THE VALUE OF SUPPLEMENTARY BACTERIA FOR LEGUMES

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INTRODUCTION

Over 40 years ago it was observed that the transfer of a small quantity of soil from a well-established legume field to a field that was being planted to the legume for the first time may make a difference between failure and success of the crop. The explanation of this lay in the fact that by such a transfer of soil there were distributed the legume bacteria which are required by the host plant. This procedure has been practiced to a considerable extent, but often the inconvenience of securing such soil and the danger of transferring disease-producing organisms, as well as undesirable weed seeds, have led to the development and the use of artificial cultures, or commercial cultures, of the desired bacteria.

The artificial culture method has, therefore, very largely supplanted the soil transfer method. The ease with which these cultures may be procured, together with the desire of the manufacturer to sell as many cultures as possible, has resulted in the recommendation and in a considerable use of such cultures not only on land that has never grown the legume but also on fields that have grown the legume consecutively for 10 years or more. This has been practiced on a commercial scale with such a crop as canning peas. The value of this practice on fields that have been previously inoculated or are known to contain the desired organism has been questioned, especially with such crops as red clover, alfalfa, etc. It has been assumed that once a field was thoroughly inoculated with the desired organism it would survive so that maximum nodulation would occur on subsequent crops, and that the addition of more bacteria at seedtime was unnecessary. The practical and scientific point in this connection is whether or not soil will maintain under various cropping conditions from year to year or longer the legume bacteria in sufficient numbers to meet the requirements of young plants.

Deherain (2), after making a study of the distribution of bacteria throughout the soil, believed that abundance of bacteria may be carried by wind, etc., to all soils and that artificial cultures are unnecessary. Albrecht (1) stated that soils once inoculated for soybeans and red clover did not need to be reinoculated when these

1 Contribution from the Department of Agronomy, Cornell University, Ithaca, N. Y. Received for publication February 8, 1929.
2 Professor and Experimentalist in Soil Technology, respectively.
3 Reference by number is to "Literature Cited," p. 586.