Mixed cropping in agriculture is an ancient practice, but the origin of the benefits ascribed to it is little understood. For the special case of associated growth of leguminous and non-leguminous plants at least three alternative explanations are available:

1. Efficient agronomic management. This would include seeding mixtures of legume and non-legume in field or pastures for production of a more balanced ration, the custom of drilling cowpeas or soybeans between the rows or hills of corn for greater utilization of the land, use of cover or nurse crops, and the preparation of a silage high in protein.

2. Substitute for rotation. Several writers have noted that the agricultural systems of India practice continuous cropping without noticeable detrimental effects and have suggested that the wide use of crop mixtures in the systems may be the explanation of this apparent discrepancy in the experience of the native farmers of India and the results of scientific investigations (7, 8).

3. Excretion of nitrogen by leguminous plants. For many years various observers have speculated on the possibility that the advantage of mixed cropping with legumes may be related to the ability of these plants to fix atmospheric nitrogen, part of which is passed on to the non-leguminous companion. Such speculations were not experimentally tested until the early part of the present century. Lyon and Bizzell (6) and especially Lipman (4) provided evidences which suggested that the non-legume was aided because of excretion of nitrogen by the legume. Other interpretations of the data were offered and, in general, accepted. These included: (a) The nitrogen obtained by the non-legume was fixed by soil organisms as Azotobacter; (b) As the experiments were rather long-time in nature it was possible that nitrogen was not excreted but came from decomposition of sloughed-off nodules and roots; (c) Activities of soil microorganisms, e.g., the nitrifiers, were stimulated by the growth of the legume. This paper will discuss the more recent work which is concerned with the beneficial effects of mixed cropping from the excretion of nitrogen as an explanation of the phenomenon of mixed cropping.

Since 1927 Virtanen and associates (10, 11) in Finland have made extensive experiments which provide apparently unassailable proof that leguminous plants, at least under certain conditions, are able to excrete nitrogen into the substrate in which they are growing and that such nitrogen may be used by non-leguminous plants in association. The Finnish school obtains excretion only from a variety of legumes, but results of their work at other stations has been uniformly successful (1, 5, 9, 12). It is apparent that the cause of these discrepancies in the results of the various workers must be determined before final conclusions regarding the significance of the phenomenon for practical agriculture may be made. An effort to ascertain the reason for the curious lack of agreement in the results of different investigators, the senior author spent some time last year at Professor Virtanen’s institute in Finland. In a series of joint experiments with Dr. S. v. Hausen positive results were obtained in a number of cases, but negative findings resulted from experiments performed during the season of minimum photosynthetic activity. Following these experiments, similar tests were made at the Wisconsin station the next spring, but in spite of excellent growth of the plants and of attempts to duplicate in every detail the technique used in the Finnish work no excretion was obtained. Details...