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Standardization of severity of pruning and crop load on growth and yield in pomegranate (*Punica granatum* L.) var. Bhagwa

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Abstract
15 cm pruning + 40 fruit retained per plant in two years old tree resulted in recording has enhanced the growth characters and given maximum plant height (3.47 m), maximum number of shoot/branch (3.88), maximum length of shoot at 75 DAP (33.05 cm) and 150 DAP (48.05 cm). While, 30 cm pruning + 30 fruit retained per plant gave maximum fruit diameter (8.95 cm) and maximum fruit weight (392.50 g). However, 30 cm pruning + 50 fruit retained per plant gave maximum leaf area (10.50 cm^2), maximum number of flowers/shoot (6.88) and maximum fruit yield/plant (18.35 kg).

Keywords: Pomegranate (*Punica granatum* L.) var. Bhagwa, pruning, crop load

Introduction
Pomegranate (*Punica granatum* L.) is a well-known table fruit of tropical and subtropical regions of the world. The Romans received it from Carthage, hence the name of the genus *Punica*. Some botanists place it in the family Lythraceae, of the peculiar type of fruit, called as balausta, most authorities make it the only genus in the family Punicaceae. It belongs to genera Punica and family Punicaceae (Chatterjee and Randhawa 1952; Joshi 1956) [5, 11]. The name pomegranate follows the Latin name of the fruit *Malum granatum*, which means "growing apple" the plant was first domesticated about 10,000 years ago in Iran, where it is native (Eric, 2005) [8] and is extensively cultivated in Mediterranean regions since ages especially in Morocco, Egypt, Afghanistan. It is also grown to some extent in Burma, China, Japan, USA, USSR, Bulgeria and Southern Italy. Generally pomegranate is not similar to other fruit crops of temperate, tropical or subtropical fruits except that it behaves as deciduous in temperate but in tropical and subtropical regions it behaves as an evergreen or partially deciduous.

Materials and Method
The present investigation to study the "Standardization of severity of pruning and crop load on yield and quality in pomegranate (*Punica granatum* L.) Var. Bhagwa." was carried out at farmer's field near Junagadh Agricultural University, Junagadh, during 2015-2017. The experiment was laid out in a Randomized Block Design (RBD) with four replications. There were seven treatments comprising T1 (15 cm pruning + 30 fruit retained per plant), T2 (15 cm pruning + 40 fruit retained per plant), T3 (15 cm pruning + 50 fruit retained per plant), T4 (30 cm pruning + 30 fruit retained per plant), T5 (30 cm pruning + 40 fruit retained per plant), T6 (30 cm pruning + 50 fruit retained per plant) and T7 (Control).

Results and Discussion
The data on effect of pruning and crop load on vegetative characters in Table 1.
The two year pooled data with respect to maximum plant height (3.47 m) was recorded at treatment T_2 and it was at par with treatment T_7 and T_1 as compared to control (3.41m). The practice like pruning increases the vegetative growth, this factor probably due to an optimization of light environment inside the tree likely to promote photosynthesis rate. More ever the lower the fruit load could improve the distribution of available mineral elements within aerials part of trees. Similar results were also found by Nath (1994) [17] and Lal and Mishra (2008) [14].

Table 1: Effect of pruning and crop load on vegetative characters in pomegranate var. Bhagwa

Treatment	Plant height	No of shoots/branch	Length of shoot at 75 DAP (cm)	Length of shoot at 150 DAP (cm)	Leaf Area cm^2
	Pooled	Pooled	Pooled	Pooled	Pooled
T1	3.29	3.50	28.85	43.85	8.00
T2	3.47	3.88	33.05	48.05	8.13
T3	3.01	3.63	27.73	42.73	8.50
T4	2.60	3.63	26.00	41.00	8.63
T5	2.59	3.13	28.78	43.78	9.00
T6	2.84	3.63	28.15	43.15	10.50
T7	3.41	2.25	22.80	38.05	5.88
Mean	3.03	3.38	27.91	42.94	8.38
S.Em.±	0.14	0.17	1.31	1.36	0.28
C.D. at 5%	0.41	0.49	3.77	3.91	0.79

The maximum number of shoots/branch 3.88 was recorded at treatment T_2 (15 cm pruning + 40 fruit retained per plant) and it was at par with treatment T_7 and T_5 as compared to control. Mohammad *et al*., (2006) [15] reported that removing of apical bud of mango by pruning stimulated initiation of shoot from axillary bud. These similar results are in accordance with findings of Wansche and Palmer (1997), Kumar (2002) [12] and Chandel *et al*. (2004) [4].

The maximum length of shoot 33.05 (cm) at 75 DAP was recorded in treatment T_2 and it was at par with treatment T_1, T_5, T_6 and T_3 in pooled. The maximum length of shoot 48.05 (cm) at 150 DAP was recorded in treatment T_2 (15 cm pruning + 40 fruit retained per plant) in pooled. Similar results were also found by Shaban (2009) [18], Sharma *et al*. (1997) [19] and Mohammad *et al*. (2006) [15].

The maximum leaf area 10.50 (cm^2) was recorded in treatment T_6 (30 cm pruning + 50 fruit retained per plant) in pooled as compared to control. Gopikrishna (1979) [9] noted that by severe pruning of guava branches there was a marked increase in leaf area. Similarly, Gupta and Godra (1988) [10] reported that in ber the maximum leaf area was recorded with severity of pruning.

The maximum number of flowers/shoot 6.88 was recorded in treatment T_6 (30 cm pruning + 50 fruit retained per plant) and it was at par with treatment T_4, T_5 and T_3 in pooled. Pruning helps the induction of flowers. It was also effect on length and number of shoot. Similar results were found by Mohammad *et al*. (2006) [15], Dhaliwal *et al*. (1998) [7] and Arora and Yamdagni (1985) [2].

The maximum fruit diameter 8.95 (cm) was recorded in treatment T_4 (30 cm pruning + 30 fruit retained per plant) and it was at par with treatment T_5 in pooled. Lakso (1994) [13] reported that high crop densities during the early growth period of fruit cell division may cause a deficit in carbohydrate availability to the developing fruit that ultimately can lead to decreased fruit growth rate and reduces the final fruit size. Similar results were found by Cheema *et al*. (2003) [6], Sheikh and Hulmani (1993) and Anon. (1982) [1].

The maximum fruit weight 392.50 (g) was recorded in treatment T_4 (30 cm pruning + 30 fruit retained per plant) and it was at par with treatment T_5 and T_6 in pooled. The enlargement of fruit size is caused by drawing of photosynthates to the fruit as a consequence of intensification of the sink. It is in conformity with the observations of Brar *et al*. (2007) [3]. These findings are in agreement with Somkumar *et al.* (2006) [21], Sutton and Harty (1990) [22] and Sheikh (1999) [20].

The maximum fruit yield/plant 16.93 kg was recorded in treatment T_6 (30 cm pruning + 50 fruit retained per plant) pooled. Metabolic activities have helped to increase the fruit size and fruit weight and thereby increase the fruit yield. Similar results are also found by Mohammed *et al* (2006) [15], Myrium *et al*. (2005) [16], Sheikh (1999) [20] and Lal and Mishra (2007).

The data on effect of pruning and crop load on yield characters in Table 2.

Table 2: Effect of pruning and crop load on yield characters in pomegranate var. Bhagwa

Treatment	No of flower/shoot	Fruit diameter (cm)	Fruit Weight (g)	Fruit yield/plant (kg)
	Pooled	Pooled	Pooled	Pooled
T1	5.63	8.14	346.00	9.25
T2	5.63	7.70	293.00	10.52
T3	6.00	7.54	285.00	12.82
T4	6.25	8.95	392.50	10.67
T5	6.25	8.53	375.00	13.56
T6	6.88	7.80	367.00	16.93
T7	5.38	6.98	232.50	11.89
Mean	5.98	7.95	327.29	0.53
S.Em.±	0.19	0.26	12.15	1.53
C.D. at 5 %	0.54	0.73	34.84	12.33

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