

Study of the trait and fourth cumulants of tomato (*Lycopersicon esculentum* Mill.) population to detect additive epistasis and identify the nature of gene interaction

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ABSTRACT

Genetic studies were done in tomato and parameters such as skewness and kurtosis were statistically analyzed for yield and physiological traits. Studies on skewness and kurtosis revealed that additive epistasis was present for number of fruits per plant, number of primary branches per plant and single fruit weight in cross III, cross IV and cross V. Studies on the nature of gene interaction are undoubtedly needed to increase the efficiency of selection and breeding programme.

Key words : Skewness, Kurtosis, Additive epistasis, F_2 generation

Tomato (*Lycopersicon esculentum* Mill.) is one of the important vegetable grown through out the world including tropical, sub tropical and temperate regions. Tomato begins its colourful and varied history in the entire globe. It occupies the top ranking in acceptance by every human race. It is a good source of vitamin A (320 IU per 100 g), vitamin C (31 mg per 100 g) and minerals (680 mg per 100 g). It tops the list of industrial crops because of its outstanding processing qualities. Tomatoes are mainly used as a food ingredient. The fruits are consumed raw, cooked or processed as juice, ketchup, sauce, paste, puree etc.

A study was undertaken utilizing the intervarietal crosses of tomato (*Lycopersicon esculentum* Mill.) to select superior crosses and promising segregants in F_2 generation with the objectives to study the trait and fourth cumulants of tomato population to detect additive epistasis and identify the nature of gene interaction.

MATERIALS AND METHODS

The present study on tomato (*Lycopersicon esculentum* Mill.) was carried out at the Agricultural College and Research Institute, Madurai during 2005-2006 involving F_2 generation of six intervarietal crosses, with an aim to select the best crosses / families and promising progenies in each cross, for yield and physiological characters.

The experimental materials included were six crosses of F_2 viz., $P_3 \times P_4$ (CO 3 x Arka Meghali), $P_3 \times P_6$ (CO 3 x CLN 1462 AG), $P_4 \times P_6$ (Arka Meghali x CLN 1462

AG), $P_4 \times P_5$ (Arka Meghali x Paiyur 1), $P_4 \times P_8$ (Arka Meghali x H 24), $P_5 \times P_8$ (Paiyur 1 x H 24) involving five parents viz., P_3 (CO 3), P_4 (Arka Meghali), P_5 (Paiyur 1), P_6 (CLN 1462 AG) and P_8 (H 24). The selfed seeds of F_1 generation from the previous study conducted by Rahul Marik (2005) were used for raising the F_2 progenies.

Study of F_2 generation:

The F_2 generation was raised during June-October, 2005. A total of two hundred and fifty plants of each cross were maintained in all the six crosses. Forty plants in each of five parents involved in the above crosses were also maintained. The progenies were evaluated for eleven characters on single plant basis for yield and physiological contributions.

Selfing:

The selected F_2 progenies were selfed with an idea of forwarding them to the next generation. Care was taken to maintain a healthy crop by adopting all the recommended cultural practices. Observations were recorded on single plant basis in F_2 populations on plant height, number of primary branches per plant, number of fruits per plant, single fruit weight, fruit yield per plant, flowering duration and physiological characters viz., style length, chlorophyll stability index, root length, dry matter accumulation, root/shoot ratio.

Skewness and kurtosis:

Formula by Choo and Rein berg (1994) was used