EFFECT OF SOMATIC INJURY UPON YIELD IN CORN

Introduction

In a series of experiments on hens the author (5, 6) found the partial removal or mutilation of the ovary or merely bodily injury produced in some birds a stimulating effect in egg production. In approximately an equal number of birds in the same experiments the operation produced a retarding effect. When the operations were performed on six-weeks' old pullets, similar stimulation and retardation were noted in the length of time until the first egg was laid.

In order to test for a similar reaction in plants a series of experiments was performed on corn. While the results do not warrant a conclusion directly related to the experiments on animals such as those described above and those of ZELENY (7), PEARL (4), HARTMAN (3), and others, yet some very interesting results from an economic point of view are indicated by the experiments. The disputes arising from some appraisals by insurance companies on hail or wind injured crops, the custom in some localities of allowing lambs to eat off the lower leaves of corn, seem to the author to be examples to which the results of this experiment may be related.

The author wishes to express his appreciation to Mr. SAM DUNKELBERGER, Halstead, Kansas, who harvested the corn in the fall and on whose farm the experiments were performed during the summer of 1929, also to his colleague, Dr. E. C. DRIVER of Smith College, for helpful criticisms during the writing of this paper.

Methods

The experimental plants were selected in a field of about four acres in size. The corn was between five and six feet tall and the silk was just beginning to appear when the experiments were begun. The plants of each experiment were tagged with different sun-fast cloth labels.

Each experiment, with its results is described below.

Results

Experiment 1.—A search was made to find 50 hills each containing 2 plants of equal height, thickness and quality. One stalk was to be the operated and the remaining one the control. In the "operated" stalk 3 longitudinal incisions, about 3 inches long, were made through the stem at about 18 inches from the ground. The incisions were made from different sides of the stalk.

1 Contribution from the Department of Zoology, Smith College, no. 164.
2 Paper now in manuscript form.
3 In case there was a slight advantage in one of the two stalks it was always given to the control. This procedure holds for the other experiments as well.
There were 45 hills recovered in November when the corn was harvested. The 45 operated stalks produced 48 ears which yielded 25 pounds of shelled corn. The 45 control stalks produced 45 ears of corn which weighed 25 pounds and 3 ounces when shelled. Obviously there is no significant difference in total corn yield in this experiment. During the summer it was noticed that there were several operated stalks considerably taller than their particular controls, yet this factor was not critically analyzed.

Experiment 2.—The material for this experiment was 25 hills each containing 2 similar plants. From one plant in each hill all the leaves were removed except the two nearest the tassel. These were called “operated plants” and their corn yield was compared with the control plants. The 23 operated stalks recovered carried 7 ears of corn which produced 1 pound 4 ounces of shelled corn as compared with 29 ears from 23 control stalks, which yielded 14 pounds and 5 ounces of shelled corn.

Experiment 3.—This experiment was similar in every way to experiment 2 except that every other blade was removed from the operated plant. There were 22 operated stalks recovered on which there were 19 ears which produced 5 pounds 10 ounces of shelled corn. From the 22 control stalks, 23 ears were obtained, the shelled corn of which weighed 12 pounds and 12 ounces.

Experiment 4.—Fifty individual plants were selected on which there were either 2 or 4 ears. In case there were 2, one of them was cut, directly down the middle, leaving only the back part of the husk to hold the ear somewhat intact. If there were 4 ears on the stalk every other one was cut. The uppermost ear on each plant was used alternately as a control and an operated ear. A few days after the operation the operated ears spread out, due to the lack of tension, causing the silk to appear through the incision. Soon the cob began to curl and the immature kernels became hardened by the weather. Many of these ears became so infected with molds that they were lost entirely.

There were 30 operated ears recovered which produced 2 pounds 12 ounces of shelled corn as compared with 39 control ears which yielded 20 pounds and 8 ounces of shelled corn.

The data described in these experiments are shown also on table I.

Discussion

Part of a letter from a farmer, who was acquainted with these results, appears below.

“In August we had a hail storm, when the ears of corn were partly made; the grain had already started on the cob. During the storm the blades were knocked off but the ears still remained. The insurance adjuster refused to grant my claim, saying that no damage was done to the actual
TABLE I

NUMBER OF EARS AND THE WEIGHT OF SHELLED CORN OBTAINED IN FOUR EXPERIMENTS ON
THE EFFECT OF INJURY ON CORN YIELD

<table>
<thead>
<tr>
<th>Experiment</th>
<th>NO. OF EARS</th>
<th>SHELLED CORN</th>
<th>YIELD PER EAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operated</td>
<td>Control</td>
<td>Operated</td>
</tr>
<tr>
<td>1. Incisions through corn stalk</td>
<td>48</td>
<td>45</td>
<td>25.00</td>
</tr>
<tr>
<td>2. Every blade removed</td>
<td>7</td>
<td>29</td>
<td>1.25</td>
</tr>
<tr>
<td>3. Every other blade removed</td>
<td>19</td>
<td>23</td>
<td>5.63</td>
</tr>
<tr>
<td>4. Ear cut longitudinally</td>
<td>30</td>
<td>39</td>
<td>2.75</td>
</tr>
</tbody>
</table>

corn yield. The yield was actually lessened, and by your experiments I can prove my claim." It is obvious from table I that the more blades removed before the corn is ripe the greater is the damage. Some Iowa farmers allow lambs to eat off the lower leaves of corn. This experiment may have a bearing on this practice as well.

Although the yield was less in the operated plants, the results may still be related to the zoological experiments cited in the introduction. It was mentioned there that both a stimulation and retardation was noted. Perhaps in the work on corn only the retardation became evident. Some plants, e.g., dandelions or willows, might experience some stimulation to a more luxuriant growth of leaves or of seed, when injured.

Conclusion

Corn plants which have been injured produce less corn than uninjured plants.—Morris Steggerda, Smith College.

LITERATURE CITED


