in combination with straw and barnyard manures was started in 1914 with various crops and in various crop rotations. It was found that the prairie soils and most of the soils of the county were of high lime content which made them suitable for leguminous crops such as clovers, alfalfa, peas beans etc. Due to the lack of nitrogen fixing bacteria in the soil it was found necessary to use inoculated seed to get the crops established. It was found also that the county soils were rich in the mineral elements of plant food such as phosphate and potash and in general a fair to good supply of nitrogen. While the potential supply of potash in the soil was adequate for many generations and the phosphate and nitrogen were in lesser amounts, it was found that the available supply of the mineral elements, especially phosphate was by continuous cropping deficient for maximum yields of crops. It was found, early, in the fertilizer tests at the Northwest Station that phosphate fertilizers gave their most profitable return when applied to alfalfa and other legumes and in the early twenties profitable returns were shown on potatoes, sugar beets and grain crops. The economy of high analysis fertilizers was demonstrated during the late twenties and early thirties. The compulsory requirement for the use of 125 lbs. of 16 or 20% phosphate per acre in the sugar beet contract and the beneficial results obtained from that application, helped demonstrate the value of that fertility element. It was found that phosphate fertilization of hay and grain crops fed to livestock helped overcome the phosphate deficiency malady in livestock in certain areas of southeast Polk and central Mahnomen counties.

The guess work in knowing what fertilizers to use and the amounts per acre has now been quite largely removed by chemical analysis of soils from the different fields of farms and from field tests. At a slight cost per sample, farmers today can get soils tested at a State Soil Testing Laboratory and get also directions for field fertilization. Soil fertilization prescriptions can now be filled by the farmer himself, by the use of fertilizer attachments to his drills, or planters or he can make use of the commercial agencies available to spread different materials in gaseous, liquid or pellet form.

The problem of the so-called “alkali spots” on fields in the prairie sections of the county has been solved. While the heavy soil types in the major portion of the county are on the alkaline side which is conducive to excellent growth for most field crops yet alkaline soils with a Ph reading of 8 are unsuited for many fruits and acid loving trees and shrubs. The “alkali spot” trouble was most noticeable during dry years in which the crops in various parts of the grain fields would be stunted in growth and produce little if any marketable seed. The Department of Soils of the University made studies of the problem at the Northwest Experiment Station. By studies of the soil profiles of the "alkali spots" it was found that domes or ridges of heavier soils came to the surface which were less permeable to soil moisture than adjacent