CHAPTER - I

INTRODUCTION

The total production of rice achieved in India in 1978-79 amounted to 52.3 million tonnes from about 38 million hectares of land (Anon., 1979). The National Commission on Agriculture (Anon., 1976) has suggested measures for doubling the rice yield in the country and for reducing the area under rice from 38 million to 32 million hectares by 2000 AD. Obviously, the increased yield is expected to be achieved through suitable agronomic practices including adequate provision of inputs such as seeds, fertilizer, water, plant protection and energy as well as precision in harvest and post-harvest operations. The modern varieties of rice have responded remarkably to timely and adequate agronomic inputs. However, the gain so made needs systematic evaluation for each input apportioned to the increase in field yield of paddy and mill yield of rice. It has been reported that, of the total production, more than 10 per cent of paddy is lost due to shattering in field and in other post-harvest operations including losses in milling (Rama Rao, 1975). Any measure adopted to avoid or reduce the losses of paddy in the field during harvesting and of rice during milling would eventually raise the level of outturn in hectare yield of rice.

Scientific methods in crop production should aim at richer harvest in quantity as well as in quality of paddy. Production of high quality paddy is imperative for realising quality rice. High quality paddy is characterized by fully developed undamaged grains free from sun checks. Quality of rice includes, among

other characters, greater percentage of head rice and high protein content. Any production practice, therefore, aimed at minimizing sun checks in the grain and maximizing head rice recovery on processing would be a worthwhile attempt. These would necessarily involve method of cultivation, water and fertility management and harvesting of the grain at suitable grain moisture content.

In the agroclimatic region of West Bengal, paddy is generally grown in two seasons, namely, 'aman' (wet season : June-November) and 'boro' (dry season : January-May). In wet season, it is grown by three methods, namely by seeding in dry field, seeding of sprouted seeds in puddled field, and by transplanting of seedlings. Under varying management, these methods may bring variation in the production of total yield and in the quality of rice. The results on these lines, available so far, are not adequate and at times inconsistent to arrive at a definite conclusion. In the present experiment, attempts have been made to raise the crop by the three methods of cultivation in order to obtain the produce for testing the quality.

While considering the fertility management of paddy field, information on the optimum level of fertilization in maximizing the yield of rice is available for certain agroclimatic regions. However, precise information regarding the influence of these practices on quality and milling yield of rice is not available. The quantitative information necessary to qualify the fertilization schedule which would improve both grain yield and milling quality of the produce are now considered to be of great importance.

Of the different nutrient elements, evidence on the influence of nitrogen on yield and milling quality of rice is now amply recorded. It has been suggested that nitrogen availability has relationship with the N-uptake and grain protein content which in turn influence the milling quality of rice. In order to increase the availability and thereby recovery of applied N in submerged paddy fields, split application of nitrogenous fertilizers is being advocated, suggesting beneficial effect of such a practice on nitrogen availability and uptake as well as yield of the crop. Nevertheless, investigation on the effect of such a practice on quality of rice is also considered to be of interest. Further, climatic conditions modify the nitrogen uptake and utilization by the plant, which are higher in the dry season than in the wet season. Therefore, it was imperative to study the seasonal influence on the quality of rice under varying levels of nitrogen and its management.

The role of micronutrients in increasing the yield, particularly where continuous cropping with high yielding modern varieties has been adopted, needs no emphasis. From information on earlier researches, it has been evident that Zn, Cu and Mo considerably improve the growth and yield of the rice crop, but their influence on the milling quality is not known as yet. Therefore, it was deemed necessary to find out the individual as well as combined effect of these micronutrients on both production and quality of rice particularly when the crop is grown in both wet and dry seasons and fertilized with high levels of N, P and K.

The common water management practices followed in rice fields is to maintain varying depths of submergence throughout the period of crop growth. However, this may not prove to be the most suitable, particularly under different land situations and in the two seasons, wet and dry. Phasic and cyclic submergence have been very effective in obtaining higher yield in certain situations. However, there is no information on quality of rice, as affected by such water management practices, which has been attempted in the present study.

Among production practices, harvesting the crop at the appropriate stage of maturity minimises the field losses, and thereby increases the yield. Moisture content of the grain has been considered as a suitable index for judging the appropriate stage of maturity. The crop maturity is generally decided by visual observation, like golden yellow colour of the panicle. This may not always prove to be the correct stage and often results in delayed harvest causing considerable losses in the field due to shattering and damage by birds and rodents. Further, there is reduction in milling outturn when the harvesting is delayed and the grain is allowed to dry in the field. The time of harvest for rice could be identified on the basis of the number of days after heading or flowering or on the grain moisture content at harvest. However, it would be desirable to consider the moisture content of the grain with a conventional index, like number of days after heading or flowering, to give an approximate idea of the maturity of the crop so as to ascertain and facilitate timely harvesting.

For a particular region, varieties having better yield stability under different environmental conditions may be considered as the promising ones. It also becomes equally important to test the varieties on the basis of their head rice outturn. This is due to the fact that our main interest is to attain high head rice. Information on varietal performance with respect to milling quality is available, but there is paucity of information regarding their relative performance for quality rice under different environmental conditions.

Keeping these points in view, an investigation was planned with the following broad objectives :

1. To identify the effects of the major inputs, namely fertilizers including micronutrients, water management and method of cultivation on grain ripening, yield, protein content and milling outturn.

2. To find out the suitable level of grain moisture for harvesting a crop in order to minimize the field and milling losses.

3. To identify varieties of rice suitable for wet and dry seasons and responsive to packages of agronomic practices for both production and processing.