



GRAPHICAL ANALYSIS FOR FRUIT YIELD AND ITS COMPONENT TRAITS IN BRINJAL (*SOLANUM MELONGENA* L.)

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Abstract

Present investigation is carried out with six diverse genotypes of brinjal (*Solanum melongena* L.) and generated thirty F1 crosses through 6×6 full diallel mating design, it was found that a lot of diversity present with respect to all the traits as depicted by scattered positions of parental arrays in the Vr-Vr graphs. The present study indicated that existence of both additive and non-additive genetic variances for inheritance of most of the traits. The graphical analysis revealed that number of secondary branches per plant, number of long styled flowers per plant, number of medium styled flowers per plant, number of flowers per plant, days to 1st flowering, number of fruits per plant, fruit length and fruit girth were controlled by partial dominance. The over-dominance played a role for the inheritance of plant height, number of primary branches per plant, number of short styled flowers per plant, fruit set percentage, shoot and fruit borer incidence, fruit weight and fruit yield per plant.

Key words : Brinjal, Full Diallel, Graphical analysis and Vr-Wr graph.

Introduction

Brinjal (*Solanum melongena* L.) is one of the important vegetable crops grown in India. Diallel analysis helps in understanding the genetic control of the trait, which guides the breeder to advance and select segregating populations. There are several approaches available for analysis of diallel crosses but the two main approaches being followed are Griffing's (1956) and Hayman's (1954) approaches. These two approaches are often used together for complementary data interpretation. The analysis has been used successfully by various scientists in peppers (Baseerat *et al.*, 2013) and in brinjal (Biswajit *et al.*, 2004 and Hussain *et al.*, 2018).

The nature of gene action involved in the inheritance of various characters is very important to decide any

breeding methodology for crop improvement. This can be determined by graphical approach (Vr-Wr graph). To test the validity of the assumption, relation between the variance (Vr) and parent offspring covariance (Wr) of the same array and linear regression coefficient of Wr on Vr over arrays provides adequate means. The Vr-Wr statistic provides an estimate of the relative number of dominance to recessive genes present in the common arrays of the parents, with the Vr and Wr statistics, calculated from diallel tables, graphs can be drawn and the geometric representation of these statistics can be interpreted. The position of the regression line in the graph indicates the degree of dominance and we can construct parabola limits in this graph. The interpretation of the results of this analysis is easy and straight forward if the main assumptions of the diallel analysis are fulfilled. The present investigation was planned to assess the gene action in all the ways for different quantitative characters

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in brinjal that could be utilized in specific breeding programme for achieving fruitful results.

Materials and Methods

The basic materials for the present investigation consisted of six diverse genotypes of brinjal (*Solanum melongena* L.) viz., IC 316291, IC 127063, Pechiparai-mothiramalai local, Pechiparai local, Annamalai brinjal, and Thoivalai local. These lines were selected for the present study on the basis of diversity for various morphological traits. Thirty F1 crosses were generated through 6 x 6 full diallel mating design at Department of Horticulture, Faculty of Agriculture, Annamalai University, Chidambaram, Tamil Nadu. The final experimental materials consisting of six parents and thirty F1 crosses were evaluated in randomized block design with three replications. The observations were recorded for fifteen characters viz; plant height, number of primary branches per plant, number of secondary branches per plant, number of long styled flowers, number of medium styled flowers per plant, number of short styled flowers per plant, number of flowers per plant, days to 1st flowering, number of fruits per plant, fruit set percentage, shoot and fruit borer incidence, fruit length, fruit girth, fruit weight and fruit yield per plant. Recommended package of practices were adopted to raise a healthy crop. The graphical analysis was done according to Hayman (1954).

Results and Discussion

The pooled Vr-Wr graphs are presented in (Figs. 1 to 15). The scattered position of parental arrays in the Vr-Wr graphs indicated that a lot of diversity was present with respect to plant height, number of primary branches per plant, number of secondary branches per plant, number of long styled flowers per plant, number of medium styled flowers per plant, number of flowers per plant, days to 1st flower, number of fruits per plant, shoot and fruit borer incidence, fruit length, fruit weight and fruit yield per plant. Graphical analysis for fruit set percentage, and fruit girth revealed that some of the parental arrays were clustered around the regression line indicating little diversity for these traits.

The relative position of the parental points along the regression line indicated the distribution of dominant and recessive genes in the parents. The location of array points nearer to the point of origin and far away from the point of origin suggested higher proportion of dominant and recessive genes in the parents, respectively. A higher proportion of dominant genes observed in the parents P₁- IC 316291 for plant height, primary branches per plant, secondary branches per plant, number of long styled

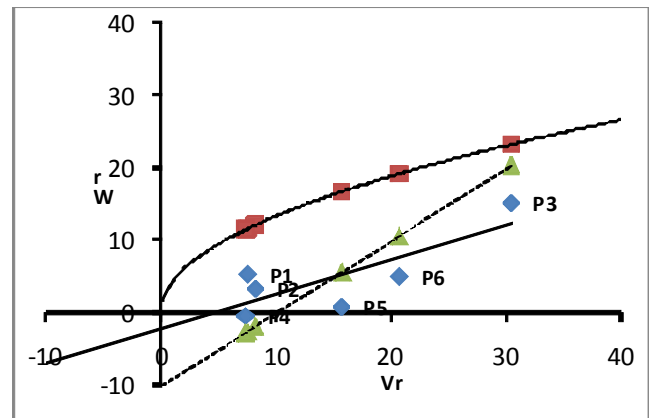


Fig. 1: Plant height.

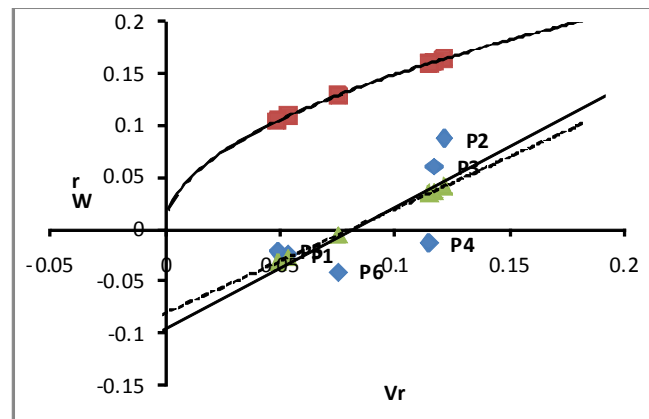


Fig. 2: Number of primary branches per plant.

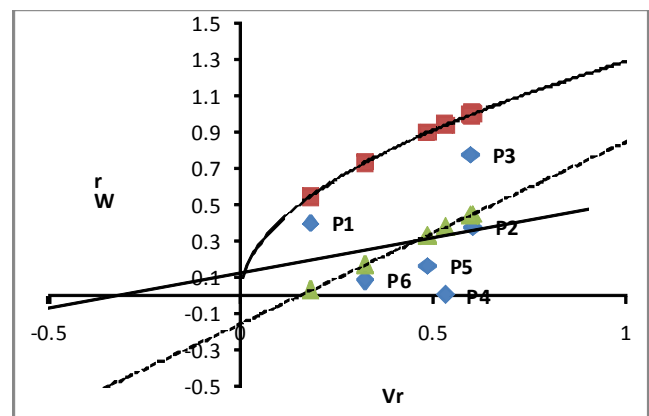


Fig. 3: Number of secondary branches per plant.

flowers per plant, number of flowers per plant, days to 1st flower, number of fruits per plant, fruit weight and fruit yield per plant; P₂- IC 127063 for plant height, number of short styled flowers per plant, fruit set percentage, shoot and fruit borer incidence and fruit yield per plant; P₃- Pechiparai-Mothiramalai local for number of flowers per plant, days to 1st flower per plant, number of fruits per plant and fruit set percentage; P₄- Pechiparai local for plant height and fruit yield per plant; P₅- Annamalai brinjal for number of primary branches per plant, fruit

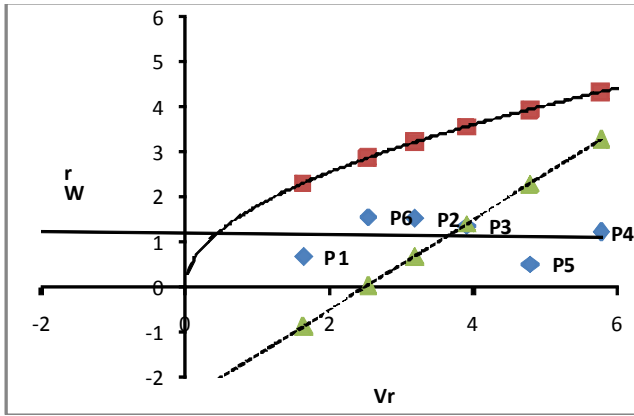


Fig. 4: Number of long styled flowers per plant.

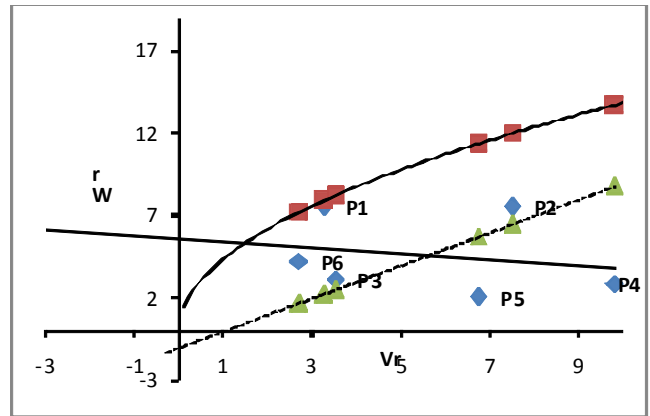


Fig. 7: Number of flowers per plant.

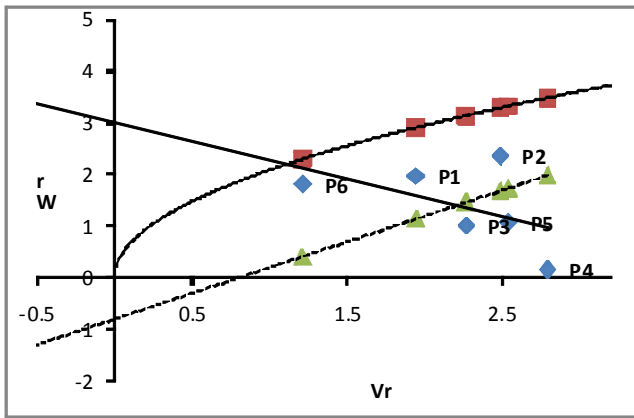


Fig. 5: Number of medium styled flowers per plant.

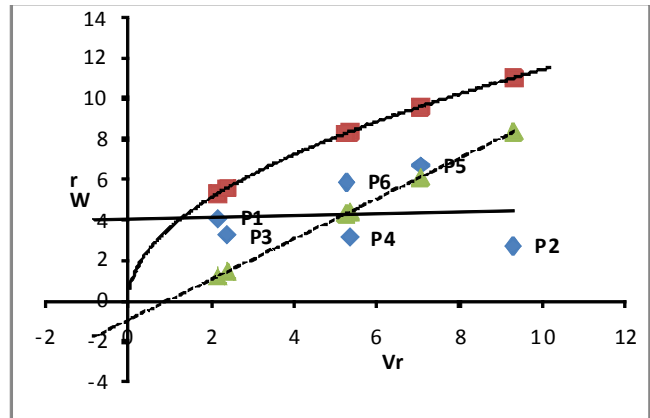


Fig. 8: Number of days to first flowering.

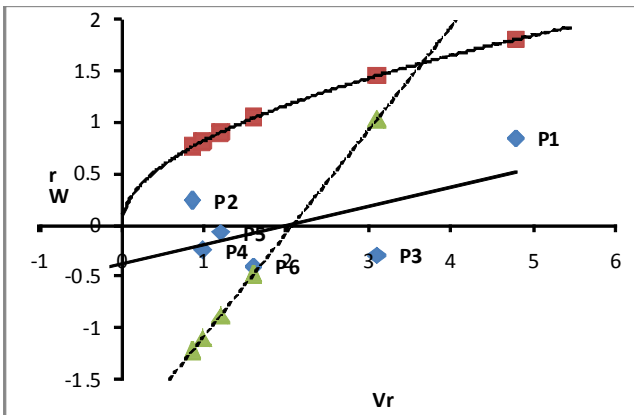


Fig. 6: Number of short styled flowers per plant.

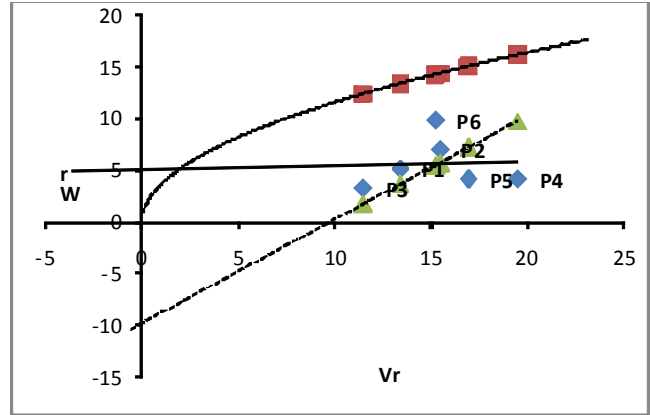


Fig. 9: Number of fruits per plant.

girth and fruit yield per plant; P_6 -Thovalai local for number of primary branches per plant, number of secondary branches per plant, number of long styled flowers per plant, number of medium styled flowers per plant, number of flowers per plant and fruit length. On the other hand, higher proportion of recessive genes were manifested in the parents P_1 - IC 316291 for number of short styled flowers per plant and fruit length; P_2 - IC 127063 for number of primary branches per plant, days to 1st flower

and fruit length; P_3 - Pechiparai – Mothiramalai local for plant height, number of primary branches per plant, number of secondary branches per plant and fruit yield per plant; P_4 - Pechiparai local for number of primary branches per plant, number of flowers per plant, number of fruits per plant and fruit girth; P_5 - Annamalai brinjal for number of short styled flowers per plant and P_6 - Thovalai local for fruit set percentage, shoot and fruit borer incidence, fruit weight and fruit yield per plant. Over-dominance played

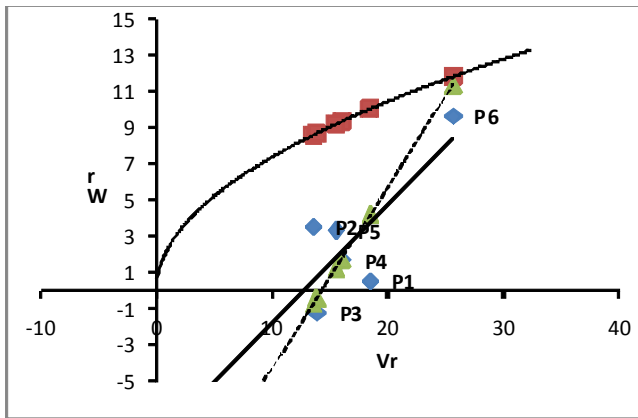


Fig. 10: Fruit set percentage.

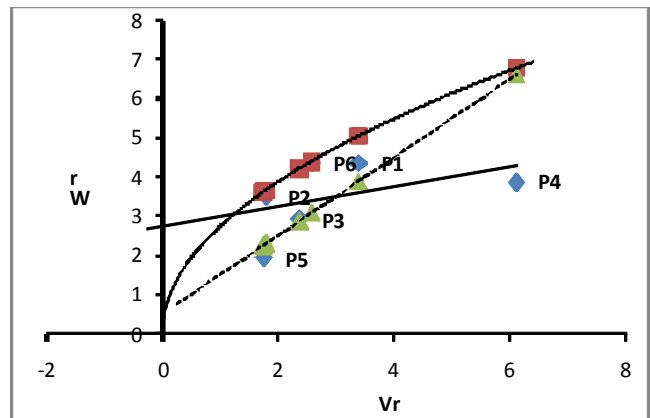


Fig. 13: Fruit girth.

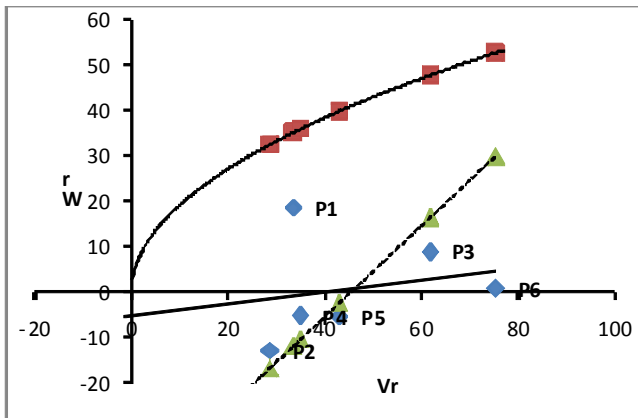


Fig. 11: Shoot and fruit borer incidence (%).

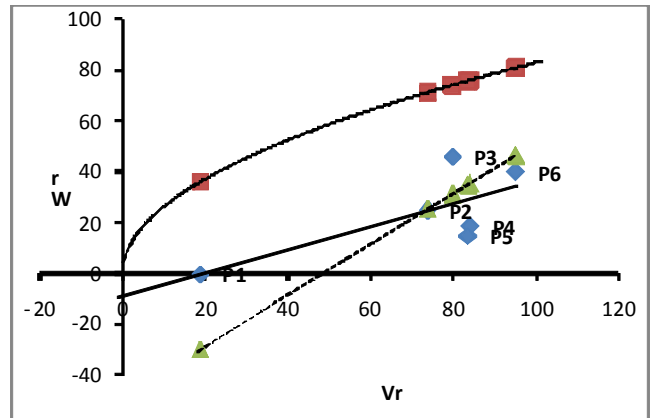


Fig. 14: Fruit weight.

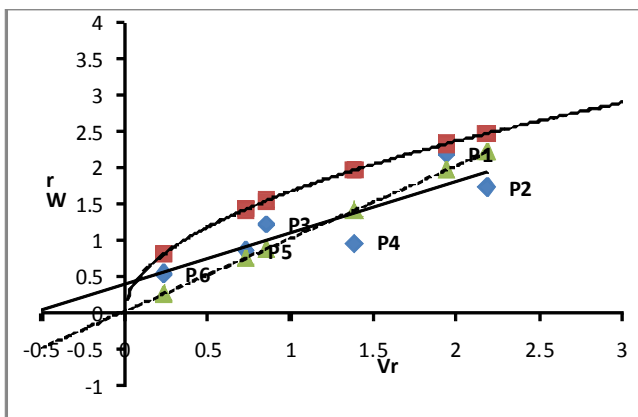


Fig. 12: Fruit length.

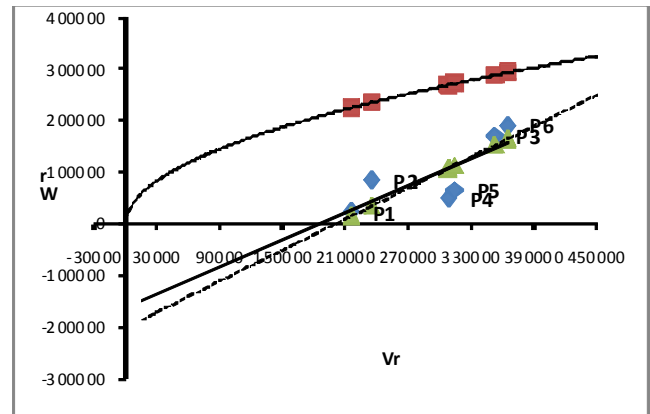


Fig. 15: Fruit yield per plant.

a role for plant height, number of primary branches per plant, number of short styled flowers per plant, fruit set percentage, shoot and fruit borer incidence, fruit weight and fruit yield per plant. Where as partial dominance played a role for number of secondary branches per plant, number of long styled flowers per plant, number of medium styled flowers per plant, number of flowers per plant, days to 1st flower, number of fruits per plant, fruit length and fruit girth. Most of the findings results have also been corroborated with the reports of Sousa and

Maluf (2003) and Baseerat *et al.* (2013) for various traits in brinjal.

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