COLORADO AGRICULTURAL EXPERIMENT STATION  
Colorado State College  
Fort Collins

Report of investigations on BEAN CUTWORM in 1942 in cooperation with the  
       Mesa County Research Committee

by JOHN L. HOEPNER, Entomology Section  

While considerable time was spent in bean fields during the later part of July and the month of August, only three moths were collected. These moths were in no way associated with the cutworm that appeared in the fields later.

On August 26 cutworm larvae were found in fields North of Fruita and at  
back. At this time the worms were 3/8 inch long, indicating that the eggs had been deposited in the fields the first part of August. The first part of September two hatched egg masses were found on bean leaves, but these were not associated with the worms.

A number of larvae have been placed in three screen cages in locations where they will not be disturbed. From these hibernial cages we can expect to rear moths in the summer of 1943 and complete the life history studies of the insect in question. If the small worms feed on the bean foliage, late spraying or dusting may simplify control measures. This point remains to be worked out.

On September 2, baits were tested by broadcasting in bean fields at the rate of about 25 lbs. per acre. About 1 1/4 acres were used for each bait. Baits tested in this way:

1. Untreated check.
2. Bean meal, 92 lbs.; cryolite, 5 lbs.; mixed dry.
3. Corn meal, 100 lbs.; cryolite, 5 lbs.; mixed dry.
4. Bran, 50 lbs.; sodium arsenite, 1/3 gal.; water, 3 gallon.
5. Bran, 50 lbs.; cryolite, 2 1/8 lbs.; superla white mineral oil, 1 gal.
6. Bran, 50 lbs.; cryolite, 2 1/2 lbs.; mixed dry.
7. Bran, 50 lbs.; sodium arsenite, 1/4 gal.; superla white mineral oil, 1 gal.

Examination of these plots in 24 hours showed about 10% dead worms in all  
plots. The second day No. 7 containing bran, sodium arsenite, and mineral oil showed about 50% dead worms. The other plots showed about 10% dead worms. Six  
days after application, 100 feet of a bean row was selected in each plot and ex  
amined for live worms. The results are listed below:

1. Check plot, 73 live worms in 100 feet of bean row.
2. Bean meal and cryolite-- -- -- -- -- -79 worms in 100 feet
3. Corn meal and cryolite -- -- -- -- -- -52 worms in 100 feet
4. Bran and sodium arsenite-- -- -- -- -- -44 worms in 100 feet
5. Bran, cryolite, oil- -- -- -- -- -- -31 worms in 100 feet
6. Bran, cryolite (dry)- -- -- -- -- -- -36 worms in 100 feet
7. Bran, sodium arsenite, oil- -- -- -- -- 9 worms in 100 feet

On this same date, September 8, plots No. 2 and 3 were baited, using bran,  
100 lbs.; sodium arsenite, 3/8 gal.; base oil No. 10, 2 gal.; and No. 4 was  
baited, using bran, 100 lbs.; sodium arsenite, 1/2 gal.; pale paraffin, 2 gallon.
Plots 5, 6 and 7 were being irrigated and were not baited. Three days later plots 2 and 3 were estimated at about 25%, or about one dead worm for every 3 live worms. Plot No. 5 was about 50% efficient. These beans were cut and shocked September 24. As only a few worms collected under the shocks, baiting under them was considered unnecessary. At threshing time, October 1, the injury to the bean field was estimated at 7%. Practically all of this injury occurred before the beans were shocked.

On September 12, twenty gallon cans were prepared with 3 inches of moist soil and 26 worms in each can. To these containers a tablespoonful of bait and a few bean pods were added. Examination of these containers at later dates gave erratic results. A few worms in each cage were killed and all baits appeared to have been equally fed upon. As some of the worms started building prepupal cells soon after being placed in the cages, they probably did not feed upon the poisoned baits. Linseed meal, "steer fattener", and "milk chow", and several other unpoisoned foods were readily fed upon by the caged worms.

On September 8 baits composed of bran, 100 lbs.; sodium arsenite, 3/8 gal.; base oil No. 10, 2 gal., and bran, 100 lbs.; sodium arsenite, 1/2 gal.; and pale paraffin, 2 gallon, were broadcast in a field where part of the field had been cut and shocked and part of the beans were still uncut in the row. It was hoped that the bait would poison the worms as they moved from the field to positions under the shock. Examination two days later showed about 5 to 10% of the worms dead and about 30 worms under each bean shock.

This field was later baited under the shocks with bean meal, 65 lbs.; sodium arsenite, 3/8 gal.; and bran, 75 lbs.; sawdust, 25 lbs.; sodium arsenite, 1/2 gal.; and water, 4 gallons (grasshopper bait). Examination under the shocks 4 days later showed about 60% of dead worms under the shocks baited with bean meal and about 40% dead worms under the shocks baited with grasshopper poison. Examination 8 days after applications showed a 20% increase of dead worms under each bait. At this time the untreated shocks showed a reduction in the worms present under the shocks indicating that some of the worms had entered the ground to build prepupal cells. At threshing time this bean field showed about 12% injury before shocking and about 3% injury during the period they were in the shock.

On September 20, six different baits were tested under shocked beans in a field North of Fruita. The beans had been cut and reaped for two days. As the shocks were moved into a double row, an area was baited with a small handful of bait and the shock moved onto the baited area. Next the area where the moved shock had been was baited and the "outside" shock moved to this baited area. Baiting in this manner used about 30 lbs. per acre. The worms moved from the old shock location to positions under the shocks about 60% the first night. By the 3rd night all worms had moved under the shocks. Examination under four shocks from each different kind of bait were made at 7, 5, and 7 days. The results are as follows.

<table>
<thead>
<tr>
<th>No. 1—Bran, 75 lbs.; sawdust, 25 lbs.; sodium arsenite, 1/2 gal.; water, 4 gallon.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Three days</strong></td>
</tr>
<tr>
<td>Total Worms</td>
</tr>
<tr>
<td>230</td>
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</tbody>
</table>
No. 2—Bean meal, 85 lbs.; sodium arsenite, 3/8 gal.; water, 2 gal.

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<thead>
<tr>
<th></th>
<th>Three Days</th>
<th>Five Days</th>
<th>Seven Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Worms</td>
<td>400</td>
<td>322</td>
<td>394</td>
</tr>
<tr>
<td>% dead</td>
<td>55.7</td>
<td>72.6</td>
<td>59.2</td>
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No. 3—Bean meal, 100 lbs.; cryolite, 5 lbs.; mixed and applied dry.

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<th>Three Days</th>
<th>Five Days</th>
<th>Seven Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Worms</td>
<td>124</td>
<td>213</td>
<td>288</td>
</tr>
<tr>
<td>% dead</td>
<td>35.3</td>
<td>48.3</td>
<td>52.2</td>
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No. 4—Bran, 50 lbs.; bean meal, 50 lbs.; sodium arsenite, 1/4 gal.;
pale paraffin, 2 gallon.

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<th>Three Days</th>
<th>Five Days</th>
<th>Seven Days</th>
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</thead>
<tbody>
<tr>
<td>Total Worms</td>
<td>240</td>
<td>290</td>
<td>116</td>
</tr>
<tr>
<td>% dead</td>
<td>10.4</td>
<td>26.2</td>
<td>23.6</td>
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No. 5—Ketag ortho bait (Calcium arsenate, 5.16%; metaldehyde, 1.5%,
California Spray Chemical Corp).

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<tbody>
<tr>
<td>Total Worms</td>
<td>409</td>
<td>329</td>
</tr>
<tr>
<td>% dead</td>
<td>24.3</td>
<td>27.6</td>
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No. 6—Ortho P.G. Bait (Cupric aceto arsenite 3.2, Calif. Spray Ch. Corp).

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<tbody>
<tr>
<td>Total Worms</td>
<td>292</td>
<td>202</td>
</tr>
<tr>
<td>% dead</td>
<td>14.0</td>
<td>40.5</td>
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No. 7—Untreated check

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<tbody>
<tr>
<td>Total Worms</td>
<td>255</td>
</tr>
<tr>
<td>% dead</td>
<td>0</td>
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In this test the 'hopper' bait did not give as good results as in the
Davidson field. The bean meal containing sodium arsenite gave about the same
percentage of dead worms. At threshing time the total injury was estimated at
17% of which 4% occurred during the period the beans were shocked.

Injury to beans this year is much less than that reported for last year
when the wet weather caused the beans to remain shocked in the fields for a long
period. Injury this year during the dry period of a week or two that the beans
remained in the field does not appear to be more than 4 or 5 percent. In most
cases it has not been more than 2 or 3%. Last year many small worms were reported
on October 1. This year no small worms were observed at this date and many of the
worms were full grown and entering the ground to build pupal cells.

Fields with only a trace of injury were found 4 miles west of Grand Junction.
No injured fields were found east of this point.

In the Redlands, fields were examined that showed about 4% injury. The growers
in that area said they had a few bean cutworms the past three years and that injury
last year had been more than this year. No trace of injured beans was found on
Orchard Mesa.
Dry root rot was present in most bean fields this season. Some bean foliage was injured by bacterial blight. These diseases were determined by Mr. Henderson and Dr. Kreutzer from material sent to Colorado State College through Mr. Davis' office.

Acknowledgement

The Colorado Agricultural Experiment Station wishes to express its appreciation to Mr. Carl Davis, Mesa county agent of the Colorado and Mr. Verne Stewart, assistant county agent, State College Extension Service, to Mr. Lee Toothaker, chairman of the Mesa County Research Committee, to the County Commissioners of Mesa County, to the various growers in the county, for their hearty cooperation and assistance in making the research program effective and worthwhile.

Homer J. Henney
Director

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Chairman, Substation Committee

(6357-42)