rather a large scale, as small drums are not nearly so efficient in proportion to size. The fuel requirements are about 300 pounds of coke, or its equivalent, for one ton of potatoes, and the labor requirements are small. The approximate cost of operation, including fuel, labor, interest on investment, taxes, wear, etc., is $1.30 per ton of potatoes. Four tons of potatoes yield one ton of dried product. In Germany, most of the product is used as feed for all kinds of animals, having, it is said, about the equivalent value of corn for cattle, horses and swine. It is used, technically, in the manufacture of yeast, alcohol, etc. The product, being partially cooked, is not suitable for the manufacture of starch. One of the large manufacturers of machinery is now trying out a process for making a material that will be suitable for making into finished starch.

It appears that this industry may be applicable to the United States, especially where the question of freight is one of importance, for, as seen above, the weight of product is reduced to one-fourth. It should enable our Western States to utilize the advantages they have for potato-growing, both as a money crop and as a cultivated crop in the rotation to prepare the land for wheat and other grains. Furthermore, the machines could be used for drying sugar-beet pulp, beet leaves, and other similar products, as it is in this way the German beet-sugar factories conserve their pulp, mixing it with a small quantity of molasses for stock feed, a part of which is exported to the United States.

Soil Water Investigation.

An interesting statement on the investigation of water in its relation to soil is made by United States Secretary Wilson, in which he says :

"Several of the formations permeated by the subterranean waters abound in soluble minerals, which are slowly dissolved and either washed out in the springs, to be carried off through surface streams, or swept seaward at depths beneath the surface. Such solvent action of subterranean waters is well known, but in the central plains region the proportion of soluble matter is so large, and so related to other factors that its removal becomes a distinctive geologic agency. As the solution of the rock matter proceeds, the strata are weakened, and from time to time they slump beneath their own weight and that of the superposed deposits in such a manner as to warp the strata, and frequently produce depressions of the surface, when the local run-off following storms accumulates within these depressions, and gradually fills them with silt eroded from the rims and neighboring uplands. So characteristic is this process that the general surface over thousands of square miles is of a distinctive topographic type—coalescing basins and low divides forming an irregular surface, without continuous seaward slopes. The conditions by which this topography was produced have existed for ages ; indeed, throughout the greater part of the vast interval since the Cretaceous, and during these ages the progressive slumping in the deep-lying strata, with the subsequent warping of the surface and shifting of local areas of erosion and deposition, have resulted in an immense accumulation of silts and loams forming the soils and subsoils of the region. Nowhere else in the world, so far as known, are there so extensive accumulations of subaerial deposits as in the central plains, and the accumulation is due primarily to that subterranean movement of the waters which to-day render the silt loams more productive than they would be if watered only by the meagre local rainfall.

"Under the modern view of the suborganic and dynamic character of the soils, the chief factor of continuous activity is the circulating soil water, which maintains appropriate texture in the soil body, passes thence into the plants carrying material for growth in solution, and finally returns through transpiration to the condition of aqueous vapor in the atmosphere. Investigations have shown that in productive regions there are two sources for the soil water : (1) rainfall and (2) the store of ground water accumulated from the rainfall of previous years and non-growing seasons. Throughout the greater part of the United States the rainfall of the growing season does not suffice to produce crops, and cropping succeeds only as the growing plants draw on the accumulated store of moisture, which is generally equivalent in quantity to the rainfall of several years; in fact, without this store farming, especially during the dry seasons, would frequently fail, so that it may be viewed as a big factor in the agricultural capital of the country. To this important resource the soil-water investigations have been extended during recent months, with the object of ascertaining (1) the quantity of ground water within reach of capillarity, and (2) the changes in quantity attending settlement and cultivation. Generally, the best indication of the ground water level is afforded by wells and springs, and a census of representative wells and springs in every county in the United States was undertaken through correspondence. In the country settled for a quarter of a century or more there has been a decided lowering of the ground-water level, with, of course, a corresponding increase in danger of crop loss through drouth. Thus, in Michigan, the mean water-level in 794 wells lowered 2.2 feet during an average period of 88 years ; in Minnesota, the average lowering of water in 920 wells was 3.45 feet during 14 years ; in Iowa, the lowering in 1,160 wells averaged 3.6 feet in 21 years. The mean rate of lowering of the ground-water level, indicated by the wells in the three States is 0.18 foot per year, or 4.5 feet during a quarter century. The facts brought out by the inquiry serve to emphasize the importance of so improving agriculture as to utilize and conserve on each farm all the water received by it during the year."

The Production of Clover and Timothy Seed.

Speaking at a meeting held in connection with the Eastern Ontario Live-stock and Poultry Show, E. D. Eddy, B.S.A., of the Seed Branch, Ottawa, said, in discussing the production of clover and timothy in the Ottawa Valley, that he believed one of the greatest opportunities the farmers of Eastern Ontario and Quebec have is in the more extensive growing of clover for pasture, hay and seed. What is true of that district is also true of many other portions of the country. Continuing, Mr. Eddy said : Not only is clover one of our most profitable crops, but in conjunction with live stock it has a remarkable influence in increasing the fertility and improving the mechanical condition of the soil, thus making it more productive for all other crops. So great is this influence that some prominent agriculturists have gone so far as to say that no country where clover cannot be successfully grown can long remain highly productive, except through the very liberal application of fertilizers, which is impracticable on a large scale.

We can appreciate the force of this contention more fully when we consider why it is that clover has such a highly beneficial effect on the soil, and this in a word is explained by the fact that it is a plant-food gatherer, instead of consumer, in so far as the element of soil fertility usually deficient is concerned. The farmer's great problem in soil fertility is to convert the elements of nature, particularly nitrogen, into a form available for plant food. In this work, clover and other leguminous plants are his chief assistants, for they have the power of drawing on the inexhaustible supply of nitrogen in the air, and, through the bacteria in the root tubercles, converting it into nitrates for the use of the growing plant itself and for succeeding crops. The result is that clover not only does not remove nitrogen from the soil, but actually leaves it so much richer in that element that its beneficial effects can be seen in several succeeding crops. Not only does clover increase the store of available nitrogen in the soil, it also makes it more friable, and improves its mechanical condition. The roots penetrate deeply and bring up plant food from the subsoil, and, upon decay, they leave channels for the freer circulation of air and water, which is very important, especially in heavy soils.

One of the principal reasons why more clover is not grown was given as the high cost of seed, which has caused smaller areas to be seeded, and at a lower rate of seeding. There is, according to Mr. Eddy, no reason why clover seed should not be more extensively produced in the Ottawa Valley, because farmers experimenting in growing it in this district have had good success.

For several years, good crops of first-class clover seed have been grown on the Macdonald College farm, Ste. Anne de Bellevue, Que. This year, 24 acres of red clover were saved for seed after a first cutting of 3½ tons per acre had been removed for hay. The second crop yielded 2,776 pounds of seed, or at the rate of about 2 bushels per acre, which, at 20 cents per pound, is $555, or $23 per acre. This seed, a sample of which has been tested at the seed laboratory, is free from weed seeds, and of such high quality that it would be very difficult to secure stock as good from the trade at any price. This record is not an exception, by any means ; in fact, the yield this year is considerably lower than the average, although the price is higher. Equally satisfactory results have been secured by private farmers in different parts of Eastern Ontario, and this year, with the encouragement of the Provincial and Federal Governments, quite a large number of farmers have saved clover for seed in Pontiac and some other counties in Quebec.

FARMING MODIFICATIONS NECESSARY TO SUCCESS.

There are several features of farming operations which need to be modified considerably before clover-seed production, or even clover-growing for pasture or hay, will be the success that it might be. In the first place, the crop rotation should be shortened so that the land will be seeded to clover oftener. Fields bearing the third or even the fourth crop of oats in succession are not likely to respond very well to the seeding of clover, and when they do not the owner often gets discouraged, and thinks that buying expensive slover seed is a waste of money. The trouble is likely not with the soil or climate, but with the management; for clover, perhaps more than any other crop, demands suitable conditions for a start, and one of the conditions is a fairly fertile soil containing plenty of nitrogen and potash. As clover is a nitrogen-gatherer, it is consequently the best possible preparation for a succeedjng crop. For this reason, land that is frequently seeded usually responds readily, but that which is seeded only at long intervals is likely to give a poor catch. The main secret, then, in making sure of a good catch of clover each year is, first, to bring the land into a good condition of fertility by good cultivation and the application of barnyard manure, and then seed frequently. In some districts, excellent results in preparing land for clover have been obtained by sowing other leguminous crops, such as peas and vetches, for the purpose of enriching the soil in nitrogen. On soils that are deficient in available potash, sometimes very beneficial effects are secured from the use of land plaster or gypsum.

A Better Investment.

Prof. Wm. H. Day, speaking at the Dairymen's Convention in Campbellford, declared that reports sent in during 1909 and 1910, showed that the acreage increase of crop on drained soil had been $11.50 per acre per annum, and the average cost to drain had been only $25.00.

Another mistake that is often made is the sowing of insufficient seed. The average rate of seeding in this district is perhaps three or four pounds of clover seed, with about as much timothy seed per acre. This low rate of seeding is almost sure to result in a poor stand of clover, with the next year's crop containing too large a proportion of timothy to make the second growth of clover thick enough for a seed crop. Even when a crop is intended for hay or pasture only, but more especially for seed, it will be found good economy to sow from nine to twelve pounds of clover seed, with four or five pounds of timothy seed per acre.

FACTORS AGAINST PROFITABLE SEED PRODUCTION.

A factor which frequently disqualifies a field of clover for profitable seed production in the Ottawa