Short Communication

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Evaluation of pomegranate varieties under semi-arid environment of central Gujarat

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Pomegranate (*Punica granatum* L.) belongs to the family *Punicaceae*, widely grown in the moderate climate of the Mediterranean region and it is well adapted to arid and semi-arid soils, and their trees grow successfully under unfavorable climatic and soil conditions and considered as salinity resistant plant (Ibrahim, 2016). Owing to its high nutritive value, wider adaptability to diverse agro-climatic conditions, early and prolific bearing with a high monetary return, pomegranate is becoming popular as a commercial crop in western part of India. In Gujarat, it occupies an area of 30.51 thousand ha with an annual production of 0.46 MT and it is mainly grown in Kachchh, Banaskantha and Mehsana districts; the average productivity is 15.13t/ ha (Anonymous, 2018). Pomegranate is grown in many states of India like Maharashtra, Gujarat, Rajasthan, Uttar Pradesh, Haryana, Andhra Pradesh, Karnataka and Tamil Nadu and to a limited extent in Jammu and Kashmir, Himachal and Uttarakhand. Pomegranate possesses drought hardiness, offers immense potential to grow under marginal lands. As a result it is gaining popularity among farmers all over the country particularly in rain-fed areas (Verma *et al*., 2013). Several old varieties are under cultivation in this region but evaluation and recommendation regarding their suitability for this region has not been done. In this regard present work was carried out to know the plant growth and physico-chemical properties of different important varieties in this region.

Fifteen genetically diverse genotypes including varieties were evaluated for growth, yield and fruit quality attributes at the ICAR-CIAH, Bikaner regional station CHES, Vejalpur; planted during August, 2016 at a spacing of 5 m x 5 m in randomized block design with three replications. *Hasta bahar* crop 2017-18 in which flowering commences during Sept.-Oct. was taken for recording the data on fruit yield and quality attributing characters on one year old plants. Three uniform trees of each genotype/cultivar was selected for recording observations on growth in terms of plant height (cm), stem diameter (cm), plant spread (cm), number of stems and suckers. Average fruit weight (g) was calculated by weighing the fruits in an electronic balance. The yield (kg/tree) was obtained through the weighing the harvested fruits. However, for measuring physical parameters like fruit weight, seed weight and fruit size were recorded as per standard procedures with the help of an electronic balance and vernier caliper, respectively. The total soluble solids (TSS) were determined with hand refractometer (0-32°Brix). The titratable acidity (%) was determined by method of A.O.A.C. (1980). The average data were subjected to statistical analysis as per the method outlined by Gomez and Gomez (1984). Least significant difference at 5% level was used for testing the significant differences.

The maximum plant height was recorded in Ramnagram (243.33 cm) followed by Jyoti (215.10 cm) and P-16 (211.70 cm) while the minimum plant height was noted in Goma Khatta (145.0 cm). However, Jyoti recorded the maximum plant spread in north-south direction (217.33 cm) while Ramnagram in east-west direction (116.70 cm). The minimum plant spread in both the directions was observed in Goma Khatta (131.67 & 133.33 cm). The maximum stem girth was recorded in Muscat (3.77 cm) followed by Kandhari (3.51 cm) while the minimum stem girth was measured in Gul e-shah Rose (2.08 cm). P-16 recorded the highest number of stems (5) while Mridula recorded the highest number of suckers (25). Whereas the minimum numbers of stems (1) and suckers (2.67) were recorded in Goma Khatta (Table 1). Genetic makeup of the plants and adaptability of diverse genotypes under different climatic conditions could be the possible reason for the wide variation with respect to growth and plant spread. The results of present findings are in agreement with Verma *et al.* (2013) and Rao and Subramanyam (2010) in pomegranate. Significantly, the maximum number of fruits/plant was observed in Goma Khatta (85) followed by Super Bhagwa (18.33) and Mridula (15.70) and same found minimum in Gul-e-shah Rose (4.66). Whereas, the maximum fruit yield/plant was recorded in Super Bhagwa (3.39 kg) followed by Bhagwa (2.82 kg) while the minimum fruit yield was found in P-16 (0.60 kg). The rich diversity in these characters may be due to highly heterozygous and diverse genetic background of parents (Verma *et al*., 2013; Rao and Subramanyam, 2010).

Physico-chemical characters of all the evaluated germplasm are presented in Table 2. The maximum fruit weight was observed in Muscat (200.30 g) followed by Ramnagram (198.49 g) and Jyoti (195.19 g). Although, fruit weight ≥ 180 g was recorded in Ganesh, Kandhari, Super Bhagwa and Bhagwa. However, the minimum fruit weight was recorded in P-16 (112.37 g) followed by Sinduri (120.50

g) and Goma Khatta (138.57 g). The maximum fruit length was recorded in S-1 (7.77 cm) followed by Muscat (7.56 cm) while the highest width was observed in S-1 (7.52 cm) followed by Ruby (7.49 cm). However, Goma Khatta recorded the minimum fruit length (5.73 cm) while width was observed in P-16 (5.76 cm). Muscat recorded the maximum juice percentage (73.89%) and the lowest 100 seed weight (1.53 g) while the lowest juice content was recorded in Goma Khatta (47.61%). The highest 100 seed weight was noted in Ramnagram (4.80 g) followed by Goma Khatta (4.79 g) and Gul-e-shah Rose (2.99 g). Similar variations in fruit size, juice percentage and 100 seed weight among pomegranate genotypes were reported by Prasad *et al*. (2012) in pomegranate and Mishra *et al.* (2019) in guava.

There were significant difference among the varieties with regard to chemical quality attributes of pomegranate (Table 2). The highest TSS was recorded in Super Bhagwa (17.20 °Brix) followed by Kandhari (16.42°Brix) while the minimum TSS was observed in Ramnagram (9.51°Brix) followed by Goma Khatta (13.20°Brix). The maximum acidity (1.35%) and lowest TSS: acidity ratio (9.77) were recorded in Goma Khatta while the minimum acidity (0.38%) and highest TSS:acidity (37.39) were found in Mridula and Super Bhagwa, respectively. Similar kind of variation was recorded by Verma *et al.* (2013), Prasad *et al.* (2012) in pomegranate and Mishra *et al.* (2019) in guava. Based on the present findings, pomegranate varieties like Super Bhagwa and Bhagwa were found better in terms of yield and fruit quality parameters. The above findings are preliminary and needs to be studied further.

Table 1. Different vegetative growth characters and average number of fruits in pomegranate genotypes

Germplasm	Height (cm)	Canopy spread (cm)		Stem girth (cm)	No. of stems	No. of suckers	No. of fruits/plant	Yield/plant (kg)
		N-S	E-W					
Gul-e-shah Rose	165.00	108.33	102.10	2.08	3.00	11.66	4.66	0.83
Muscat	206.67	200.33	238.33	3.77	3.66	4.66	14.00	2.80
Ramnagram	243.33	204.08	216.70	3.43	2.33	2.00	12.00	2.40
Jyoti	215.10	217.33	207.20	3.02	3.00	3.66	9.00	1.76
Ganesh	185.00	143.33	150.05	2.49	4.66	16.33	6.33	1.20
Kandhari	185.20	185.00	175.00	3.51	2.66	2.00	12.33	2.27
Appuli	196.70	146.70	141.67	2.32	3.00	18.00	7.70	1.28
P-16	211.70	200.15	218.33	3.02	5.00	7.67	5.00	0.60
Goma Khatta	145.00	131.67	133.33	3.12	1.00	2.67	19.33	2.67
Super Bhagwa	166.70	175.12	156.70	2.82	3.66	12.33	18.33	3.39
Bhagwa	188.33	168.33	186.66	2.85	4.03	13.67	15.67	2.82
Mridula	186.70	173.33	163.33	3.12	4.00	25.00	15.70	2.73
Sinduri	161.70	142.67	161.67	2.94	3.00	9.00	13.66	1.64
S-1	175.00	168.33	183.33	3.11	1.67	9.33	15.00	2.70
Ruby	165.00	145.10	145.05	2.78	2.67	11.00	17.00	2.99
CD (0.05)	37.01	45.09	48.07	0.92	1.75	7.66	9.28	0.46

Table 2. Physico-chemical characters of pomegranate genotypes

Germplasm	Fruit weight (g)	Length (cm)	Width (cm)	Juice (%)	TSS (^{0}B)	Acidity (%)	TSS: acidity	100 seed weight (g)
Gul-e-shah Rose	178.25	5.65	6.50	72.75	13.55	0.91	14.89	2.99
Muscat	200.30	7.56	7.43	73.89	14.27	0.45	31.71	1.53
Ramnagram	198.49	7.22	7.18	57.87	9.51	0.64	14.85	4.80
Jyoti	195.19	7.44	7.38	72.70	13.95	0.38	36.71	1.88
Ganesh	189.17	6.82	6.98	76.71	16.37	0.46	35.58	1.52
Kandhari	184.25	7.35	7.15	73.33	16.42	0.38	43.21	1.65
Appuli	166.69	5.88	6.38	62.30	16.25	0.49	33.16	2.91
P-16	112.37	6.19	5.76	67.30	13.36	0.47	28.43	1.97
Goma Khatta	138.57	5.73	6.34	47.61	13.20	1.35	9.77	4.89
Super Bhagwa	185.15	7.16	6.87	62.30	17.20	0.46	37.39	1.73
Bhagwa	180.25	6.55	6.66	61.20	14.21	0.48	29.60	1.74
Mridula	174.47	6.88	6.41	61.68	11.21	0.38	29.50	1.77
Sinduri	120.50	6.07	6.31	61.25	17.05	0.45	37.88	1.79
S-1	180.08	7.77	7.52	70.45	16.38	0.40	40.95	1.82
Ruby	176.13	7.66	7.49	72.33	13.75	0.39	35.26	1.85
$CD_{(0.05)}$	1.83	0.60	0.11	0.92	0.56	0.09	0.34	0.16

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