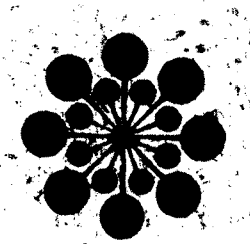

CHAPTER I

INTRODUCTION

Soil salinity has become one of the serious problems of modern agriculture. Salinity develops mainly due to excessive accumulation of sodium salts like chlorides, sulphate and carbonates. More and more land is becoming non productive every year as a result of poor soil management. About 25% of the earths surface can be considered 'Saline'. In India about 10 million hectares of cultivated land is under saline conditions. In Maharashtra certain region in Kolhapur and Sangli Districts have become non-productive because of this problem. The reason attributed to these saline fields is over irrigation and over fertilization. Studies from our laboratory have revealed that saline soils around Kolhapur and adjoining areas are mainly due to excessive accumulation of chloride and sulphate salts.

Salinity profoundly influences the growth, yield and very existance of plants. Plant species differ greately in their tolerance to salinity, however, most of the crop plants are sensitive to this soil problem. Increasing area of saline land has created a great problem in present day agriculture. Therefore, a time has come to look at this problem seriously and to search for some salt tolerant genomes in economically important plants.

According to Epstein et al. (1980), besides and engineering approach, the development of crops, tolerant to

salinity is a better strategy for metting the challenge of salinity problem. For this it is essential to screen the present crop species for salt tolerance, to study physiology of such plants for the mechanism of salt tolerance. Several crop species have been investigated for the mechanism of salt tolerance. It has been found that crop species differ greatly in their tolerance to salinity. Most of the studies, however, are with and individual plant either salt sensitive or tolerant. Even the plants belong to different groups, not only this the techniques followed for raising the plants under saline conditions vary from laboratory to laboratory, therefore, to understand the exact mechanism of salt tolerance it is highly essential to study the physiology of plant species differing in salt tolerance, belonging to the same group and following a standard technique for raising the plants. Keeping this view in mind in the present investigation and attempt has been made to study the effect of NaCl salinity on growth and metabolism of groundnut Var. SB-11, a salt sensitive plant and another plant belonging to the same group to which groundnut also belongs, Sesbania grandiflora, a salt tolerant species. In fact present work is continuation of earlier work in our laboratory. The salt tolerant nature of these plants has already been suggested by Karadge and Chavan (1980-84).

Salinity puts various problems to plants at the population, the organismal, the physiological and the molecular level. The over all reflection of all these problems occurs in the reduction of growth. Salinity causes stunting in glycophytes, on the contrary the growth in halophytes is favoured by certain amount of salts (Strogonov, 1964) the plant subjected to salt stress show several morphological and anatomical changes. Salinity also affects several nutritional or metabolic activities. The major nutritional effects of salinity are those associated with cation nutrition as suggested by Greenway (1965). The regulation of ion concentration is relevant to salt tolerance of vascular plants. The consequence of the change in ionic balance in salt stressed plant is the shift in ionic interaction with the enzyme and intermediates of metabolism at several levels. Salinity is also known to influence the net photosynthetic rate of plants. Salt stress also brings about significant changes in the pattern of photosynthetic carbon metabolism.

It is evident from the foregoing discussion that salinity has far reaching effects on the plant metabolism either favourable or unfavourable which ultimately results in impairement or improvement of growth and loss or gain in over all productivity. In the present investigation we thought it worthwhile to study different aspects of metabolism in salt sensitive groundnut and salt tolerant

Sesbania grown under saline conditions in all other environmental conditions identical.

The plants were grown under nonsaline and saline conditions in sand culture and attempt has been made to study the effect of salt stress on growth, uptake and distribution of inorganic ions in different parts of a plant such as young and mature leaves, stem and roots, and on organic constituents such as chlorophylls, polyphenols, total nitrogen, proline and carbohydrates. Some important enzyme systems such as hydroxyperoxidases, acid phosphatase and nitrate reductase in young and mature leaves and roots of these plants grown under saline condition has also been studied. The effect of salinity on nodule formation and root anatomy has also been carried out. For these studies recent and advanced methods have been followed. Spectrophotometry and flame photometry have been extensively used.

For convenience and presentation, the thesis has been divided in different parts. To know the basic problem, a brief review of salt tolerance in plants and some aspect of economic important and agronomy of Sesbania grandiflora and groundnut, has been given in Chapter II of the thesis. Chapter-III describes the material obtained, the method of culture and the methods followed for analysis. The important

findings of the investigation have been critically discussed and co-related in the light of recent literature, which has been covered in Chapter-IV of the thesis. The problem, perspectives and significant findings of the investigation have been summarised briefly in the last Chapter of the thesis (Chapter V). The recent research papers, books, reviews and monographs, used extensively for discussion have been properly listed in 'Bibliography', the last part of the thesis.