

FARMERS' INSTITUTE

OPERA HOUSE : DWIGHT, ILL.

Wednesday and Thursday **JAN. 7-8**

MORNING AND AFTERNOON SESSIONS

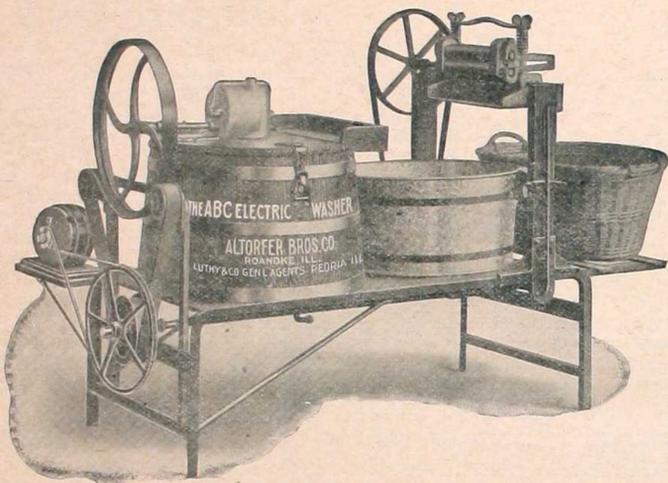
SPEAKERS

HON. CHARLES ADKINS, Ex-speaker House of Representatives
A. N. JOHNSON, State Highway Commissioner

MOTION PICTURES AND LECTURE "The Dawn of Plenty"
DOMESTIC SCIENCE by Mrs. E. F. Ford

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Home Course In Modern Agriculture

IV.—Water In Its Relation to Plant Growth

By C. V. GREGORY,
Agricultural Division, Iowa State College

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WE have already learned something of the value of water as a plant food. This is only one of its minor uses, however. In addition to the water which is decomposed by the plant and used in making starch and other products, many times as much is used for other purposes. One of the principal of these is dissolving plant food and carrying it upward to the leaves. After reaching the leaves most of the water is evaporated, leaving in the leaf cells the materials which it brought up.

The cells of which the leaves are made are very delicate and depend for their stiffness on the water which they contain. Without this water they would collapse in the same way a bicycle tire does when the air is let out. This is the very thing that happens when the leaves wilt. The rise of water from the roots has been checked in some way, and as evaporation still continues the leaf cells become partly emptied and shrink up.

The leaves are not entirely helpless at such a time, however. On each side of the tiny pores on the underside of the leaf is a cell known as a guard cell. When the supply of moisture begins to fall, these guard cells shrink up and in doing so close the openings, thus checking evaporation. In some plants, like corn, the leaves curl up at such a time, thus still further lessening the rate of evaporation. Of course when a leaf is wilted in this manner the work of building up plant tissues is seriously checked. This often happens during the dry weather of July and August, when the soil becomes so dry that the roots have difficulty in obtaining the needed moisture. The checking of development which results often reduces the yield of corn as much as twenty to thirty bushels per acre and that of other crops in proportion. For every pound of dry matter in a mature plant from 300 to 500 pounds of water have been brought up by the roots and evaporated from the leaves. One of the most important factors in the production of a maximum crop is the maintenance of a plentiful water supply within easy reach of the roots.

There are three classes of water in the soil. The first is known as ground water and is that water which collects in a hole dug in a wet soil or runs off through the tile in drained land. The second is the capillary water and is that which is left between the soil particles after the ground water has been drawn off. The ground water is affected by gravitation, while the capillary water is not.

If a sample of soil that looks perfectly dry is placed in an oven and heated for some time it will be found that it has lost considerably in weight, owing to moisture being driven off. This is the third class, or hygroscopic moisture. This, of course, is of no value to the plant, since the roots cannot extract moisture from an air dry soil. Neither can they use the ground water. This is really a damage in the upper two or three feet of soil, since it so fills the spaces that the roots cannot get enough air.

During a rain the ground water passing through the soil draws considerable air with it. As soon as the

comes when a sudden dry period follows a few weeks of excessive rainfall. The abundance of moisture during the early part of the season has kept the plants from sending their roots down very deep. When dry weather does come, the soil bakes and cracks and evaporation goes on very rapidly. This, together with the demands made by the plants, lowers the water table so rapidly that root growth cannot keep pace with it. As a result the capillary moisture within reach of the roots is not replaced as fast as it is used, and the growth of the plants is seriously checked.

Fields with a clay subsoil withstand dry weather much better than those with a subsoil of sand or gravel. The latter, because of their looser texture,



FIG. IX.—COVERING THE TILE DITCH.

allow the water to filter down out of reach instead of retaining it for future use, as do the clay soils.

The farmer cannot influence the amount of rainfall, of course. After the rain has fallen, however, it belongs to him to do with as he sees fit. The way he handles it from this time on determines to a large extent the size of the crop he will harvest when fall comes.

The first problem is to get rid of the surplus ground water quickly, and the second is to waste as little of the capillary water as possible. An endeavor should be made to lower the water table to three or four feet below the surface as soon as possible after each rain. If this can be accomplished in two or three days the growth of the crop will be interfered with very little. A few soils are so well drained naturally that little artificial drainage is necessary. On almost any farm there are hills and ridges where the natural drainage is sufficient. The hollows between these elevations, however, and all the flat fields will yield much larger crops if tiled.

The distance a line of tile will "draw" is in sandy soils often as far as 100 feet on each side, while in heavy clay soils it may not be more than sixteen feet. This distance is also affected by the depth of the tile. The deeper they are placed the farther they will draw. Tile are usually placed at an average depth of about three feet, though in many instances four would be better. The extra cost of digging the ditch a foot deeper is something of an objection, but is balanced by the fact that the lines of tile do not need to be as close together. Deep tile are not as easily displaced by freezing, and a deeper feeding ground for the roots is provided.

A mistake made more frequently than that of not putting the drains in deep enough is that of using too small tile. The character of the soil, the fall and the amount of surface drained are the factors which largely determine the proper size to use. Almost every book or bulletin of tile drainage gives tables for figuring the size of tile required under various conditions. If there is any doubt it always pays to get a size too large rather than a size too small, even if the cost is a little more.

It is usually better to let the job of tiling to a contractor rather than to attempt to do it yourself. There are reliable tilers in almost every locality who can be depended upon to lay the tile to grade and do a first class job in every particular. Only the hard burned tile should be used. These will last for a lifetime or longer if properly put in. When tile go within fifteen or twenty feet of trees the joints should be cemented. Otherwise the tree roots will find their way through the joints and fill up the drains to such an extent that the flow of water will be cut off.

The most important part of a drainage system is the outlet. The tile should empty into a stream if possible. Water should not be allowed to stand over the mouth of the outlet if it can be avoided, as this checks the current and causes the drain to partly fill up with silt, thus reducing its capacity just that much.

With a thorough system of tile drainage in good working order the problem of getting rid of surplus water is solved. Tiling also helps to solve the problem of lack of water. The roots go down so much deeper in a tiled soil that they are in position to withstand a drought better than if they were a foot or two farther above the water table. Removing the surplus water by drainage also hastens the warming of the soil in the spring.

THE FATE OF A WOMAN DUELIST

Tale of a Career of Bloodshed and Its Tragic End.

Serane, fencing master at Paris when dueling was not only more common but more serious there than now, prepared the way for the killing of many men by teaching his art to the Parisians. It was generally understood that a pupil of Serane was sure to kill his man. If his lessons were really so valuable it must have been partly owing to a special confidence given the pupil and a corresponding loss of nerve on the part of the opponent. At any rate, those whom Serane had taught usually had little trouble in settling their disputes without recourse to the foil.

One evening Serane was sauntering down the boulevards and on reaching the opera concluded to go in and attend the performance. One of the singers on the stage was a woman named Maupin. Though she was not singing an important part, Serane's gaze was constantly fixed upon her. Why one woman's personnel will appeal to one man when another woman is the chief attraction for other men is an insoluble problem. In Maupin, Serane saw that which appealed to him strongly. At the close of the performance he sent his card to her and received an invitation to call upon her.

"M. Serane," she said as soon as he appeared, "I deem myself fortunate in your desiring to make my acquaintance. You are well known to me by reputation as a splendid teacher of fencing, and I wish you to give me lessons."

Serane found the singer as fascinating in the greenroom as on the stage. She was young, fairly good looking, and about her was a certain abandon which, when not too pronounced, is attractive to men. Serane fell desperately in love with her, and she permitted him to love her in order that she might get out of him all the skill in fencing he was capable of imparting. She was an apt pupil and, taught by a lover, became the most skillful fencer that had ever been turned out from his academy.

No sooner had Maupin acquired the art than she began to attract attention as a duelist. At first her affairs with the sword leaked out as mere rumors. One report was that a young nobleman who had been devoted to her had fallen by her hand; that, disguised in man's apparel, she had insulted him and killed him without his knowing of her identity. Again it was rumored that she had fought and killed another woman.

She liked to have Serane with her, both on account of his devotion and because his presence gave her additional éclat as a swordswoman. But he came to understand that she craved blood or the excitement of taking it, and he endeavored to dissuade her from her course.

One night Serane and Maupin were dancing at a students' ball in the Latin quarter when Maupin jostled the belle of the evening, and upon the girl's looking at her resentfully Maupin was rude to her. The insulted girl was dancing with an intimate friend of Serane, Gustav Grammont. Grammont, supported by two other men, ordered Maupin to leave the room. She said that she would do so provided they would go with her. They did so, and before morning she had killed them all.

Serane in this affair refused to support Maupin. Indeed, she was obliged to call on another man to act as her second. The day after she had killed Grammont and the others Serane received a note from her accusing him of cowardice in having deserted her in the hour of need and challenging him to mortal combat. Stung to the quick by her ingratitude, he sent a hasty reply accepting the challenge.

The man who had been a lover and had taught the object of his love to kill people, filled with a mad remorse, resolved to kill her, thus punishing her and stopping her career of bloodshed. They met in his academy, the doors of which had been bolted and the windows screened. Maupin stepped out on to the floor with as much composure as a mother would administer food to a babe. She looked at Serane with a stony stare and said:

"Serane's pupils always kill their opponents."

There can be no doubt but the woman said this to fill her antagonist with a superstitious dread that would take away his nerve. If it had any such effect Serane gave no evidence of it. A revulsion of feeling had come over him. Had this not occurred, had he opposed Maupin as a lover, as she had presumed he would, there would have been no chance for him. As it was it was a fair fight between them.

But with Serane in full possession of his faculties there could not be a fair fight between them. As soon as Maupin saw that she had lost her power over him she knew that if he chose her punishment had come. The moment they crossed swords she saw in Serane's eyes not only a determination to kill her if he could, but a perfect confidence of being able to do so.

Singularly enough, this woman who had conquered men with men's weapons no sooner discovered that her womanly influence over the man who had furnished her with her power had ceased than every particle of her confidence deserted her. She gave her opponent a mute look of appeal. He answered it with a sword thrust to the heart.