RELATION OF FALLOW TO RESTORATION OF SUBSOIL MOISTURE IN AN OLD ALFALFA FIELD AND SUBSEQUENT DEPLETION AFTER RESEEDING

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The work of Kiesselbach, Russel, and Anderson and of Duley has shown that alfalfa is capable of depleting the subsoil moisture to the point where the crop is dependent on current rainfall for its growth. Furthermore, under the soil and climatic conditions existing at Manhattan, Kansas, and at Lincoln, Nebraska, it has been shown that after the subsoil moisture is depleted by alfalfa it is not regained under continuous cropping even with comparatively shallow-rooted crops. With these facts in mind an experiment was undertaken in 1930 on a well-drained upland soil at the Kansas Agricultural Experiment Station to obtain information regarding the effect of fallow on the restoration of subsoil moisture. This experiment was planned to determine the rate of restoration of moisture during fallow periods ranging from 1 to 5 years and the rate at which this moisture was again depleted by a new seeding of alfalfa.

EXPERIMENTAL METHODS

A field which had previously grown alfalfa for 4 years was plowed in December, 1929, and the first soil samples were taken in March, 1930. One fallow plat was sown each year for 5 years, hence the fallow periods varied from 1 to 5 years and the subsequent cropping periods from 1 to 5 years.

The soil, a dark brown silt loam, is underlaid at a depth of 15 to 18 inches by a moderately heavy subsoil. The slightly weathered parent materials are encountered at a depth of 30 to 36 inches and are probably of loessial origin. The soil is relatively friable throughout the zone of root penetration of most crops and the deep subsoil, as judged from the appearance of the samples, is friable to a depth of 20 feet. Sand strata and pockets occur between the 10- and 20-foot levels. The subsoil in the 20- to 25-foot area is rather heavy.

Clean fallow was practiced on all the plats prior to seeding, all growth being killed by cultivation and the surface ridged so that practically no runoff occurred during the 5 years.