

Genetic Diversity of Sugar Beet Pollinators

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Abstract : Information about genetic diversity of sugar beet parental populations is of a great importance for hybrid breeding programs. The aim of this research was to evaluate genetic diversity among and within populations and lines of diploid sugar beet pollinators, by using SSR markers. As plant material were used eight pollinators originating from three USDA-ARS breeding programs and four pollinators from Institute of Field and Vegetable Crops, Novi Sad. Depending on the presence of self-fertility gene, the pollinators were divided into three groups: autofertile (inbred lines), autosterile (open-pollinating populations), and group with partial presence of autofertility gene. A total of 40 SSR primers were screened, out of which 34 were selected for the analysis of genetic diversity. A total of 129 different alleles were obtained with mean value 3.2 alleles per SSR primer. According to the results of genetic variability assessment the number and percentage of polymorphic loci was the maximal in pollinators NS1 and tester cms2 while effective number of alleles, expected heterozygosity and Shannon's index was highest in pollinator EL0204. Analysis of molecular variance (AMOVA) showed that 77.34% of the total genetic variation was attributed to intra-varietal variance. Correspondence analysis results were very similar to grouping by neighbor-joining algorithm. Number of groups was smaller by one, because correspondence analysis merged IFVCNS pollinators with CZ25 into one group. Pollinators FC220, FC221 and C 51 were in the next group, while self-fertile pollinators CR10 and C930-35 from USDA-Salinas were separated. On another branch were self-sterile pollinators EL0204 and EL53 from USDA-East Lansing. Sterile testers cms1 and cms2 formed separate group. The presented results confirmed that SSR analysis can be successfully used in estimation of genetic diversity within and among sugar beet populations. Since the tested pollinator differed considering the presence of self-fertility gene, their heterozygosity differed as well. It was lower in genotypes with fixed self-fertility genes. Since the most of tested populations were open-pollinated, which rarely self-pollinate, high variability within the populations was expected. Cluster analysis grouped populations according to their origin.

Keywords : auto fertility, genetic diversity, pollinator, SSR, sugar beet

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