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Drainage is Still a Problem

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DRAINAGE
Is Still a Problem

In our war effort to produce more food, let’s work our level and low soils harder and take the crop producing load off the farms that are rolling, rough and liable to erode.

The level and low land in Iowa has highly productive soil which is able to stand heavy cropping over a long period of years without hurting it. But it is also low and flat land which presents a drainage problem.

During the first World War we plowed up and cultivated many hilly fields that should never have been used for that purpose. The result has been many farms cut with deep ditches — gullies. We do not want to make the same mistake again, and one of the ways we can avoid it is to press into “hard work” for crop production our level lands that do not wash. The farms that are steeply rolling can serve in the food program in another very important manner by producing grass and roughage.

How can we press the level, productive soils into carrying more of the crop production load? Of course the answer to that entails all of the good farming practices — the right kind of seedbed preparation, cultivation, the most productive varieties, the choice of the correct crops, etc. But here we are going to talk about a still more fundamental consideration than any of these — drainage.

Many of these highly productive soils in Iowa that are flat have become productive because they have had the excess water drained off so that they could be farmed and so that those precious helpers which the farmer has and never sees — the soil bacteria — can do better work. These tiny living organisms help turn the elements of the soil into a form that the plants can use. But they don’t work well in wet soil.

But the drainage problem is far from entirely solved. Drive through central and northern Iowa in a rainy year and you will see many acres of potentially productive land with crops on them drowned out or discolored and stunted because of “wet feet.” Or notice the countless seepy hillsides in the other parts of the state and the flooded river bottoms. All of these still present drainage problems which are holding back maximum crop production. Here are places that we can make telling efforts in our food production program for winning the war.

A poorly drained field which is fairly productive in some seasons and not productive in others may be more of a handicap to satisfactory crop production than swamp land, for when a field is plowed, planted and cultivated and
A drainage system survey party taking open ditch cross-sections in Webster County. The Soil Conservation Service and the county board of supervisors of Webster County are cooperating in making a survey of the public drainage system of the county to determine the maintenance needs. Near this cross-section station two covered-up tile outlets were located as shown in the pictures below and on the left at the bottom of the following page.

Controlled grazing of open ditch banks by cattle and sheep — never hogs — is one way to prevent the growth of young trees. If young trees start and are not cleared away, they will slow down the flow of water and allow the ditch to fill up, thus ruining the outlet for the farmers' tile systems. Cleaning out these filled ditches is costly and can easily be avoided by some care.

The ditch at the left is in good condition because it has had the proper kind of care and treatment. It will not fill up as will those with heavy growth of trees and weeds along them.

Below: Seepy soil discovered by the above surveying crew on the south bank of the open drainage ditch indicated to the surveyors that a clogged tile outlet might be found in the bank and on digging this was found to be true. In one such ditch a big roll of wire was unearthed which the farmer had put in trying to protect the end of a tile.

Below: Looking upstream from the east side of an open ditch showing a section of ditch on which the spoilbank has recently been leveled by a local contractor. Note how high the point of the leveled bank is near the ditch so that rain falling on the banks drains away from the ditch and enters the ditch through surface inlets. This is to prevent the washing of surface soil into the ditch itself. Bromegrass is the best crop for seeding down and holding ditch banks. Cattle and sheep pasturing it will help check the growth of young trees and weeds.
Right: A broken or misplaced tile has caused this sunken area or "hole" over a 12-inch tile-line. Unless the broken tile is replaced at once, the entire drain line above the damaged section may become filled with dirt. Then the only remedy would be to re-lay that portion of the system, which is costly. Farmers can do much to keep the drainage systems working by keeping watch for such needs of repair as this one. It's not costly to make such a repair.

Right: A 12-inch tile outlet is submerged 3 feet below the water at the white stake. Filling of the open drainage ditch owing to excessive tree growth has reduced the carrying capacity of the ditch to such an extent that lateral tile lines no longer have free outlet. The result is gradual silting and filling of the tile and poorly drained land. The open ditch needs to be cleaned and put in shape, then maintained so that it will offer rapid and free outlet for the land which it was "built" to serve.

Below: A stream of clear water bubbles up from the end of the 8-inch tile submerged almost a foot below the foot of the man. Outlets for tile drains and the lower ends of tile lines should be inspected frequently. All weeds, grass, trash and debris which check the free flow of water should be removed. Only by such procedure can the benefit of tile drainage systems be obtained and the tile kept working as it was intended.

Below: Here's the sort of condition that one often finds when the tile outlet is not protected or the bulkhead fails. Water flowing out of the end of the tile washes back under it until the first tile drops, then the next one, and so the process continues, cutting back far into the field. The remedy here is to re-lay this line, using bell-end sewer tile, cemented, and then put in a bulkhead.
then no crop is harvested, not only is the land wasted, but the labor, power and machinery costs and seed are totally lost.

No Priorities for Tile

The old swamps and low spots of Iowa which have been drained have mostly been taken care of by clay tile or non-reinforced concrete tile systems. There are no priorities on tile up to 12 inches in diameter, so where drainage is needed and the labor can be obtained to do it, we can make a big push now in crop production by installing the tile needed.

(This article will deal mostly with putting into shape and maintaining drainage systems. The problems of laying out and properly installing drainage systems will be discussed in an article in the Farm Science Reporter in the next issue — January, 1944.)

Essentials for Tile Drains

Not all drainage systems have been satisfactory. If any one of a number of essentials for an adequate tile drainage system is lacking or faulty, the whole system is certain to be unsatisfactory and cease to function as it was planned. Experience and study indicate that the essentials of a satisfactory tile drainage system are as follows:

1. A suitable outlet.
2. Tile drains properly located.
3. Adequate depth and spacing of the tile drains.
4. Greatest obtainable fall for tile.
5. Quality and size of tile properly chosen.
6. Correct laying of the tile.
7. Watchful and careful maintenance of the drainage system.

Of these essentials the most important is to have a good outlet. Unless you can get a satisfactory outlet, the drainage system, no matter how small or large, will fail. The outlet may be a natural waterway, an open ditch or another tile line. Whichever is used should be adequate to handle the full flow being emptied without submerging the tile for any appreciable time during heavy rainfalls.

The outlet of a tile is where most trouble occurs. Washing away of the fill over the tile may result unless the last few tile at the outlet are filled around with stone. It is advisable when possible to use a length of galvanized iron culvert pipe instead of the last few tile.

Webster County Reports

To bring the big problem of what needs now to be done about drainage down to a specific case, we are going to take a look at a report made by the County Agricultural Planning Committee of Webster County concerning the drainage problem there. What was found is common in many other counties and the recommendations for solving the drainage problem will work as well in other counties. The committee found that over 65 percent of all county tile outlets were submerged or partly submerged, which resulted in ineffective use of the tile drainage system. This also meant that this percent of the open drainage ditches was filled with sludge and was in poor to bad condition.

The causes for the above situation were sized up as follows:

1. Excessive tree and brush growth has been allowed to develop in the open ditches.
2. Ditches consequently were filled with silt and organic matter which had accumulated over a period of years.
3. The spoilbanks have never received any care and were left to contribute to weed and tree growth.
4. Improper pasturing of the open drainage ditches and undesirable fencing has led to the development of dams in the ditches and the sloughing off of the ditch banks.
5. In some areas surface soil has eroded into the drainage ditch, causing it to be partly filled with silt.
6. The county and private outlets in many cases were improperly constructed, have broken down and have contributed to erosion and silting. Often the entire outlet has been destroyed.
7. It was found that the surface pipes were often improperly located, while not enough pipes were supplied in other instances.

How to Recondition

After sizing up the situation about drainage in this northwestern Iowa county, the Webster County men made the following recommendations for improving and reconditioning open ditches.

First, clean and grub all trees and brush in ditches and on all ditch banks. Then clean the main ditch thoroughly. If the laterals to the main ditch need it, clean them. Repair the county tile outlets and encourage the repair of private tile outlets.

They recommended that surface drain pipes be installed where needed, and properly located. All spoilbanks should be leveled so that they can be properly seeded. They urged proper maintenance of private drainage systems by inspection and an educational program.

Maintaining Ditches

To maintain the ditches after they have once been put in order, they recommended:

1. Keep hogs out of the drainage ditches. They contribute to the damming process and the sloughing off of ditch banks.
2. Seed all drainage ditch banks and slopes to bromegrass.
3. Do not cultivate and farm closer to the open ditch than 10 to 12 feet.
4. Install suitable fencing across the ditch and use water gates.
5. Inspect the ditch periodically under the supervision of a county engineer's office for the following: To see that no tree growth is allowed on the ditch banks or in the channel; to prevent overpasturing with livestock, especially hogs; to encourage seeding ditch banks to bromegrass; to locate broken tile outlets (these should be repaired or replaced at once); to find evidence of broken tile back in a drainage system so that it can be repaired.

Final Suggestions

Other possibilities of improving the drainage systems to protect the crops are pointed out. The throwing of old car bodies, rolls of wire, discarded farm machinery, etc., into drainage ditches was condemned. These serve as obstructions and hurry the filling up of the ditches — the outlets for the farmers' tile systems.

Dynamite to remove silt from open ditches and to straighten natural ditches was suggested. In the use of dynamite, competent persons should be consulted.

There are times and situations when a plow or V-drag or grader can be used to construct small, short, open tempos.
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ary drains to remove water from fields

One of the reasons some drainage-

ways fail to function properly is the

growth of willows and cottonwood tree

roots in the tile. So the Webster County

men suggested that trees of these species

be removed along both public and

private tile lines.

Broken tiles in private tile lines allow

soil to enter and help fill the main

lines and open ditches. To prevent this,

the Webster County committee suggest-

ed that these private lines be watched

and broken tiles replaced.

Finally, the success of draining the

farm land so that it will produce to

capacity lies in properly installing

drainage systems on the farms. This

should be done wherever a satisfactory

outlet can be had. The system should

be planned to give ample drainage and

should be installed by a competent

person.

Careful installation and maintenance

of the drainage systems on our highly

productive land that is not well drained

is one avenue we should follow in our
effort to increase food production. It's

far safer and is likely to be more effective

now and in the future than bringing

more of the rolling and rough land into

intensive crop production.

Fertilizer Helps Hemp

In tests conducted by the Iowa Sta-
tion this year to try to find out the

needs and the response of hemp to com-

mercial fertilizer, it was found that this

crop shows considerable increase from

fertilization. The increase was espe-
cially large from nitrogen.

Data have not been analyzed from

the experiments, but it appeared that in

some of the tests the yields were dou-

bled by the use of fertilizer.

The tests consisted of the use of pot-

ash, phosphorus and nitrogen fertiliz-
ers applied separately and in combina-
tion to soils in eight tests. There were

24 plots in all of the principal soil
types of the hemp-growing area.

In addition to the fertilizer tests,
some study has been made of the effect
of preceding crops on hemp and also
of different rates, dates and methods
of planting, seed treatment and soil
adaptation.

Cows and Lambs Not Fussy About Proteins

In this year when there is a crit-
tical shortage of proteins, it may be

of some comfort to know that experi-

ments conducted by the New York Ex-

periment Station workers show that it

makes little difference what the source

of protein is for cows or lambs. They

will do about as well on one as an­ther

as long as they are palatable and get a

sufficient amount to satisfy their needs.

Five experiments with dairy cows

have been completed by the New York

men in each of which one group of

cows was fed a simple grain mixture,

consisting of ground corn, ground oats,
corn gluten feed and corn gluten meal.

This kind of ration would provide a

poor protein quality for non-ruminants

such as poultry, hogs or horses, but the
cows did very well as compared with

another group fed a high-quality pro-
tein. The latter group got ground corn,
ground oats, corn gluten feed, soybean
oilmeal, linseed meal, cottonseed meal
and corn distillers' dried grains. The
roughage fed was corn silage and mixed
hay low in legumes.

On the average, the cows fed the

higher quality protein produced 36.93
pounds of 4 percent fat-corrected milk
a day as compared with 36.55 pounds
for the other ration. This small differ-
ence of only 0.38 pound of milk was not
significant. In two of the experiments
the yield was higher on the high-quality
protein mixture and in two experiments
it was higher on the low-quality pro-
tein. In the other experiments there

was no difference. There were also no
differences in the health or the main-
tenance of weight on the two rations.

These experiments with a total of 86
lactations show clearly that the kind or

quality of protein is of little practical
importance in any ordinary grain mix-
tures for dairy cows, even when but
little of the roughage is legume forage.

This means that in making up grain
mixtures for dairy cows one can use
whatever protein supplements are avail-
able, so long as the mixture is pal-
atable to the cows and contains enough
protein for satisfactory milk pro-
duction.

This fact is of especial importance
at the present time when there is a
serious shortage of protein supplements
supplying protein of high quality, and

the high quality protein is urgently
needed for feeding swine and poultry.

In addition to these tests with dairy

cows, at Cornell University, the New
York workers (R. W. Bratton, G. W.
Salisbury and F. B. Morrison) conduction
some metabolism experiments with grow-
ing lambs to find out whether or not the quality of protein was of im-
portance for them.

For these growing lambs there has

been no difference in the efficiency of

the “high quality” protein furnished

by dried skim milk, casein, soybean oil-
meal and proteins from the corn plant

as gluten meal. These experiments

were conducted by J. I. Miller and F. B.
Morrison and earlier tests by K. L.
Turk and F. B. Morrison.

These were the results of the New
York workers which Iowa farmers may
well like to know about this year. They

were reported in the Journal of Dairy
Science.

This work helps explain why the

Iowa Station found a few years ago the

mixture of linseed meal, soybean meal

cottonseed meal was of practical

value for dairy cows as linseed or soy-
bean meal fed alone.

Several years ago the Iowa Sta-
tion also compared ground soybeans

with linseed meal and soybean oilmeal

as protein supplement for dairy cows.

Ground beans seemed to furnish as a

protein from the standpoint of pro-
duction as the oilmeals. Of course

the present time, the oil in soybean

seeds is badly needed in the war effort and

less the beans are not of good qua-

lity, farmers should market their beans

buy back the oil meal.

Hunt Rubber Plan

The Iowa Agricultural Exp-

Station is in search for plants

that will produce rubber. About 1

of Russian dandelions are being

this year and selected strains of

milkweds also are being studi

possible rubber sources.

From the milkweeds has been

obtained a gum resin mixture. This

being used with considerable prom-
in blending experiments. Yields

over 100 pounds per acre of this gum

resin mixture have been obtained.