The possible deficiency of Michigan soils in nutrient elements other than those usually applied in commercial fertilizers has been under study for several years. These studies have indicated a deficiency of boron for certain crops on a number of soil types. This report deals with boron deficiency as evidenced by characteristic symptoms, by growth, and by the date of maturity of several commonly grown crops.

Sugar Beets

As a result of the findings of Kotila and Coons (7), the attention of the Soils Section of the Michigan Experiment Station was recently called to a certain disease of sugar beets known as heart rot. For several years attempts were made by European investigators to trace the cause of this disorder to some organism, but it was finally shown by Brandenburg (1) and later by others that the injury was due to a deficiency of boron in the soil. Vilkaitis (18) reduced heart rot infection from 51.7 to 4.4 per cent by the application in water solution of 5 kgm. of borax per hectare. Further reductions of 1.2 and 0.5 per cent were obtained by 10 and 20 kgm. applications respectively. Brandenburg (4) reported complete prevention of heart rot in pot tests as a result of additions of 30 to 50 mg. of boric acid per plant and similar results in the field as a result of the application of 20-25 kgm. of boric acid per hectare. He stated further that the beneficial effects persisted the year after the application. Kotila and Coons (7) obtained the most vigorous growth of beet plants in quartz cultures as a result of the application of twenty pounds of borax per acre. They reported also the recovery of sugar beets afflicted with heart rot as a result of placing them in soil treated with borax.

Field Plat Experiments

As a result of inquiries regarding the addition of borax to sugar beet fertilizers in Michigan, a small amount of field plat work on this problem was conducted by the Michigan Station in 1936. Experiments were completed on five farms in Gratiot and Tuscola counties but unfortunately the experiments were found to be located on fields where the deficiency did not occur.

In the fall of 1936 a survey of certain of the sugar beet areas showed the presence of serious heart-rot injury in the northwestern part of Tuscola County, near Wixner, Unionville, and Akron, and in the southwestern part of Huron County, near Sebewaing. Arrangements were made at that time for 1937 field plats in those areas. The 1937 investigations were so planned as to give information regarding the quantity of borax necessary to control heart rot and the quantity which might be added without injury to the sugar beet crop and to following crops. Again, as in 1936, the injury did not occur on the fields where the experiments were located. This was in spite of the fact that it had occurred on adjoining fields in 1936 and was found in many other portions of the sugar beet area in 1937. The experiments, however, resulted in one interesting observation. The highest application, eighty pounds of borax per acre, made broadcast before planting, was not injurious to sugar beets on either Wauseon sandy loam or Napanee silt loam. This may have been influenced by the fact that moisture conditions were ideal on both fields at planting time and there was no serious deficiency of moisture at any time during the season.

Deficiency Symptoms and Areas of Appearance

During the 1937 season no fields were