | 42 | 14 | 15.4 | 5.8 | 15.7 | .063 | .012 | .186 | .0451 |
| Malathion 25% w.p. mixed with fertilizer 2 lbs./acre | 19 | 10 | 11.9 | 4.5 | 15.2 | .069 | .016 | .206 | .0466 |
| Check—no insecticide | 103 | 21 | 21.2 | 8.0 | 15.9 | .064 | .017 | .177 | .0441 |
| Check—no insecticide | 112 | 24 | 20.9 | 7.8 | 16.2 | .053 | .018 | .176 | .0425 |
| L.S.D. at 1 percent level | | | 12.81 | | | .024 | | | |
| L.S.D. at 5 percent level | | | 9.6 | | | .018 | | | |

[1]An experimental insecticide produced by Dow Chemical Co.
[2]An experimental insecticide produced by American Cyanamid Co.

cide required for a treatment could be reduced to 5 percent of the currently recommended amount.

All insecticides used in this experiment reduced germination and emergence. However, the chlorinated hydrocarbons appeared to be less phytotoxic than the phosphates.

The phosphates (except American Cyanamid 3911 and Hercules AC 528) did not appear to be good soil insecticides.

Increases in yield by the use of insecticides to control the sugar beet root maggot were as great as six tons per acre.

Chemical analysis of the beets indicated that the sucrose, calcium, potassium and phosphate contents were not affected by the insecticides. The sodium content was significantly increased where aldrin, American Cyanamid 3911, and Dow ET-14 were employed as seed treatments and mixed with the fertilizer.

### Literature Cited

Gojmerac, W. L. and Callenbach, J. A. 1956. Sugar Beet Root Maggot — One Year's Trials in Red River Valley Show That Chemical Control is Feasible. N.D. Exp. Sta. Bimonthly Bulletin, Vol. XVIII, No. 4, March-April 1956, pp. 115-120.