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Genetic analysis for fruit yield and its component characters in tomato (*Lycopersicon esculentum* Mill.)

U.J. PATEL, K.B. KATHIRIA, J.S. PATEL AND I.M. SAIYAD

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SUMMARY

A field trial was conducted to ascertain the genetics of fruit yield and its components using six generations of five crosses in tomato. The analysis exhibited the presence of additive, dominance and epistatic interactions in almost all the cases indicating the importance of both additive and non-additive gene actions for the expression of these traits. Duplicate type of gene action was also observed in majority of the cases. In this situation, recurrent selection, bi-parental mating, inter se mating between desirable segregants followed by selection can be employed in such genotypes.

Key words : Additive and non-additive gene action, generation mean analysis, *Lycopersicon esculentum* Mill.

The knowledge of gene effects for different traits in tomato is of prime importance before starting a breeding programme. Determination of the most suitable breeding method and selection strengthening for improvement of a trait would depend on the knowledge of gene actions operating in the breeding population. Generation mean analysis has a general application for genetic evaluation of any population irrespective of gene frequency and mating design. This provides not only valid estimate of gene effects but also an unambiguous test for presence or absence of epistasis. The present investigation was, therefore, undertaken to study the inheritance of fruit yield and its related characters in tomato and to suggest appropriate breeding approaches for its improvement programme.

MATERIALS AND METHODS

The experimental material comprised of five crosses *viz*., Feb 4 x KS 17, GT 2 x KS 17, Sel 14 x KS 118, GT 2 x GT 1 and SL 120 x Angur Lata. The six generations *viz*., P_1, P_2, F_1, F_2, B_1 and B_2 of each of five crosses were grown in compact family block design with three replications during 2005-06 at Main Vegetable Research Station, Anand Agricultural University, Anand (Gujarat). Each plot had one row for parents and F_1, two rows for each of the B_1 and B_2 and four rows for F_2 population. Each row consisted of 10 plants and the inter and intra row spacing was 90 and 75 cm, respectively.

Data were recorded on days to flower initiation, plant height (cm), fruit length (cm), fruit girth (cm), fruit weight (g), fruits per plant and fruit yield per plant (kg / plant). The characters were measured / recorded for five, ten and twenty competitive and randomly taken plants from each plot of homogeneous materials (parents and F_1s), backcrosses (B_1 and B_2) and F_2 generation, respectively.

The scaling tests A, B, C and D of Haymen and Mather (1955) were performed for all the characters under study to judge the adequacy of the additive - dominance model. Further it was confirmed by the joint scaling test given by Cavalli (1952). The crosses where the additive - dominance model was inadequate the genetic analysis carried out following Hayman (1958) using six-parameter model given by Jinks and Jones (1958).

RESULTS AND DISCUSSION

The A, B, C and D scaling test carried out in the five crosses indicated the presence of non-allelic interactions in almost all the cases except for days to flower initiation in the cross GT 2 x GT 1, for fruit length and fruit girth in the cross Feb 4 x KS 17, and in the cross SL 120 x Angur Lata for the traits *viz*., days flower initiation, fruit length and fruit girth (Table 1). In all other cases, the additive - dominance model was found to be inadequate to explain the gene action. The A and B scaling tests provided the evidence for the presence of 'i' (additive x additive), 'j' (additive x dominance) and 'l' (dominance x dominance)

Correspondence to:
U.J. PATEL, Department of Plant Breeding and Genetics, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA
Authors' affiliations:
K.B. KATHIRIA, Main Vegetable Research Station, Anand Agricultural University, ANAND (GUJARAT) INDIA
J.S. PATEL, Department of Agricultural Statistics, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA
I.M. SAIYAD, Department of Plant Breeding and Genetics, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA