EXPERIMENTS with some of the newer fungicides were conducted at Park River and Grand Forks, North Dakota, in 1945 to determine the effectiveness of these new materials in preventing early, *Alternaria solani* (Ell. & Mart.) Jones & Grout, and late, *Phytophthora infestans* (Mont.) de By., blights of potatoes. More extensive tests were carried on at Grafton in 1946 in order to confirm the previous work and to obtain information on other new products, but the absence of early and late blights prevented an evaluation of the various fungicides. The yields were obtained in order to determine if any of the treatments affected the yield in the absence of these two diseases.

**Materials and Methods**

Certified Bliss Triumph seed was used to plant a 3 1/2-acre plot May 21 and 22, 1946. The 15 different treatments and one check were each replicated 6 times. Each of the 96 plots was 2 rows wide and 80 ft. long with 2 untreated rows on each side. The plot arrangement (Triple lattice) and the details concerning the analysis of variance have been omitted from this report.

The dusts were applied with a 2-row, tractor-mounted Niagara duster, having 3 nozzles to the row, at approximately 35 lb. per acre. A 2-row, power-take-off, Bean sprayer, having 3 nozzles to the row, was used to apply approximately 125 gal. of spray per acre at 400 lb. pressure. The average height of the plants was 10 inches when the first of 6 treatments, at 10- to 12-day intervals, was made July 12. The last application was made September 3, and one month later yields were obtained by digging each entire plot. It was not necessary to consider wheel injury to plants. Such damage was negligible this year on account of insufficient moisture for large vines.

The materials and concentrations used are indicated in table 1. Five per cent DDT was added to each dust and 1 lb. of DDT to each 100 gal. of spray. The quantity of each fungicide per 100 gal. of water is also given in the table. Assuming that early blight would be present, plot 5D was treated with 5 per cent DDT in order to compare its yield with plots receiving fungicides and DDT. In case early blight had appeared, Zer-
late was to be included in the DDT dust being applied on plot 6D as soon as infection was observed. Since the disease was absent, plot 6D had the same treatment as 5D. HE-178 (Zinc Ethylene Bisdithiocarbamate) and the Zinc Ethylene Bisdithiocarbamate applied on plot 14S were similar materials supplied by different companies.

**Experimental Results**

In order to determine the effect of the fungicides on yields when early and late blights were absent, the plots receiving fungicides and DDT were compared to the 2 plots (5D and 6D) just receiving 5 percent DDT. When such comparisons were made there were 2 plots that yielded the same, 5 that yielded less and 6 that yielded more than the plots receiving only DDT. The difference between any 2 yields of treated plots was not statistically significant. The low yield of the check plot (16) was due to the presence of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say); the potato flea beetle, *Epitrix cucumeris* (Harr.), the potato leafhopper, *Empoasca fabae* (Harr.) and the 6-spotted leafhopper, *Macrostelies divius* (Uhl.).

Sweepings made on the plots at various times throughout the summer indicated these insects were more numerous on the check plots than on the plots receiving fungicides and DDT. In years such as 1946 the results indicated it was necessary to apply only DDT for insect control. It is questionable whether the application of a fungicide would ever significantly increase the yield when early-blight infections were light.

Although the difference between the yield of any plot receiving a fungicide and DDT, and either of the 2 plots just receiving DDT was not statistically significant, it was inter-

<table>
<thead>
<tr>
<th>Plot</th>
<th>Materials</th>
<th>Bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1D</td>
<td>HE-178 (Zinc Ethylene Bisdithiocarbamate) 7%, DDT 5%</td>
<td>159</td>
</tr>
<tr>
<td>2D</td>
<td>Copper Compound A 6%, DDT 5%</td>
<td>156</td>
</tr>
<tr>
<td>3D</td>
<td>Zerlate 10%, DDT 5%</td>
<td>158</td>
</tr>
<tr>
<td>4D</td>
<td>Tribasic Copper Sulphate 7%, DDT 5%</td>
<td>161</td>
</tr>
<tr>
<td>5D</td>
<td>DDT 5%</td>
<td>161</td>
</tr>
<tr>
<td>6D</td>
<td>DDT 5%</td>
<td>161</td>
</tr>
<tr>
<td>7S</td>
<td>Phygon 1 lb., DDT 1 lb.</td>
<td>157</td>
</tr>
<tr>
<td>8S</td>
<td>Tribasic Copper Sulphate 4 lb., DDT 1 lb.</td>
<td>154</td>
</tr>
<tr>
<td>9S</td>
<td>8-8-100 Bordeaux mixture, DDT 1 lb.</td>
<td>168</td>
</tr>
<tr>
<td>10S</td>
<td>Dithane D-14 2 qt., Zinc Sulphate 1 lb., Lime ½ lb., DDT 1 lb.</td>
<td>174</td>
</tr>
<tr>
<td>11S</td>
<td>HE-178 (Zinc Ethylene Bisdithiocarbamate) 2½ lb., DDT 1 lb.</td>
<td>169</td>
</tr>
<tr>
<td>12S</td>
<td>Polyethylene Polysulfide 2 qt., DDT 1 lb.</td>
<td>161</td>
</tr>
<tr>
<td>13S</td>
<td>Polyethylene Polysulfide 1 qt., Phygon 1 lb., DDT 1 lb.</td>
<td>161</td>
</tr>
<tr>
<td>14S</td>
<td>Zinc Ethylene Bisdithiocarbamate 2 lb., DDT 1 lb.</td>
<td>169</td>
</tr>
<tr>
<td>15S</td>
<td>Manganese Ethylene Bisdithiocarbamate 2 lb., DDT 1 lb.</td>
<td>162</td>
</tr>
<tr>
<td>16</td>
<td>Check</td>
<td>141</td>
</tr>
</tbody>
</table>

*Adjusted bushels per acre obtained from an analysis of variance.*
esting that plots 10S, 11S and 14S, sprayed with zinc-contain-
ing fungicides, had the highest yields. When zinc-containing materials (HE-178 and Zerlate) were applied as dusts, the yields were approximately the same as plots 5D and 6D. It was also of interest to note that the Bor-
deus-sprayed plots had the fourth highest yield. This fun-
gicide has been reported as being injurious to potatoes causing a reduction in yield.

Conclusions
1. Some of the newer fun-
gicides were applied to
Bliss Triumph potatoes
at Grafton, North Dakota,
in order to determine
their effectiveness in
preventing early blight,
and late blight in case
the latter occurred. In
the absence of these 2
diseases the yields were
obtained to determine if
the treatments had any
effect.

2. No statistically signifi-
cant difference existed
between the yields of
any plot receiving a fun-
gicide and DDT, and
either of the 2 plots just
receiving DDT.

3. The low yield of the
untreated plot was due
to the presence of the
Colorado potato beetle,
the potato flea beetle, the
potato leafhopper and
the 6-spotted leafhopper,
and indicated the neces-
sity of applying DDT to
reduce the insect popula-
tion.

4. Plots 10S, 11S and 14S,
sprayed with zinc-con-
taining fungicides, had
the highest yields.

5. Six applications of Bor-
deous mixture had no
apparent effect in reduc-
ing the yield.

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IMPROVING FARM AND RANCH TENURE IN THE
NORTHERN PLAINS

Report No. 1 of the Tenure Committee of the Northern Great Plains Agricultural Advisory Council has been issued under the foregoing title as Bulletin 436 of the Montana Agricultural Experiment Station. The North Dakota Agricultural Experiment Station has purchased a limited number of them for distribution. Copies of the bulletin will be sent by the North Dakota Station to all inquirers as long as the supply lasts. Address your request to Information Department, State College Station, Fargo, N. Dak. and ask for Mont. Bulletin 436.

*Insect collections, determinations and tabulations were made by Mr. Arden Aanestad, Field Assistant, North Dakota Agricultural Experiment Station.