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Evaluation of Date palm Cultivars under Hyper Arid Climate condition

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ABSTRACT: Date palm is a nutrition rich fruit plant which is well adapted in hot arid climate, where plenty of water available. There are lots of verities of date palm available in world. All varieties dose not suits in particular climate condition. This experiment was conducted at date palm research center, SKRAU, Bikaner, during 2020. The experiment conducted on twenty date palm cultivars viz., Agoloni, Barhee, Bint-E-Sha, Halawy, Hatmi, Hayani, Khalas, Khasab, Khdarawi, Khuneizi, Medjool, Mundara Selection, Nagal, Nagal Halali, Ruziz, Sedmi, Shamran, Syar, Tyar and Zahidi to identify the suitable cultivar for arid climate condition. The experiment conducted in completely randomized design. The result obtained from this study show that the maximum fruit weight, pulp weight and volume attained by cultivar Khalas. Maximum fruit length obtained by cv. Hayani, maximum pulp%, pulp stone ratio and minimum stone weight, stone girth and stone % were found in cultivar Tyar. Other cultivars also perform well in this climatic condition were Khasab, Medjool, Bint-E-Sha, Khuniezi, Barhee, Halawy etc.

Keyword: Date palm, Evaluation, Morphological traits, Date palm cultivars.

INTRODUCTION

Date palm scientifically known as *Phoenix dactylifera* which is belongs to the family Arecaceae. Based on archeological proof, Iraq is considered as the center of origin of date palm (Johnson *et al*., 2013). It is well known that date palm is a dioecious plant *i.e.* pistillate and staminate flowers are borne on distinct palms and the natural pollination may follow by wind and insects (Ashour *et al*., 2008). The scientific name *Phoenix dactylifera* is derived from the word phoenix, in Greek mythology it means a long lived bird and dactylos meaning finger, which denotes to the shape of the fruit. It is believed that, date palm has been familiarized in Indus valley during 4th century B.C. by the soldiers of Alexander. Egypt, Saudi Arabia, Iran, Algeria, Iraq, Pakistan and Sudan are the top most date palm producing countries. In India date palm mainly cultivated in Kutch (Gujarat), Rajasthan, and some parts of the Punjab, as well as Tamilnadu (Shah, 2014). Area of date palm in Rajasthan is 850 ha with production of 800 tonnes (Singh, 2018). The date fruit has four distinct growth and ripening stages. These four stages are derived from Arabic language as Kimri, Khalal, Rutab and Tamar. In India, these stages are called as Gandora, Doka, Dang and Pind, respectively. Dates are rich source of essential minerals such as calcium, iron, magnesium, phosphorus, potassium, zinc, selenium, manganese. Vitamins, ascorbic acid and folic acid which enhance their nutritional values (Al-Farsi *et al*., 2005; Elleuch *et al*., 2008; El Hadrami *et al*., 2011). Hot dry summer, moderate winter and rain free period favors the quality production of date palm. Rain is a major distorting factor in production of date palm. At early stage of development rain cause less damage but at ripening stage it cause severe damage. Date palm cultivars show diversity from one region to another one. Date palm is an exotic introduced crop therefore, this experiment was conducted to exploit the suitable varieties in Bikaner condition.

MATERIAL AND METHODS

The experiment was conducted at Date Palm Research Centre, Agricultural Research Station, S. K. Rajasthan Agricultural University, Bikaner during 2020. Geographically, the Date Palm Research Centre of Swami Keshwanand Rajasthan Agricultural University

(SKRAU) is situated 07 Km away from Bikaner on NH-15 at an altitude of 234.7 m above mean sea level at latitude 28°01′N and longitude 73°22′E. Bikaner falls in agro climate zone (IC), this is known as hyper arid partially irrigated north-western plain zone. The maximum and minimum temperature during fruiting time was 47°C and 20°C, respectively. The experiment was conducted on 20 date palm cultivars fruits at doka stage (Agoloni, Barhee, Bint-E-Sha, Halawy, Hatmi, Hayani, Khalas, Khasab, Khdarawi, Khuneizi, Medjool, Mundara Selection, Nagal, Nagal Halali, Ruziz, Sedmi, Shamran, Syar, Tyar and Zahidi) to exploit the morphological suitability of fruits in this region. For each cultivars 10 random fruits selected and replicate three times. The experiment conducted in completely randomized design. Parameters studied were recorded according to the standard A.O.A.C. (2005) procedures for fruit weight, fruit length, fruit girth, volume, pulp weight, pulp %, stone weight, stone %, stone length, stone girth, pulp: stone. Data obtained on various characters were analyzed statistically according to the analysis of variance techniques as suggested by Panse and Sukhatme, (1985); Chandel, (1999). The critical difference (CD) was calculated at 5 per cent level of significance.

RESULT AND DISCUSSION

The data presented in the Table 1 show that the significant deference were found in between cultivars regarding fruit characters. Weight of fruit, pulp and volume of fruit (12.5g, 11.3g and 13.05 cm^3, respectively) was found maximum in cultivar Khalas. Whereas, minimum fruit weight (3.64g), length (2.48g), volume (4.07 cm^3) and pulp weight (3.2g) were exhibited by cultivar Nagal Halali. Maximum fruit length attend by cultivar Hayani (5.64 cm) followed by Khalas (3.93 cm), Syar (3.73 cm) and Bint-E- Sha (3.66 cm). Maximum fruit girth was attended by Medjool (2.39 cm) followed by Khalas (2.28 cm) and Hatmi (2.28 cm) cultivars, whereas, minimum fruit girth obtained by cultivar Mundara Selection (1.67cm)which is found at par with NagalHalali (1.70cm), Tyar (1.71cm) and Ruziz (1.72cm). Maximum pulp percentage was exhibited by cultivar Tyar (91.41%), which found at par with Khasab (90.49%), Khalas (90.39%), Khuneizi (90.23%), Agoloni (90.03%), Nagal Halali (88.42%) and Hayani (88.22%). Whereas, minimum pulp percentage was obtained by cultivar Nagal (76.45%) which was found at par with Mundara Selection (77.45%). Morphological attributes of date palm fruit depends on cultivar genotype and environmental conditions. The results found similar with Muralidhara *et al*. (2016); Singh *et al*. (2005).

Table 1: Fruit morphological attributes of various cultivar of date palm.

Treatments	Fruit Weight (g)	Fruit length (cm)	Fruit Girth (cm)	Volume (cm^3)	Pulp Weight (g)	Pulp %
Agoloni	7.03	2.75	2.09	7.76	6.32	90.03
Barhee	8.11	2.92	2.24	8.78	7	86.37
Bint-E-Sha	10.28	3.66	2.06	10.81	8.87	86.36
Halawy	7.4	3.47	1.82	8.31	6.08	82.14
Hatmi	8.93	2.88	2.28	9.36	7.73	86.51
Hayani	7.65	5.64	1.97	8.05	6.75	88.22
Khalas	12.5	3.93	2.28	13.05	11.3	90.39
Khasab	7.61	2.85	2.13	8.32	6.88	90.49
Khdarawi	8.59	3.17	2.19	8.98	7.49	87.11
Khuneizi	7.95	3.09	2.03	8.4	7.18	90.23
Medjool	9.98	3.36	2.39	10.35	7.97	80
Mundara Selection	5.08	2.79	1.67	5.75	3.93	77.45
Nagal	7.44	3.54	1.87	7.86	5.69	76.45
Nagal Halali	3.64	2.48	1.70	4.07	3.2	88.42
Ruziz	4.49	2.5	1.72	4.95	3.76	83.64
Sedmi	8.02	3.36	2.08	8.6	7	87.32
Shamran	5.78	2.81	1.94	6.41	4.69	81.03
Syar	8.05	3.73	1.99	8.64	6.87	85.38
Tyar	4.41	2.86	1.71	4.79	4.03	91.41
Zahidi	9.28	3.32	2.19	9.7	7.71	83.11
SEm ±	0.22	0.33	0.03	0.19	0.17	1.13
CD (P=0.05)	0.64	0.95	0.09	0.55	0.49	3.22

Table 2 show that the maximum stone weight (2.01g) and stone girth (1.12 cm) was obtained by cultivar Medjool. Minimum stone weight (0.38g), stone girth (0.6cm) and stone percentage (8.59%) was obtained by cultivar Tyar. Maximum stone percentage was shown by cultivar Nagal (23.55%) which was found at par with Mundara Selection (22.55%). Longest stone was exhibited in cultivar Hatmi (2.52cm) which was found at par with Halawy (2.5cm), Jahidi (2.5cm), Syar (2.48cm), Bint-E-Sha (2.47cm) and Nagal (2.46 cm) cultivars. Shortest stone was obtained in cultivar NagalHalali (1.38cm) followed by Khdarawi (1.59cm), Agoloni (1.65cm) and Ruziz (1.67cm). Pulp stone ratio was found maximum in cultivar Tyar (13.93) followed by Khasab (9.54), Khalas (9.42) and Agoloni (9.36). Variation in quality of date palm fruit varies from variety to variety. It also depends on the genotype of plam, environmental conditions and developmental stage of fruit. Some experiments also similarly done by Mertia *et al*. 2010. The majority of the plantation is of seedling origin, resulting in high variability and diversity in fruit size, colour, taste, *etc*. (Muralidharan, *et al.*, 2008; Pareek, 2015).

Table 2: Fruit morphological attributes of various cultivar of date palm.

Treatments	Stone Weight (g)	Stone %	Stone Length (cm)	Stone Girth (cm)	Pulp: Stone
Agoloni	0.71	9.97	1.65	0.86	9.36
Barhee	1.11	13.63	1.95	0.99	6.49
Bint-E-Sha	1.41	13.64	2.47	0.89	6.42
Halawy	1.32	17.86	2.5	0.92	4.67
Hatmi	1.21	13.49	2.52	1.05	6.42
Hayani	0.9	11.78	2.06	0.85	7.49
Khalas	1.2	9.61	2.38	0.87	9.42
Khasab	0.73	9.51	1.81	0.82	9.54
Khdarawi	1.1	12.89	1.59	0.81	6.85
Khuneizi	0.78	9.77	1.92	0.83	9.32
Medjool	2.01	20	2.21	1.12	4.04
Mundara Selection	1.15	22.55	2.26	0.89	3.44
Nagal	1.75	23.55	2.46	0.99	3.25
NagalHalali	0.45	11.58	1.38	0.63	8.53
Ruziz	0.74	16.36	1.67	0.86	5.12
Sedmi	1.02	12.68	2.06	0.9	6.93
Shamran	1.1	18.97	1.97	0.93	4.3
Syar	1.18	14.62	2.48	0.9	5.88
Tyar	0.38	8.59	2.12	0.6	13.93
Zahidi	1.57	16.89	2.5	1.02	4.94
SEm ±	0.08	1.13	0.08	0.03	1.41
CD (P=0.05)	0.23	3.22	0.23	0.10	4.02

CONCLUSION

From the above results it was concluded that Khalas cultivar found good in morphological traits. Tyar was small fruited variety among all the cultivars but its pulp stone ration found highest. The well performing cultivars in this climatic condition are Khalas, Khasab, Medjool, Bint-E-Sha, Barhee, Halawy etc.

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Conflict of Interest. None.

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