

among farmers of long experience was found to exist although differences in membership relations are not so pronounced as is true of the farmers' marketing associations.

### Significance of the Findings

What is the significance of these findings for farmers' organizations, particularly cooperative business enterprises? In the first place, the leadership in such organizations will come to a fuller realization of the importance of past experiences, habits, viewpoints, and desires as forces that influence each farmer's response to the appeals of any and all organizations. Solicitation methods, means of disseminating information, membership contracts, relationships between members and management, and methods of promoting esprit de corps among the members will be developed so as to recognize these influences which so greatly affect the human factor.

In the second place, farmers' organizations will make increasing demands that the public-school opportunities of farm boys and girls be made more nearly equivalent to those afforded urban children by means of State equalization of existing inequalities and handicaps, and in other ways. This educational emphasis appears to be the greatest source of hope for the organizations from a long-time point of view.

Finally, it seems evident that a good many of the older farmers especially those whose methods of operation class them as unprogressive and unlearned, can never be depended upon to make successful cooperators. Nor should organization leaders and members feel defeated when time and energy does not cause these impossibles to join. The transition to the cooperative way of doing things is simply beyond them. Their gradual replacement by a younger, better trained, and more easily approachable generation, is the only satisfactory solution of this problem. Organizational pressure brought to bear in favor of adequate rural schools is usually better spent than is an equal amount of effort used in trying to get people who are unable to cooperate successfully to join these organizations.

Granting the importance of efficiency in business management, the study of the human factor as it relates to all forms of cooperation, and the development of organizational policy to correspond with its limitations and capacities, are of equal importance with business activities in determining the degree of success that can be secured in the future through cooperative activity.

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### CORN-BORER Control by Machinery Facilitated Through Seasonal Plan

In the area where only one brood of European corn borers occurs each year (western area), controlling this pest by mechanical means may be greatly facilitated if the recognized control practices be worked into the farm operating schedule, the requirements for control having been developed by the Bureau of Entomology. By carefully planning and executing, little extra work will be required and yet the ravages of the insect will be held in check and better farming result. To make the program effective each farmer should carry it through to the best

of his ability; otherwise, neglected cornfields will nullify the control measures practiced on near-by fields.

Beginning in the spring, in fields where the corn has been hogged down or the stalks grazed, the practice of carefully plowing under the stalks should be followed. The ground should be clean and no pieces of stalk should be left exposed on the surface as a refuge for a borer which might crawl to the surface after being plowed under. (Fig. 24.) This means, when possible, the plowing of stalks under to a depth of 6 inches—8 inches would be better. With no shelter available the borer can not then continue its life cycle, as it will either die of exposure or be attacked and destroyed by birds and other natural enemies.

If standing stalks are left after the corn has been picked, and if soil conditions permit, the stalks may be plowed under in the spring by using a wide-furrow plow equipped with colters, jointers, and trash



FIGURE 24.—A clean job of plowing for corn-borer control

wires. If care is used almost a perfect job of coverage can be obtained with 16-inch plows and larger, and a good job can be done with 14-inch plows if in good adjustment and properly equipped. Late plowing in the fall, after the corn has been harvested, is about equally effective but often is impossible because of unfavorable field conditions.

Where the field is not to be plowed but is to be sown to small grain a careful job of stalk shaving, raking, and burning will dispose of the majority of the borers. The shaving is accomplished by either a sled-type or a wheel-type stalk shaver. The former consists of a sled to each runner of which a diagonal knife is attached, as described in Miscellaneous Publication No. 69. This will cut two rows of stalks flush with the ground. A wheel-type shaver which consists of an attachment for a single-row cultivator works equally satisfactorily and will cut three rows at one time. (Fig. 25.) The sled-type shavers may be hitched two abreast and cut four rows of stalks at one time. (Fig. 26.)

After the stalks are carefully severed, raking and cross raking into piles or windrows by special cornstalk rakes collect the stalks for burning. A specially adapted side-delivery rake, which is also capable of



FIGURE 25.—A wheel-type stalk shaver cutting three rows at a time

raking hay equally well, will accomplish the result in one operation. (Fig. 27.)



FIGURE 26.—Two sled-type shavers hitched abreast and cutting four rows

The burning operation then follows and should be carefully watched so that all outlying stalks may be raked into the flames to destroy any straggling borers. This done, small grain can be safely sown.

## Preparing the Seed Bed

In preparing the seed bed after plowing care must be used in the selection and use of tillage tools so as not to bring any plowed-under stalks to the surface, as this would nullify the good job of plowing already done.

When planting corn, if conditions are favorable for the practice, the work of subsequent control machinery will be greatly facilitated if the corn is drilled rather than checked. The individual stalks are easier to cut or shave than stalks grouped in hills. Likewise, in cultivating, the operation of control machinery will be eased if the corn is laid by with the ground ridged as little as possible. This reduces the strain and racking on corn binders, rakes, and other machinery, which all function better on smooth ground.

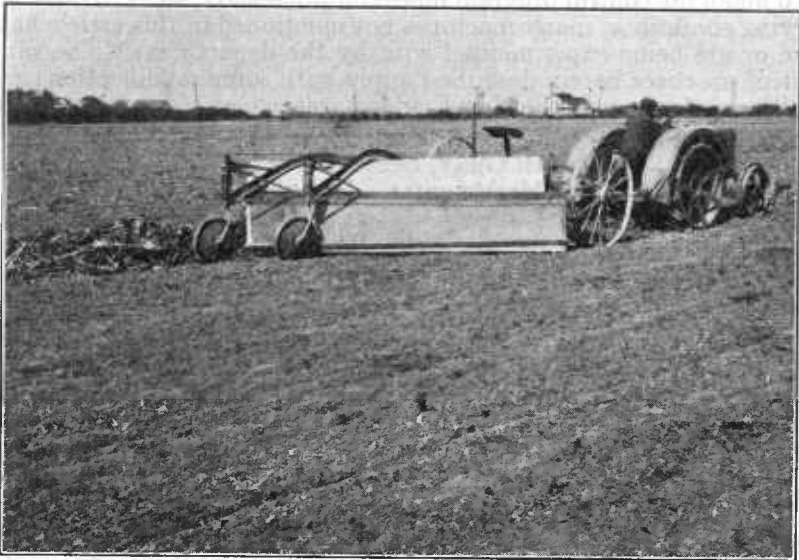


FIGURE 27.—A side-delivery rake in operation. Note absence of débris on the ground raked

If the corn is to be harvested by removing the whole crop from the field, the stalks should be cut flush with the ground surface, thereby permitting the removal of the majority of the borers from the field in the stalks. For accomplishing this, any make of binder now being manufactured may be equipped with the stationary low-cutting knife attachment. This attachment may be made up by the farmer himself according to instructions in Miscellaneous Publication No. 56, or it may be purchased at a nominal cost from the manufacturer of the particular binder in use.

Where the corn is to be cut by hand a special low-cutting hoe should be used. One type is described in the publication mentioned.

If the corn thus cut is to be ensiled, careful operation of the silage cutter with special attention to cleaning up trash around the machine after each operation will make for good control. What borers may not be destroyed in the silage cutter will be killed during the fermentation process in the silo. The silage harvester, when equipped with a low-

cutting knife attachment, accomplishes practically the same result as the silage cutter.

In case the corn is to be handled by a husker-shredder, careful feeding, proper adjustment of the snapping roll pressure to a safe maximum, and the practice of cleaning up around the machine after each operation will destroy a large percentage of borers. If the shredded fodder is put into the mow or fed to the stock, the remaining live borers will perish from dessication, be eaten by the stock, or be tramped into the manurial juices. Therefore, fodder passing through a properly adjusted shredder may be spread on the fields with little danger of being a source of infestation.

When fodder is to be fed whole to the stock, or where hand husking from the shock is done, care must be exercised in cleaning up feed lots and destroying the stalks before the pupation time of the borers.

To make the control program more comprehensive, so as to meet the varying conditions, many machines not mentioned in this article have been or are being experimented with by the department. The same control practices herein described apply with some modifications and additions, of course, to the New England area, where two generations of the borer occur annually.

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## **C**ORN More Resistant to Cold When Grown on Soil Rich in Plant Food

The problem of reducing the hazard of untimely frosts to the corn crop is seriously complicated by reduction in soil fertility. One of the most important factors influencing the extent of injury following frosts and freezes

in the late spring and early fall is the quantity and balance of soil fertility available for use by the growing corn plants. The encouraging feature is that this factor is more or less under the control of the corn grower.

Field studies on cold injury in both spring and fall have been conducted for the last three years with the use of portable field refrigeration chambers to produce chilling temperatures and frosts. The planting arrangement and a general view of the experimental field in 1930 are shown in Figure 28. Part of the plantings were made on soil cropped since 1921, prior to which time the soil was virgin prairie sod. Comparable plantings were made on closely adjacent soil that was plowed from virgin sod in the fall of 1929.

A comparison of the reaction to freezing temperatures, 28° to 29° F., for two hours, of five strains of corn growing on the soil cropped since 1921, and of the same strains growing on the newly plowed virgin soil, is shown in Figure 29. The greater resistance to injury from cold of the plants growing on the virgin soil is very marked.

On part of the soil cropped since 1921, plant nutrients were applied, singly and in combination, and at different rates of application. The applications were made in such a way that one of the field refrigeration chambers would cover at the same time corn growing on unfertilized soil and corn on soil that had received each of three different fertilizer treatments. Both cold-resistant and cold-susceptible strains of corn were grown on each soil treatment. (Fig. 30.)