INTRODUCTION

Water serves several functions in the life of the plant. It is the most abundant and the best solvent known. As a solvent it makes up the medium for movement of molecules within and between cell and greatly influences the molecular structures and properties of other cell constitutes. The structure and properties of the water strongly influence the structural properties of proteins, membranes, nucleic acid and other cell constituents. And it is one of the most common important substances on the earth's surface. Of all the resources that plant need to grow and function, water is the most abundant and at the same time the most limiting for agricultural productivity. The fact that water limiting is the reason for the practice of irrigation water availability also limits the productivity of natural ecosystems, thus an understanding of the uptake and loss of water by plant is of particular importance.

India ranks second among silk producing countries after Peoples Republic of China. In 1997-98 production of raw silk has reached 15,236 tonnes. Since silk is rooted in Indian Social tradition, the domestic market is strong and most of the production of raw silk is consumed within the country. India has the distinction of being the only country in the world to produce all the Commonwealth known varieties of silk, namely Mulberry Tasar, Eri and Muga. In India, Sericulture is a cottage industry practiced in about 59,000 villages.

(Sericulture is labour intensive industry providing full time and part time employment to about six million people in plant cultivation, silkworm seed production, rearing, weaving and playing an important role in transferring wealth from the richer to poorer sections of the population. Sericulture industry has been identified as one of the important sectors of the economy).

The interesting feature of sericulture is the net profit earned from unit land through sericulture is more than any other agricultural or commercial crop especially in developing and undeveloped countries where the average income is low (FAD; Agricultural services Bulletins; Manuals on Sericulture, Reprinted by Central Silk Board, Bangalore, India, Vol. 1, Mulberry and Cultivation, page 1-150).

Agro-climate suitable for Mulberry

The planting season for proper establishment of mulberry plantation is early spring and late autumn seasons are best suited. Mulberry has been cultivating mainly in red-loams, frequently manured with inorganic fertilizers to keep them sufficiently mellow for rooting. In some parts, mulberry cultivated in block soils and these soils are comparable to "Chenozems" of temperate zone and low organic content and high in water-holding capacity.

The soil pH range suitable is 6.5 to 7.5 which are free injurious salt are ideal for good growth of mulberry plant. Planting distance depends upon the agro-climatic condition such as sunshine, precipitation and temperature etc.

Spacing for mulberry cultivation are two types i.e. pit system and row system.

	Spacing between rows	Spacing between plants
1. Pit system	0.9 to 0.75 m	0.9 to 0.45 m
2. Row system (Rain fed)	0.45 to 0.60 m (0.3 to 0.45)	0.45 to 0.60 m (0.15)

Mulberry forms the basic food material for silkworms and bulk of the silk goods produced in India are mulberry. The cost of leaves to feed silkworms works out to a about 60 per cent of the total cost of silk production. Silkworm production on scientific lines is essential for organising sericulture on sound economic lines. Mulberry plant is exploited in different ways for commercial production of silk as mulberry is the chief food for *Bombox mori*. Mulberry leaf is the source of the silkworm to biosynthesize the silk which is made up of silk proteins, such as sericin and fibroin. Mulberry is cultivated in India both under irrigated, semi irrigated and rainfed condition. However, more than 40 per cent of mulberry area in India is under water stress condition. The normal growth of mulberry plant under rainfed condition requires an annual precipitation of 1200 to 1500 mm distributed uniformly throughout the year, atmospheric temperature 25 to 30°C and humidity of 65-80% and soil moisture content 20 to 25% at soil depth of 90 cm (Kasiviswanathan and Seetharam Iyyangar, 1966). The study of the effects of environmental stress on plant performance has yielded much

information in the past two decades, yet many of these results are inconsistent. The most important factors limiting mulberry productivity is the water stress condition. The water stress is a situation when the supply is inadequate and inhibits plant growth.

Sericulture mainly spread to Andhra Pradesh from Karnataka State like boarder area through Kolar district. Mulberry cultivation is spread over 1 lakh acres, mainly 10 districts in Andhra Pradesh, wide agroclimatic zone ranging from hot humid coastal districts to semi-arid zones of Rayalaseema where rainfall over 90 years reveals the occurrent of drought as high as 42 to 51 drought years. The rainfall recorded minimum 485 nm, maximum 615 mm; average 552.46 mm.

Mulberry in Anantapur

Anantapur district, one among the Rayalaseema districts of Andhra Pradesh grown mulberry in about 45,000 acres out of 1,10,000 acres in Andhra Pradesh. As rainfall is considered, Anantapur ranks second lowest receiving district in the State (receiving 220 to 554 mm of average annual rainfall, temperature 22 to 48° C and relative humidity 24% to 84%). The competitive crops are mainly groundnut, jowar, sunflower and sugarcane to some extent. The silkworm cocoon production was 50 to 60 Kgs/100 Dfls and mulberry leaf yield increased to 55 MT/ha/year. The district is also facing severe scarcity in drinking and irrigation water problems leading to low yield of agriculture crops.

Wide range of climatic condition interlaced with varied constraints in management is characteristic in Indian sericulture. The major determining factor of productivity of any crop is the yield, which is mainly dependent on soil

moisture and fertility. The rainfed mulberry occupies a major role in Rayalseema of Andhra Pradesh encountering the frequent drought spells, as there is erratic and uneven distribution of rainfall ultimately resulting in poor returns to the farmers. The utilisation of improved varieties, application of manure and fertilizers and better cultural practices may not satisfy the thirst and hunger of farmers under these conditions.

Most commonly cultivated mulberry varieties in Rayalaseema are M-5, RFS-175, S-36, S-34, S-30, S-13, RFS-135, V1 ANANTHA which have been developed and released as high yielding varieties with much less emphasis on drought tolerance nature of these varieties. Among these varieties, ANANTHA has recently been selected by clonal selection and released as an high yielding variety (Suryanarayana *et al.*, 1993). In the present study it is aimed to study the drought tolerant potential of certain locally cultivated mulberry varieties under different regimes of induced water stress conditions.

The main objectives of the present study are -

a) to study the influence of water stress on morphological, physiological and biochemical responses of certain mulberry cultivars differing in drought tolerance,

b) to correlate the physiological responses which confer drought tolerance and to suggest a few markers/traits for rapid screening of mulberry genotypes for drought tolerance.