

FARMING WITH EXPLOSIVES.

By Ex-Gov. SAMUEL J. CRAWFORD, Baxter Springs, at the Board's
Thirty-eighth Annual Meeting.

While we may not be able to farm with explosives, yet, in my opinion, we can use them with profit as an auxiliary to farming. In some parts of the state, and especially in southeastern Kansas, the surface soil is underlaid with a stratum of compact subsoil or hardpan, which is impervious to water and impenetrable to the roots of growing grain, grasses, alfalfa, and many other products of the farm. These strata of so-called hardpan vary in thickness and depth; but, however thick or deep they may lie below the surface, they check the growth of the cereals, grasses, alfalfa, sugar beets, fruit trees, and other things which have need to send their roots downward to their natural depth through an easily penetrable subsoil that receives the surplus rainfall and retains moisture during the season when moisture is most needed. On some farms which I have visited the hardpan lies within six inches of the surface and varies in thickness from six inches to six feet. Generally speaking, it is impossible for such land to produce more than a half crop, whether the season be wet or dry. On such land the roots of corn and other things will go down to the hardpan, turn off at right angles, and draw their nourishment only from the surface soil. That soil, to the depth of the plowing, an average of six inches, is speedily filled with water when the rains set in, while the surplus rainfall, from three to four feet annually, rolls off to the ravines and is lost to agriculture, when it could be easily stored in sub-reservoirs, for use when needed, by breaking the hardpan with powder and allowing the water to pass through or into such reservoirs.

Last summer I tried the experiment of breaking the hardpan on my farm in Cherokee county, preparatory to sowing in alfalfa. I used an ordinary two-inch auger, remodeled by adding a steel handle suitable for the purpose. We bored holes in the ground from two to six feet deep, and from twenty to thirty feet apart, according to the nature and compactness of the subsoil and hardpan. We used one stick of ordinary blasting powder in each hole, which would create an opening to the surface of from eight to ten inches in diameter, break the ground all around for a distance of from ten to fifteen feet, and at the same time establish a subreservoir below the bottom of the bored hole from three to six feet in diameter, with the hardpan all around shivered into fragments. Blasting powder of average strength, such as I used, breaks downward with greater force than otherwise. The holes and openings so created should be filled or partially filled with sand or gravel, so as to keep them open permanently as a passageway for the surplus rainfall. The water thus conveyed into subreservoirs, whether it remains therein any length of time or distributes itself through the subsoil, will linger and leave moisture sufficient to supply the roots of everything that grows in the ground. Heretofore, instead of thus storing the surplus water for use when most needed, which nature always brings in abundance, it has been my custom to dig trenches and let it run off into the ravines and rivers, and then suffer the consequences when the dry weather sets in.

My experience is that nature has done and always does the right thing at the right time. She supplies us liberally with everything essential, and if we neglect or fail to avail ourselves of her bountiful gifts we have only ourselves to blame. Sometimes we think the rainfall at certain seasons is too much and at others not enough, but the plan suggested will, in my opinion, remedy both these supposed evils. The bulk of the surplus rainfall, whether thirty or forty inches each year, will readily be absorbed by the broken ground and shattered hardpan underneath the surface soil, and in consequence thereof a sufficient amount of moisture will be retained in the ground, not only to supply the growing crops but also to keep other fields in good condition for fall plowing.

Nor are these the only benefits to be derived. When the spring rains come, the water often stands in fields until it is too late to plant, or, if the planting season is past, then until the growing crops are drowned out. If that surplus water when it falls could pass through into loose ground and subreservoirs, all such trouble and damage would be avoided. But to break and utilize the hardpan that lies in strata under many farms and control and utilize thirty-six inches of water that is handed down to us, sometimes in torrents, is no light task. It is not so costly, from a money point of view, but it takes labor, patience, and perseverance. In so far as the money is concerned, it will take eighty sticks of powder per acre, which, with caps and fuse, at wholesale price, are worth about \$1.50; everything else essential, except the two-inch auger, worth fifty cents, comes under the head of labor, which any farmer can do at his leisure in dry weather. The increased yield of corn or wheat per acre in one season will richly pay for shooting the ground; and for alfalfa and sugar beets it is indispensable, where the ground is underlaid with a hard subsoil. At least that is my experience in the Spring River valley.

Last summer I dynamited eight acres and seeded it to alfalfa. The ground was level, and when the fall rains came the water, which formerly stood for days on the ground, was immediately absorbed, leaving the alfalfa field dry and apparently in good condition.

I may be overenthusiastic on this subject, but certainly it seems feasible and worthy of a fair test by farmers who have to wrestle with hardpan.

DISCUSSION.

SECRETARY COBURN: We have with us here to-day Mr. Hurter, from Wilmington, Del., an expert in powder and the use of powder, and he has, I understand, a great fund of information as to its use, especially in stump pulling and similar work. In any discussion he will be here, available to answer any such questions as he may.

MR. HURTER: From the article and the description given I must say I believe Governor Crawford used dynamite all the way through. Perhaps before we start the discussion it might be well for me to give a little information about the nature of dynamite and its difference from black

when most needed, which nature always brings in abundance, it has been my custom to dig trenches and let it run off into the ravines and rivers, and then suffer the consequences when the dry weather sets in.

My experience is that nature has done and always does the right thing at the right time. She supplies us liberally with everything essential, and if we neglect or fail to avail ourselves of her bountiful gifts we have only ourselves to blame. Sometimes we think the rainfall at certain seasons is too much and at others not enough, but the plan suggested will, in my opinion, remedy both these supposed evils. The bulk of the surplus rainfall, whether thirty or forty inches each year, will readily be absorbed by the broken ground and shattered hardpan underneath the surface soil, and in consequence thereof a sufficient amount of moisture will be retained in the ground, not only to supply the growing crops but also to keep other fields in good condition for fall plowing.

Nor are these the only benefits to be derived. When the spring rains come, the water often stands in fields until it is too late to plant, or, if the planting season is past, then until the growing crops are drowned out. If that surplus water when it falls could pass through into loose ground and subreservoirs, all such trouble and damage would be avoided. But to break and utilize the hardpan that lies in strata under many farms and control and utilize thirty-six inches of water that is handed down to us, sometimes in torrents, is no light task. It is not so costly, from a money point of view, but it takes labor, patience, and perseverance. In so far as the money is concerned, it will take eighty sticks of powder per acre, which, with caps and fuse, at wholesale price, are worth about \$1.50; everything else essential, except the two-inch auger, worth fifty cents, comes under the head of labor, which any farmer can do at his leisure in dry weather. The increased yield of corn or wheat per acre in one season will richly pay for shooting the ground; and for alfalfa and sugar beets it is indispensable, where the ground is underlaid with a hard subsoil. At least that is my experience in the Spring River valley.

Last summer I dynamited eight acres and seeded it to alfalfa. The ground was level, and when the fall rains came the water, which formerly stood for days on the ground, was immediately absorbed, leaving the alfalfa field dry and apparently in good condition.

I may be overenthusiastic on this subject, but certainly it seems feasible and worthy of a fair test by farmers who have to wrestle with hardpan.

DISCUSSION.

SECRETARY COBURN: We have with us here to-day Mr. Hurter, from Wilmington, Del., an expert in powder and the use of powder, and he has, I understand, a great fund of information as to its use, especially in stump pulling and similar work. In any discussion he will be here, available to answer any such questions as he may.

MR. HURTER: From the article and the description given I must say I believe Governor Crawford used dynamite all the way through. Perhaps before we start the discussion it might be well for me to give a little information about the nature of dynamite and its difference from black powder. Black powder is made up of just simply a mechanical mixture of charcoal, saltpeter and sulphur. When fire is communicated to it the charcoal and sulphur are burned by means of communication with the saltpeter. The action is just a push; a strong, quick push, and nothing else. Now the base of dynamite is a liquid called nitroglycerin, and the action when it explodes is that of an instantaneous decomposition. Suppose this desk was covered with asbestos and we put a pound of blasting powder on top and set fire to it; there would be a great big black flame, a large cloud of smoke, and no damage to the desk. But if you put a quarter of a pound of dynamite on the desk and exploded it the decomposition would be so great that it would break the desk to fragments. If the air could all be removed the desk would not be harmed. Dynamite can be exploded by either heat or a shot. The heat method is not practicable, because dynamite will catch fire and burn, and when burned you have lost its useful effects. The only method which goes in practice is by means of a shock, and this shock is accomplished by use of fulminating mercury. It is made into little copper blasting caps from one and a half to two inches long, and whose inside diameter is a standard of twenty-two hundredths of an inch, made to correspond with the dimensions of the fuse manufactories. This fulminating mercury is one of the quickest explosives known. In the removal of stumps by means of explosives there are several distinct changes from the use of plain mechanical means. In the first place, with a little experience you can remove stumps more rapidly. When you have a large tract of land to clear it can be used to great advantage. When a stump is removed by explosives you accomplish several things by one operation. First, the stump is taken out and all the earth that clings to the roots is knocked into fragments. You have the whole thing accomplished by one operation. In blasting a stump the taproot has great bearing on the result. You have got to break the taproot to accomplish anything. You have to get your explosive right up against the taproot to cut it off. Take the stumps in the Eastern states, whose diameters run from two to three feet; the first thing is to get your hole under the stump and get your explosive up under the taproot, according to the size of the stump. It is best to get your explosive from eight to ten inches in a two- or three-foot stump, down to one foot in a four- or five-foot stump. If you find that your dirt is blown from under the stump, that shows that you have got it down a little too low; that the radiation is so great that it gets out

from under the stump and blows the dirt out from under it. In the Southern states they have a very peculiar proposition with some of their pine stumps. They have a taproot that is sometimes as large around as the tree itself, and there the only problem you have got to deal with is to cut that taproot off at a depth that will not interfere with the working of the soil. There they take a long bar and drive a hole down six or eight feet by the side of the taproot. Then they put the charges down six or eight feet below the surface, one on each side, and fire both shots at the same instant. This cuts the taproot off clean where the charge is and takes the stump out. The cypress stump has no taproot at all, but on the other hand we find as a rule that the roots are interwoven into a close and dense mat. That means a blasting of a layer off the surface of the country. They might use four to six pounds of dynamite in blasting out the stump. They put from one-half to one-fourth cartridge under each one of the spreaders, according to the size. All these, together with the charge under the stump, are connected up for electric firing. When you fire this you cut it from all the surrounding roots. In addition to the blasting of stumps the blasting of boulders is another important matter to be taken into consideration. If you want to blast a boulder, smash it up, using the smallest possible amount of explosive, drill a hole in the middle of it and put in a half pound of forty per cent stick of dynamite. This will smash that boulder all to pieces. Three to five pounds laid on top of the rock would do the same thing. In that case it would be well to take some stiff mud and plaster it down over the dynamite. You could put your powder underneath the boulder, but you don't have the roots to contend with. Instead of putting it as you would in a stump you put it right underneath, close up to the rock, so as to smash it.

MR. BOLTON: In blasting stumps do you have an auger and bore a hole in them?

MR. HURTER: No; take an auger and put it underneath the stump.

J. G. HANEY: We have had a great deal of experience with dynamite on the Deming ranch, in Labette county. There must be a question here as to which would give the best results, dynamite or black powder. Black powder has a great deal more tearing force. We have found that for loosening dirt the black powder will tear up more. Another question in regard to this dynamite for the loosening up of the ground; there has been a great deal of discussion at our farmers' institutes, and other meetings in that vicinity, and this has been discussed. Some of them have heard of these experiments that the government carries on, but it seems the people are not taking to that as well as they are to tile drainage. There is a great deal of tile being put in down there, and I believe they will get better results from tile drainage than from dynamite.

MR. HURTER: I think your point is well taken. But when you get down to the farming end of it, where you want to get the water into the ground and conserve it, that is a different thing. I am not a farmer myself, and I am getting into deep water.

MR. HOPKINS: I would like to inquire as to the nature of this so-called hardpan. I would like to know whether it is a sort of sand and gravel cemented together, or a sort of tight clay.

J. G. HANEY: It is a light, tight clay. My idea of this is that some time or other in that section it has rained, and rained, and puddled it up until it looks like the loose dirt had settled there. It varies from a few inches over the surface to a foot or so in depth. There is no sand in it. I heard a man describe it as being a soil that a man didn't make a track in. He said when it was dry he didn't make any impression in it, and when it was wet he took his track with him.



Plowing a Thomas county wheat field with a gasoline engine and three gangs of six plows each, cutting twelve feet.