THE EFFECT OF SOIL STRUCTURE ON THE CHARACTER OF ALFALFA ROOT-SYSTEMS

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INTRODUCTION

During the past decade considerable attention has been given to the study of the influence of soil structure on the development of alfalfa root-systems. Experiments (1 and 2) have been reported showing that compact soil appears to cause greater branching and less pronounced taproots, while the open or porous soils tend to produce long, slender taproots with few branches. These results characterize in part the features of the root-systems of the hardy alfalfas and the non-hardy alfalfas, as it is generally accepted that the hardy alfalfas have broad deep-set crowns, well-developed rooting rhizomes, and numerous branch roots, while the non-hardy alfalfas have small high-set crowns and slender taproots with few branches. This would seem to indicate that the features of the root-systems of the hardy alfalfas and the non-hardy alfalfas are dependent, at least partially, upon soil structure. The tendency is, however, to attribute inherent characteristics to the hardy alfalfas and non-hardy alfalfas irrespective of soil structure. This has been particularly true among commercialists who have given a great deal of publicity to the hardy alfalfas as having resistant qualities due to inherent characteristics.

In order to obtain further information concerning the development of alfalfa root-systems various varieties and strains of alfalfa were grown; first, in field plats which offered different soil structure; second, in tanks which had been filled with different classes of soil; and third, in water cultures.

PLAT EXPERIMENT

Four field plats were selected, the history of which for twenty years was known. The plats were approximately 1/200 of an acre in size. The classes of soils in the plats are described as follows:

Plat No. 1 was located on the farm crop experimental field. The soil had been classified as a Dunkirk clay loam. It consists of glacial material reworked by streams and redeposited in glacial lakes as quiet water sediment. The surface soil on the selected plat is 5 to 8 inches deep. The soil when wet is sticky and plastic and requires careful management in the field to keep it from puddling. Frequently,