

stand that will yield heavy crops for consecutive years, alfalfa should preferably be planted on land with a good subsoil which will permit the plants to send down their roots to a considerable depth. Hardpan or impenetrable clay near the surface will seriously check the growth and the yielding capacity of the crop. A high water table has the same effect. Sour or acid soil is quite unsuitable, chiefly because the bacteria which are essential to the growth of the alfalfa cannot live in soil of that kind.

Failures in obtaining a satisfactory yield of alfalfa can generally be traced back to one or more of the following causes:

1. Lack of drainage.
2. Lack of lime, phosphorus and potash.
3. Lack of bacteria.
4. Lack of suitable seed.
5. Lack of tillage.

Drainage

It is useless to attempt to grow alfalfa on land which is not well drained, either naturally or artificially. Some of the best fields observed have been secured on drained bottom lands. The good stand and heavy yields may have been due partly to the fertility of the land. But fertility alone, without good drainage, would not have produced such good results.

Minerals in the Soil

In common with other leguminous plants, the alfalfa requires large amounts of calcium, which is the active principle of lime. Also, alfalfa cannot develop properly in soils which are at all acid, because the nitrogen-gathering bacteria which live upon the alfalfa roots, and in their turn provide the alfalfa with nitrogen, cannot live, work and multiply under acid conditions. If a test should show the soil to

be acid (blue litmus paper turning red) it is advisable to apply one or two tons of crushed limestone per acre, preferably some weeks before seedling.

While alfalfa obtains practically all its nitrogen from the inexhaustible supply of the air it should be remembered that it draws upon the soil for phosphoric acid and potash. Wherever fertilizer experiments have shown that one or both of these elements are lacking, there is every reason to supply necessary amounts of these minerals in the form of commercial fertilizers.

Bacteria

A number of successful stands of alfalfa have been obtained without inoculation. Yet fewer failures are recorded where the presence of the necessary bacteria was secured by inoculation. On soils which do not naturally contain these bacteria it is absolutely essential that they be introduced. This can be done in two ways:

1. Soil from the surface foot of an old alfalfa field, or sweet clover field, may be broadcasted at the rate of about 600 lbs. per acre and immediately harrowed or disced in, or, still better, 150-300 lbs. of screened soil may be put in with a grain drill ensuring a more uniform distribution. Bacteria are sensitive to light, and the inoculation soil should consequently never be exposed to the sun for any length of time.

2. Where soil for inoculation cannot be secured, artificial culture may be used to good advantage. Such culture can be obtained, with directions as to its use, from the Central Experimental Farm, Ottawa. When the Province of British Columbia permits her University to develop properly such culture among other things will undoubtedly be available from there.