Numerous investigations have demonstrated the presence of an abundant microflora on or at the surface of normal plant roots growing in the soil. These studies have been concerned mainly with the effect of plants upon the microorganisms and their activity while relatively few have dealt with effects of the microorganisms upon the plant. The fact that the latter phase of the problem has not received greater attention is probably due to the relatively difficult techniques involved in the growing of plants with controlled microbiological conditions about the roots.

It would seem that the high concentration of microorganisms found about plant roots might be of considerable significance in plant nutrition, particularly with respect to the intake of the inmobile elements. That this may be the case is indicated by the observation of Fred and Haas that pea roots in the presence of bacteria produced greater etching of marble than did sterile roots. More recently Gerretsen found, for a number of plant species, an increased absorption of phosphorus from relatively insoluble forms due to the presence of microorganisms about the roots. The ability of roots to dissolve difficultly soluble inorganic substances is ascribed primarily to the excretion of respiratory carbon dioxide by the roots although other factors may be active also. It is possible that microorganisms may increase carbon dioxide formation at the root surface through decomposition of sloughed off portions of the root or of organic root excretions. The question of such an effect has seldom been investigated. Barker and Brophy determined the carbon dioxide production of roots excised from squash grown in nutrient solution under both sterile and nonsterile conditions. Substantially higher respiratory rates were found for roots taken from nonsterile plants. The roots were washed to remove microorganisms before the determinations. The increased rate was presumably an increase in the rate of respiration of the root itself brought about through some effect of the microorganisms. It is probable that microorganisms upon the respiration of intact plants has not been investigated only by Stille. This worker grew mustard in sand culture free of organic matter in the presence and absence of microorganisms and determined the carbon dioxide production of the entire plant in the dark. Higher values were found for plants with microorganisms present about the root system. Calculations indicated that the nonsterile system produced 35% of the total carbon dioxide due to microbial respiration and the remainder plant respiration.