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EFFECT OF VARIOUS DACTYLIFERA MALES POLLINIZER ON POMOLOGICAL TRAITS AND ECONOMICAL YIELD INDEX OF CV'S SHAKRI, ZAHIDI AND DHAKKI DATE PALM (*PHOENIX DACTYLIFERA* L.)

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ABSTRACT

A study was aimed at determining the effect of different Dactylifera male pollinizer on the pomological traits of Shakri, Zahidi and Dhakki Date Palm i.e. fruit set, days to fruit set, fruit characteristics, fruit drop and economical yield index during two successive seasons (February to September) in 2005 and 2006 at the experimental Date Palm Orchard of Gomal University Dera Ismail Khan. Results indicated that fruit setting percentage and days to fruit setting were significantly affected by male pollinizer in both years of study. Similarly fruit characteristics like fruit weight, length, breadth and seed weight was also significantly affected. The pulp weight was significantly affected in 2005, where no significant difference was observed in 2006. Maximum fruit drop percentage in cv. Dhakki was recorded as 39.00 and 38.53 during 2005 and 2006 respectively. M_1 pollen yielded the maximum fruits as 5.27 kg and 5.00 kg bunch^{-1} in 2005 and 2006 respectively. It can be concluded from the results that selection of suitable male parent as male pollinizer from different date cultivars resulted in improving quality of date varieties. Maximum fruit setting was recorded in Zahidi and Shakri while fruit characteristics like fruit weight, length, breadth and weight of pulp was recorded in cv. Dhakki. Similarly maximum fruit drop and economical yield was observed in Dhakki. It can be further concluded that amongst date palm varieties, Dhakki produced economical yield under the agro climatic conditions of Dera Ismail Khan.

Key words: Date palm, Dactylifera, Male pollinizers, Female varieties.

INTRODUCTION

The date palm (*Phoenix dactylifera* L.) is highly cross pollinated due to its diocious nature about 5 to 10 percent male plants, will suffice the purpose of pollen requirements for 100 female plants. To make pollination effective, it is better if 2 to 3 strands of male flowers are inserted between strands of female spath. To meet with this problem of artificial pollination is considered to be the most important factor affecting fruit set and yield (Hussain *et al*., 1979). Fruit setting problem can be referred to the fertilization and development of one carpel out of three into a single normal fruit containing seed and the rest of the abscission of the two carpels in the flower. In case of failure of fertilization, the abnormal fruit setting occurs. In this case all the three carpels develop into abnormal fruit called triplet, which never mature. This fruit setting behavior was reported by Milne (1918) and Chandler (1959). Economic yield depends upon higher percentage of normal fruit setting which depends upon pollination, pollination techniques, pollination efficiency viz. pollination time, flowering period of male palm pollinizer, pollen source and quality, male-female compatibility, female flower receptivity and environmental factors like temperature, rain and wind. Many factors effect the palm pollination, one of them pollen grain from different male type effect on fruit set yield and fruit characteristics is known as metazina. Metazina has been reported in most date growing countries by various researchers (Al-Tahir and Asif, 1983; Shaheen *et al*., 1989; El Makhtoun and Kader, 1990; Ibrahim and Shahid, 1994; El- Hamady *et al*., 1997; El Salhy *et al*., 1997; Abdel, 2000; Iqbal *et al*., 2004 and Marzouk *et al*., 2006) studied the effect of different male pollinizers on different cultivars of female palm. They reported that fruit set, yield and fruit characteristics of each cultivars varied according to parent used in pollination. Iqbal *et al*. (2008) and Iqbal *et al*. (2009) reported similar results. The agro-climatic conditions prevailing in D.I.Khan district are congenial for growing all kinds of dates (Iqbal *et al*., 2011). Different cultivars namely Dhakki, Gulistan, Shakri, Zaidi-1, Zaidi-II, Khudrawi, Basra, Helini, Zahidi, Muscat and Hillawi are under cultivation in D.I.Khan. Among these Dhakki, Gulistan, Shakri, Zaidi and Khudrawi are prominent cultivars and mostly cultivated. Date flesh would also serve as good source of fish feed additives, while its seeds would best be used as a source of energy for improved feed utilization efficiency (Sotolu *et al*. (2011). The present investigation was planned to evaluate the affect of different male pollinizers on fruit setting, yield and fruit characteristics of Shakri, Zahidi and Dhakki dates under the agro climatic conditions of Dera Ismail Khan.

MATERIALS AND METHODS

An experiment was conducted for two successive seasons 2005 and 2006 at Date palm Research Orchard, Gomal University, D. I. Khan. The soil texture was clayey. Five plants of each variety of Zahidi, Shakri and Dhakki having 21 years old and vigor were selected for the purpose. Five males symbolized as M_1–M_5, were used as pollen source for pollination of each variety. Male spathes were cut as soon as cracked. Pollination was done by dusting of pollens on spath opening day on each cultivar. After pollination, bagging was done in accordance with the size of spath of each female variety to avoid contamination. The experiment was conducted in split plot design having two factors – Factor A being (5) male pollinizers and Factor B (3) female varieties each has replicated 6 times. Data on the Following Parameters were recorded.

Fruit Set Percentage: Ten strands per spath were selected for recording of abnormal and normal fruit set. Fruit setting percentage was calculated by using the following formula:

$$\frac{\text{Total number of normal fruit set - Number of abnormal fruit set}}{\text{Total number of fruits}} \times 100$$

Days to Fruit Setting: The number of days were recorded when two carpals of tri-carpal ovary were abscised in each spath and then mean days were calculated.

Fruit Drop Percentage: Fruit drop percentage was calculated by using the following formula:

$$\frac{\text{Number of fruit dropped}}{\text{Total number of fruit set}} \times 100$$

Fruit Characteristics

Fruit weight (g): Twenty (20) fruits of each tree of date cultivars at each picking (at interval of 15 days) were weighed by electric balance and average weight of fruit of each cultivar was computed in grams.

Fruit length (cm): The length of twenty (20) fruits from each tree of date cultivars was measured with the help of meter rod and mean length per fruit was calculated in cm. This practice was repeated at 15 days interval (each picking).

Fruit Breadth (cm): The breadth of twenty (20) fruits was measured in cm, with the help of meter rod and mean width was calculated.

Weight of pulp (g): After separation of pulp from seeds, the pulp of twenty (20) fruits was weighed and then mean was calculated in grams.

Weight of seed (g): After separation of pulp and seed, the seed of twenty (20) fruits from each tree of date cultivars was weighed by electric balance and average weight of pulp per fruit was calculated at each picking.

Bunch Weight (kg): Six bunches from each treatment was harvested; the fruits were picked and weighed. The mean weight of fruits per bunch was calculated in kg.

Statistical Analysis: Data collected for each parameter were statistically analyzed using randomized complete block design. The Analysis of Variance was computed according to Steel *et al*., (1997) while the comparison of means was done by Duncon's Multiple Range Test (DMRT) using MSTATC computer program.

RESULTS AND DISCUSSION

Fruit Set Percentage: The results indicate that various male pollinizers as well as date cultivars differ significantly with respect to percent fruit set are revealed in Table 1. However, numerically the highest fruit set of 96.72% and 96.50% was recorded in M_4 during 2005 and 2006 respectively, which differed significantly from other male pollinizers except M_4 and M_5. The minimum fruit set of 74.27% and 74.05% were recorded in M_3 and M_2 during 2005 and 2006 respectively**.**

The significantly highest fruit set of 98.73% and 99.03% were observed in cv. Shakri followed by Zahidi (92.96 and 92.60% respectively). The least fruit set of 65.30% and 65.83% was found in cv. Dhakki during two successive years of study. The interactive effects of male pollinizers X varieties were found significant in both years. The highest fruit set of 100% was achieved when cv. Shakri was pollinated from M_1, M_2 and M_4 during both the years. The lowest fruit set of 32.50 and 31.5% were recorded when cv. Dhakki was fertilized with M_3 and M_2 during 2005 and 2006 respectively. Date palm is a diocious plant and needs proper care to pollinate the female flowers at the time of spath opening. Least fruit set was observed in Dhakki than Shakri and Zahidi. It is due to male and female incompatibility, which is lower than other cultivars. The difference in set fruit may be attributed to variation in agro-climatic conditions and the cultivars under study. These results are in agreement with those reported by Ibrahim and Shahid (1994). They found difference in effectiveness among six males in fruit setting. Similarly El-Amer (1993) reported variation in fruit setting due to pollen source. Iqbal *et al.* (2004) also reported the similar results.

Days to Fruit Setting: Table 2 revealed that significant difference among male pollinizers and varieties was observed during 2005 only, while fruit setting period due to these factors was not significantly influenced during 2006. Amongst the male pollinizers, M_1 proved to be more effective in early setting of fruit during 2005 and in 2006, while M_5 took least time for fruit setting. Amongst the varieties, Dhakki fruit set was found late during both

the years consuming 19.60 and 17.11 days. The cv. Shakri was found as early fruit setter followed by Zahidi during 2005 and 2006. The interactive effect of male pollinizers and female varieties was found significant with respect to days taken for fruit setting in 2005 but no significant difference was observed in 2006. In 2005, the least time taken for fruit setting (14.50 days) was recorded when cv. Shakri was fertilized with pollens of M_1 palm, while the maximum period of 22.50 days was noticed for fruit setting when pollens of M_3 were dusted on Dhakki female. The variation in days to fruit setting in females by pollination of different pollen sources is a genetic character of male palms. These results are in agreement with the findings of Salemi *et al*. (2008).

Fruit Characteristics

Weight of Fruit: The data relating to average weight of fruit of different cultivars as well as pollen sources at various picking dates is presented in Table 2. The perusal of data show that date cultivars differed significantly from each other during 2005 and 2006. the significantly maximum fruit weight of 11.64 g and 11.60 g was recorded in fruits produced by pollination of M_1, which was followed by M_3 (11.23 g and 11.36 g) and M_5 (10.71 g and 10.18 g). The M_4 fertilized fruits were contained the minimum weight of 9.24 g and 9.47 g in 2005 and 2006 respectively. The cv. Dhakki fruits were statistically heaviest (16.30 g and 16.29 g) amongst the fruits of other two varieties. The fruits of cv's. Zahidi and Shakri were contained significantly similar weight. However, Shakri fruits (7.97 and 7.95 g) were heavier than Zahidi (7.14 and 7.07 g). The cumulative effect of varieties and male pollens on average weight of mature fruits was found significant in both the years. The significantly highest fruit weight was reported in cv. Dhakki pollinated with M_3 pollens (11.11 g and 19.58 g). The lowest fruit weight of 4.93 g and 5.46 g was recorded in cv. Zahidi fertilized with M_4 pollens. The data suggests that average fruit weight of different cultivar increased progressively with the passage of time. These results are in agreement with the findings of Khalifa *et al.* (1980) whom reported that pollens have direct effect on fruit weight.

Fruit Length: The data pertaining to average length of fruits are presented in Table 4. The significantly maximum length (3.68 cm and 3.73 cm) was observed in M_1 fertilized fruits in both the years. The significantly shortest fruits (3.33 cm and 3.43 cm) were obtained from M_4. Amongst the varieties, cv. Dhakki fruits were the lengthiest (4.42 cm and 4.45 cm) which differed significantly from other two cultivars. The fruits of other cultivars i.e. Zahidi and Shakri possessed statistically different lengths of 3.22 cm and 2.94 cm respectively during 2005. However, these were statistically at par during 2006. The interactive effect of male pollens and varieties was found significant in both years. The statistically longest fruits were reported in cv. Dhakki pollinated with pollens of M_3 (4.75 cm) during 2005 and with M_1 (4.58 cm) in 2006. The shortest fruits were found in cv. Shakri pollinated with pollens of M_3 (2.33 cm and 2.51 cm) in both years. These results confirm the findings of Abdel (2000) who reported that specific pollens had significantly effect on the fruit length.

Fruit Breadth: Table 5 showed that M_1 male palm possessed significantly greatest breadth (2.31 cm and 2.37 cm) in both the years. It differed significantly from all other males, which were statistically identical to each other. Minimum fruit breadth was recorded in M_4 (2.00 2.80 cm). Among the varieties, the fruits of cv. Dhakki contained significantly maximum breadth of 2.45 cm and 2.49 cm. The results are quite identical to Iqbal (2008). It was followed by cv. Shakri (2.12 cm and 2.14 cm) and Zahidi (1.81 cm and 1.88 cm) in both years respectively. The interactive effect of varieties and male pollens was found significant in terms of fruit's breadth. The fruits of cv. Dhakki developed from fertilization of M_1, M_3 and M_4 pollens contained greatest fruits breadth in both the years. These findings support the results of Rahemi (1998) who reported that pollens from different males were affected significantly the breadth of fruits.

Pulp Weight: The data concerning average weight of pulp/ fruit as affected by different cultivars and date of sampling are reported in Table 6. The pulp is the edible portion of fruit and has significance in the quality of fruit. No significant differences were observed amongst the males during 2005 but exhibited significant effect during 2006. Varietals effect was significant in both the years. Numerically the maximum pulp weight (10.57 g) was recorded in fruits developed from fertilization of M4 pollens during 2005. It was followed by M1 (10.22 g), M_3 (10.08 g) and M_5 (9.59 g). The least pulp weight of 8.24 g was found in M_2. The significantly highest pulp weight of 10.47 g was recorded in fruits developed from pollen of M_1 during 2006. It was statistically at par with M_3 (10.35 g) but differed from all other males. The maximum pulp weight of 15.22 g and 15.27 g was observed in cv. Dhakki fruits that differed from other cultivars, which were statistically found similar with one another in both the years. The interactive effect of varieties and male pollens was found significant in both the years. The maximum pulp weight (18.08 g and 18.53 g) was found in fruits of cv. Dhakki fertilized with pollens of M_3 in both the years. The minimum pulp weight was recorded in fruits of cv. Zahidi developed from pollination of M_1 pollens (4.90 g) during 2005 and M_4 pollen (4.51 g) during 2006. These findings support the results of Iqbal *et al.* (2008) whom reported that pulp weight was affected due to different pollen sources. Al-Qureshi (2010) studied the physical and biochemical changes in 'Helali' date palm fruit during development and ripening in two successive seasons. They reported

that fruit flesh weight gradually increased during development until week 17 (Bisir stage) from pollination then slightly decreased during ripening at week 23 (Rutab stage), but sharply decreased during the Tamer stage at week 27.

Seed Weight: The data pertaining to average weight of seed are presented in Table 7. It was revealed that the pollen of different males showed significant effect on average weight of seed during 2005, but no significant effect was observed during 2006. The weight of seed amongst different varieties was found non-significant in both the years. In 2005, the fruit obtained from M_5 male pollens possessed the maximum seed weight (1.15 g) while that of M_3 pollinated fruits possessed the lowest seed weight of 0.99 g. Similarly in 2006, the M_1 pollinated fruits possessed seeds of statistically maximum weight (1.11 g) while minimum seed weight (0.95 g) was recorded in fruits pollinated from M_4 pollens. In both years, maximum seed weight (1.07g and 1.13 g) was recorded in cv. Zahidi, it was followed by Shakri (1.04 and 1.03 g). Minimum seed weight of (0.98g and 0.93 g) was recorded in cv. Dhakki. The interactive effect of male pollen and varieties was found significant in both the years. The maximum weight of seed (1.41 and 1.48 g) was found in cv. Zahidi pollinated with M_5 pollen during 2005 and 2006. The seeds of minimum weight (0.80 and 0.80 g) was reported in cv. Shakri pollinated with pollens of M_3 during 2005 and 2006. These results agree with the findings of Al- Ghamdi *et al.* (1988), they reported that seed weight was significantly affected due to different pollen sources. Similar results were reported by Shaheen *et al.* (1986) and Rahemi (1998).

Fruit Drop Percentage: The data on fruit drop percentage of three cultivars of dates as affected by pollination from different males are reported in Table 8. Significant difference among varieties was observed during both the years. Maximum fruit drop percentage (39.00 and 38.53) was observed in cv. Dhakki during both the years. Minimum fruit drop percentage of (5.30%) was recorded in cv .Zahidi during 2005. Whereas minimum fruit drop percentage of (5.63%) was evidenced in CV. Shakri during 2006. Five different male pollinizers did not exhibit statistically significant response on fruit drop percentage during both years of study. Maximum fruit drop percentage (19.11) was observed in M_5 during 2005 and 19.50% in M_2 during 2006. Several male sources had significantly effect on the percent fruit drop. Pollen from M_3 was resulted minimum fruit drop during 2005 and 2006 in M_4 and M_5. In varieties, maximum fruit drop of 34.66 and 34.66 with extensive economic losses was recorded in Dhakki. Dhakki is very prone to fruit drop due to several reasons like low nutrition level in the soil and high moisture present in the soil during fruit development. However, larger size and shorter internodes distance could also be the factors playing role in the higher percentage of fruit drop as discussed by Iqbal (2008) and Shafique *et al*. (2011). However, male sources are also important to minimize the drop in Dhakki dates. It is, therefore suggested to have some detailed study on factors like climatic and nutrition on the Dhakki date should be conducted. Minimum fruit drop percentage (14.77) was recorded in M_3 and (14.77) in M_4 during 2005 and 2006 respectively. Cumulative effect of different male pollinizers on fruit drop percentage of three date palm varieties was statistically found non-significant. Maximum fruit drop percentage (46.33) was observed in cv. Dhakki pollinated with M_5 during 2005 and (46.66) pollinated with M_2 (46.66%) during 2006. These results agree with findings of Iqbal *et al*. (2009) who reported that maximum fruit drop was recorded in cv. Dhakki.

Average Bunch Weight (kg): The average weight of fruits produced bunch^{-1} was not significantly affected due to varieties as well as pollen sources in both the years as mentioned in Table 9. Amongst the cultivars, the cv. Dhakki was recorded bunch weight (5.13 kg and 4.63 kg bunch^{-1}) followed by cv. Shakri (4.86 and 4.30 kg bunch^{-1}) and Zahidi (4.50 and 4.23 kg bunch^{-1}) in 2005 and 2006 respectively. The trees fertilization with M_1 pollen produced the economical fruits (5.27 kg and 5.00 kg bunch^{-1}) in both the years, it was followed by M_2 (5.22 and 4.77 kg bunch^{-1}). The M_3 pollinated palms yielded the lowest fruits (4.33 and 3.93 kg bunch^{-1}) in both years of study. The interactive effect of varieties and pollen sources were not significant in both the years. The highest fruit yields were obtained from cv. Dhakki fertilized with M_4 pollens (5.51 kg bunch^{-1}) during 2005 and with M_1 pollen (5.33 kg bunch^{-1}) during 2006. The lowest fruit yield bunch^{-1} were found in cv. Zahidi pollinated with M_3 pollens (3.50 kg and 3.00 kg) during two successive years of study. Effect of different male sources on fruit bunch weight of date cultivars like Shakri, Zahidi and Dhakki was found non significant during both years of study. Maximum bunch weight was recorded in M_1 during 2005 and 2006. Looking at the results obtained for fruit yield and other plant chrematistics, it can be assumed that different male pollens contain different genetic makeup and can be beneficial or harmful for potential date production. Percent fruit set in Dhakki was found lower than other two cultivars. Maximum fruit drop was also resulted in Dhakki but due to larger fruit size, a maximum fruit weight had compensated the set back and Dhakki produced economical fruit yield. These results are in agreement with past findings of Rahemi (1998) who reported that pollen source had no significant effect on fruit bunch.

Table 1: Effect of different dactylifera male pollinizer on fruit setting of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	89.16^{ab}	89.16^{ab}	90.66^{ab}	97.33^{a}	98.50^{a}	92.96^{a}
Shakri	100.00^{a}	100.00^{a}	99.66^{a}	100.00^{a}	94.00^{a}	98.73^{a}
Dhakki	81.33^{bc}	47.50^{a}	32.50^{e}	92.83^{ab}	72.33^{c}	65.30^{b}
Mean	90.16^{a}	78.88^{b}	74.27^{b}	96.72^{a}	88.27^{a}	
2005	CV= 10.98%, LSD for varieties =10.88, LSD for male= 8.70, LSD for interaction=12.52					
Zahidi	91.66^{a-c}	90.66^{a-c}	87.66^{a-c}	97.33^{ab}	95.66^{ab}	92.60^{a}
Shakri	10.00^{a}	100.00^{a}	97.66^{ab}	100.00^{a}	97.50^{ab}	99.03^{a}
Dhakki	84.50^{bc}	31.50^{d}	82.66^{d}	92.16^{ab}	78.33^{c}	65.83^{b}
Mean	92.05^{a}	74.05^{b}	76.00^{b}	96.50^{a}	90.50^{a}	
2006	CV= 11.85%, LSD for varieties= 9.16, LSD for male= 9.41, LSD for interaction= 13.54					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 2: Effect of different dactylifera male pollinizer on days to fruit setting of date palm varieties during 2005-2006.

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	16.00 ^{ef}	18.00 ^{cd}	16.50 ^{de}	17.50 $^{c-e}$	16.00 ^{ef}	16.80 ^{b}
Shakri	14.50 ^{f}	17.00 ^{de}	17.50 $^{c-e}$	16.50 ^{ef}	16.00 ^{ef}	16.20 ^{b}
Dhakki	18.00 ^{cd}	20.50 ^{b}	22.50 ^{a}	18.50 ^{cd}	19.00 ^{bc}	19.60 ^{a}
Mean	16.16 ^{b}	18.50 ^{a}	18.83 ^{a}	17.16 ^{b}	17.00 ^{b}	
2005	CV= 7.98%, LSD for varieties =2.036, LSD for male= 1.295, LSD for interaction=1.862					
Zahidi	13.50	15.66	16.00	15.16	13.13	15.61
Shakri	14.66	15.33	16.66	16.33	15.66	16.55
Dhakki	18.16	19.16	18.66	17.16	17.50	17.11
Mean	15.55	16.73	17.11	16.22	15.44	
2006	CV= 33.31%					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 3: Effect of different dactylifera male pollinizer on fruit weight (g) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	5.80 ^{hi}	7.85 $^{e-g}$	8.91 ^{e}	4.93 ^{I}	8.20 $^{e-g}$	7.14 ^{b}
Shakri	11.36 ^{d}	7.18 $^{f-g}$	5.66 ^{hi}	6.93 ^{gh}	8.70 ^{ef}	7.97 ^{b}
Dhakki	17.76 ^{a}	13.51 ^{c}	19.11 ^{a}	15.86 ^{b}	15.25 ^{b}	16.30 ^{a}
Mean	11.64 ^{a}	9.51 ^{b}	11.23 ^{a}	9.24 ^{b}	10.71 ^{a}	
2005	CV= 11.10%, LSD for varieties =1.42, LSD for male= 1.07, LSD for interaction=1.54					
Zahidi	5.60 ^{ij}	7.86 ^{fg}	8.46 ^{f}	5.46 ^{j}	7.96 ^{fg}	7.07 ^{b}
Shakri	11.26 ^{e}	7.33 $^{f-h}$	6.03 $^{h-j}$	6.95 $^{g-I}$	8.81 ^{fg}	7.95 ^{b}
Dhakki	18.00 ^{b}	13.45 ^{d}	19.58 ^{a}	6.01 ^{c}	14.40 ^{d}	16.29 ^{a}
Mean	11.60 ^{a}	9.55 ^{b}	11.36 ^{a}	9.47 ^{b}	10.18 ^{b}	
2006	CV= 9.89%, LSD for varieties =1.09, LSD for male= 0.95, LSD for interaction=1.37					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 4: Effect of different dactylifera male pollinizer on fruit length (cm) at of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	3.13 cd	3.41 c	3.48 c	2.68 e-f	3.38 c	3.22 b
Shakri	3.46 c	2.78 de	2.33 f	2.88 de	3.25 c	2.94 c
Dhakki	4.5 ab	4.13 b	4.75 a	4.45 ab	4.33 b	4.42 a
Mean	3.68 a	3.44 ab	3.52 ab	3.33 b	3.65 a	
2005	CV= 7.59%, LSD for varieties =0.26, LSD for male= 0.25, LSD for interaction=0.35					
Zahidi	3.10 ef	3.45 c	3.35 c-e	2.93 f	3.38 c-e	3.24 b
Shakri	3.43 cd	3.15 d-f	2.51 g	2.88 f	3.26 c-e	3.05 b
Dhakki	4.68 a	4.20 b	4.66 a	4.48 ab	4.21 b	4.45 a
Mean	3.73 a	3.60 ab	3.51 b	3.43 b	3.62 ab	
2006	CV= 6.22%, LSD for varieties =0.24, LSD for male= 0.20, LSD for interaction=0.29					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 5: Effect of different dactylifera male pollinizer on fruit width (cm) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	1.78 fg	1.93 e-g	1.93 e-g	1.51 h	1.88 e-g	1.81 c
Shakri	2.60 a	2.06 de	1.75 g	1.98 ef	2.21 cd	2.12 b
Dhakki	2.55 a	2.33 cd	2.66 a	2.50 ab	2.31 cd	2.45 a
Mean	2.31 a	2.07 b	2.11 b	2.00 b	2.13 b	
2005	CV= 7.83%, LSD for varieties =0.14, LSD for male= 0.15, LSD for interaction=0.22					
Zahidi	1.80 gh	2.01 d-f	2.01 d-f	1.71 h	1.88 f-h	1.88 c
Shakri	2.63 a	2.13 c-e	1.83 gh	1.96 e-g	2.16 b-d	2.14 b
Dhakki	2.70 a	2.26 bc	2.61 a	2.56 a	2.33 b	2.49 a
Mean	2.37 a	2.13 b	2.15 b	2.08 b	2.12 b	
2006	CV= 6.20%, LSD for varieties =0.13, LSD for male= 0.12, LSD for interaction=0.17					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 6: Effect of different dactylifera male pollinizer on pulp weight (g) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	4.90	6.76	7.18	10.75	6.78	7.27 b
Shakri	10.03	5.55	4.98	6.05	7.83	6.89 b
Dhakki	16.33	12.71	18.08	14.80	14.16	15.22 a
Mean	10.24	8.24	10.08	10.53	9.59	
2005	CV= 44.54%, LSD for varieties =4.91					
Zahidi	4.55 I	6.85 fg	7.28 fg	4.51 i	6.48 f-h	5.93 b
Shakri	9.95 e	6.20 f-h	5.23 hi	6.05 gh	7.36 f	6.96 b
Dhakki	16.93 b	12.45 d	18.53 a	15.03 c	13.40 d	15.27 a
Mean	10.47 a	8.50 b	10.35 a	8.53 b	9.08 b	
2006	CV= 10.04%, LSD for varieties =1.19, LSD for male= 0.87, LSD for interaction=1.25					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 7: Effect of different dactylifera male pollinizer on seed weight (g) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	1.06 $^{b-d}$	1.03 $^{b-d}$	1.15 $^{a-c}$	0.71 ^{e}	1.41 ^{a}	1.07
Shakri	1.30 ^{ab}	1.00 $^{b-e}$	0.80 ^{de}	0.83 ^{de}	0.96 $^{c-e}$	0.98
Dhakki	1.00 $^{b-e}$	1.00 $^{b-e}$	1.03 $^{b-d}$	1.08 $^{b-d}$	1.08 $^{b-d}$	1.04
Mean	1.12 ^{a}	1.01 ^{ab}	0.99 ^{ab}	0.87 ^{b}	1.15 ^{a}	
2005	CV= 6.37%, LSD for male =0.21, LSD for interaction= 0.31					
Zahidi	0.95 $^{d-g}$	1.11 $^{b-e}$	1.21 ^{bc}	0.91 $^{d-g}$	1.48 ^{a}	1.13
Shakri	1.31 ^{ab}	1.13 $^{b-d}$	0.80 ^{g}	0.90 $^{e-g}$	0.81 ^{fg}	0.99
Dhakki	1.06 $^{c-e}$	1.00 $^{c-g}$	1.05 $^{c-e}$	1.03 $^{c-f}$	1.00 $^{c-g}$	1.03
Mean	1.11 ^{a}	1.08 ^{a}	1.02 ^{a}	0.95 ^{a}	1.10 ^{a}	
2006	CV= 16.57%, LSD for male= 0.24, LSD for interaction=0.23					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Table 8: Effect of different dactylifera male pollinizer on fruit drop (%) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	7.83	5.00	3.66	5.50	4.50	5.30 ^{b}
Shakri	4.50	4.16	4.66	8.16	6.50	5.60 ^{b}
Dhakki	37.83	44.66	36.00	31.66	46.33	39.00 ^{a}
Mean	16.72	17.94	14.77	15.11	19.11	
2005	CV= 52.757%, LSD for varieties = 8.86, LSD for interaction= 0.31					
Zahidi	8.83	7.00	4.83	6.00	4.00	6.13 ^{b}
Shakri	5.33	4.83	4.33	8.00	5.66	5.63 ^{b}
Dhakki	39.66	46.66	37.00	34.66	34.66	38.53 ^{a}
Mean	17.94	19.50	15.38	14.77		
2006	CV= 51.71%, LSD for varieties= 9.09					

Means followed by same letter(s) do not differ significantly at 0.05 probability level.

Table 9: Effect of different dactylifera male pollinizer on fruit bunch weight (kg) of date palm varieties during 2005-2006

Varieties	Male					Mean
	M_1	M_2	M_3	M_4	M_5	
Zahidi	4.66	5.16	3.50	4.33	4.83	4.50
Shakri	6.00	5.16	4.16	4.50	4.50	4.86
Dhakki	5.16	5.33	5.33	5.50	4.33	5.13
Mean	5.27	5.22	4.33	4.77	4.55	
2005	CV= 70.78%					
Zahidi	5.00	5.16	3.00	3.50	4.50	4.23
Shakri	4.66	4.66	4.16	3.66	4.33	4.30
Dhakki	5.33	4.50	4.66	4.66	4.00	4.63
Mean	5.00	4.77	3.94	3.94	4.27	
2006	CV= 35.31%					

Means followed by same letter(s) do not differ significantly at 0.05 probability level

Conclusion: It was concluded from the research findings that maximum fruit setting was observed in Zahidi and Shakri. Likewise maximum value was noticed in terms of fruit drop and yield in Dhakki. Hence it may be recommended to the growers that that amongst date palm varieties, Dhakki would be the best choice to attain economical yield under the agro climatic conditions of Dera Ismail Khan.

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