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the wild oat for instance, is grown in a manure pile, the number and weight of the grains will be much increased, but if a plant of Banner is grown in such a place, there will be rather less than more grains, than if it were grown in ordinarily rich soil, and these characteristics of different types, are made use of in improving cereal crops. No, we do not mean to say that certain types like Banner, will do well on any soil, simply that their yielding propensities (increased grains per head) cannot be materially improved, by heavy manuring, while other types can be made more prolific.

"Constant self-fertilization or inbreeding, tends to deteriorate qualities that have been produced by breeding, or exceptional means of cultivation." The proof that this is the case, is to be found in the positive improvement made when cereals have been cross-fertilized either within or without their own variety. But it does not follow that deterioration will continue until the type is lost; they will simply deteriorate, until they reach a condition determined by the force of natural agencies, just as the wild types maintain their

true forms, and the cultivated continue to maintain a certain more or less fixed type, after the means that have been used to improve them have been withdrawn.

"The ultimate limit of improvement by selection, may soon be reached." This it seems to us is but reasonable, since it is possible to exhaust the sources of improvement by environment. True, cereals are improved by being grown farther north, and on new soils, and by other happy combinations of circumstances, but they may also be deteriorated by identical processes reversed. Mendel's law is frequently quoted by plant breeders, but as a matter of fact, Mendel's law cannot be established, and many of the most progressive plant breeders deny it. The same may be said of the work on our experimental farms, in the direction of improving Red Fife. It is quite legitimate to doubt the accuracy of any attempts to cross-fertilize, or fertilize within the variety on Red Fife, since the process of crossing is most delicate, and must be performed just at the proper time. This doubt

is further increased by the paucity of results of any kind. "This step is called regeneration." It is a fact that improvement effected by it, is so marked that any one can see it. The Highland society of Scotland, tested grains so improved and endorsed them unqualifiedly and the results at our seed fairs, have pointed unmistakably to the varieties improved by regeneration. Actual crop tests are the best proof, and these have demonstrated the use and benefit of "regeneration." If the process does not coincide with theory, then theory is wrong for the results prove the value of the process.

While we have satisfied ourselves, that improvement in plants is made more pronouncedly by other processes than selection, we would not by any means disparage selection. It is doing wonders for crop improvement, and should be more generally followed by every farmer. It is not, however, the only means upon which we must depend for improvement, and this was the substance of our comments upon Messrs. Dow's previous letter.—Ed.

CLOVER THE NATURAL FOOD FOR SOIL

There are difficulties in the way of successful clover growing in this country that do not require to be faced in those older portions of the continent, from which most of us, making up the farming population of the Canadian prairies, have been drawn. Our climatic conditions, despite everything that may be said to the contrary, are not the most favorable for the growth of this plant. Clovers are indigenous to the central temperate zone. They find in the climate of that region, conditions adapted to their most favorable development. As we take them south or north, from their natural place of growth, we submit them to conditions they must be adapted to more or less, before they will thrive in native luxuriance. But as a matter of fact, every agricultural crop grown in this country is native to a more southerly clime. The place of origin of wheat, is known to be a long ways south of the 60th parallel, north latitude, also oats and barley, yet they are grown as far north as that on this continent. Two hundred years ago, the potato was a plant of the tropics, and to-day it is grown beyond the Arctic circle. It is only about ten years since corn began crowding out of the corn belt, and spreading over the northwestern wheat states. In another ten years it will rank as a staple crop on this side of the boundary. The northern limits of plant growth will never be reached. Clover, once we find out exactly how to grow it successfully, will be cultivated here more extensively and with the same certainty of success as it is now grown down through the United States, in Ontario and Eastern Canada, or in other parts of the world where it ranks as a staple crop.

The purpose of this article is merely to summarize the methods of a few of the successful growers of clover in our three Provinces, that those who are about to begin the growing of this crop may have something to guide them in their undertaking.

One of the first difficulties in the way of successful clover growing, is to get people to see the absolute necessity of their growing this crop. Why should we grow clovers? That was the query that confronted those who, ten or fifteen years ago, went into the rich Red River Valley of North Dakota, to preach the clover gospel to the farmers of that state. The people there were growing wheat, and willing to go on growing it forever. Clover was not a crop that could be turned readily into money. It had little market value unless transformed into mutton or beef, and there was little lure in the sheep or beef business for the average grain grower. However, North Dakota is west of the Mississippi, and its farmers were willing to be shown. Some of them too were becoming a little "leary" concerning the inexhaustibility of the Red River Valley land. The "wood" as they called the organic matter, was getting out of it. It wouldn't hold moisture the way it used to and the weeds certainly were getting in. Because the argument about enriching the land by growing clover and getting after the weeds by the same means, seemed reasonable, some of them here and there began sowing a little clover seed in their grain and watching the result. They soon found that a field of clover sod turned over for wheat, gave a better yield than they got from the summer fallowing methods previously followed, and besides the land was not

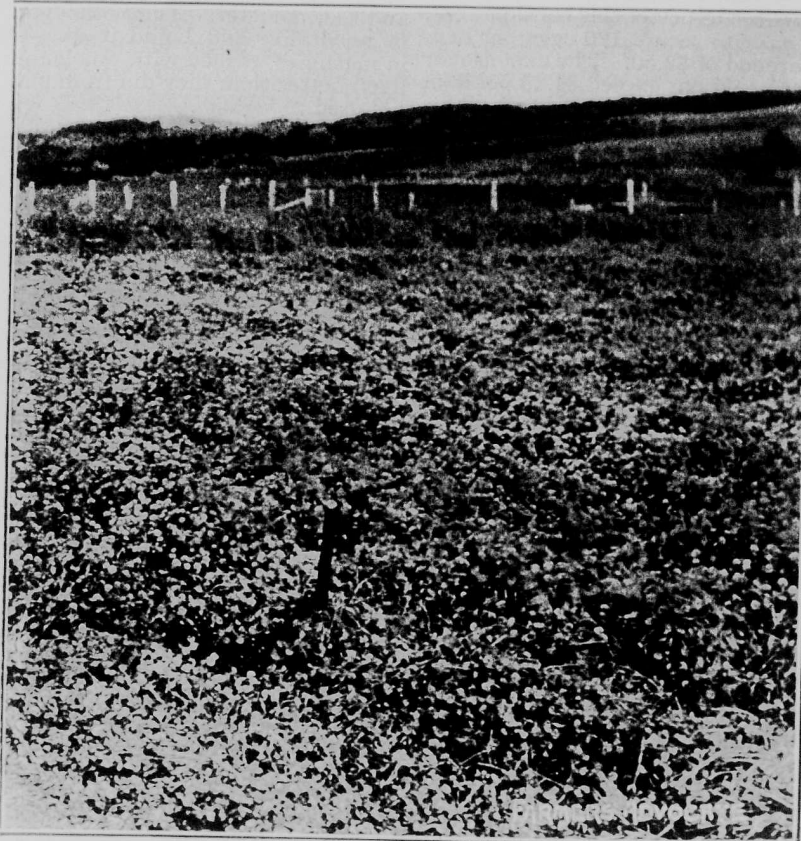
lying idle one year in four. They found too that clover was a better feed for farm stock than the prairie grass, timothy, rye or brome they had been accustomed to feed. It had more "muscle" in it. Grown mixed with timothy it made a better horse feed, fed to cows it seemed to keep them milking better in the winter than straw or the grasses did, and then some of them began feeding sheep on it, buying feeders out in the western sheep country and fattening them on clover and the screenings they used to throw away or pay freight on, to Duluth. What is happening to-day in the Dakotas is merely duplication of what happened about ten years earlier in Minnesota. It illustrates what is happening in our own wheat growing districts at present, and indicates the trend of our agriculture for the next decade. We are going into clover because we find it pays us to do so, because it enables us to acquire more of the almighty dollars, and to acquire them is the basis of most human endeavor.

In this country those of us who have grown clover experimented with it at first in a rather small way. Some settlers brought in seed with them from Ontario when they came, some of them found it would flourish here as well as it did in the east, and some didn't. Others bought seed, or got it from the experimental farms and sowed it on a small patch. Sometimes it was dried up in summer, sometimes it was badly killed out in winter, and sometimes it seemed to do alright. We found that no set rules could be followed in growing it, that our soil and climatic conditions varied so much that the methods successfully followed by one man in one place,

might not be successfully carried out by another man in another place. We found briefly, that we had to forget a good part of what we thought we knew concerning clover growing, that we had to put the question of proper methods of growing direct to Nature, experiment on our own farms, and find out exactly what our soil and climate would permit us to do, not what we could force them to do for us.

We found out early that where there is sufficient moisture, it is best to sow the seed with a light nurse crop and one that does not shade the ground too much. Clover, if it is shaded too much during its first season, by a heavy stand of grain, is liable to have the life scorched out of it, when the grain crop is cut and the clover plants exposed suddenly to the full power of our harvest sun. It is a sun loving plant and needs warmth and light right from the time it shows above the surface. However, it does not want too much of either, so most growers, except on upland prairie soils, have found that it does best when sown with a light nurse crop, barley the majority of them seem to prefer, sowing about a bushel to the acre, and cutting early, so the clover gets a good chance to grow after the barley is off the land, cutting pretty high so that a good stubble remains to hold all the winter snow possible. But on the uplying prairie clovers appear to require all the moisture available and cannot share it with a nurse crop. While the majority of growers seem to favor barley as a nurse crop, others have been quite as successful in sowing oats or wheat. The point is to sow the nurse crop, then cut it early, and leave a fairly good stubble.

(Continued on page 444).



RED CLOVER AS GROWN ON A MANITOBA FARM