# CHAPTER I

# I N T R O D U C T I O N

Maize (*Zea mays* L.) and Potato (*Solanum tuberosum* L.) form one year rotation which is very common in the northern plains of India. Maize is grown in the rainy season and followed by an irrigated crop of potato in the winter season. Both maize and potato rank high among the food crops for their production potential. Since independence, the area under these crops in the country has increased appreciably. However, the increase in the yield per hectare has not been quite encouraging. It is almost axiomatic that for optimum production of crops the factors like the maintenance of productivity of soil, the use of improved cultural methods, the use of good seeds of improved varieties, the control of insect pests and diseases, and the economical use of labour are the important ones to be given due consideration.

The response of maize and potato to favourable cultural practices has been assessed through experimentation by a number of workers in this country and abroad. Proper culture very largely helps the liberation of plant nutrients, the aeration of soil, the conservation of soil-moisture and the destruction of weeds. The response of crops to these effects brought about by cultural practices shows considerable variation. The causes of variation may be

attributed to the varying soil and climatic conditions and the intensity of weed infestation. About these, there is a paucity of information particularly with regard to maize and potato grown on the lateritic soils of the South-Western region of the state of West Bengal.

The use of deep tillage as the meansof increasing the depth of the rootbed has evoked considerable interest among scientists during the recent years. The response of maize and potato to deep tillage has not been found to be consistent. The variation may be attributed to the changes brought about by deep tillage in the physical condition of the soil such as bulk density, porosity and permeability, under certain soil and climatic conditions. Russell (1952) has analysed many interrelationships between soil, air and plant growth and has pointed out that soil parameters are needed to understand fully the growth processes under different soil conditions. It was, therefore, planned to study the effect of variable depths of tillage on the physical condition of lateritic soils affecting the performance of maize and potato.

During the rainy season, maize is heavily infested with the weeds which are mostly grassy in nature. It is aptly said that one of the main purposes of the primary tillage

leading to the seedbed preparation is to suppress the weed growth. However, an effective control of the weeds is possible only when the supplemental measures of weed control such as interculture are used. Manual weeding is the most common practice in India. Recently the use of chemical herbicides is, however, gaining momentum. It was, therefore, found necessary to devise a suitable method for controlling the weeds growing in association with the maize crop.

The tillage as a factor for the crop production cannot be considered in isolation from that of the nutrient supply. Both maize and potato have comparatively a high demand for nutrients and have been found to respond well to the judicious application of fertilizers. Moreover, it was reported by Russell (1957) that the response to deep tillage was more likely when a high rate of fertilizers was used. Taking this into consideration, different levels of fertilization, low, medium and high, were included for the study.

Potato, as reported, prefers high moisture levels in the soil. The most important aspects of irrigation practice are 'when to irrigate' and 'how much water to apply'. In the past, these aspects were studied by fixing the irrigation intervals and the depth of water to be applied

per irrigation rather arbitrarily. Advances in our knowledge of soil water relations have led to the development of 'water regime' concept for evaluating the time of irrigation and the quantity of water to be applied per irrigation, on a more scientific basis. In the present investigations an approach has been made to study the soil-water-plant relations based on the 'water regime' concept, for optimum growth of potato on lateritic soils.

With these objectives in view experiments were planned to study the effect of different cultural practices on maize and potato with the idea of having comprehensive information on both the crops since they are normally grown in rotation. The experiments embodied in the thesis are :

1. The effect of depths of ploughing, methods of weeding and levels of fertilization on the growth and the yield of maize (Zea mays L.), grown under rainfed conditions.

2. The effect of depths of ploughing, levels of fertilization and levels of irrigation on the yield of potato (Solanum tuberosum L.).