Introduction
Bajra (Pennisetum americanum (L.) Leeke.) is an important cereal crop of the semi-arid tropics. It originated in Africa from where it was imported to India in the early days. The plant is an annual with tillers arising from the basal nodes of the main shoot. The main shoot as well as tillers terminate in an inflorescence, which is a cylindrical spike tapering towards the end. It is densely packed with groups of spikelets which vary in number, but the most common number is 2. Each spikelet contains two flowers partly protected by glumes. The lower flower is usually male and the upper one is bisexual. The male flower consists of a single lemma and three stamens, but
does not have either a palea or lodicules. The bisexual flower has a broad lemma, thin palea, three stamens and a carpel with two styles terminating in brush like stigmas. The flower is protogynous and the stigma remains receptive for 24-48 hours after its emergence. The chromosome number in the species is $2n = 14$.

This crop is cultivated in the arid regions of Africa and Asia for grain as well as for fodder and as a pasture in USA. *Pennisetum* is one of the most drought resistant cereals and it is extensively grown in the semi-arid regions where rainfall is scanty which cause a major limitation to crop growth. Among the cereal crops in India, bajra is fourth in acreage behind rice, sorghum and wheat, and fifth in production behind rice, wheat, sorghum and maize. In India, this crop is grown over 12 million hectares, representing 30 percent of world acreage and 11 percent of total cereal production in India. Western Uttar Pradesh, Rajasthan, Gujarat and West-Central Maharashtra comprise the predominantly bajra growing regions of India.

The early maturity, high yielding potential, low water and fertilizer requirement, high resistance to insects and other pests and high nutritive value of its grains have placed bajra in a position superior to maize or jowar. However, the presence of phytic acid and other factors
reducing the digestibility, the high amount of fatty acid which will reduce the keeping quality of bajra flour, the coarse texture of the bajra flour products and low palatability have made it a poor man's food.

The stored food in the endosperm of the cereal grain form a potential energy source for man and his domesticated animals. So, it is not surprising that man has advanced in his abilities as a cereal technologist; breeding, processing and using the harvested grain. The seed of a cereal plant is surrounded by a seed coat or testa which is fused to the pericarp, forming the type of a single seeded fruit known as caryopsis. The term grain and kernal are used to describe the part of the cereal plant which is harvested. The true endosperm is a tissue unique to the angiosperm and arises by division of the triple fusion nucleus. During growth of the endosperm, some nutrients are drawn in from adjacent tissues, and others are synthesised in situ using transported material.

Since the quality and quantity of the plant products are ultimately determined by the genetic material, the yield and quality of the grain can be improved by the manipulation of the genetic material through intensive breeding practice. Before 1960, the then present local
varieties gave only very low yield. The first attempts towards exploitation of heterosis through inbreeding followed by hybridisation started at Coimbatore during 1943. The identification of cytoplasmic male sterile line permitted the exploitation of heterosis on a commercial scale. The first cytoplasmic male sterile, TIFT 23A was developed in Tifton Georgia, USA and this line has been most extensively used in the production of commercial hybrids in India. The first commercial hybrid, a promising variety, HB-I was released in 1965. Thereafter, a number of hybrid varieties were developed. The wide adaptation of the hybrids with two to three fold response to fertility and moisture of the soil, and maturity in 85-95 days as compared with 85-120 days of some of the local varieties, have made the hybrid very popular. However, the hybrids are noticed to be highly susceptible to various diseases.

The composition of seeds can be modified by breeding; much effort has been and is still expended by plant breeders to produce seeds with desirable contents of carbohydrates, lipids or protein to suit human and animal dietary requirement. Therefore, it is of considerable relevance to collect physiological data of various genotypes and their response to hormones. This will be helpful to the plant breeders to have a better germ plasm collection to eliminate the drawbacks of this crop besides improving the yield.
In view of the above facts it is highly essential to have an intensive breeding practice in bajra for the integration of the desired characters and to remove the deleterious qualities. In this crop plant, much effort has not been expended to understand the physio-biochemical parameters which are determining the eminent qualities of this plant. Growth regulators especially gibberellic acid is having a vital role in modifying the quality and quantity of the plant products at different growth phases. Moreover, in the same species itself the different genetic lines will respond differentially to the externally applied plant growth substances.

In the present work, an attempt has been made to elucidate the varietal difference in the light of important biochemical parameters, which are crucial in determining the vigour of the plant, yield and quality of the grain. The differential response of the different genetic lines to the externally applied gibberellic acid is also studied. Three hybrid varieties, BK 560-230, BJ-104 and CJ-104 were selected for the study. BK 560-230 and BJ-104 are high yielding and the commonly cultivated varieties. CJ-104 is dwarf and low yielding, however, it is a profuse tillering and very early maturing variety.

Experiments were performed on the seedlings raised in the laboratory (Lab experiments) as well as plants raised
in the field (field experiments), keeping separate, controls and gibberellic acid treatment. The lab experiments were mainly designed to understand the mobilisation of storage materials in endosperm during germination and seedling growth, and the response of gibberellic acid application in the hybrid lines. The field experiments were designed to study the effect of applied gibberellic acid with different genetic lines on some metabolites and enzymes which are important in determining the yield and quality of the grain.