

Effect of Different Time of Pollination in Date Palm (*Phoenix dactylifera* L.) cv Barhee

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ABSTRACT

Date palm is one of important crop of fruit crop of the world, while in India; its major area of production is present in the area adjoining western boundaries of the country. Among the major cultivated cultivars, Barhee is highly adopted by the farmers; however, there were incidences of poor fertilization and fruit set resulting in parthenocarpic fruits. To understand the same best time of the day for pollination was studied with six time duration viz., 06:00-08:00 h, 08:00-10:00 h, 10:00-12:00 h, 12:00-14:00 h, 14:00-16:00 h and 16:00-18:00 h as different treatments for their fruit set and yield characters. From the study it was found that best time of pollination for date palm in Kachchh district is 08:00-12:00 h resulting in higher fruit set and yield.

Keywords Date palm, Pistillate receptivity, Pollination, Time.

INTRODUCTION

Date palm is one of the oldest cultivated crops in the world while its presence in Kachchh district of Gujarat dated back around 500 years old. Over the years the cultivation has seen an up-change from cultivation of only seedling lines to propagation through either offshoots or tissue culture plants. Among them around 1.5 lakh plants are only of cultivar Barhee which was endorsed by Date Palm Research Station, Mundra in 2002 under an AICRP-AZF trial (Ramdevputra et al. 2009). The variety is a prolific bearer and high yielder. Since date palm is a dioecious crop, hand pollination is a mandatory operation for successful fruit set. However, under certain circumstances there were chances that the pollination was not successful and the fruits were developed parthenocarpically which are of very inferior type and are not edible (Muralidharan et al. 2008). In lieu to that two experiments were conducted, first to identify the duration after the spathe opening under which pollination can be done, second, to identify the time period of the day under which the pistillate receptivity is highest. The former has been discussed in a separate paper where the higher receptivity is observed if the pollination is done within 2 days of spathe opening (Muralidharan et al. Unpublished). This paper discusses the second part i.e. effect of different time of pollination in date palm and discusses the best time for pollen receptivity.

MATERIALS AND METHODS

The experiment was conducted at Date Palm Research Station, SD Agricultural University, Mun-

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Table 1. Effect of different time of pollination on yield components of date palm cv Barhee (Year 2017 and 2018).

Treatments	Fruit retention percentage			No. of Fruits/bunch			Yield (kg/bunch)			Yield (kg/palm)		
	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled
T ₁ =6 to 8 h	47.18 (53.83)	43.82 (47.98)	45.51 ^b (50.91)	35.13 (1237.60)	35.91 (1293.57)	35.52 ^c (1265.58)	14.06	13.94	13.99 ^c	125.61	125.43	125.22 ^{cd}
T ₂ =8 to 10 h	50.67 (59.85)	49.94 (58.55)	50.31 ^a (59.20)	37.98 (1444.44)	42.10 (1775.67)	40.04 ^{ab} (1610.05)	16.89	18.44	17.66 ^a	153.91	165.93	159.92 ^a
T ₃ =10 to 12 h	51.85 (61.81)	52.34 (62.61)	52.09 ^a (62.20)	39.14 (1538.76)	42.42 (1804.24)	40.78 ^a (1671.50)	17.17	18.19	17.68 ^a	156.77	163.71	160.24 ^a
T ₄ =12 to 14 h	50.78 (61.81)	51.65 (62.61)	51.22 ^a (60.72)	38.00 (1445.80)	39.22 (1541.90)	38.61 ^b (1493.85)	15.35	16.65	16.00 ^{ab}	138.45	149.91	144.18 ^{ab}
T ₅ =14 to 16 h	50.49 (59.52)	50.59 (59.65)	50.54 ^a (59.58)	39.44 (1557.40)	37.89 (1453.53)	38.67 ^{ab} (1505.46)	15.30	16.05	15.67 ^b	138.00	144.46	141.23 ^{bc}
T ₆ =16 to 18 h	46.64 (52.89)	47.02 (53.54)	46.83 ^b (53.22)	33.58 (1128.92)	33.98 (1156.04)	33.78 ^c (1142.48)	11.66	12.67	12.16 ^c	101.6	114.03	107.82 ^d
Mean	49.60 (57.98)	49.23 (57.30)	-	37.22 (1392.15)	38.58 (1504.16)	-	15.07	15.99	-	135.72	143.91	-
SEm ± (T)	1.29	1.55	1.03	0.92	1.2	0.75	0.74	0.96	0.65	7.44	8.66	6.12
CD @ 5% (T)	3.84	4.6	2.95	2.73	3.58	2.13	2.21	2.86	1.87	22.1	25.73	17.51
SEm ± (Y)			0.59			0.43			0.38			3.35
CD @ 5% (Y)			NS			1.23			NS			NS
SEm ± (Y × T)			1.46			1.05			0.93			8.66
CD @ 5% (Y × T)			NS			NS			NS			NS
CV%	5.83	7.03	6.43	5.52	6.98	6.33	11.03	13.46	11.63	12.26	13.46	12.92

dra-Kachchh during 2017 and 2018; 24 palms of date palm of cv Barhee of same age were selected. The flower initiation starts in last week of February in 2017 and 1st week of March in 2018. Pollination was done in six intervals of time starting from morning 6 am, i.e. T₁ = 6:00 h to 8:00 h, T₂ = 8:00 h to 10:00 h, T₃ = 10:00 h to 12:00 h, T₄ = 12:00 h to 14:00 h, T₅ = 14:00 h to 16:00 h and T₆ = 16:00 h to 18:00 h based on Indian Standard Time and were replicated four times (one plant as a replication) and were analyzed under Randomly Block Design. For proper management of sink: Source ratio ten bunches in each plants were kept and the excess were removed. Among the remaining bunches two random bunches were selected and five strand from each bunch were selected for observations. Female inflorescence were pollinated within two days of its spathe opening based on its treatment and initial observations of number of flowers on each strand were counted based on which fruit retention percentage were calculated during harvesting period based on the number of fruits during harvesting. Further during harvesting number of fruits/bunch, yield per bunch and yield/palm were observed. The analysis was done through OPSTAT by CCS HAU, Hissar (Sheoran et al. 1998)

and DNMR test.

RESULTS AND DISCUSSION

The data presented in Table 1 represents the yield components during 2017 and 2018 and their pooled analysis. In fruit retention percentage it can be observed that highest fruit retention were observed in treatment T₃ (62.20%) which were found to be at par with T₂ (50.31%), T₄ (60.72%) and T₅ (50.54%), i.e. the duration between 8 am to 4 pm were found to give higher fruit retention. However, number of fruits/bunch were found highest in T₃ (1671.50) which was at par with T₂ (1610.05) and T₅ (1505.46) whereas yield was found highest with T₃ (160.24 kg) which was at par with T₂ (159.92 kg), i.e. 8 am to 12 noon. However, Iqbal et al. (2014) have noted that higher fruit set and yield was observed if the pollination was done between 10 am to 2 pm in Pakistan, whereas, Hajian (2005) reported that best time of pollination is 10 am to 3 pm. The probable reason behind the better fruit set is presence of lower temperature in early morning or late evening with hot afternoon during the month of February-March as discussed by Zaid and Wet (2002) suggesting that shade temperature

Table 2. Effect of different time of pollination on fruit characters of date palm cv Barhee 2018.

Treatments	Fruit weight (g)	Fruit length (mm)	Fruit width (mm)	Seed weight (g)	Seed length (mm)	Seed width (g)	TSS (^o Brix)
T ₁ = 6 to 8 h	11.88	31.81	22.82	1.04	17.24	8.36	31.33
T ₂ = 8 to 10 h	11.62	32.88	23.20	1.17	17.28	8.05	30.66
T ₃ = 10 to 12 h	12.94	32.95	23.35	1.03	17.11	8.40	31.00
T ₄ = 12 to 14 h	11.27	32.46	23.51	0.98	18.16	7.65	29.66
T ₅ = 14 to 16 h	11.93	32.96	23.92	1.10	18.31	8.15	30.66
T ₆ = 16 to 18 h	11.31	31.65	24.32	0.93	18.04	8.60	30.66
SEm ±	0.42	0.68	0.63	0.08	0.37	0.27	1.46
CD @ 5%	NS	NS	NS	NS	NS	NS	NS
CV %	11.62	4.65	6.23	11.89	6.47	10.28	8.27

lower than 18^oC and more than 25^oC results in poor fruit set. Harvested fruit were also examined for their fruit length, seed width, seed weight, seed length and TSS which were found to be non-significant (Table 2) which signify that time of pollination has no impact on the fruit characters. This indicates that the best time of pollination is 8:00 h to 12:00 h resulting in higher fruit set and yield.

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