INTRODUCTION

As the human population of the world increases and utilizes more land area for housing and industrial activities, agriculture is being forced into marginally productive areas. Drought, salinity, temperature extremes, air pollution, and chemical interference are stresses often encountered. Alteration of environment and climates may also result from human activities that increases stressful conditions under which plants must grow and survive. Therefore, knowledge of the effects of various stresses on physiology of plants is essential to an understanding of resistance and survival mechanisms and to breeding for stress resistance. Development of new cultural practices using technology to alleviate stress effects also depends upon a knowledge of the physiological reactions of plants to stressful conditions. Plants have characteristic that may enable them to survive aberrant metabolism, hormonal imbalances, and membrane disfunctions. The process of tolerance and avoidance of effects of stress are better known.

Besides, water is the earth's most abundant compound yet the lack of water is the most important single factor limiting plant productivity and crop yield throughout the world. It is therefore, not surprising that the effects of water stress on physiological processes, productivity, and yield of plants have been widely studied

and reported. Moreover, since water stress in nature is usually accompanied by, above-average temperatures, studies of high temperature stress have received considerable attention.

In recent years interest has been focussed not simply on response of plants to water and high temperature stress, but also on the importance of morphological and physiological mechanisms of adaptation to water and high temperature stress.

Water stress caused due to unpredictable rains has become an endemic problem in India more so particularly in Maharashtra. Genetic improvement of stock to sustain water stress has reached its limit for the reason that it severely restricts photosynthetic productivity. One cannot afford to sustain the productivity loss if it is severe. It is, therefore, necessary to evolve alternate method effectively to handle such problem.

When we assess the water requirement of plant, it is found that less than one per cent of the water absorbed by plant roots is retained within the plants, and considerably smaller percentage is contained in harvested crop. Thus water used by plants actually constitutes the least efficient step in the system of precipitation, collection, water storage conveyance, irrigation and conversion to the harvested crop. The possibility of reducing plant transpiration thus saving water and also alleviating the adverse effect of water imbalance on plant growth. When transpiration exceeds the rate of water uptake,

presents a tremendous challange in this era which is increasingly plagued with dwindling (Landsberg 1964).

Apart from prigmatic interest, antitranspirant (material applied to plant for the purpose of retarding transpiration) challenge plant physiologists with such questions as : what will be the effect on plant of the cessation of transpiration stream? What is most appropriate manner of reducing transpiration? What physiological side effects will result from different types of antitranspirants, applied to different plant ecotype under varing ecological conditions?

Survival of plants to water scarcity mainly depends upon control of internal water balance (Kozlowski 1968). Plants have three basic means for controlling internal water deficits : absorption, transpiration and internal redistribution of water. Plant control of water loss primarily by stomatal regulation. Loss of water through cuticular transpiration in many plants prevented by waxy coatings, surface waxes of plants, represents a wide range of organic compounds. These are complex mixture of long chain alkanes, alcohols, ketones, aldehydes acetals, esters and acids (Eglinton and Hamilton 1967).

Maintaining low internal water stress in plants constitutes a practical problem of paramount importance, for several decades attention has been given to maintaining favourable internal water balance of tree, nursery stock by supressing transpiration with various leaf coatings. Such compounds have included oils, plastic films, wax emulsion, and metabolic inhibitors. There has been little agreement,

however, on the usefulness of antitranspirants. Leaf coatings reduced transpiration effectively in some cases but not in others. Effects on survival of transplant have been beneficial in some cases but useless in others. Many leaf coatings, which control transpiration chiefly by physically blocking the stomates, have proved especially disappointing. Although they often reduced transpiration, they also inhibited photosynthesis and eventually killed out planted trees (Kozlowski 1968) e.g. plastic film type antitranspirants were more permiable to water vapour than to CO_2.

A completely different approach to control of water loss involve use of antitranspirants that operate as metabolic inhibitors. These chemicals are as under :

1.	ß-napthoxyacetic acid	- Ferri and Lex (1948)
2.	8 -hydroxyquinoline sulphate	- Zelitch (1961)
3.	2,chloro-4-ethylamino-6-iso-phylamino 1,3,5-trizine	- Wills and Davis(1962)
4.	Phenylmercuric acetate (PMA)	- Shimshi (1963).
5.	Alkaneylsuccinic acid	- Zelitch (1964)
6.	Decenylsuccinic acid	- Kozlowski and Clausen (1967)
7.	Abscisic acid (ABA)	- Milborrow (1969) - Jones and Mansfild (1970)
8.	Morphactin (MPA)	- Das et al. (1977).

A second approach to transpiration reduction is by use of material that forms thin films. Higher alcohols, waxes, silicons, and plastics such as polyethelene, vinylacerylate and similar polymer have been tried with varing results (Crafts 1968).

Based on the studies carried out by different workers by using different above mentioned antitranspirants, it has been concluded that these materials will need careful study by physiologist and agriculturalist to find their effects on mineral nutrition and photosynthesis etc. and to avoid injury to crops. Despite some disappointing results with metabolic antitranspirants, enough success has been achieved with some herbaceous plants to warrant expansion of work with these compounds, even if growth should be inhibited by stomatal closure during crucial period. Following out planting, the possibility of saving transplants by maintaining favourable internal water balance is far more important than its temporary growth inhibition. Longer retention and greater specificity are needed for antitranspirants that promote stomatal closure, and greater selectivity to gases and vapors is needed for film-forming types (Gale and Hagan 1966).

Recently the large scale availability of industrially produced agrochemicals have helped to revolutionize agricultural practice by making it less labour intensive and by increasing yield potentials. In recent years several Water Evaporation Retardent Chemicals (WERCs) which can be used as antitranspirants are available in the market. One of such effective chemical was introduced by HICO Product Limited, Bombay and the another chemical is ACITOLTA-1618 WER, introduced by Bombay based chemical industry at Jalgaon. It has been experimentally shown that these chemicals stimulate growth in crops, whereby biomass of crop increases. No scientific explanation hetherto could be given as to how such chemicals help in withstanding

water stress due to lack of sustained physiological investigation. It is, therefore, proposed to carry out the experiments by using HICO-110-R (WERC) on sorghum and groundnut with a view to investigate physiological mechanism of its action on plant growing in drought prone area.

The attempt made out in the present investigation therefore, is to examine physiological effects of synthetic long chain fatty alcohol (HICO-110-R) on parameters like osmotic potential of cell sap, chlorophyll contents chlorophyll stability index, proline content, polyphenols, nitrogen content and the activity of enzyme nitrite reductase, nitrate reductase. The stomatal regulation as influenced by HICO-110-R spray has also been studied. The results obtained have been discussed in the light of recent literature.

The subject matter of the dissertation is divided into - Introduction, Review of Literature, Materials and Methods and Results and Discussion. The extensive literature survey carried out by referring recent journals, review articles, books, and monographs is listed at the end of dissertation in bibliography.