Preface

Cotton (*Gossypium spp.*) is an important natural source of fibre. It is the world's second largest fibre and oilseed crop. About seven million farmers in India are growing this crop on a large scale. Cotton, which is mainly important for its fibre for clothing also provides oil, protein for food and feed. Therefore, cotton based cropping systems would ensure stable national economy, employment and progress. About half of the total cotton area in India is covered by *desi* cotton. There has always been an effort to improve cotton by cytogeneticist and plant breeders. Therefore, it became interesting to cross *desi* varieties to bring about better varieties.

In the present investigation two diploid cultivated species of *desi* cotton i.e. *Gossypium arboreum* L and *Gossypium herbaceum* L having same chromosome number and similar genomic constitution were crossed. In order to enhance recombination frequency in F₂ progenies the present study embodied the use of chemical and physical mutagens.
Cotton is a renewable source with long term supply assurance and is an important commodity in farming, trade and textiles for sustaining a large number of economies all over the world. Hence global cotton consumption could continue to rise to 28 million tons (Sundaram, et al. 1999) by the end of current decade with increasing prices of petroleum based fibres and politics associated with it. Cotton may further improve in textile with new innovative uses coming out of R&D efforts.

Cotton crop is a versatile provider of many requirements such as fibre for clothing, oil and protein for food and feed, several chemical and biological by-products for medical and ancillary industries. Therefore, cotton based cropping systems would be a highly stabilized proposition for ensuring stable national economy, employment and progress.

In the past independence period India has brought about a significant transformation in the quantitative and qualitative composition of the domestic cotton crop which now produces the widest quality range of cottons suitable for spinning to meet the expanding requirements of the Indian textile industry.

In India, cotton occupies a good position among the cash crops. Out of 750 cotton textile industries about 400 are in operation to cater the
yielder. Therefore, interspecific hybridization can be made through pollination to create the variability at ploidy level. The crosses in a manner which could have resulted surfacing the desirable recombinations for selection. The genetic behaviour of several economic characters should have been first known before starting the crossing programme. The cytogeneticists should have worked in consonance with geneticists and plant breeders in planning and devising the crossing programme so as to pickout the correct type possessing the required attributes of two different species. The present investigation was, therefore, undertaken to integrate cytogenetical studies with genetical ones so that better results may be obtained. In order to enhance the recombination frequency in F₂ progenies further, the present study embodied the use of chemical and physical mutagens as suggested by Raut, et al.(1971), Siddiqui (1971), Singh, et al. (1976), Kuliev (1978), Azimova (1978) and Raut and Mandal (1979). The whole experiment was conducted with the following broad objectives:

1. To study the extent of variability of various morphological and genetical characteristics in F₁ and F₂ generations.

2. To study the cryptic structural differences in F₂ progenies.
3. To select the best recombinations in F₂ progenies with their morphological and cytological associations.

4. To estimate the enhancement in F₂ combinations over F₁ by physical and chemical mutagens.

5. To study the meiotic behavior of chromosomes.

6. To increase the recombination frequency by physical and chemical mutagens at chromosomal level.

7. To find out the extent of pollen viability in the F₁ and F₂ progenies of various crosses between *arboreum* and *herbaceum* species.