

Short Communication

**Variability and Correlations among Growth Attributes in Pomegranate in Semi-arid Bhal**

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Pomegranate (*Punica granatum* L.) is one of the important table fruits of tropical and sub-tropical regions. In arid and semi-arid regions, however, the growth of this crop is slow and the crop generally faces problem of fruit cracking due to fluctuations in soil moisture. Bhal Zone of Gujarat falls under semi-arid climate, where soil is saline-sodic, groundwater is brackish and productivity of field crops is low and unstable. As the crop can tolerate drought and saline water irrigation to some extent, growing of pomegranate fruit crop could be one of the viable alternatives. As pomegranate is a newly introduced crop in this zone, information on its survival, growth attributes and correlation among growth attributes of pre-bearing plants is not available. Keeping the above points in view, the present investigation was undertaken on pomegranate to find out their survival, growth patterns/attributes (plant height, N-S and E-W spread, number of branches and canopy volume) of pre-bearing plant, their variability and correlations among the growth attributes in order to predict fruit yield.

The study was conducted on pomegranate (var. Ganesh) at Regional Research Station, Gujarat Agricultural University, Arnej, from 1995 through 1998 on a clay soil (Vertic Ustochrept) having low available N and P,

and high available K. The maximum and minimum temperatures during the period of study were 45 to 47°C and 4.2 to 5.8°C, respectively. Rainfall received during 1995, 1996, 1997 and 1998 was 405.3, 562.8, 1041.7 and 678.5 mm, respectively. Nine-month-old pomegranate seedlings (95 nos.) were transplanted on the 7 March 1995 at a spacing of 5 x 5 m, applying 10 kg FYM and 100 g insecticide per pit. Each seedling was fertilized with 33 g urea, 54 g DAP and 20 kg FYM in the second and third year. During summer, plants were uniformly irrigated once a week through drip irrigation with 25 L of water of 2 to 4 dS m<sup>-1</sup> salinity. Basins of plants were covered with grass mulch to conserve soil moisture and reduce weed infestation. Survival per cent and growth characters of randomly chosen 30 pre-bearing plants were recorded on 8 December 1997, while number of fruits and yield of 30 plants were recorded in 1998. Height was measured from base to tip of last leaf, while spread in N-S and E-W were measured from last tip of leaves on both the directions. Range, mean, standard error (SE) and coefficient of variation (CV %) in respect of growth attributes of pomegranate plants are presented in Table 1, while simple correlation coefficient (r) are given in Table 2.

Table 1. Range, mean, standard error and coefficient of variation of growth attributes in pomegranate

Character	Range	Mean	S.E.m±	C.V. (%)
Plant height (m)	1.45-2.20	1.92	0.04	11.46
N-S spread (m)	1.40-2.90	2.06	0.07	18.36
E-W spread (m)	1.40-2.30	1.92	0.04	12.70
Canopy volume (m <sup>3</sup> )	1.44-8.43	4.39	0.34	41.86
No. of stem/plant	2.01-5.00	2.77	0.13	25.84

The results revealed that 86% pomegranate plants survived as of December 1997. The canopy volume showed the highest range of variability, followed by number of stems, N-S spread, E-W spread and plant height (Table 1). Plant attained mean canopy volume of 4.39 m<sup>3</sup> with mean N-S and E-W spread of 2.06 m and 1.92 m, respectively, and height of 1.92 m. Average number of stems per plant was 2.77. The data clearly indicate that in semi-arid Bhal zone, though the survival per cent and height of pomegranate plant is good, the canopy volume, in particular, which has large bearing on fruiting (Chundawat, 1990) has comparatively high degree of variability under the prevailing Vertisol/Vertic Inceptisol: Character associated revealed that only six correlations were positive and significant (Table 2). Of them, three correlations were associated with canopy volume. Canopy volume had shown the highest and positive correlation with N-S

spread (0.96\*\*), followed by E-W spread (0.84\*\*) and plant height (0.38). Plant height was positively associated with N-S spread (0.42\*) and E-W spread (0.37\*), indicating that with increase in plant height, plant spread also increased. A highly positive correlation also existed between N-S and E-W spread of plant. Since pomegranate fruits are borne terminally on short spurs arriving from mature shoots, the growth of new shoots, which result in good spread and canopy volume, is a good sign (Chundawat, 1990). Thus, higher the canopy spread and volume the more is the probability of bearing of pomegranate fruits. Yield recorded during 1998 varied from 2.80 to 8.70 kg plant<sup>-1</sup> with a mean of 4.80 kg plant<sup>-1</sup>, while number of fruits varied from 22 to 62, with a mean of 34. Thus E-W spread or N-S spread, which ultimately results in the higher canopy volume, increases the probability of fruit bearing capacity of plant. Correlation worked out between fruit yield and canopy volume,

Table 2. Correlation co-efficients among growth attributes

Character	Plant height	N-S spread	E-W spread	Canopy volume	No. of stem/plant
Plant height	1				
N-S spread	0.42*	1			
E-W spread	0.37*	0.70**	1		
Canopy volume	0.38*	0.96**	0.84**	1	
No. of stem/plant	0.17	-0.23	-0.09	-0.20	1

\* Significant at 0.05%, \*\* Significant at 0.01%.

E-W and N-S spread revealed that correlation between number of fruits and canopy volume (0.96\*\*), and weight of fruits and canopy volume (0.86\*\*) depicted the highest significant correlation amongst all, indicating that the canopy volume can predict to a higher degree the future growth and yielding ability of pomegranate plant. About 92% and 74% variability in number of fruits and weight, respectively, were controlled by canopy volume of pre-bearing plants. A similar observation on such associations amongst growth attributes in fruit plants was earlier reported by Read (1928) and Shikhamany *et al.* (1978). Number of stems, however, was not significantly related with

other growth attributes. Varying the number of stem from 1 to 5, however, did not affect the yield of pomegranate in initial year at Rahuri (Chundawat, 1990).

### References

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