

Survey was conducted in three districts viz. Vadodara, Bharuch and Jamnagar of Gujarat to find out different cotton varieties (Bt/non Bt/ hybrid) under cultivation. Data of their yield obtained and associated seed and soil borne fungi. The results depicted that most of the farmers preferred to grow Bt cotton variety in all the present three districts and maximum yield was obtained from the seeds belonging to Ajeet-11 variety.

For the study Bt cotton varieties Ajeet-11 and Vikram -5 were used. Comparison was made with non Bt cotton.

### **Soil and Seed Borne fungi associated with cotton**

Isolation was done from the rhizospheric and non rhizospheric soils to find out the associated fungi. Twenty one different types of fungi were isolated belonging to twelve genera. Various Ascomycetes fungal members like *Aspergillus niger*, *A. terreus*, *A. flavus*, *A. fumigatus* *Chaetomium globosum* and *P. citrinum* were present in the rhizospheric soil. Members belonging to Deuteromycetes were *Alternaria alternata*, *Curvularia lunata*, *Cladosporium cladosporaoides*, *Fusarium oxysporum*, *F. roseum*, *Myrothecium verrucaria*, *Tricothecium roseum*, *T. harzianum* and *T. viride*. Presence of Mucorale member *Rhizopus stolonifer* of Zygomycetes group was interesting feature.

The seed borne fungi were isolated by using Blotter method and Agar Plate method as recommended by ISTA. In blotter method ten types of fungi and in case of Agar plate method thirteen types of fungi were isolated.

### **Occurrence of Arbuscular Mycorrhizal fungi in rhizosphere soil of cotton**

To find out the occurrence of mycorrhizal fungi with rhizospheric and non rhizospheric soils of different cotton fields. Method suggested by Gerdemann and Nicolson

was followed. Arbuscular Mycorrhizal fungi belonging to 4 genera and 28 species were observed in the soils of different cotton fields of Gujarat.

Isolated different arbuscular mycorrhizal fungi were identified on the basis of morphological characteristics of the fungal spores and their hyphal attachment.

### **Effect of Arbuscular Mycorrhizal Fungi on Growth of Cotton Varieties**

The effect of inoculations of AM fungi on plant height, root length, mycorrhizal colonization and chlorophyll content of cotton was studied. Mycorrhizal colonization was found to be superior in hybrid seedling inoculated with consortium of *Glomus* sp. in comparison to hybrid cotton plants without AM inoculation. The data clearly show that the plants which were inoculated with *Glomus* consortium, showed maximum mycorrhizal colonization, better shoot and root length and more dry weight. The chlorophyll content in leaves also increased as compared to non mycorrhizal plants.

### **Studies on *in vivo* effect of three fungi on growth performance of cotton**

Effect of three selected fungi viz. *A. niger*, *T. viride* and *G. virens* was observed on growth performance of cotton plants. All the three varieties of cotton viz. Non Bt and Hybrid varieties Ajeet-11 and Vikram-5 showed maximum shoot length, root length of both fresh and dry weight and highest chlorophyll content in plants treated with *T. viride* followed by *G. virens* and *A. niger* as compared control plants. Thus we can conclude that the *Trichoderma viride* increased the rate of seed germination and shoot and root growth.

### **Effect of fungal metabolites on germination and growth of cotton**

Effect of fungal metabolites on seed samples of three cotton varieties and their effect on percentage of seed germination and seedling growth was observed. *F. oxysporum* was found to be the most pathogenic and inhibited the seed germination in all three cotton varieties. *Alternaria alternata* and *Chaetomium globosum* were also found to inhibit the seed

germination in all three varieties of cotton seeds after 1 hour of presoaking of the seeds. Fungal filtrates of *T. harzianum*, *T. viride* and *Aspergillus niger* were not found to inhibit the seed germination of all three varieties of cotton.

### **Effect of two different organic composts on the growth of cotton**

Effect of organic composts like vermicompost and dried leaves was observed on plant height, root length and chlorophyll content of cotton plants. The data evidently indicated that the plant treated with vermicompost showed maximum, shoot length, root length of both fresh and dry weight. The chlorophyll content was more in leaves of the plants grown with vermicompost as compared to plants supplemented with dried leaf powder and control plants.

### **Studies on *in vitro* antagonistic activity of pathogenic fungi**

Study on *in vitro* antagonistic activity of three pathogenic fungi viz. *F. oxysporum*, *C. globosum* and *A. alternata* isolated from soil and seeds of cotton were examined using the dual culture method. The observation based on the comparative analysis of the radial growth three pathogens revealed that *T. viride* hampered the growth of pathogenic fungi and showed the maximum percentage of inhibition against all three pathogens. It reduced the growth of *F. oxysporum* by 50.98%, in case of *C. globosum* 64.66% and in case of *A. alternata* 70% of growth inhibition. Fungi *T. harzianum* and *A. niger* also inhibited the growth of three pathogens and least inhibition of pathogens was recorded by *Gliocladium virens*.

### **Biocontrol Studies of Seed borne and Soil borne fungi**

Botanical pesticides obtained from leaf extracts aqueous and methanolic using Soxhlet method were used. The activity was tested by Poisoned Food technique. Best results were obtained in the methanolic extract of *Balanites roxburghii*, *Cochlospermum religiosum* and *Limmonia acidissima*. These extracts were highly effective against all three test fungi used.