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RELATIONSHIP BETWEEN HYBRID PERFORMANCE AND GENETIC DIVERSITY BASED ON ISSR-PCR MARKERS IN PEPPER (*Capsicum annuum. L.*)

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ABSTRACT

Capsicum annuum is widely cultivated around the world. The enormous genetic diversity available for pepper breeding has facilitated the development of new varieties and hybrids. Several pepper breeders coincide in that the level of heterosis exhibited by pepper hybrids is directly related with the genetic distance between their parental lines. Therefore, it is important to develop reliable techniques for the estimation of genetic distance. The search for superior hybrid parents in pepper breeding programs is commonly based on the estimation of the General Combining Ability (GCA) and Specific Combining Ability (SCA) of inbred lines. However, the application of this procedure is expensive and time consuming. The development of DNA based molecular markers represents an alternative procedure for the identification of promising parental lines for high performance of hybrid production. The Inter Sequence Repeat Polymerase Chain Reaction (ISSR-PCR) markers have been widely used for the estimation of genetic distance among closely related individuals. Thus molecular markers, such as ISSR-PCR, could be used for germplasm classification and clustering. This could be a valuable information for heterosis prediction. The aim of this research was to study the relationship between the genetic distances, measured using ISSR markers among parental lines, and the heterosis observed as yield, of the F_1 hybrids as estimations of GCA, SCA. Heterosis were performed using seven elite lines and their F_1 hybrids. The 28 genotypes (7 lines and 21 hybrids) were distributed in the field following a complete block design with three replicates. The genotypes tested were statistically different for fruit yield/plant. Among all the hybrids and parental lines, the F_1 (P_4 x P_6) produced the highest yield. Also, GCA and SCA were statistically significant, with P_6 showing the highest GCA effect, and the F_1 (P_6 x P_7) the highest SCA. The F_1 (P_4 x P_6) showed the highest heterosis (108.95%). Genetic distances calculated by ISSR markers produced a dendogram with seven nodes for the parental lines. However, the correlation between the matrix of genetic distances among parental lines and the matrix of heterosis gave positive significant correlation ($r = 0.574$).

Key Words: *Capsicum annuum* — ISSR_PCR — cluster analysis — genetic diversity — heterotic group.