INOCULATION OF SEED

Nitro-Cultures for Increasing Legume Production.

Friendly Bacteria Perform the Trick —Preparation and Distribution of Cultures Described—How to Procure Supplies.

(Contributed by Ontario Department of Agriculture, Toronto.)

LEGUMINOUS crops, such as alfalfa, clover, peas, beans, vetches, etc., have long been known, under certain conditions, to leave the land on which they were grown in a richer condition than it was in before the crop. The necessary conditions are, in addition to the soil being in good tilth and well drained, that there should be in the so certain species of bacteria known as Legume Bacteria. These legume bacteria penetrate the young roots of the legumes where they produce little swellings or nodules, singly or in bunches. On clovers these nodules are very small but numerous, while on peas and beans they are comparatively large and few in number. The bacteria in these nodules fix the free nitrogen of the atmosphere so that the plant can use it as food. Without the aid of the bacteria the plants cannot do this and no crops other than the legumes can do it, even with the bacteria present in the soil.

On old soils, or where clovers or other legumes are successfully grown in crop rotation, the bacteria are usually present. In new soils, however, or when new legume crops, as alfalfa, are grown in old soil, the appropriate bacteria are apt not to be present and in such cases some method of inoculation should be adopted to supply the bacteria. Numerous experiments and prolonged experience have shown that the best way to do this is to inoculate the seed with the necessary bacteria.

For such seed inoculation, artificially grown cultures of the bacteria originally secured from the nodules on the roots of the same species of plant which is to be sown, are applied to the seed shortly before it is sown. By this method the bacteria are carried into the soil with the seed, and in ample numbers to practically insure infection of the roots, with consequent increased growth of the crop.

The Bacteriological Laboratory of the Ontario Agricultural College has prepared and distributed legume nitro-culture to Canadian farmers each season since 1905. For ten years blanks were sent to those farmers who received cultures, on which they reported the results of the seed inoculation as to whether it had been of benefit to the seeding. During this time 27,750 cultures were sent out, and reports received showed that 80 per cent. alfalfa and 70 per cent. red clover gave increased returns following seed inoculation.

The cultures for inoculating seed are grown in the Bacteriological Laboratory on a specially prepared "culture medium" and each one contains a sufficient number of bacteria to inoculate a bushel of seed.

For inoculating the seed, the culture is simply mixed with a little skim-milk, or whey, or whole milk, then mixed thoroughly with the seed, which is allowed to dry a few minutes and sown in the usual way.

Cultures are distributed from the Bacteriological Laboratory for inoculating seed of alfalfa, red clover, white clover, crimson clover, alsike clover, sweet clover, vetches, peas, sweet peas, cow peas, field peas and soy beans.

Each kind of seed requires a different kind of culture. The cultures are for use on seed only. There is only one size package, this being sufficient for 60 pounds of seed, though the entire culture may be used on less seed without harm. The cultures are sent by mail with complete directions for their use.

Price.—A nominal charge of 25c for each culture is made to cover expense of preparation and postage.

Application for Nitro-Cultures.—Applications for cultures should state the kind and amount of seed to be inoculated and the approximate date of seeding. Applications should be sent early, and should be accompanied with remittance to pay in full for the number of cultures desired (twenty-five cents per culture). Address as follows: Prof. D. H. Jones, Ontario Agricultural College, Guelph, Canada. It is important that the application should state plainly the kind and amount of seed to be treated, and the Name, Post Office, County and Province of the applicant.

Letters received from those who have received these cultures speak very highly of this method of inoculation as shown by the following:

Messrs. J. J. Murray & Co., Seed Merchants, Edmonton, Alta.: "We wish to congratulate you on your products which we have made use of many times. We made many tests in Ontario which proved to us that even alfalfa screenings would produce a greater growth the first and second year after being treated with the bacterial culture than the very best quality of alfalfa seed would without treatment."

Mr. J. B. Munro, Fort William, Ont.: "The cultures were used on peas of an early variety. The larger portion of the seed was inoculated, but part was planted in the ordinary way as a check plot. In twelve weeks the whole field had reached maturity with the exception of the uninoculated strip which was still green. I was not aware that the use of cultures hastened maturity of this legume, but it appears from this experiment that the crop was not only improved in yield, but growth and maturity were hastened. The part of the crop grown from inoculated seed gave excellent results and in future cultures will be used on all legumes grown on the home farm."—Prof. D. H. Jones, O. A. College, Guelph.

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Avoid Novelties.

When selecting nursery stock for home orchards, Paul Thayer, horticulturist at the Ohio Experiment Station, advises farmers and orchardists to select only standard varieties that have been tested out on different soils and under widely varying conditions. Novelties in the nursery stock line usually do not prove satisfactory.

Mr. Thayer advises farmers to buy from nurseries close at home; berry plants do not stand shipment as well as trees and vines, and if poorly packed or delayed in transit they may arrive in poor condition.

Nursery stock should be free from crown gall, which is identified by a hairy-like growth on the roots. Wooly aphis, which causes swellings on the roots, should also be watched. A small root when badly attacked is swollen so that it resembles a string of beads.

The San Jose scale, which is sometimes transmitted on nursery stock, may be destroyed by dipping the plants in a lime-sulphur solution used for the regular dormant spray.

Prevent Ravages of Weevil

Protect beans and peas from the weevil ravages by putting in an air-tight receptacle and putting carbon bisulphide in a saucer. This quickly evaporates and the fumes settle among the peas or beans, destroying any weevils present.

PRODUCTION OF SEEDS.

Much Valuable Data Secured From Experiments.

During the last few years considerable quantities of field root seed, including mangel, Swede turnip and carrot seed, have been raised by the Dominion Experimental Farms' System for the purpose of safeguarding against a threatening shortage in the supply. Much valuable information has been accumulated on the subject of root seed production, the more so because, while engaged in seed growing as an emergency undertaking, the Experimental Farms' System at the same time desired to gain reliable data bearing on the possibilities of making root seed growing a permanent agricultural industry in Canada, says Dr. M. O. Malte in a Farms Bulletin.

One of the more important subjects in connection with root seed growing which have been investigated is the question of under what conditions the heaviest possible seed yields may be expected. This question is, of course, of particular interest, as the size of the seed yields will largely determine the profit from seed growing.

In the first place, it is necessary that the roots to be used for seed raising are absolutely sound when planted out. Our experience is that planting of roots which show signs of disease or rot, especially at the crown, leads to most disappointing results. Such roots may linger along for some time, but sooner or later they die off, with the result, of course, that the seed field becomes patchy, and consequently gives a comparatively low yield per acre.

In the second place, the seed roots should be planted as early as possible in the spring. The earlier they are set out the heavier are the seed yields which may be expected. This applies to all kinds of field root seed crops and has been demonstrated over and over again.

In the third place it is absolutely necessary that the land is in good tilth and in a high state of fertility. Several experiments conducted the last few years have most decidedly shown that the land must be in the best possible shape if good seed crops are to be expected. An experiment carried out at Ottawa in 1915 gave results to the effect that an application of twenty tons of barnyard manure to the acre, or of a commercial fertilizer, composed of 500 pounds of superphosphate, 200 pounds of nitrate of soda and 200 pounds of muriate of potash, increased the seed yield of mangels with almost 50 per cent. Experiments carried out later have not only substantiated this result, but also shown that a still greater increase in the yield may be realized if the land is given both manure and artificial fertilizers in liberal quantities.

Sound roots, early planting and rich land are the main factors which determine the size of the yields. It should be added, though, that the yields are also influenced, to a not unimportant degree, by the supply of farm labor that may be available and by the size of the seed fields. Profitable root seed growing requires plentiful labor at certain periods, and under present conditions, the writer would say that to a farmer who has not had years of experience in root seed growing one or two acres may prove more remunerative than a large acreage, because with a small acreage the yield is apt to be much greater per acre than if the acreage is so large that it cannot be handled conveniently.

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