

Chapter-I
INTRODUCTION

Soil salinity has become one of the serious problems of modern agriculture. The saline environment is mainly due to excessive presence of sodium salts like chlorides, sulfates and carbonates. More and more land is becoming nonproductive each year as a result of poor soil management which results in salt accumulation. About 25% of the earth's surface can be considered 'saline'. In India about 10 million hectares of the cultivated land is under saline condition. Studies from our laboratory have revealed that saline soils around Kolhapur and adjoining areas are mainly as a result of excessive accumulation of Cl^- and SO_4^{2-} salts. Salinity affects the growth, yield and very existence of plants. Plant species differ greatly in their tolerance to salinity.

Pulse crops occupy a unique place in agriculture. They also have high protein content which helps to maintain the body health and is a source of energy to human beings. Among the pulses 'Phaseolus aconitifolius (Jacq.) is an important crop. It has a high nutritious value. Usually it is a Kharif pulse crop growing in different regions of India. Generally arid and semi-arid, light sandy soils are suitable for the growth of P. aconitifolius. It is widely cultivated in Rajasthan. In spite of these important qualities this crop is one of the most neglected crops. There are only a few attempts with respect to improvement programmes through selection and hybridization in this pulse crop. The cultural practices are

of very primitive type full of negligence. There are almost no reports describing any physiological aspect of this plant. As this plant is growing in any type of or almost in any set of environmental conditions it will be interesting to elucidate the mechanism(s) of tolerance underlying in this plant towards stress conditions.

According to Epstein et al., (1980), besides an engineering approach, the development of crops, tolerant to salinity is better strategy for meeting the challenge of salinity problem. Keeping this view in mind in the present investigation an attempt has been made to study the effect of NaCl salinity on growth and metabolism of this crop plant. An attempt has also been made to study the process of growth and development thoroughly and to correlate it with organic and inorganic metabolism, under natural non-saline conditions.

As salinity affects growth and yield of the plant, in the present investigation various growth parameters like average shoot length, average root length, average plant height, root to shoot ratio, number of leaves plant⁻¹, number of internodes, fresh and dry weight plant⁻¹, leaf area plant⁻¹, leaf area index, number of pods plant⁻¹, RGR, LAR, NAR are studied. Among the organic constituents Titratable acid number, polyphenols, chlorophylls, carbohydrates, total nitrogen and protein content, proline, some important enzymes as

peroxidase, catalase, acid phosphatase and nitrate reductase are also studied. Uptake and distribution of some inorganic constituents like Na^+ , K^+ , Ca^{2+} , Cl^- , Mg^{2+} , P, Fe^{3+} and Mn^{2+} have been studied. In addition to this, sand culture technique is used to study the effect of slow and shock treatment of salt and to study the effect of Ca^{2+} in the growth medium on growth and mineral nutrition of this crop plant.

The thesis has been divided in different parts for convenience. To know the basic problem a brief review of studies in salt tolerance of plants and some aspects of P. aconitifolius has been taken which is induced in Chapter II of the thesis. Chapter III describes the material obtained and the method followed for the investigation. This important findings of the investigation has been critically discussed and correlated in the light of recent literature. All this has been covered in Chapter IV of the thesis. The problem, perspectives, the significant findings of the investigation have been summarised briefly in the last chapter of the thesis, Chapter V "Summary and Conclusions", the recent research papers books, reviews, monographs which were extensively used for discussion have been properly listed in Bibliography, the last of the thesis.

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