1. INTRODUCTION

Mixed cropping is an age old practice all over the world, more so in India. Man has learnt by experience that mixed cropping is a safety devise against vagaries of weather or natural calamities. The practice of growing different crops in mixtures is based mostly on traditions according to local convenience. Scientific investigations need to be channelised to understand the principles involved in mixed cropping. Some good pieces of work on mixed cropping have been done in India (Ayyangar, 1942; and Reheja, 1953) and abroad (Papadakis, 1941; Lang and Hilst, 1949; Alexander and Genter, 1962; and Pendleton et al., 1963).

These works led to the conclusion that advantages in mixed cropping are: (1) an extension of photosynthetic period, (2) an improvement in utilization of soil nutrients, and (3) biological fixation of nitrogen by legumes and its transfer to the companion crop. Some of the disadvantages indicated are: (1) the competition between species might be harmful, and (2) there might be difficulty in carrying out cultural operations under mechanised farming. In India where all efforts are being made to increase the intensity of cultivation, mixed cropping may turn out to be an important tool to increase production per unit time and space.

In the underdeveloped countries where malnutrition is a major problem, the diet includes mostly cereal food. Cereals have low calorific value as compared to pulses or oil seeds. The Government of India wants to popularise cultivation of high energy food crops, as for example, soybean (calorific value 432 per 100 grams) to overcome the problem of malnutrition. Soybean has got multifarious uses, some of which are—oil, milk, and many industrial by-products.
Soybean also has very high yield potential and can give 20 to 30 quintals of grain per hectare under rainfed conditions in the wet season or even more under irrigation in the dry season. In India most of the cultivable area is devoted to the cultivation of food crops, like rice, wheat, maize, and millets. If soybean is to be grown, some land has to be searched out. Farmers are partially accustomed to grow pulses in mixture with food crops, e.g. rice plus redgram or maize plus redgram, etc. Some basic works need to be done to understand as to how soybean can be grown in mixture with other cereal crops.

In any study on mixed cropping, the problem of crop competition is the most important factor that needs to be properly analysed. Plants growing in a community react to environment differently as compared to single plants. Plant physiologists are usually interested in studying single plants and their results can not be translated into practice directly by agronomists. The study of plants within the community, as reviewed and interpreted by Donald (1963), is a field where much work is yet to be done. This understanding of competition in plants grown as a commercial crop is of vital interest for agricultural workers.

In the present study, an attempt has been made to grow soybean in mixture with rice/maize/sorghum in large size plots and to study their growth and yield performances under different row spacings. The conventional spacing practices of a crop, as for example, 40 to 45 cm spacing between rows with 5 to 7 cm between plants for soybean, 60 to 90 cm between rows with 30 cm between plants for maize have been tried in these experiments. The nitrogen levels were further varied to study their effect on mixtures as
compared to pure crops. The crops, however, received an adequate supply of irrigation water. Such treatments also helped in altering the light regime in the different crop canopies.

In any cropping pattern, pure or mixed, the vegetation will move towards equilibrium; this equilibrium will be in terms of yield and botanical composition of the plant community. An effort has been made to find out such equilibrium, when soybean was grown as a pure crop or mixed with rice/maize at different row spacings, proportion of rows, and different doses of nitrogenous fertilization.

Most of the earlier researches were directed to find out the yield variations due to mixed cropping, and the knowledge pertaining to such yield variations is limited. Characters like plant height, tillers, pod and grain number, and their weights, influence the yield. There are also a few references in literature on crop growth rates as affected by leaf area, foliage density, assimilation rates and light regimes, particularly in mixed swards and pastures. In the present investigation, it has also been proposed to study how the growth attributes are affected by such factors in mixed cropping.