



Bhagwa a promising variety of pomegranate for dry regions of Karnataka

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Abstract : Field experiment was conducted at farmer's field near Hiriur, Chitradurga district to know the performance of Bhagwa variety in comparison with Ganesh variety of pomegranate with respect to their physico-chemical characters. The results revealed that the Bhagwa variety of pomegranate is an outstanding variety for all the characters studied. Bhagwa variety recorded the maximum fruit weight and weight of arils (320.60 g and 220.80 g), maximum number of arils recorded in the variety Ganesh and maximum quantum of juice recovered in the variety Ganesh (161.60 ml/fruit). With regard to overall acceptance of fruit for organoleptic qualities, Bhagwa variety emerged as the best variety fetching highest score of 90.80 out of 100.

Key Words : Bhagwa, Physico-chemical characters, Ganesh

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INTRODUCTION

Pomegranate (*Punica granatum L.*) is an important arid zone fruit crop. It is being grown since ancient times for its fruit, ornamental and medicinal purpose and in recent times, it has emerged as a commercially important fruit crop. The hardy nature, low maintenance cost, steady and high yields, fine table and therapeutic values, better keeping quality and the possibility to put the crop into rest period whenever the water potential is low are some of the qualities which make the plant ideally suitable for semi-arid and arid regions. However, the performance of the plant will be excellent if maintenance is with protective irrigation. In the recent past, pomegranate has attained export potential and foreign exchange. Fruits are exported to Europe, Middle East, Africa, America and Asian countries. It is commercially cultivated in Maharashtra, Karnataka, Gujarat, Rajasthan, Uttar Pradesh, Andhra Pradesh, and Tamil Nadu. The major pomegranate growing districts in Karnataka are dry regions (Bijapur, Bagalkot, Belgaum, Bellary, Chitradurga, Koppal and Gulbarga). Many varieties are under cultivation in this region but evaluation and recommendation regarding their

suitability for this zone has not been done. In this regard, present work was carried out to know promising variety which is suitable to dry regions of Karnataka.

MATERIALS AND METHODS

Field experiment was conducted at farmer's field near Hiriur, Chitradurga district. In this experiment five varieties which are cultivated commercially in this region Ganesh, G-137, Bhagwa, Arakta, Ruby and MHP 7/2 which is a multiple hybrid from Indian Institute of Horticulture Research, Bangalore. Ganesh was used as a control. The design of experimental plot was Randomized Complete Block Design replicated thrice with two plants per replication. For observation of shoot length, number of leaves per shoot, leaf area per shoot, number of flowers, fruits set per shoot were taken by randomly selecting twenty shoots in each plant. Ten fruits from each variety were selected for taking observations of fruit characters and for organoleptic evaluation.

RESULTS AND DISCUSSION

In the present study Bhagwa variety emerged as highly

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vigorous in nature where maximum length of shoot (30.93 cm) as well as maximum leaf area per shoot were noticed (630.97 cm²) While, Ganesh variety was medium in vigour with 28.38 cm length of new shoot and 465.32 cm² total leaf area (Table 1). According to Nath and Randhawa (1959c) Khandhars and Dholka varieties were highly vigorous varieties where length of new shoot was 90 and 86 cm, respectively.

Least number of male flower per shoot (3.07) noticed in the variety Ganesh, maximum number of hermaphrodite flower per shoot (4.03) were noticed in the pomegranate cultivars

Bhagwa. Bhagwa may be considered as the varieties which produces medium number of flower per shoot. Number of fruits set per shoot was more in the variety Bhagwa (3.59), while it was 3.56 in the variety Ganesh. The number of fruits retained per shoot was maximum in the variety Bhagwa (2.43) (Table 1). The number of fruit set per shoot as well as number of fruits retained per shoot was greatly influenced by the genotype and to some extent environmental conditions especially in soil moisture status as well as temperature. The variation in the fruit set as well as number of fruits retained per shoot may

Table 1: Performance of Bhagwa v/s Ganesh varieties of pomegranate

Vegetative characters	Ganesh	Bhagwa
Length of new shoot (cm)	28.38	30.93
No. of leaves/shoot	43.76	59.36
Total leaf area/shoot (cm ²)	465.32	630.97
Flowering and fruit set		
No. of male flowers/shoot	3.07	3.86
No. of hermaphrodite flowers/shoot	2.52	4.03
Total no. of flowers/shoot	5.56	7.22
No. of fruits set/shoot	3.56	3.59
No. of fruits retained/shoot	2.33	2.43
No. of fruits cracked/plant	4.80	2.30
Yield attributes		
No. of fruits/plant	111.00	147.90
Kg/plant	30.81	55.07
Estimated yield (t/ha)	13.31	18.19
Physical parameters of fruit		
Weight of fruit (g)	297.80	320.60
Weight of arils (g)	220.00	220.80
No. of arils/fruit	786.80	716.20
Weight of peel/fruit (g)	71.00	97.80
Weight of seeds/fruit (g)	40.80	20.20
Weight of non-edible portion of fruit (g)	111.80	118.00
Volume of fruit (ml)	292.00	323.00
Specific gravity	1.01	0.98
Length of fruit (cm)	8.52	8.14
Breadth of fruit (cm)	8.74	8.62
Circumference of fruit (cm)	26.30	27.32
Weight of 100 arils (g)	27.40	28.20
Volume of 100 arils	27.00	27.40
Weight of 100 seed (g)	6.90	3.70
Juice recovery/fruit (ml)	161.60	155.00
Juice recovery from 100 arils (ml)	23.60	27.60
TSS (° Brix)	14.74	14.52
Total sugars (%)	12.74	13.72
Overall acceptance of variety (for 100 points)	57.80	90.80

be attributed to the genotype or the genetic make up of the varieties where the role played by environment factors is least as all these genotypes are cultivated in same type of the environmental condition and soil type. There is a significant difference in the yield in different cultivars of pomegranate. Maximum number of fruit yield per plant was recorded in the variety Bhgwa (147.90 fruits/plant) while in Ganesh variety it was 111.00 fruits per plant. The same trend was observed in fruit yield on weight basis as well as estimated yield on hectare basis. Bhagwa variety yielded maximum of 18.19 tonnes per hectare and in Ganesh variety minimum of 13.31 tonnes per hectare (Table 1). High yield in Bhagwa may be due to the hybrid vigour, it is a multiple hybrid developed with cross combination of local variety Ganesh and Afghanistan varieties. Thus it may be concluded from the present study that multiple hybrid varieties of pomegranate are high yielders when compared to the traditional varieties. This can be further illustrated by the low yield noticed in Bassien Seedless and Kabul Yellow (Sreeramu *et al.*, 1996), Bassien Seedless and Jodhpur Red (Prasad and Bankar, 2000) the local traditional varieties. Keskar *et al.* (1990) observed 59./85 fruits per plant and 12.21 kg fruits per plant in Ganesh variety and it was 55.66 fruits per tree and 11.97 kg fruits per plant in the variety G-137. Sreeramu *et al.* (1996) observed maximum of 265 fruits per plant in the variety RCR-1 least number of fruits per plant was observed in the variety Kabul Yellow (154 fruits/plant) and Bassien Seedless (170 fruits/plant). The variety Jyothi that is a selection from Bassien Seedless variety yielded 234 fruits per plant. G-137 recorded maximum yield of 17.45 tonnes per hectare and followed by Ganesh (13.42 t/ha) (Prasad and Bankar, 2000).

The length of the fruit was highest in the variety Ganesh (8.52 cm), and in Bhagwa it was 8.14 cm; the breadth of the fruit was highest in Ganesh (8.74 cm) and in Bhagwa it was 8.62 cm; circumference of the fruit was highest in Bhagwa (27.32 cm) and in Ganesh it was 26.30 cm. The volume of the fruit was highest in Bhagwa (323.00 ml) and the weight of the fruit was also highest in Bhagwa (320.60 g) and in Ganesh it was 297.80 g (Table 1). It may be concluded that among the varieties of pomegranate studied, the fruits of Bhagwa variety were large in size and thus help in fetching the good price in the market. There are reports that the fruits of some of the selections, multiple hybrids and improved varieties were large in size. For example selection No. 79/1 fruits were 8.4 cm in length (Anonymous, 1991); selection No. 5 and G-137 fruits were 7.9 cm each (Chadha, 1998) and GKVK selection No.1 fruits were 7.93 cm (Anonymous, 1996). Similarly with respect to breadth of fruit also Ramanagaram selection fruits were 9.1 cm; selection 79/1 fruits were 9.1 cm and GKVK-2 selection fruits were 8.6 cm (Anonymous, 1991) and selection No. 5 were 8.9 cm (Anonymous, 1996). This clearly shows the fruit of the multiple hybrids or selections were large in size and it may be due to a genetic variation in the plant.

In the present study the multiple hybrid Bhagwa recorded the highest weight of fruit (320.6 g) whereas in Ganesh variety it was 297.80 g (Table 1). The highest weight of fruit in Bhagwa may be attributed to hybrid vigour as it is a multiple hybrid. The literature also clearly indicates that the weight of fruit in the selections P-23 and P-26 also yielded fruits of highest weight (385 g and 379 g, respectively) (Anonymous, 1996); selection No. 79/1 (Anonymous, 1991) and selection No. 5 (414 g), P-23 (385 g), P-20 (379 g) (Chadha, 1998). The peel weight and the seed weight are the two important characters of a pomegranate fruit which decide the non-edible portion of fruit is a desirable character in the selection of pomegranate genotype. In the present study the least weight of peel per fruit was noticed in Ganesh (71.00 g/fruit). In all the cases multiple hybrid Bhagwa exhibited least weight of non-edible portion of fruit this is mainly attributed to the hybrid vigour. The least weight of peel per fruit, seed per fruit as well as least weight of non-edible portion of fruit was noticed in MHP 7/2 and Arakta (Nataraja, 2002), Jyothi (Sulladmath, 1985), Jalore Seedless (Prasad and Bankar, 2000).

Mean weight of aril per fruit (220.80g) was highest in the variety Bhagwa. The arils in this variety were bold in size and the weight of non-edible portion of fruit which consisted of peel and the seed was medium in the variety Bhagwa. The superiority of Bhagwa variety in the aril characters mainly attributed to the genetic make up of the plant (Table 1). This hybrid might have obtained these desirable characters of the arils either from Afghan or Indian varieties, which were, employed in development of this multiple hybrid. Similarly various workers from time to time observed desirable characters. Sayed *et al.* (1985) was of the opinion that weight of arils per fruit was 63 to 76 per cent in YCD-1 variety and it was highest in both Ganesh and G-137 (69%) as reported by Jagtap *et al.* (1992). In this present study weight of 100 arils was highest in the variety Bhagwa (28.20 g). Nataraja (2002) was also of the opinion that multiple hybrid pomegranate 30/2 and 30/8 yielded maximum weight of 100 arils that is 31.21 and 30.31 g, respectively. Similarly Sree Ramu *et al.* (1996) recorded maximum weight of 100 arils in the selections Jyothi (34.2 g) and Ganesh (33.8 g) varieties.

Juice recovery from 100 arils was highest in the variety Bhagwa (27.6 ml). However, it was least in the variety Ganesh (23.60 ml) (Table 1). From this it may be concluded that Bhagwa variety was juicy variety and it is because of more juice and small seeds in the variety Bhagwa. Nataraja (2002) was also of the opinion that Arakta is one of the low juice recovery varieties where 100 arils yielded 20.46 ml juice. From one of his multiple hybrid pomegranate 30/2 he recovered as high as 24.39 ml of juice from 100 arils. Similarly in the present study the juice recovery per fruit was also followed the same trend as that of juice recovery from 100 arils where juice recovery per fruit was highest in Ganesh and Bhagwa and least in Arakta. The juice recovery reported per fruit was also least in

Arakta (Nataraja, 2002), Jyothi (Sulladhmath, 1985), Gulsha (Jagtap *et al.*, 1992), Both in RCR and Alandi (Sree Ramu *et al.*, 1996).

Ganesh varieties recorded highest TSS of 14.74 °Brix, it was medium in Bhagwa variety (14.52 °Brix)(Table 1). Various workers noticed highest TSS in both multiple hybrids as well as selections of pomegranate. For example Nataraja (2002) was of the opinion that multiple hybrids 30/2 and 7/2 had 15.4 and 14.73 °Brix TSS; Jalikop and Kumar (2000) reported 16 °Brix TSS in Ruby and Chadha (1998) reported 17.9 and 17.2 °Brix TSS in Mridula and Ruby varieties, respectively. Balasubramanian *et al.* (1998) reported that 16.8 and 16.6 °Brix TSS in Ganesh and Jyothi varieties, respectively. Prasad and Bankar (2000) reported 18.2 and 18.0 °Brix TSS in Jalore Seedless and GKVK-1 varieties; Anonymous (1990) reported 17.9 °Brix TSS in Arakta and 17.2 °Brix in Ruby and Keskar *et al.* (1996) reported 16 °Brix TSS in G-137 varieties.

It is not only the physical parameters of the fruit but also the chemical composition of fruit and organoleptic qualities play a vital role for the overall acceptance of the variety. It is evident from the present study that Bhagwa variety of pomegranate fetched the highest score of 14.4 out of 15 for the rind colour character. Similarly with respect to taste of aril and aroma of aril also Bhagwa variety fetched the highest score of 27.9 and 17.2 score out of 30 and 20, respectively. Further, the overall acceptance character also, Bhagwa variety fetched the highest score of 90.80 out of 100. This clearly shows that Bhagwa was an outstanding variety specially for the organoleptic characters evaluation. However, the traditional variety Ganesh fetched the lowest score for all the parameters studied under the organoleptic qualities of fruits with overall acceptance of 57.80 score out of 100. Blood red colour of fruit rind of Bhagwa as well as bright and sparkling red colour of arils of Bhagwa might have acquired from its parents Gulsha Rose Pink and Kabul. Similarly the delightful flavour and excellent taste of multiple hybrid might have acquired from its parents of Indian varieties of pomegranate. Similarly in the crop improvement work of pomegranate, excellent quality hybrids or multiple hybrids or selection made from time to time by various workers have been reported *viz.*, in Jyothi (Sulladhmath, 1985), in G-137 (Keskar *et al.* 1990), in RCR-1 (Sree Ramu *et al.*, 1996) and in multiple hybrid 7/2 (Nataraja, 2002).

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