

ar has demonstrated how much seed for our crops of roots and not only has it revealed the fact of our supply has been coming water but through this revelation that the importance we have quality of our seed has been in the supply. Each year growers more to know the ability of their seed, what the ancestry was and if stock contained those characters for in the crop to be grown. es, cattle, sheep or swine trace of their stock and in the case they test the dams for production; done with sugar beets by Henry Stokes, Agricultural Superintendent of the Sugar Company at Berlin. One day, late in August, the writer was shown over the breeding station and fields by Mr. Stokes and A. McMeans, a special representative of the Seed Branch at Ottawa. Space will not allow the technicalities and deeper principles connected with the operations in vogue there to be recorded but the practice in a general way is important for it has a direct bearing upon an industry which is yet in its infancy in Canada but promises to have a wonderful influence on future agricultural production.

The breeding plots are located near the factory in order that personal supervision is possible and a more thorough study can be made of individual tests. Unlike live-stock breeding the operator everything under his control steps in and crosses different strains many well-planned and es. In order to overcome this cent plots must be isolated at ut Mr. Stokes believes that the mile is a greater security and t distance is allowed. The writer rent varieties of mangels grow his season. It is a mistake, of are many things that can best ctical experience and this is one rains of the same variety must art that pure seed from the be obtained.

the grounds 1,100 mother beets ed professed to be the best the seen anywhere. They had all ually for sugar content and good. This test is made by gonally from one side of the ne other and making a chemical me. The plug resembles in aken by a judge when judging representative of the entire beet. eals a good percentage of sugar et is plugged with clay and the d to produce stock seed. This own as a "mother beet." In he mother beets tested from ent. sugar, averaging approxi- cent. for the entire plot. In a Prussian chemist, was only 5 per cent. of sugar from beets ne the most vigorous scientific practiced and in some cases as nt. of sugar has been obtained. to 17 per cent. is considered a eld-grown beets and conditions ry to accomplish even that. nd the significance of producing beets possessing 19 per cent. of once, apparent. What has been eets in the last century and a g financial advantage to-day, yet.

is procured in this way from it is stored and used to pro- following year. Twelve pounds e used to produce factory beets e thinned but when stecklings are s of beet seed per acre are used done. The plants are cultivated ow until fall but since they're hey do not attain the size of e beet; in fact they are much ble steckling will only measure a half to two inches across. ted in the fall and siloed, the put them in pits in the fields th and straw. All the steck-

lings harvested are not suitable to plant out and produce seed, selection must be practiced the following spring. When the ground becomes suitable for cultivation and the weather is favorable these small beetlets or stecklings, as they are called, are planted 24 inches apart in rows 30 inches apart. As a general thing the crop of stecklings from one acre will plant from 4½ to 5 acres of ground to produce seed. The large sized beets are often used for this purpose but on account of the extra expense in handling, in pitting and in setting again in the field it is much cheaper to produce seed from stecklings. The seed produced from the stecklings is then ready to be used to grow beets for the factory; however, before the stecklings are harvested a selection is made for mother beets from which to produce stock or special seed. A crinkly leaf is indicative of a high sugar content yet it also indicates what, in live stock, would be termed vigor or constitution. The leaf, however, is sometimes too crinkly so considerable experience is necessary in order to detect quickly the most promising specimens. When pulled another selection is made according to the appearance of the root itself and the slight groove from which spring the majority of the side rootlets. If this groove runs straight up and down the beet it is discarded for the groove should tend to run in a spiral manner as a number of tests have shown that character to indicate sugar. This selection is made to procure mother beets from mother seed, and the remainder of the crop after a less severe selection in the spring is again set out to produce the bulk of the seed for factory beets.

Sometimes one and sometimes as many as three or four main stalks spring from the beet and on them the most and earliest seed is produced. These are surrounded with from 10 to 20 smaller stalks which mature their seed somewhat later and require that three cuttings be made in order to harvest the seed without serious loss. Cutting is done with a sickle and small stooks are made with the stalks and seed. Often it is necessary to thresh the early-cut stooks before the entire field is cut. Threshing is done with an ordinary separator and the product is cleaned on a fanning mill. After this however, there will be stems mixed with the seed but they can be taken out by allowing the seed and stems to fall upon an endless canvas which is set on an incline sideways and caused to move over a couple of rollers. The good seed which is somewhat round and heavier than the stems will fall off almost at once. The smaller seed will be carried farther on, while the stems will be carried to the end and dropped over the canvas to the floor as it passes over the end roller. The seed is then spread out to dry and stirred or shuffled three or four times the first week, once the second and third weeks, after which time it is ready to be put in sacs and store away.

The process of procuring any quantity of beet seed as is done under the direction of Mr. Stokes may be summed up as follows: First, mother beets are selected which contain a high sugar content, the seed produced from these beets the following year is sown to produce stecklings. They in turn must be planted to produce the main bulk of seed for field use. Thus four seasons elapse before a substantial quantity of proven seed can be produced.

One thousand pounds of seed per acre is considered a good average and from the 30 acres being grown this year about 30,000 pounds are expected. However, the two factories operating in Canada under the name of this company require about 240,000 pounds for their annual seedling. In addition to the 30 acres of seed this year 36 acres of stecklings are being grown and these should plant next year somewhere between 125 and 150 acres for seed. It is the aim of the company to eventually produce enough seed for their own use for they have great faith in their own home-grown product. Last year, beets grown from seed produced in 20 different fields in different parts of Ontario gave on an average one-half of one per cent. more sugar and an increased tonnage per acre over beets grown from imported seed. It is the opinion of those in charge that the sugar content will hold up if proper selection is followed each year; that is, beets grown from seed produced from mother beets testing from 18 to 19 per cent. of sugar will be as good as the parent stock.

Aside from the beet seed production mangel seed is being grown but the operation is much the same as has been described, and suffice it to say that 7 acres of seed and 2 acres of mangel stecklings are being handled this season.

In this connection it is interesting to know the relation between seed production in Canada and in parts of Europe where for many years it has been carried on. Austria has long been noted for sugar beets and sugar beet seed. We have learned from a reliable source that the daily pay for men in that country during the period from April 1 to June 30 is 28 cents per day. Through July and August it is 30 cents per day and from September 1 to the finish of the season it is 28 cents per day. Through July and August a day is from 4.30 a.m. to 8 p.m.; in June and Sep-

tember it is from 5 a.m. to 7.30 p.m. and in May and October it is from 5.30 a.m. to 7 p.m. From these hours two hours are deducted for meals. It is at once apparent that vegetable seed cannot be produced as cheaply in this country as in the older countries of Europe but the growers here have the advantage of being able to procure seed which they are sure has been produced from selected mother stock and furthermore it is acclimated to the country where it is to be sown.



An Individual Plant.

This plant containing seed grew from a "mother beet" having a sugar content of over 18 per cent.

### Stinking Smut of Wheat and Loose Smut of Oats Easily Prevented.

Editor "The Farmer's Advocate":

The damage to the winter wheat and the oats grown in Ontario in the past year through the prevalence of smut is enormous. This great loss could have been easily prevented if the seed had been treated before sowing. It is probably a conservative estimate to put the loss in the oat crop caused by loose smut at from ten to twelve per cent., and in the winter wheat crop caused by stinking smut at from four to six per cent. This would be a direct loss to the Province of about four million dollars in the case of oats, and of nearly one million dollars in the case of winter wheat, or a total of about five million dollars. Besides this direct loss the grain is considerably injured for commercial purposes. Especially is this true with winter wheat. Some years ago millers were compelled to reduce the price of wheat from ten to fifteen cents per bushel owing to the prevalence of smut.



The Grower Demonstrating Good Seed.

In the foreground, beet seed still uncut may be seen, while beyond stecklings are growing, from which seed will be produced next year.

The reason that the smuts in the grains are so prevalent this year is the fact that living smut spores were sown with the seed, and the weather conditions were particularly favorable for the growth and the development of the smuts. The spores of the smuts correspond with the seeds of the grains and germinate and grow when the conditions of moisture and heat become favorable. The smuts are fungous plants which enter the tissues of other plants such as those of wheat and oats where they live and grow and finally produce smut spores. The spores of the loose smut of oats and of the stinking smut of wheat when mixed with the ripened grain can be readily killed by treatment. This fact is of great agricultural and economic importance. If farmers grow wheat and oats which are infested with these smuts they have themselves to blame.

Those farmers who treated their seed wheat last autumn and their seed oats last spring have

practically no smut in their crops this season. The Dominion Seed Inspector for Western Ontario told me that he had been over the western part of the Province and had found the smut in the fields of oats of which the seed had not been treated to constitute from ten to fifty per cent. of the whole crop. He was anxious to see the oats at the College. We examined the field of the O. A. C. No. 72 variety, the seed of which had been treated last autumn, and we were unable to find even a trace of smut, although we walked about fifty rods through the field. When in conversation with some of the judges of the fields in the Ontario Crop Competitions I was informed that they had found certain fields practically free from smut while others were badly infested. On enquiry they learned that the clean crops had resulted from seed which had been treated in the spring. The College has recommended treatments in past years, and the most progressive farmers who have treated their seed have been amply rewarded for their labors. The treatment of winter wheat this autumn and of oats next spring should be general throughout Ontario.

In each of five years experiments were conducted at the Ontario Agricultural College in the treatment of the loose smut of oats and of the stinking smut of wheat. Careful determinations were made each year to ascertain the comparative influence of the different treatments. There were in all seven treatments for oats, and five for wheat. In every instance one sample was left untreated as a basis of comparison. The experiment was conducted in duplicate each year. The seed grain was obtained in every instance from a known source, and where no treatment for smut had been made for some time previously.

Of all the treatments used for the stinking smut of wheat and the loose smut of oats the best results were obtained by immersing the grain for twenty minutes in a solution made in the proportion of one-half pint of formalin (40 per cent. formaldehyde) to twenty-one gallons of water. We now use this treatment in the Department of Field Husbandry on about one hundred bushels of oats and fifteen bushels of winter wheat each year with excellent results. We make the solution by adding three-quarters of a pint of formalin to two hundred and five quarts of water. We use coarse jute bags and treat two bushels of grain at once. The same solution is used several times and the quantity is sufficient for treating about fifteen bushels of seed. The bag is lowered into a barrel containing the solution, and is raised and lowered several times to insure quick and thorough wetting of the grain. By the aid of a rope and pulley this is easily accomplished. After the seed has been soaking for twenty minutes it is spread thinly on a floor to dry and is stirred frequently. It is sometimes sown on the same day as treated, but if it is kept several days before sowing it is thoroughly and quickly dried. Caution is always taken to prevent further contamination from living smut spores. This can be done by using the solution for wetting the bins, floors, bags, grain boxes, etc. When the method here outlined has been followed the germination of the grain has been good and the smut has been destroyed. The treatment is comparatively simple, the cost is small, and the results have been entirely satisfactory.

It might be noted that we treated winter wheat last autumn and oats last spring with Corvusine, which is advertised in Canada as a remedy for smut and other plant diseases. The booklet advertising the material stated that "all chemicals used in this

preparation are so treated as to prevent injury to the germinative power of the grain." In the experiments at the College, however, the germination of both the wheat and the oats treated with Corvusine was exceedingly poor, while that of the untreated seed was excellent.

We believe that many farmers have had a lesson this year which they will not soon forget. May the treatment of the winter wheat this autumn and that of the oats next spring give no opportunity for smutted grain in Ontario next season. If care is taken it is not difficult to keep a farm comparatively free from smut.

If the reader wishes to receive fuller information on the practical results of treating grain for smut I would suggest that he secure bulletin No. 228 on "Farm Crops," and bulletin No. 229 on "Smuts and Rusts" from the Ontario Department of Agriculture, Parliament Buildings, Toronto.

C. A. ZAVITZ.