

son for this. If you will examine, you will find that at that stage new shoots are coming up from the crown which will be injured by the mower if you wait longer. There is no advantage, though, in cutting earlier. In your climate, I should say that two or possibly three cuttings might be taken every year.

The Production of Clover Seed.

Editor "The Farmer's Advocate":

At the present time there is a general awakening amongst our farmers in the matter of the production of clover seed. Owing to the prevailing high price and the constant growing demand for seed, farmers realize they are compelled to go in to this money-making business. Those who are engaged in it openly testify there is as much—if not more—money made growing clover seed as from most other crops grown on the farm, besides the incident benefits of the clover crop. It is thought by many that to grow clover seed requires special soil and machinery, and that it could only be grown in certain districts in Ontario. This, however, is not the case, as we find some kinds of clover seed can be grown in almost any part of Canada, and on almost any kind of soil. Excellent results have been obtained on the Macdonald College Farm for the past five years. The season of 1911 being thought a rather poor one, 24 acres produced $3\frac{1}{2}$ tons per acre of choice hay, which was cut before July 1st. The second crop of the same season produced 2,776 pounds of No. 1 clover seed. The interesting part is that nine acres, which appeared to be thin and scarcely worth cutting, produced 141 pounds of seed per acre; while the balance of the 24 acres, which appeared heavy, only produced 100 pounds per acre—a yield which most farmers would be proud of, when seed is selling so high. Even at half the price, it would pay to grow clover seed for the benefit of the fertilizing elements of the clover roots.

Soils.—From personal experience, the soils giving best results are in the following order: Clay loam, sandy loam, sandy and peaty soil. Clay loam appears to be most suitable, giving a brighter and plumper seed, although good seed can be produced on the other soils mentioned.

CLOVER HAY AS A FODDER.

Clover hay as a fodder for all kinds of live stock, cannot be surpassed. It has been the general belief among Quebec farmers that timothy hay had more feeding value than clover hay, especially when fed to horses. It may be a surprise to many to find that chemical analysis shows conclusively the superiority of clover in feeding value. Clover contains over twice as much digestible protein, and considerable more digestible fat and carbohydrates than timothy hay; or, to put it in another way, from 86 to 88 pounds of clover hay are equal in feeding value to 100 pounds of timothy hay.

CLOVER AS A FERTILIZER.

A vigorous crop of clover, at a moderate estimate, as given by Prof. Shutt, contains in its roots and stems: Nitrogen, 100 to 150 pounds per acre; phosphoric acid, 30 to 45 pounds per acre; potash, 85 to 116 pounds per acre. It is evident, therefore, that, by the use of clover, we can, with a single crop, furnish the soil with as large a quantity of nitrogen as would be supplied by a dressing of ten tons of manure per acre. The greater part of the nitrogen is gathered from the air, a source not otherwise available, and is, therefore, a distinct addition to the soil. The amounts of phosphoric acid, potash and lime in the clover have, it is true, been obtained from the soil, but these have largely been drawn from depths beyond the reach of roots of ordinary crops. The decay of the clover roots, moreover, liberates these important fertilizing elements in soluble and available form, so that they can be readily utilized by the crops which follow, as our results of field tests on the fertilizing value of clover show. From 11 to 15 additional bushels of grain, 6 to 8 tons of corn, and 50 to 60 bushels of potatoes extra have been secured from the turning under of a good clover sod. Those figures are a distinct gain over and above the yields secured on adjoining land, where no clover sod had been turned under, the same varieties being used in both cases.

PLACE IN ROTATION.

Clover does best when it follows a cultivated crop, such as corn, roots and potatoes. By the manuring and thorough preparation of the land for the hoed crop, and, in addition, by the thorough cultivation of the hoed crop during the growing season, the soil is pulverized and mixed and loosened up to hold moisture, the weeds are killed, and ideal conditions are formed for a clover crop to catch the following season. Should the farmer be so unfortunate as to have insufficient cultivated crops to follow, after-harvest cultivation should be put into practice. Just after harvesting the crop which the clover is to follow, put on the cul-

tivator or plow very shallow, and keep the cultivator going at short intervals until autumn, each time cultivating a little deeper, for the deeper the cultivation, the deeper will be the feeding ground, and more moisture conserved for the young clover seedling. In both methods of preparation I would advise plowing the land thoroughly and fairly early in the autumn, so that the soil will be well firmed for spring seeding. In spring time allow the soil to get in perfect condition before working much; much is often lost by getting on the land too early as too late. The land roller will be found the best machine to pack the corn stubble firm and level the soil. Then the disk or smoothing harrow should be used to make a fine surface before sowing. The second rolling should be done when the grain is 4 to 6 inches high.

DRAINAGE.

To be successful in producing good clover seed, the water line should be kept two to three feet below the surface. If tile drainage is necessary, and cannot be installed, then there is no excuse for not having open ditches. Clover requires a deep feeding ground; it also requires moisture and a thoroughly pulverized soil. Drainage provides a free, loose soil that will hold more moisture than undrained land. It also warms the soil, allows the air to enter, prevents plants from heaving in spring time, allows plants a longer growing season, and, with drainage, a good crop of clover and seed can be produced, that will more than pay for the draining in one season.

SEEDING.

Clovers may be sown along with either barley, wheat or oats. Barley is preferred, on account of its being an early ripener, and less liable to lodge. The growing of clovers will not lessen the yield of grain per acre, and will be found a great benefit in smothering weeds. When sowing with grain, sow, barley, $1\frac{1}{2}$ to 2 bushels; wheat, $1\frac{1}{2}$ to $1\frac{3}{4}$ bushels; oats, 2 to $2\frac{1}{2}$ bushels, per acre. Along with the grain chosen, sow clover, common red, 8 pounds; timothy, 6 pounds, and orchard grass, 6 pounds, to the acre. If land is heavy, sow alsike, 2 pounds extra. Why all this seed? Big crops are what we are after. If, however, the soil is rich in plant food, and in a good state of cultivation, the total may be reduced four to six pounds per acre. The fact of sowing the mixture does not interfere with the growing of common red clover seed, for the first year the heavy seeding of clover takes almost full possession of the field. Harvesting the clover crop very early (before July 1st), gives a chance for the second crop to mature its seed. In the case of timothy, alsike and orchard grass, the seed is harvested from the first crop, and, therefore, is not ripe when the clover is harvested. Other mixtures and amounts, of clover and grasses are advised, according to rotation and condition of soils.

WEEDS.

Weeds are a pest in all crops, especially in clover seed. While it is true that many weed seeds may be removed by the fanning mill, the best and cheapest plan is to go over the field and hand-pick them out before cutting. One or two small boys will very soon go over the field and pick out the weeds, which should be destroyed afterwards.

TIME OF HARVESTING.

This is one of the most particular points in growing seed. The first crop of hay must be cut before July 1st to give the second crop of the same year time to mature the seed. As to the time for harvesting the second or seed crop, no special date can be set, as so much depends on the season. As a rule, it is time to cut when the majority of the heads are well browned. It is a good plan to go over the field and rub a head here and there, and if the seed will shell in the palm of the hand, I would advise cutting. If the seed is soft, and not properly filled, let it stand, even at the loss of a few ripe heads. Many mistakes are made with this particular point in cutting before the seed is ripe.

CUTTING OR HARVESTING.

This was thought to be a tedious job, but, after experimenting with the mower, with a table attached, with the self-rake reaper and with the self-binder, I have come to the conclusion that the binder is by far the best machine to use. In cutting with the binder, remove the cord and slacken the strings of the trip and the two boards that hold the sheaf while being tied. This will allow the knocker to revolve continually, and, instead of having bundles, the clover will be distributed in a continuous row around the field, and well up the way of the horses and machine for the next round. The windrow can be gathered with a large back fork, and the field after gathered.

The length of time to allow the clover to remain in the windrow all depends on the weather, and the condition in which it is cut. It sometimes happens that it takes two or three days to get it wise, however, to allow the clover to remain in the windrow and run for feed.

forage is dry enough to keep in the mow, it should be gathered in. The seed can then be threshed, or mowed away to a more convenient time. If a clover huller can be secured, much time and money will be saved in threshing direct from the field. The fodder will also be much more valuable as feed. Threshing clover appears to be the greatest problem to solve. Farmers who have threshers of any kind can overcome this difficulty to a certain extent. I have threshed clover seed with the two-horse tramper or tread-power, with the large steam grain-thresher, and also with the clover huller. With the grain thresher it takes considerable time, as the short material has to be put through several times to get the seed out of the hull. There are also some slight changes to be made. They require full sets of concaves, with good square teeth. There should be a board behind the concave to keep the clover from passing through too quickly. The chaff board should be removed to save all the short material the first and second time going through. It may then be put in place again, and the chaff allowed to go out into the straw. All this means work, but it will pay. With the clover huller, which has the regular tooth-cylinder and a large drum covered with rasps, and two fanning mills, the threshing is complete, and the seed is almost clean enough for sowing. If there are enough enterprising farmers in one district to grow 200 acres of clover seed, it would pay them to join and purchase a clover huller; they could save the price of the machine through the extra quantity of seed and labor in getting it in two years.

To show the average farmer that it is not only experimental farms and agricultural colleges that can grow clover seed successfully, I append the following from the Ottawa Valley Journal: "Jas. Higginson, of Inkermann, Ont., from 16 acres obtained 2,700 pounds, sold for \$11.45 per bushel, a total return of \$32 per acre. Wm. Higginson, 16 acres, produced 40 bushels, sold at 20c., or \$30 per acre. Mr. Higginson states that they stumbled on a gold mine. Albert Guy said thousands of dollars had been lost to the township every year from their neglect to cut the second crop for seed. He had called at the College when the clover was being cut, and Mr. Finter induced him to cut six acres of second-growth clover, which had threshed three bushels to the acre, and sold for \$11 per bushel. Henry Marquet had six acres, from which he cut fifteen loads of hay the first crop, and then threshed 22 bushels of seed from the second crop of the same season, which he sold at \$12.10 per bushel, or a turnover of \$44 per acre. Jas Slater, who bought the clover huller, deserves a great deal of credit for purchasing the machine. Mr. Slater states most of the hay was cut too late to give best returns in clover seed. He had already shipped a carload, and expected to get several more this season. The seed, he said, was running about four bushels to the load. He expected to thresh 200 loads, and was looking for two months' steady work. Farmers have been spending, in Eastern Ontario, thousands of dollars every year, said Mr. Slater, and bringing in all kinds of noxious weeds, when they might just as well have threshed their own seed."

Many more names could be given, but I fear I have now trespassed too far.

Macdonald College, Que.

J. FINTER.

More about Farm Power.

Editor "The Farmer's Advocate":

My letter, in your issue of Jan. 18th, 1912, seems to have attracted some attention, as I have had quite a number of inquiries forwarded through your office as to make of my grain-grinder, size of plates, quantity and quality of work done on a given amount of gasoline, etc.

The principal interest seems to center on the grain-grinding, as farmers generally are of the impression that it takes a large engine and grinder to do satisfactory work. I may say that I was of the same belief myself at the time I bought my first engine, for the only small grinders I had seen never did good grinding, and I would not have tried the larger engine and grinder, except on the terms that both were to suit me, or no sale.

To answer some of the questions: The engine is of four horse-power; the grinder has 7-inch flat plates. It is driven from the line shaft at a speed of approximately 1,750 revolutions per minute. If I could belt the grinder direct to the engine, I could get a little better results, as it takes some power to drive the 36 feet of shaft.

Usually, I do not keep a record of the gasoline or time taken on any given part of my work, but I know the amount of the crops raised and the amount of my gasoline bills. I have just made a test, grinding 32 bushels of oats with one gallon of gasoline. Second test gave 20 bushels of oats and barley ground fine for pigs on one gallon gasoline. Of oats, I grind 12 bushels per hour.

The essential points in grain-grinding are that the plates run perfectly true with each other, and that the entire surfaces are in contact. The advantage of flat plates is that, when dull, they may