

***Chapter I***

**Introduction**

Sorghum ( Sorghum bicolor (L.) Moench ), commonly known as 'jowar' in local language is one of the major food grains of the world. In supplying nutrition to human race, it is second to wheat and rice and completes maize for that place. In addition to supply of grains, the fodder is fed to millions of animals which provide milk and meat for the nourishment of man. Sorghum thrives well with very much less rainfall than that is needed for rice and has lesser water requirement than the maize. It can be grown where no other major cereals have a chance to survive. It appears that sorghum is one of the indispensable crops required for the survival of the man. The world acreage and production of sorghum indicate the cosmopolitan nature of this crop in different countries of the world.

Sorghum is widely grown in North, Central and South America, India, Pakistan, a good part of Africa, U.S.S.R. and in some parts of Europe. It is a staple cereal of a large population in Africa and Asia. India ranks first in acreage but second in the production, the U.S.A. being the largest producer in the world. Besides the U.S.A. the other important sorghum producing countries in descending order are India, China, West Pakistan, Australia, Israel and Soviet Union ( Rachie, 1970 ). Sorghum production for food has been recognized in arid and semiarid areas of Africa and Asia from very ancient times. However due to less scientific efforts acreage as well as productivity remained more or less stagnant till 1970 or so. In the recent years contrary to this, increase in both acreage and productivity have been spectacular in

the countries like U.S.A., Argentina and Israel; where sorghum has been a relatively recent introduction primarily as a feed grain.

Responses of plants to drought however varies from plant to plant and species to species. Some of the plants have well developed mechanism to resist stress and make use of available water efficiency. Xerophytes and succulents are some of the good examples of drought resistant plants. In spite of several studies regarding the mechanism of drought resistance, the exact nature of mechanism is not yet clear. To face the problem of drought then it is highly essential to identify drought resistance in crops and to study their physiology for mechanism of drought resistance.

Sorghum forms an essential part of the Indian diet, and is grown commonly as pure crop; in rotation or mixed with pulses. It is the main source of carbohydrates. The present critical situation in the world food supplies demands that all over agricultural resources are to be utilised to the full.

The study of physiology of sorghum has an important role to play in guiding the efforts of agronomists, plant breeders, plant pathologists and others who are actively engaged in the business of improving efficiency of production. It is important to know the extent to which the physiology of a crop can be moulded to fit a particular set of environmental conditions. The physiological study of a plant is also useful in production practices and conversally the extent to which the techniques need to be modified to accomodate unalterable physiological processes.

In the present investigation an attempt has been made to study the effect of water stress on soil temperature, soil moisture percentage, chlorophyll content, stomatal behaviour and inorganic constituents. For this plants were raised from seed in soil culture and water stress was induced by withholding water from the pots.

For convenience and presentation, the thesis has been divided into different chapters. To have an idea of drought problem a brief review of physiology of plants under water stress and physiology of sorghum has been given in chapter II of this thesis.