The effects of soil colloids on the toxicities of selenium compounds were investigated for the purpose of obtaining a better understanding of certain field observations, such as the effect of seleniferous irrigation waters on field crops and the relation between the selenium content of a soil and the selenium absorbed by a plant.

Pot cultures, chiefly with millet, were employed in these studies. The details of procedure have been described in a previous publication (1).

The results obtained with sodium selenate have recently been published (1). In sand-soil mixtures containing 1 per cent of soil colloids, sodium selenate was fully as toxic as in quartz sand, and in whole soils the selenate was only a little less toxic than in quartz sand. It seemed quite evident that soil colloids have no specific effect on the selenate ion.

A rigid figure for toxicity of the selenate cannot be set owing to the fact, first established by Hurd-Karrer (2), that the toxicity varies considerably with the sulphate supply. In our experiments where the sulphate supply was from five to ten times that needed for maximum growth, about one part per million of selenium was sufficient to reduce the growth of millet in quartz sand by one-half. In soils about one and one-half parts per million of selenium usually brought about the half reduction in growth.

Quite different results are being obtained with sodium selenite. The experiments show clearly that soil colloids have a marked effect on the availability or toxicity of the selenite ion; that the effect varies with the kind of colloid; and that toxicity of the selenite is not affected by the sulphate supply, providing sufficient sulphate is available for maximum growth.

The markedly different effects of soil colloids on sodium selenate and sodium selenite are shown in Table 1. The experiments were conducted in sand-soil mixtures containing one per cent of soil colloids, and toxicities are expressed as the quantity of selenium per pot required to reduce the yield one-half. Toxicities of the two compounds in sand-soil mixtures are shown in columns 2 and 4 and comparable toxicities in pure cultures, determined in the same experiments in the sand-soil mixtures, are shown in columns 3 and 5.

It will be seen that none of the soil colloids affected selenate toxicity appreciably. All colloids, however, reduced selenite toxicity, and some colloids were much more effective than others. Differences between quantities of selenite required for one-half injury in quartz sand and in sand-soil mixtures may be taken as representing the quantities of selenite rendered unavailable by the soil colloids.