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Name of the Scholar : **Arlene Asthana Ali**

Name of the Supervisor : **Dr. Mohammad Irfan Qureshi**

Name of the Department/Centre : **Department of Biotechnology, Jamia Millia Islamia**

Topic of Research : **Multi-omic Response of *Brassica juncea* to Arsenic and Development of CRISPR/Cas9 Construct against rbcS Gene**

Keywords : **Multi-omic, *Brassica juncea*, Arsenic, Iron sulfate, *rbcS*, CRISPR/Cas9**

Finding

Summary of Abstract

The present work was carried out to study the multi-omic response of the important oilseed plant *Brassica juncea* L. (Indian Mustard) during arsenic (As) exposure and the role of iron sulfate ($FeSO_4$) in ameliorating As stress. Arsenic decreased the growth and photosynthetic parameters less in the presence of $FeSO_4$. Furthermore, the antioxidant system and metal chelators operated in better coordination with $FeSO_4$. Blue-Native polyacrylamide gel electrophoresis revealed $FeSO_4$ supplication retained a better stoichiometry of light-harvesting complexes and stabilized every membrane protein complex. Untargeted and organ-specific metabolomics of *B. juncea* using liquid chromatography mass spectrometry and pathway analysis revealed that As stress significantly impacted pyrimidine metabolism in root and leaf and isoquinoline alkaloid biosynthesis in stem by differential expression of metabolites having anti-oxidative and protective roles. The use of *B. juncea* in phytoremediation of As-contaminated soils may be advanced, as found in this study, by administration of iron sulfate to the plant that strengthens its stress tolerance mechanism. Guide RNAs targeting RuBisCO small subunit gene (*rbcS*) were designed. Two CRISPR/Cas9 constructs were successfully developed for creating knockouts of *rbcS* in *B. juncea*. Such mutants will be useful for studies on RuBisCO, the photosynthetic enzyme known to be affected by heavy metal stress.