C H A P T E R - 1

INTRODUCTION

In India, rice is the most important food crop grown in an area of 39 million hectares. Of this, about 6 million hectares are annually subjected to flooding or water-logging. Most of this problem area lies in the low lands of eastern Uttar Pradesh, Bihar, West Bengal, Orissa, Assam, Manipur, Tripura and Kerala states, which come within the high rainfall region. Even the moderate rainfall zones of coastal Andhra Pradesh and Tamil Nadu are prone to this problem. Rice, the only crop grown in the low lying areas during rainy season, often suffers due to water-logging or occasional flooding as a result of unpredictable heavy rains and drainage congestion. Under such situations, the productivity of the crop is not only low but also unstable.

There is growing concern over the plight of rice farmers in the flood-prone and water-logged areas of India. It is recognised that so far these regions have not been able to contribute significantly to meet the growing food requirements of the country. Besides, they have been neglected by modern rice production technology and have received little research attention. As a consequence, the available technology has remained applicable only to the problem free medium lands and is found to be inadequate or inappropriate for the vast problem areas. The crop in these regions suffer mostly from uncontrolled excess water during the growing period. By virtue of geographical location it may not be possible to control water-logging by any engineering methods. Therefore, the strategy

for improving the crop yield should be aimed at development of agro-technology to escape or endure flooding or water-logging. To achieve this objective, the major gaps in the available rice technology for low lying areas are necessarily to be identified and efforts are to be made for a technology that combines high yield potential with low risk and suits the prevailing environment.

One of the major causes of poor and unstable yield of rice in the low lands is the cultivation of traditional, tall, low yielding varieties which manage to survive under water-logging or flooding. Therefore, for a revolutionary change and raising the level of production, modern varieties of high yield potential need to be introduced replacing the traditional varieties.These improved varieties should possess adequate tolerance to deep standing water. Morevover, the basic understanding of the effects of varying depths and durations of submergence on growth and yield of rice and mechanism involved in tolerance to submergence, is necessary for identification of suitable types which can tolerate a wide range of flooding or water-logging without losing their yield potentialities. With the development of improved high yield potential varieties suited to the low lands, prospects of raising the level of production of such problem areas have increased. However, very little information is available on the agronomic requirements of these varieties for the realization of their potential yield when grown under such conditions of environmental stress.

The damage of the crop due to flood varies considerably with years and location. This is mainly due to variation in

the depth of water, time of occurrence and duration of submergence, time of planting and stage of the crop at which flood occurs. As the depth of water, occurrence and duration of flood depend upon natural factors, so far very few research efforts have been made to assess the extent of damage caused by them. But, for the development of an appropriate production technology to overcome the problems of low land rice, a detailed study of the factors associated with the crop damage becomes imperative. Besides these, the studies on the effect of flood at different growth stages of the crop would eventually help in identifying the critical stages susceptible to submergence. Such informations are necessary for proper scheduling of cultural practices, particularly seeding or transplanting in the flood-prone areas. By adjusting the date of seeding or planting, it may become possible to enable the crop to either escape the flood at the vulnerable stages or withstand its adverse effects. Thus, the implication of adjustment of planting time is considered to be important for minimising the risk in cultivation.

One of the problems of flash-flood and water-logged areas is the poor stand of the crop. This generally happens due to mortality of seedlings particularly at the early stage of the crop growth. Under such situations, aged seedlings at transplanting may have an added advantage of greater submergence tolerance than the seedlings of normal age of 25 days. Moreover, the higher number of seedlings transplanted per unit area does

compensate to some extent for the poor tillering which is not very uncommon under deeper depth of standing water. A critical appraisal of the above aspects would help in suggesting agronomic measures for maintaining adequate plant population as one of the major steps for successful rice cultivation in the flood-prone or water-logged situations.

The traditional varieties being poor fertilizer responsive, are usually grown either without fertilizers or with meagre doses of nitrogen only. Moreover, the recovery of nitrogen is very low due to unavoidable losses which increase when applied as single basal dose at planting. As yet, no suitable technique has been developed for increasing the efficiency of nitrogenous fertilizers, particularly when the standing water depth in the field is high. With the advent of high yield potential and fertilizer responsive varieties for the lowlands, it becomes essential to develop appropriate techniques of fertilizer application as the recovery of the flood damaged plants has close relationship with soil fertilization. The slow release N fertilizers, which have been developed in the recent past, hold some promise in such situations for increasing the production through better supply of nitrogen to the plants and hence need to be studied.

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

1. To identify the causes of low and unstable yield and to find out the extent of damage caused by flash-floods.

2. To overcome some of the problems of flood-prone and water-logged areas and to increase the yield of rice.

3. To develop suitable agronomic management practices for realizing the yield potential of improved rice varieties.