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Original Research Article

Order of Dominance for Maturity Traits in Eight Parents Bottle Gourd [*Lagenaria siceraria* (Mol.) Standl.]

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A B S T R A C T

The experiment was conducted in Randomized Complete Block Design with three replications to assess the performance of 28 hybrids and their 8 parental lines conducted at Vegetable Research Farm, Department of Horticulture, Banaras Hindu University, Varanasi. Gene Action refers to the behavior or mode of expression of genes in a genetic population. Knowledge of gene action helps in the selection of parents for use in the hybridization programmes and also in the choice of appropriate breeding procedure for the genetics improvement of various quantitative characters. The coefficient of correlation (r) between parental order of dominance (Wr-Vr) and parental measurements (Yr) was calculated to get an idea about the dominance genes with positive and negative effects. The present study consisted of eight distinct genotypes and important varieties collected from Indian Institute of Vegetable Research. These were Samrat (P_1 + Stranded variety), Aditi (P_2), Pusa Summer Prolific Long (P_3), IC 093236 (P_4), TC 092372 (P_5), VRBG 100 (P_6), VRBG VAR - 45 (P_7) and VRBG 444 (P_8).

Keywords

Additive, Dominance, Genetic variation, Samrat, PSPL, Yield

Introduction

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is synonymously called as Calabash gourd. Bottle gourd is a vigorous, monoecious, annual, climbing or prostrate, branching herb, with angular, ribbed, thick, softly hairy stem and proximally bifid tendrils. The tender edible fruit are also prepared into sweets, pickles, rayata and other delicious preparation. It is one of the most nutritive menu for human and tone up his energy and vigour, because it happens to be valuable source of carbohydrates, proteins, vitamins and minerals (Kumar *et al.*, 2011). The coefficient of correlation (r) between parental order of dominance (Wr-Vr) and parental measurements (Yr) was calculated to get an idea about the dominance genes with positive and negative effects. Recurrent selection for gca is effective with additive gene effects, recurrent selection for sca makes use of non-additive gene effects and reciprocal recurrent selection utilizes both additive and non-additive gene effects (Kathiria *et al.*, 2005).Gene Action refers to the behavior or mode of expression of genes in a genetic population. Knowledge of gene

action helps in the selection of parents for use in the hybridization programmes and also in the choice of appropriate breeding procedure for the genetics improvement of various quantitative characters.

Hence, insight into the nature of gene action involved in the expression of various quantitative characters is essential to a plant breeder for starting a judicious breeding programme in bottle gourd (Parvathi *et al.*, 2005).

Therefore, for development of effective breeding programme in bottle gourd one need to elucidate the genetic nature and magnitude of quantitative inherited traits and estimated prepotency of parents in hybrid combinations.

Materials and Methods

The experimental material for the present study consisted of eight distinct genotypes and important varieties collected from Indian Institute of Vegetable Research. These were Samrat (P_1 + Stranded variety), Aditi (P_2), Pusa Summer Prolific Long (P_3), IC 093236 (P_4), TC 092372 (P_5), VRBG 100 (P_6), VRBG VAR - 45 (P_7) and VRBG 444 (P_8). The experiment was conducted in Randomized Complete Block Design with three replications to assess the performance of 28 hybrids and their 8 parental lines conducted at Vegetable Research Farm, Department of Horticulture, Banaras Hindu University, Varanasi. The crop was planted in rows spaced at 3.0 meters with plant to plant spacing of 0.5 meter apart. All the recommended agronomic package of practices and plant protection measures were followed to raise a good crop. The data were recorded for maturity traits *viz.*, days to first staminate flower anthesis, days to first pistilate flower anthesis, days to first fruit harvest, primary branches per plant, node number of first staminate flowers and node number of first pistilate flowers.

Results and Discussion

The Vr-Wr graph for days to first staminate flower anthesis (Fig. 1) showed that the regression line intersect the Wr-axis above the origin indicating presence of partial dominance.

The parent IC 093236 possessed dominant genes, while parents Samrat and Aditi had recessive genes for days to first staminate flower anthesis. However, PSPL, TC 092372, VRBG 100, VRBG VAR - 45 and VRBG 444 occupied intermediate position indicating presence of dominant and recessive genes in parents, more or less in equal proportion.

The Vr-Wr graph (Fig. 2) revealed that the dominant gene was in greater proportion in parent IC 093236 whereas, Samrat, Aditi, PSPL, VRBG 100 and VRBG VAR - 45 contained greater proportions of recessive genes.

The intermediate position of TC 092372 and VRBG 444 indicated the distribution of equal proportion of dominant and recessive genes in them governing days to first pistilate flower anthesis. The regression line intersect the Wr-axis above the origin indicating expression of this trait under the control of partial dominance.

In the Vr-Wr graph (Fig. 3), regression line intersected the Vr-axis below the origin indicating presence of over-dominance for days to first fruit harvest. The scattered parental array points indicate the differences between the parents regarding this trait. The parent VRBG VAR-45 was away from the origin, indicating greater proportion of recessive alleles for days to first fruit harvest (Singh *et al.*, 2000) (Table 1–3).

Table.1 Vr-Wr graph of eight genotype for maturity traits in bottle gourd

• **Vr-Wr (Parental array points)**	**Vr-Wrp (Parabolic curve)**
Vr Wrei (Observed regression line)	**Vr- Wrei (Expected regression line)**

Fig.1 Vr-Wr graph for days to first staminate flower anthesis

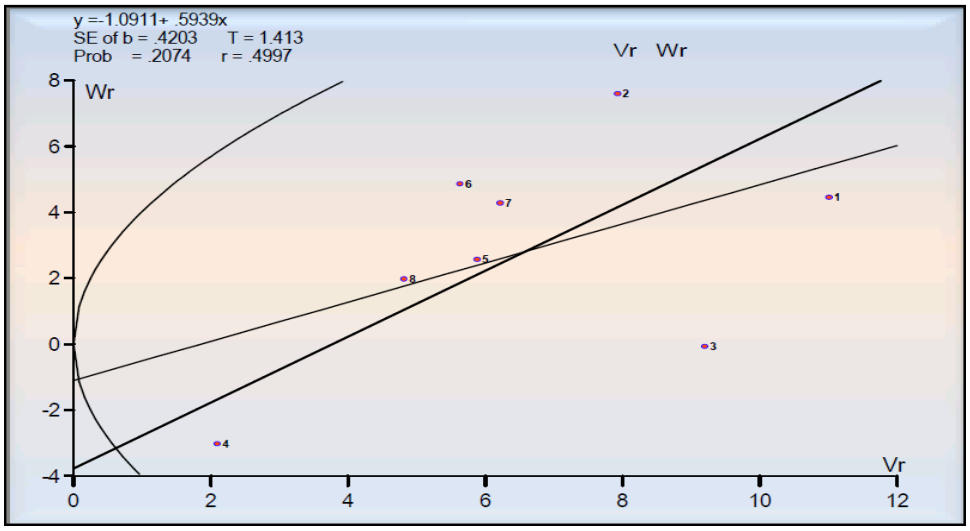
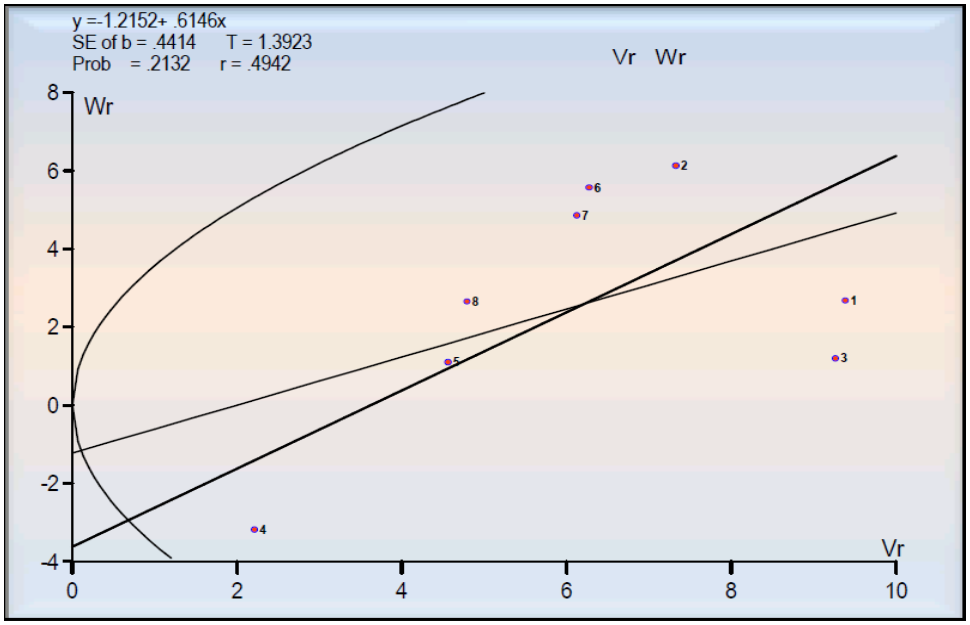


Fig.2 Vr-Wr graph for days to first pistilate flower anthesis



Samrat (P_1), Aditi (P_2), Pusa Summer Prolific Long (P_3), IC 093236 (P_4), TC 092372 (P_5), VRBG 100 (P_6), VRBG VAR - 45 (P_7) and VRBG 444 (P_8)

Table.2

• **Vr-Wr (Parental array points)**	**Vr-Wrp (Parabolic curve)**
Vr Wrei (Observed regression line)	**Vr- Wrei (Expected regression line)**

Fig.3 Vr-Wr graph for days to first fruit harvest

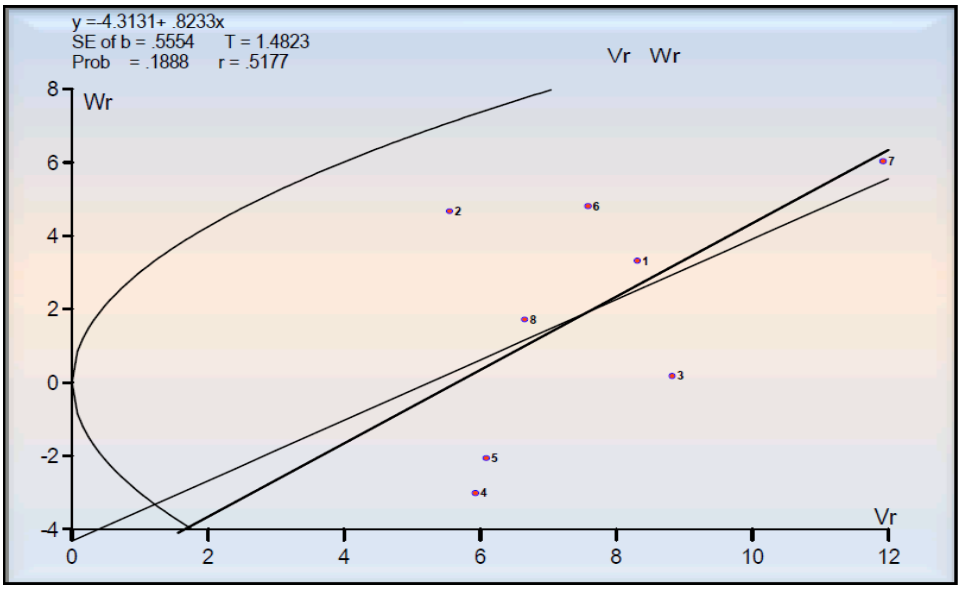
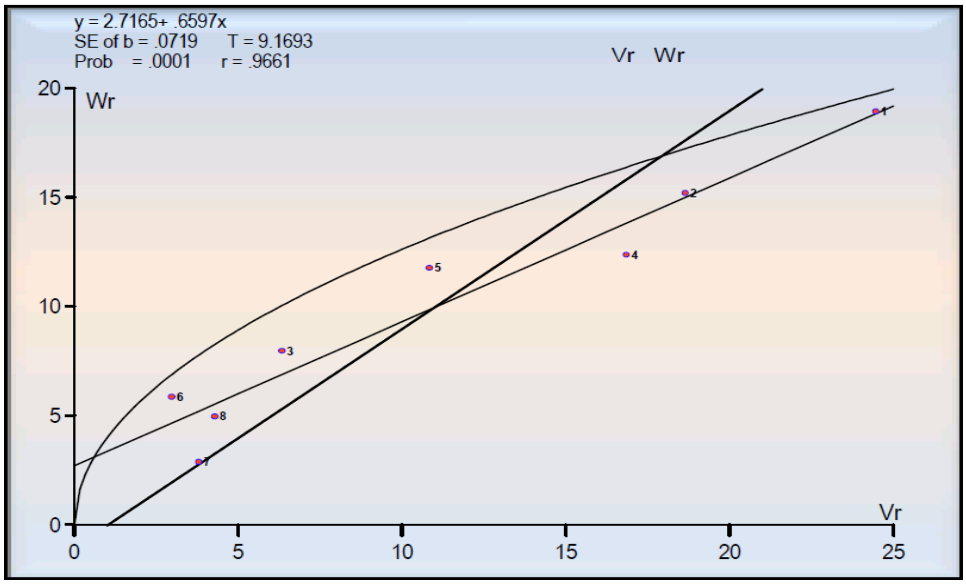


Fig.4 Vr-Wr graph for primary branches per plant



Samrat (P_1), Aditi (P_2), Pusa Summer Prolific Long (P_3), IC 093236 (P_4), TC 092372 (P_5), VRBG 100 (P_6), VRBG VAR - 45 (P_7) and VRBG 444 (P_8)

Fig.5 Vr-Wr graph for node number of first staminate flower

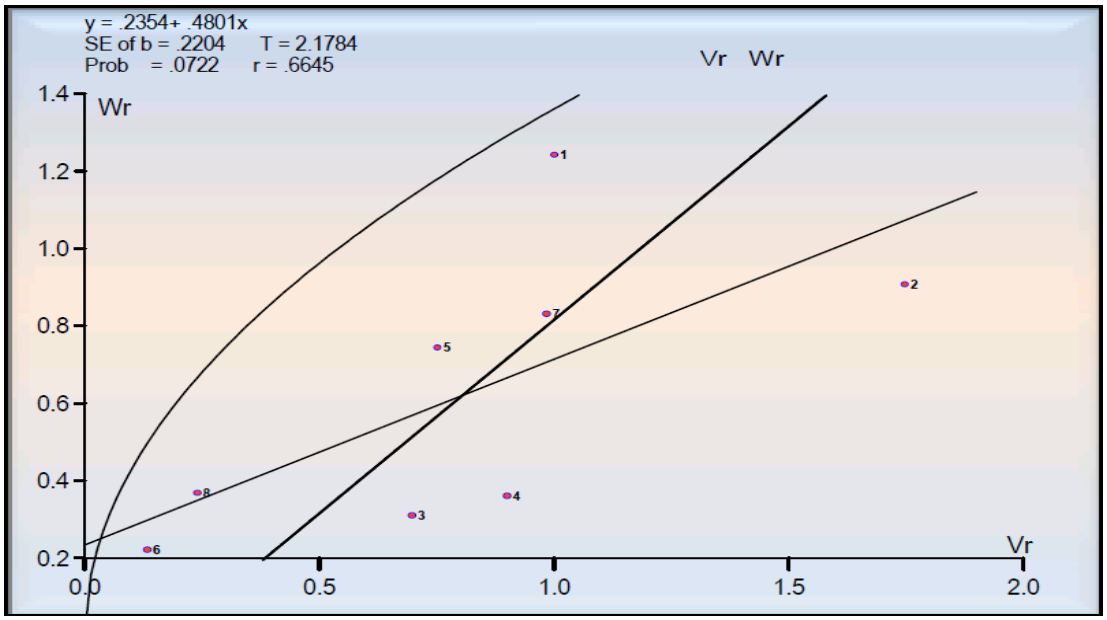
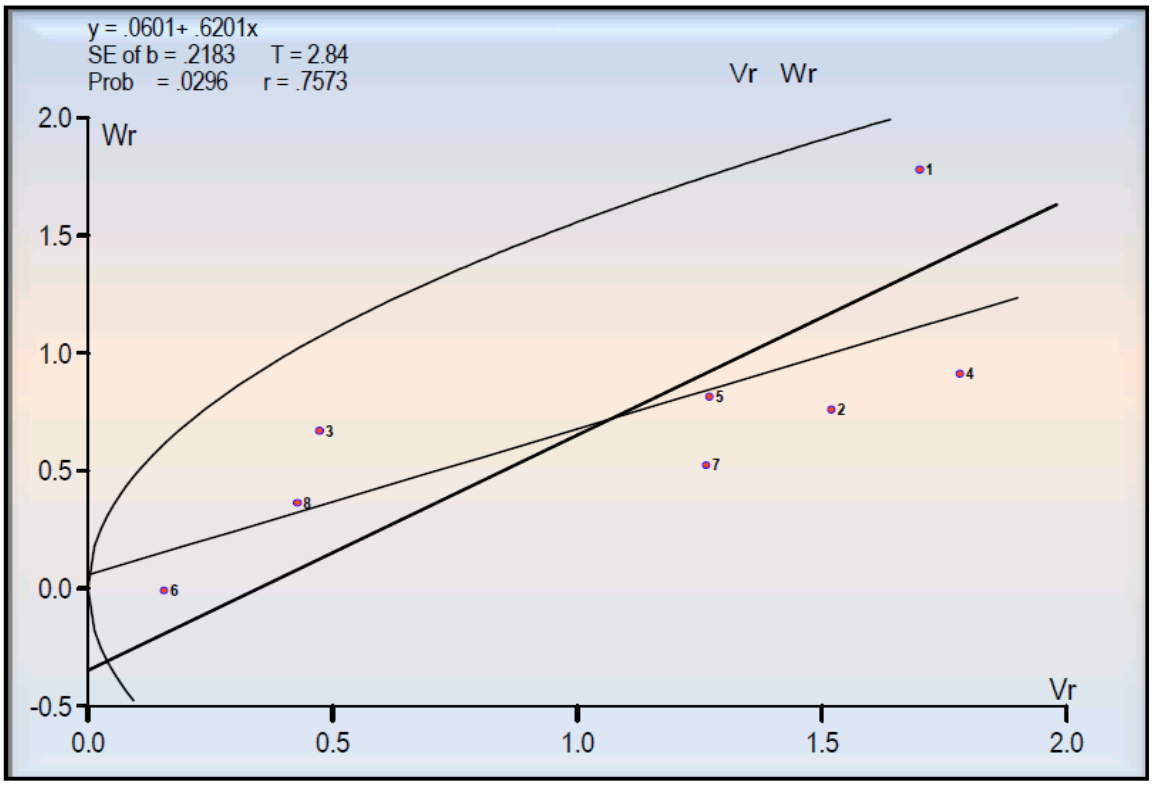


Fig.6 Vr-Wr graph for node number of first pistilate flowers



Samrat (P_1), Aditi (P_2), Pusa Summer Prolific Long (P_3), IC 093236 (P_4), TC 092372 (P_5), VRBG 100 (P_6), VRBG VAR - 45 (P_7) and VRBG 444 (P_8)

Table.3

• **Vr-Wr (Parental array points)**	**Vr-Wrp (Parabolic curve)**
Vr Wrei (Observed regression line)	**Vr- Wrei (Expected regression line)**

Vr-Wr graphs (Fig. 4) shows that regression line intersected the Vr-axis below the origin indicating presence of over-dominance for primary branches per plant.

The scattered parental array points indicated the differences between the parents regarding this trait. The parent Samrat was away from the origin, indicating greater proportion of recessive alleles for primary branches per plant.

The parents VRBG 444 and VRBG 100 falling towards origin indicates the presence of greater proportion of dominant genes whereas, parent Samrat and Aditi being far away from origin indicated presence of recessive genes controlling this trait, while rest of the parents occupying intermediate position contained equal proportion of dominant and recessive genes. The regression line intersects the Vr-axis below indicating the trait was under the control of over-dominance (Fig. 5) for node number of first staminate flowers.

The Vr-Wr graph for node number of first pistilate flowers (Fig. 6) showed that the regression line intersects the Wr-axis above the origin indicating presence of partial dominance.

The parents IC 093236 and Samrat possessed recessive genes while parent VRBG 100 had dominant genes for node number of first staminate flowers.

The positive correlation coefficient (r) between parental order of dominance (Wr + Vr) and parental measurement (Yr) for majority of traits indicated the direction of dominance towards negative side (Quamruzzaman and Ahmad, 2010 and Sharma *et al.*, 2010). The validity of specific assumption of diploid segregation, lack of reciprocal differences and multiple allelism was presumed. Bottle gourd being cross pollinated crop, it is tedious to get complete homozygous parents for all the traits (Wani *et al.*, 2008). However, if some traits exhibit the partial non fulfillment of assumption, the estimates of population parameters are still possible.

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