

## Analysis of direct and indirect effects of various components on tomato (*Lycopersicon esculentum* Mill.) fruit yield by correlation and path co-efficient analysis

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### ABSTRACT

Genetic studies were conducted for yield and physiological traits in  $F_2$  generation involving six crosses. The parameters statistically analyzed were correlation and path analysis to study direct and indirect effects of various components on fruit yield. From the correlation studies, it was revealed that the trait plant height followed by dry matter accumulation and number of fruits per plant showed the highest positive and significant relationship with fruit yield. The path analysis in  $F_2$  cross combination concluded that plant height, number of fruits per plant and flowering duration had the highest direct contribution than other component of yield in all the six crosses. If emphasis would be given for selection of these traits in breeding programme, it will automatically increase fruit yield per plant.

**Key words :** Correlation, Path analysis,  $F_2$  generation, Direct and indirect effects, Tomato

Tomato occupies the largest area among the vegetable crops in the world, next to potato. It is considered as "poor man's apple" because of its attractive appearance and high nutritive value. In the recent past, tomato improvement is being attempted with wider breeding objectives, including development of heat tolerant lines, processing tomatoes and resistant genotypes for various biotic and abiotic stresses etc.

Unfortunately, the minimum temperature of Tamil Nadu also, never falls below  $20^{\circ}\text{C}$  during summer months. Hence attempts have been made in recent past to evolve a variety with potentiality of high yield and also tolerance for heat. Based on these objectives parents of heat tolerants were selected in this study.

Further, in any crop improvement programme, it is obvious to have simultaneous improvement of more than one character. Involvement of more than one component in the expression of complex characters like yield complicates the progress of selection. Hence, before attempting for selection, information on magnitude of association existing between these characters and their components should be made available. Estimate of simple correlation coefficient is important to facilitate selection programme. Hence, selection based on the magnitude and direction of association between yield and its components would be more useful for a successful breeding programme.

### MATERIALS AND METHODS

The study was undertaken at Agricultural College

and Research Institute, Madurai utilizing the intervarietal crosses of tomato (*Lycopersicon esculentum* Mill.) with an aim to select superior crosses and promising segregants in  $F_2$  generation

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. The unopened, matured flower buds of the crosses and parents that are likely to open on the next day were covered with butter paper covers and the same were removed after 4 or 5 days following the confirmation of self pollination with