amount of scab present, but it is found that from one to one and a half hours is the most satisfactory length of time in ordinary practice. If the tubers are somewhat wilted and sprouted, half an hour will be found satisfactory. The cost of material will not exceed 50 cents per acre, and the extra labor and trouble are not considered serious obstacles.

Bordeaux mixture and potassium sulphide were tested at the station, but with little success.

## Crimson Clover.

A. A. Crozier, Michigan Experiment Station, publishes reports of more than forty correspondents in seventeen counties in the State. The greater number of these reports were unfavorable, and are summed up as follows:

Many of the sowings of crimson clover appeared to pass the winter successfully, only to be killed by the freezing and thawing of early spring. On sandy soil and rolling land the clover did the best, except where the soil was too dry, or where the snow blew it off. There was, in some instances, a failure to get a good stand, owing to dry weather, and in many cases the growth, when winter set in, was less than desirable. Judging mainly from the experience of the past season, it seems probable that over most of the lower peninsula of Michigan crimson clover will not prove to be a satisfactory crop, though for certain localities, particularly along the western part of the State, it seems worthy of a further trial. Under ordinary circumstances a smaller growth is to be expected here than in warmer climates.

Since the climate of Michigan is similar to that of Ontario, it would be well for Ontario farmers to "go slow" on crimson clover.

## Growth of Leguminous Crops for Many Years in Succession on the Same Soil.

Nowhere in the world have more extended and systematic experiments in the growth of crops been conducted than at Rothamstead, England. For more than half a century this work has been carried on, and, therefore, the results are especially valuable. The following notes on leguminous crops are interesting and instructive:

Beans and clover on a given area stored up much larger amounts of nitrogen than did wheat, barley, or roots. Thus, in 1873, the nitrogen in a crop of barley was only 37.3 lbs. per acre, while in an adjacent crop of clover it amounted to 151.3 lbs. In 1874, barley was sown on both plots; when it followed barley the nitrogen stored up in the crop of 1874 was 39.1 lbs.; but on the plot where clover in the preceding year had removed so much nitrogen, the barley crop of 1874 contained 69.4 lbs. of nitrogen, indicating the high manurial value of clover stubble. After both clover and barley were harvested in 1873 it was found that the upper nine inches of soil were richer in nitrogen on the clover plot than on the plot that had grown barley.

Red clover was sown on the same land fifteen times in twenty-nine years, but in only seven was any clover obtained.

In marked contrast with the failure to grow frequent crops of red clover on ordinary arable soil was the success in getting excellent crops of clover hay for forty years in succession on rich garden soil without any nitrogenous fertilizers. The garden surface soil contained four or five times as much nitrogen as the field soil.

The amount of nitrogen stored up per acre per annum in clover hay averaged during forty years 159 lbs., but in the second year the nitrogen was estimated at 435 lbs. per acre. "There would seem, then, to be clearly indicated a soil source of failure on the arable land, and a soil source of success on the garden soil." (In other words, a soil must be naturally very rich in nitrogen in order to support the long continued growth of clover).

Soil samples taken a few years after this test on garden soil was begun, and, again, twenty-one years later, showed that, as a result of twenty-one years of clover culture without fertilization, the surface nine inches of soil had lost, on an average, 130 lbs. of nitrogen per acre per annum.

With this decline in the nitrogen content of the surface soil there was a very marked reduction in the clover-growing capacity of the soil. While fresh seed was sown only five times during the first twenty years, it was fully or partially sown twenty-one times during the last twenty years. During the period that the soil lost annually 130 lbs. of nitrogen per acre, the crop removed annually more than 160 lbs. of nitrogen per acre.

After growing clover for three years on a somewhat exhausted soil, it was found that the surface soil had become determinably richer in nitrogen.

Of fourteen different leguminosæ tested, only white clover, vetch, Bokhara clover, and alfalfa gave satisfaction when grown continuously on the same land.

Analyses of the soil of the plots showed that, when cropped with vetch, white clover, Bokhara clover, and alfalfa the surface soil gained in nitrogen.—*E. S. R., Vol. 7, No. 5.*