

## Morpho-anatomical and Physiological Traits related to Abiotic and Biotic Stress Resistance of Cotton: Hypothesis

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Cotton plays an important role in our society and is called as white gold for its high economic importance. Significant research advances have been attained for its genetic improvement of cotton for yield, fibre quality and drought resistance. Incorporation of Bt cotton has contributed a lot to its productivity for insect resistance, but the level of resistance is going down probably due to the development of immunity of the insects. The abiotic stresses can broadly be categorized as edaphic, atmospheric and geographic stresses. The soil, besides being integral part of rhizosphere, is the prime source of water and most of the nutrient elements to the plant. The main edaphic factors that cause stress to plant are water, salt, soil temperature, nutrition, physical and chemical composition etc. Among the atmospheric factors, cardinal temperature, solar radiation, relative humidity, precipitation, air, wind and climate change are the major causes for stress to plants. The other factors include altitude, slope, aspect etc. of the location; though not directly affect the crop but lead to the other situations itemised in the preceding text. As a consequence, it is important to understand the factors leading to of abiotic stresses along with their nature and magnitude on crops during pre and post harvest life. The improved understanding of these aspects of abiotic stresses in relation to crops would show the way to their better management.

Very little progress has been achieved in improving drought resistance. Therefore, there is a great necessity of concerted inter-disciplinary research to improve cotton resistance to both abiotic and biotic stress resistance. On the basis of my

experience and publication of research papers and book; I am putting forward my hypothesis for potential genetic improvement of cotton both for abiotic and biotic stresses.

- Drought resistance: Small thick leaves with long stout leaves, presence of dense trichomes, thick cuticle, compact long palisade cells, thick collenchyma and long deep roots are the characteristics of drought resistant cultivars. Simple low cost technique has been developed to screen and select pipe line cotton cultivars for drought resistance. The cultivars selected are confirmed in field testing in drought prone areas.
- Salinity tolerance: Salt tolerant cultivars show elongation of roots and production of fine root hairs exposed to salt stress functioning as osmotic adjustment. Simple low cost technique has been developed to mass scale screening and selecting of pipe line cultivars for salinity tolerance which have been confirmed in field test in saline prone areas demonstrating the transfer of technology from the lab to land.
- Flood tolerance: Flood tolerant cultivars produce swollen roots with profuse aerenchyma responsible for oxygen supply for respiration. Simple technique has been developed for flood tolerance
- Tolerance to sucking pest: Presence of dense trichomes on the abaxial leaf surface which needs to be confirmed.

I feel strongly that utilizing this simple low cost technology could improve resistance of cotton to stress resistance (OPEN FOR CRITICISM.)