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# ***INTRODUCTION***

Mineral nutrition is one of the key factors which control the growth and productivity of crops, about 14 mineral elements are considered quite essential in this respect either in macro or micro quantity and they are obtained from the soil. Nutrient elements are continuously used by the plants, and the supply ultimately becomes depleted where the nutrients are removed year after year. Most of the fertilizer practices are based on application of mineral elements at proper place and proper time. Among these elements the practices are mostly centered around the three elements N, P and K. Potassium is regarded as one of the most indispensable element of plant growth and metabolism. Hence study of K nutrition of plants has a great importance.

Alluvial soils constitute the most important soil groups in India, particularly in respect of agricultural potentialities. They form a major soil group in the states Uttar Pradesh, Punjab, Haryana, Delhi, West Bengal, Assam, Part of Madhya Pradesh and other central parts of country. These soils are generally rich in available potassium (Goswami and Bandyopadhyay, 1978). In Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra majority of soil is black and contains moderate potassium (Zende, 1978). Goa, Daman, Diu, East Andhra Pradesh, some parts of Karnataka, Chota-Nagpur and South-west Maharashtra soil is red. These

soils are poor in potassium content (Ramanathan and Krishnamoorthy, 1978). Ghosh and Hassan (1977) have made survey of 88% of the total number of districts in India. They noticed that about 20% soils have low nutrient status with respect to NPK. About 42% of soils have medium nutrient status, and only 38% of soils were having high nutrient status.

Crop species differ greatly in their K requirement as well as K uptake potential. Some crops such as *Lycopersicon* spp., *Amaranthus* spp. and *Medicago* spp. are reputed to show a luxury consumption of this element (Besford, 1975; Grubben, 1976 and Smith et al., 1982). *Amaranthus* is one of the ancient plant in India. It was cultivated in India even before the organized agriculture came into existence. It is believed that *Amaranthus* was introduced from Brazil into India by early Portuguese traders after 1500 A.D. from where it reached Northern India. In India *Amaranthus* is grown in Himalayas (from Kashmir to Bhutan), Himachal Pradesh (Kulu valley, Sutleg valley), Gujarat and Maharashtra. In Maharashtra, it is grown along the edges of the fields and also in home gardens (Singh and Thomas, 1978). *Amaranthus* is sometimes referred to as pseudocereal as distinguished from the true cereals which belongs to the grass family. It is with edible stem and leaves and highly nutritious grains. Similar to seeds, the leaves of vegetable *Amaranthus* species are rich in

protein as well as in vitamins and minerals. Although it is well known that *Amaranthus* is a only dicot crop possessing an efficient C<sub>4</sub> mode of photosynthesis and it can grow in variety of adverse environmental conditions. Review of Literature indicates that as compared that crops like rice, maize, bean, soyabean very little work on potassium nutrition of *Amaranthus* has been carried out. Hence it was thought worthwhile to understand physiological responses of this crop to potassium defficiency. For this purpose three popular *Amaranthus* species such as *A. caudatus*, *A. paniculatus*, *A. hypochondriacus* were choosen.

The thesis is divided into four chapters. It is well known that potassium plays a vital role in plant's life. In order to understand this role a brief review of available literature on potassium nutrition has been taken which forms the substance of first chapter. The methodology followed for present investigation has been covered adequately, in the second chapter 'Material and Methods'. Various findings of investigation have been discussed in the light of recent and relevant literature in the third chapter 'Results and Discussions'. The significant findings have been briefly summarised in the last chapter under the heading 'Summary and Conclusions'. This chapter is followed by Bibliography.