

EFFECT OF DIFFERENT POLLINATION TECHNIQUES ON FRUIT SET, POMOLOGICAL CHARACTERS AND YIELD OF DHAKKI DATE PALM (*PHOENIX DACTYLIFERA L*) IN DERA ISMAIL KHAN, KP.

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ABSTRACT

The experiment was designed to compare the effectiveness of different pollination techniques i.e. natural as well as artificial methods and their response to fruit setting percentage, yield and yield contributing traits of Dhakki date at Gomal University Date Palm Research Orchard during the fruit season 2001 and 2002. The treatments including dusting of pollens, placement of male spath, liquid spraying of pollens as well as natural process of pollination (control) were carried out on female flowers. Results revealed that different pollination techniques had significantly affected the fruit setting and other quality parameters. Moreover, the highest fruit set of 89.3% and 88.9% were recorded in the placement method and while the lowest fruit set (21.1 and 41.2%) was observed in the control in both years. In addition to fruit set, consistent results were revealed by placement method in respect of fruit weight, length, pulp, seed weight and bunch weight (kg tree⁻¹). It was concluded that placement method was found instrumental one for improving yield and quality in Dhakki date palm under the agro-climatic conditions of Dera Ismail Khan.

Key words: Dhakki, Fruit setting percentage, Pollination, Pulp, Spath, Yield.

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INTRODUCTION

Date palm (*Phoenix dactylifera*) is the third major fruit of Pakistan and is commercially grown in many parts of this country (Smead and Chaudhary, 1970). In Pakistan, Dhakki, a local variety of date palm is the most popular and extensively grown due to its attractive colour, high yield, good taste, extra large size and better keeping quality (Ali, 1962). This local variety is playing an important role in the economic development of the area as well as of the country by earning handsome amount of foreign exchange. Its Quality is severely effected by natural pollination as it is ineffective in efficient fruit set and yield. Dhakki Date can be a best possible source of foreign exchange for Pakistan, so endangering our national economy. This factor of fruit setting has a pronounce impact on increase in yield in date palm have been reported by various investigators. Beacher *et al.* (1999) reported that artificial pollination in date palm helps in improving yield and quality. Attalla and Sharran (1998) observed the effect of different pollination techniques by dusting pollens by dusting various proportions of pollen powder significantly increased the average fruit set percentage as compared to other treatments. Hussain, *et al.* (1984) reported reduction in pollen viability within half an hour in all suspension media, resulting poor fruit setting. Similarly khan and Ghafoor (1993) reported that hand pollination gave good results in fruit setting and yield over the control. Soliman and Khosary (2006) also reported similar results. In Pakistan, farmers mostly use hand pollination techniques by various ways. They are unaware of the best techniques of pollination, which may be easiest and most convenient. So it is needed to find the best pollination technique for improving fruit setting percentage.

METHODS AND MATERIALS

An experiment was conducted for two successive seasons (February to August) during year 2001 and 2002 at Date Palm Research Orchard, Gomal University D.I.Khan. Four date palm trees of Dhakki of 20 years age and vigorous growth were selected for the study. The pollination was done on 28th March 2001 and 30th March 2001 at 11:00 a.m on a well sunny day. In order to avoid repetition and overlapping, only six spath from each tree were selected for pollination. The experiment was planned in Randomized Complete Block Design (RCBD) having four treatments with control (Natural pollination, the spathes were left open for natural pollination). The treatments were including dusting pollens, placement of male spath and liquid spraying of pollens. In dusting pollens, the pollen grains were extracted by removing protective sheath and inflorescence was kept under sunlight on newspaper for releasing pollen grains. After one hour the flowers were opened and

pollen grains released. After drying pollen grains were rubbed in foam duster. Dusting was done on opened spathe. In placement of male spath, the male strands were removed from inflorescence and placed in top of opened spath. In dilute spray after extraction the pollens were mixed into the distilled water and were sprayed on the open spathes by a micro sprayer. After pollination the bagging was done with waxy paper to avoid contamination. It was observed that under pressure of socio-economic changes of D.I.Khan, traditional Dhakki date cultivation from local tenant farming, to private, mechanized orchards had been maintained as a result of dusting, placement and liquid spray of pollen. Before opening of each spath bagging was done by waxy paper. After pollination the spathe were rebagged to avoid contamination. Data on the following parameter were recorded 1 Fruit Setting Percentage was recorded as per (El Makhtoun (1981, 2) Pomological characteristics of fruits (Fruit weight, length, pulp and seed weighted). yield of fruit bunch (kg) were recorded as per Iqbal, *et al* (2004). Placement methods had allow monitoring and/or control of fluid placement during appropriate formation treatment techniques, including, but not limited to, matrix stimulation, scale inhibition, scale removal treatments, fracture stimulation, gravel pack cleanup, and the like. Monitoring and/or control of treatment fluid placement was conducted by measuring concentration of one or more components in the injected fluids as the key differentiating factor between fluids presented in the wellbore and/or near wellbore region. Placement Method was used to monitor reservoir/wellbore placement of any treatment fluids containing components which were detectable in accordance with methods of the invention.

Statistical Analysis

The data were analyzed statistically according to Steel and Torrie (1980) and means of the two years in terms of control, dusting of pollen, placement of male spath and liquid spray of pollens were separated, compared and significantly differentiated by Least Significant Difference (L.S.D.) as reflected in Table 1.

RESULTS AND DISCUSSION

Fruit Setting Percentage

The data regarding fruit set percentage is given in Table 1. The results show that different pollination techniques significantly affected the fruit set percentage in both years. The significantly highest fruit set (89.3% and 88.9%) was recorded in placement method during both years which differed significantly from all other treatments. It was followed by dusting (81.3%) in 2001 and liquid spray (69.3%) during 2002. The lowest fruit set of 26.1% and 41.2% were observed in control treatment during 2001 and 2002 respectively. These results are in accordance with the findings of Khan and Ghafoor (1993) who reported that maximum fruit set was obtained with adopting of placement method for pollination of Dhakki date. Similar findings were reported by Attalla and Sharaan (1998) who worked on different pollination techniques on the Sukari and Hellawa of date palm and recorded lowest fruit set in Control. Shukar, *et al.* (1988) tested four pollination techniques on 14 female date palm of Zahidi viz. fresh pollen from male, heat killed pollen, soaking fresh pollen in distilled water and no pollen in control. They found 60-90% fruit set in three methods against 33% in control. Similar results were reported by Aziz, *et al.* 1983 and Laghavi, *et al.* 1993.

Weight of Fruit

No significant difference in fruit weight was observed among the different pollination techniques. However, during both years, the statistically maximum fruit weight of 15.38 (g) and 16.71 (g) were recorded in fruits developed from pollination with the placement method. It was followed by the dusting and liquid spray method. The minimum fruit weight of 13.25 g and 14.65 g was recorded in fruits developed from the control. These results are in accordance with the findings of Hamood, *et al* (1986). They observed no significant difference in fruit weight among different methods of pollination.

Length of Fruit

Different pollination techniques did not show any significant effect on average length of fruit. The lengthiest fruits (4.93 cm and 5.15 cm) were obtained by the placement method followed by dusting, second longest fruits of 4.85 cm and 5.01 cm during 2001 and 2002 respectively. In both years, the naturally fertilized fruits were shortest in length (4.60 cm and 4.86 cm). These results are in agreement with the findings of Hamood, *et al* (1986). They did not find significant difference among different methods of pollination. Moreover, Attalla and Sharaan (1998) also reported the similar results.

Pulp Weight of Fruit

The pulp weight was not significantly affected by different pollination techniques during the both years. The statistically maximum pulp weight was recorded in fruits developed by the placement method while

the minimum pulp weight was recorded in the control. The dusting of pollens and liquid spray of pollens ranked second and third position with regard to pulp weight of fruits. These results are contradictory to the findings of Attalla, *et al* (1998). They reported that pulp weight was significantly affected by pollination techniques.

Seed Weight

No significant variation in seed weight was observed among the different pollination techniques during 2001, while a significant difference was exhibited in 2002. During 2001, the heaviest seeds (2.01 g) were found in fruits developed by placement method in 2002, the fruits fertilized by the liquid spray of pollens contained the seeds of maximum weight (1.88 g). The seeds possessing minimum weight (1.51 g and 1.30 g) were obtained from dusting method and control during both years. The inconsistency of the results may be attributable to difference in climatic conditions and due to possibly hormonal action in the ovule.

Fruit yield (kg/ bunch)

Different pollination techniques exhibited significant effect on yield of fruit per bunch during 2001 while no significant difference was observed in 2002. During 2001, the significantly highest fruit yield per bunch was recorded by placement method (7.21 kg/ bunch) followed by dusting (6.14 kg) and liquid spray (5.87 kg). However, all the three methods were at par with regard to fruit yield per bunch. The significantly lowest fruit yield of 3.02 kg/bunch was recorded by control treatment which differed significantly from all other treatments. During 2002, the maximum yield of 7.581 kg/bunch was obtained from placement method followed by dusting and liquid spray (6.88 kg/ bunch) and liquid spray of pollens (6.70 kg/bunch). The lowest fruit yield of 4.72 kg/bunch was found in control palms. These findings are in accordance with the findings of Hamood, *et al* (1986) and Attalla, *et al* (1998). They reported that fruit yields were increased by various pollination methods than control. Likewise, Hussain, *et al.* (1989) and Ibrahim and Haggag (1993) reported that hand pollination gave good yield than natural pollination.

Table-I Effect of different pollination techniques on fruit setting percentage, pomological characters and yield of date palm cv. Dhakki during the year 2001 and 2002.

Pollination Techniques	Fruit Setting Percentage (%)		Fruit weight at maturity (g)		Fruit length at maturity (cm)		Fruit pulp weight at maturity (g)		Seed weight at maturity (g)		Fruit bunch weight (kg)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Control (Natural Pollination)	26.1 c	41.2 c	13.3	14.7	4.60	4.87	12.0	13.4	1.62	1.30 b	3.02 b	4.72
Dusting of Pollens	81.3ab	52.0 bc	14.7	15.7	4.85	5.02	11.8	14.1	1.517	1.60 ab	6.15 a	6.88
Placement of male spath	89.3 a	88.9 a	15.4	16.7	4.93	5.15	13.4	14.9	2.02	1.80 ab	7.22 a	7.58
Liquid spray of Pollens	69.3 b	64.1 b	13.7	15.4	4.78	4.87	12.7	13.2	1.93	1.88 a	5.87 a	6.71
LSD	2.8	21.8	NS	NS	NS	NS	NS	NS	NS	0.49	2.48	NS

LSD = Least significant difference at 5% probability.

NS = Non-significance.

CONCLUSION AND RECOMMENDATIONS

It can be concluded from the result findings that for obtaining maximum fruit set and the yield in Dhakki date palm, the placement technique may be adopted as under present study, it had proved their importance from economic point of view. From the results it is evident that yield is related with maximum fruit setting, maximum fruit weight, length, pulp and seed.

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