MORPHOLOGICAL, BIOCHEMICAL AND MOLECULAR CHARACTERIZATION OF BRINJAL (*Solanum melongena* L.) GENOTYPES THROUGH PCR BASED MOLECULAR MARKERS

ABSTRACT

Brinjal (*Solanum melongena* L.) is the important *Solanaceae* family vegetable crops with diploid chromosome number 2n = 24. The experiment was conducted at Biotechnology Laboratory, Department of Genetics and Plant Breeding, J.A.U., Junagadh during the year 2015-16. The experimental materials comprised of 12 genotypes of brinjal with three main objectives: (i) Morphological characterization (ii) Biochemical characterization (iii) Molecular characterization

Seven quantitative characters were determined at morphological level revealed that the highest 10-fruit weight, fruit length and fruit girth were recorded in GJB-3, JBL-08-08, JBL-08-08, respectively. Twelve qualitative characters recorded in twelve brinjal genotypes revealed that JBL-08-08 has slight curved and long fruit shape, while JBL-10-11 showed striped and oblong fruit shape. Fruit flesh density was highest in Swarna Mani Black. The maximum intercluster distance (D= 28.13) was observed between cluster I and cluster IV and minimum intercluster distance was observed between cluster I and cluster II (D= 19.29).

Isoenzymes and biochemical activities were used for the characterization of 12 brinjal genotypes. Maximum Peroxidase activity was recorded by KS-224, while GJB-2 was having minimum total sugar content, reducing sugar content and antioxidant activity. In case of esterase activity, JBG-10-208 was on top among all the genotypes. Genotype AB-09-01 had lowest content of chlorophyll, carotenoids and protein content. At 10 DAG, Peroxidase generated four bands. Out of four bands, two was polymorphic. Esterase generated three bands, out of three one band was polymorphic. Polyphenol oxidase generated five bands out of which three bands were
polymorphic. Superoxide dismutase generated six bands out of which two bands were polymorphic.

Seventeen RAPD primers generated total of 232 bands/alleles in which 224 bands were polymorphic showing 96.55% polymorphism. with 13.17 average bands per primer. The PIC was recorded from 0.7947 to 0.9405. Jaccard’s coefficient of similarity of 12 brinjal genotypes ranged from 27.9 to 59.3%. Seventeen ISSR primers produced 161 bands/alleles in which 148 bands were polymorphic and 91.92% polymorphism with an average of 9.47 bands per primer. The PIC ranged between 0.7409 and 0.9008. Jaccard’s coefficient of similarity between 12 brinjal genotypes ranged from 37% to 63%. Fourteen SSR primers produced 33 bands/alleles in which 30 bands were polymorphic and 90.91% polymorphism with an average of 2.14 bands per primer. The PIC ranged between 0.0 and 0.7372. Jaccard’s coefficient of similarity between 12 brinjal genotypes ranged from 20 to 87.5%

The pooled study of molecular marker through RAPD, ISSR and SSR was done to confirm the differences and similarity between 12 brinjal genotypes. Dendrogram developed by Jaccard’s similarity coefficient and UPGMA method showed the highest (60.8%) similarity between JB-12-06 and JBG-10-208 and the lowest (32.0%) similarity between JBL-08-08 and Swarna Mani Black. The dendrogram consisted of two main clusters I and II with an average similarity of 38%. Among the studied techniques, RAPD primers gave slightly higher polymorphism among the genotypes (96.55%) as compared to ISSR markers (91.92%) and SSR markers (90.91%). More PIC and higher percentage polymorphism per primer was amplified by RAPD as compared to SSR and ISSR markers.

The genotype identification through morphological, biochemical and molecular markers resulted in developing moderate diversified dendrogram of 12 brinjal genotypes. The data revealed that molecular techniques are more accurate than biochemical and morphological markers, and can be used for genetic diversity analysis of brinjal genotypes.

*Key words:* RAPD, ISSR, SSR, Brinjal