



The field at the left is typical of many an Iowa farm this year if the drainage systems were inadequate or were not working properly.

corn yield of Webster County by about 400,000 bushels or approximately 4 percent of the total production of 9,500,000 bushels. Stated another way, this loss amounts to about 3 bushels per acre if equally distributed over the entire 147,000 acres of corn grown in Webster County last year. The total corn loss was equivalent to a complete crop failure on 6,000 acres.

The loss of soybeans from poor drainage, estimated to be 20,000 bushels, is equivalent to a complete crop failure on 1,000 acres, or approximately 2 percent of the total 1943 acreage of the county.

Damage to oats in 1943 was estimated to amount to about 50,000 bushels or about 1¼ percent of the total oat production. This loss was equivalent to a complete failure on, roughly, 1,200 acres of oats.

In addition to the damage caused by poor drainage the farmers recognized additional loss caused by the "alkali" rims around the poorly drained pockets. Crop damage arising from "alkali" injury was not included in the totals reported in the survey.

Of the 110 farms studied, 71 were listed by the farmers as being 100 percent drained (either artificially or naturally). When the amount of damage to the corn crop was tabulated for these 71 farms and for the remaining 39 that indicated incomplete drainage, it was found that although the extent of damage was higher on the incompletely drained farms, considerable crop loss occurred on farms that were classified as "completely" drained.

FEW FARMS *Well Drained*

Survey Among Farmers of Webster County Shows How Much It's Cutting Production

By M. B. RUSSELL and B. J. FIRKINS

FARMERS in north central Iowa have had severe crop losses the last few years because of poor drainage. How much loss?

From a survey which we made in one county of this Clarion-Webster soil area, it appears that poor drainage cost the farmers of Webster County about 400,000 bushels of corn in 1943, 20,000 bushels of soybeans and 50,000 bushels of oats. Losses were probably similar in other counties of this area.

To arrive at these estimates we visited 110 farmers in Webster County last February and obtained their estimates of the damage to 1943 crops as a result of inadequate drainage. The 110 represented approximately 5 percent of the farms in Webster County.

Farmers were selected at random from all parts of the county,

except those on the rough broken land along the Des Moines River or approximately 12 percent of the area of the county. In compiling estimates for the whole county, we took into account the fact that the area sampled did not include this 12 percent of the county.

From the questions asked in the survey, we found that in 1943 inadequate drainage reduced the

PERCENTAGE OF CORN CROP LOST WITH "COMPLETE" AND "INCOMPLETE" DRAINAGE

Percentage of corn crop lost	Number of farms having "complete" drainage	Number of farms incompletely drained
No loss	30	10
0 to 5%	27	17
5 to 10%	8	4
10 to 15%	3	4
15 to 30%	3	4
Total number of farms	71	39

The fact that 20 percent of the farms listed as completely drained suffered greater than a 5 percent loss in corn production indicates that the drainage system was not working properly or that the system was inadequate. On many of the farms that were classified as 100 percent drained, the farmers said there was need for additional laterals in certain fields.

Pockets Are Problem

Small areas of low-lying land or "pockets" that are surrounded by higher ground were listed as one of the most important causes of inadequate drainage. The farmers interviewed attributed 30 percent of the crop damage to this cause alone. Some of these areas are so small and are surrounded by such high ridges that it is often impractical to run a tile line to them. A large number of such "pockets" can be economically drained, however, and many farmers are planning to run tile lines into these pockets as soon as tilers are available.

In many cases tile lines actually run through these areas but fail to remove the water rapidly enough to prevent serious crop injury. The failure of the existing tile line may be due to broken or plugged tile or to the "sealing-over" of the soil over the tile line. This latter condition results from the destruction of the granular or crumb structure of the surface soil and is caused by (1) the loss of active organic matter that occurs under intensive rotations lacking legume and grass crops and (2) the working of the soil when it is too wet.

Working of soil when too wet probably occurs more frequently than farmers realize since their farming operations are governed by the condition of the field as a whole and not by these small pockets. Consequently, there is the tendency to "mud-through" these small wet areas at the same time that the rest of the field is being worked. Such a practice sets up a vicious cycle since each time the soil is worked when too wet decreases its "drainability" with the result that it dries out even more slowly and is therefore



Two or three feet below this wooden bulkhead is the opening of a tile system on one Webster County farm. The first necessity of a properly working tile system is an adequate outlet and this means that it should never be submerged in water if it is to carry the water away from the fields at a rapid rate. In the interview farmers seldom mentioned the lack of a good outlet as a fault of their drainage system, but a study formerly made in Webster County showed many of the outlets to be poor.

worked a little wetter next time and so on.

Because these pockets receive a considerable amount of surface water from the surrounding higher ground, the demands on the tile that drains the pocket are much greater than on an area of level land of equal size. One solution to this problem is to install surface intakes at the low point in the area; this will allow the large volume of surface water to enter the tile quickly and thus be removed before the crop is damaged. It was evident from the survey that farms which had properly functioning intakes were having less crop damage in the low-lying pockets.

13,000 Acres Idle

We estimated from the data collected in this survey that there were approximately 13,000 acres of crop land in Webster County that were not used in 1943 because of inadequate drainage. Three-fourths of this or about 10,000 acres actually need drainage; the remaining one-fourth is adequately drained but is not being cropped because the farmer can't get to it

owing to adjoining undrained areas.

Only a small number of farmers indicated that poor outlets were responsible for the improper functioning of their drainage systems. This was surprising inasmuch as an earlier survey conducted by the Webster County Planning Board in 1941 had shown that 60 percent of the outlets in the county were submerged. We believe this indicates a lack of appreciation among farmers of the importance of adequate outlets for their tile lines. A better understanding of the need for maintaining open outlets would undoubtedly lead to more adequate drainage on many farms.

Because of the importance of adequate drainage for maximum productivity in many areas of the state, the Iowa Agricultural Experiment Station in cooperation with the Research Division of the Soil Conservation Service is now conducting experiments in several sections of the state in an attempt to evaluate the effectiveness of drainage systems of different designs in the several soil areas of Iowa where drainage is needed. Results of these studies will be reported in later issues of the Farm Science Reporter.