

## **Transgenic cotton (*Gossypium hirsutum L.*) showed resistance against cotton leaf curl virus**

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Cotton leaf curl disease (CLCuD), a major factor resulting in the enormous yield losses in cotton crop, is caused by a distinct monopartite begomovirus in association with Cotton leaf curl Multan betasatellite (CLCuMB). Micro (mi)RNAs are known to regulate gene expression in eukaryotes, including antiviral defense in plants. In the present work, effect of *Gossypium arboreum*-encoded miRNAs on the genome of CLCuMuV and CLCuMB was investigated in planta. Two computationally predicted cotton-encoded miRNAs (miR398 and miR2950) that showed potential to bind multiple Open Reading Frames (ORFs; C1, C4, V1, and non-coding intergenic region) of CLCuMuV, and ( $\beta$ C1) of CLCuMB were selected. Functional validation of miR398 and miR2950 was done by overexpression approach in *G. hirsutum* var. HS6. A total of ten *in vitro* cotton plants were generated from independent events and subjected to biological and molecular analyses. Remarkably, expression of pre-miRNAs was shown up to 5.8-fold higher in the transgenic (T0) lines. The virus resistance was monitored following inoculation of the transgenic cotton lines with viruliferous whitefly (*Bemisia tabaci*) insect vector. After inoculation, four of the transgenic lines remained apparently symptom free. While a very low titre of viral DNA could be detected, betasatellite responsible for symptom induction

could not be detected in any of the healthy looking transgenic lines. In this study for the first time, efficacy of the host (*G. arboreum*)-encoded miRNAs against CLCuD symptoms was experimentally demonstrated through overexpression of miR398 and miR2950 in *G. hirsutum* var. HS6. Computational prediction of miRNAs targeting virus genome and cleavage-based suppression of viral mRNA via overexpression could help in generating virus resistant plants.

### **Biography**

Mohammad Akmal has completed PhD from Hamdard University, New Delhi in 2011 in Biotechnology. His work was on the development of the transgenic *Brassica juncea* L. plant having high affinity sulfur transporter gene for higher sulfur uptake and efficiency. He also had gotten very prestigious Dr. DS Kothari Postdoctoral Fellowship from UGC (2012) and completed it from Jamia Millia Islamia, New Delhi in 2015. His work was on the development of Cotton Leaf Curl Virus resistant plants of cotton. He is currently Assistant Professor in MLK (PG) College, Balrampur, UP, India, in Department of Botany. He changed the area of research and currently worked on the use of new herbal drugs for the treatment of rheumatoid arthritis and associated inflammation. He is in the starting of his career, and has published several scientific papers and chapters in peer reviewed journals and books and has 124 citations.

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