DATE PALM POLLEN VIABILITY IN RELATION TO STORAGE CONDITIONS

M.A. Shaheen; T.A. Nasr and M.A. Bacha

Department of Plant Production, College of Agriculture, King Saudi University, Riyadh, Saudi Arabia

ABSTRACT

Viability of fresh and stored pollen of date palm (*Phoenix dactylifera*, L.) was studied. Pollen samples were stored at room temperature (25-30°C), under refrigeration (3-4°C). *In vivo* test, pollen viability was determined by percent fruit set.

Results suggest that different storage conditions had no apparent effect on pollen viability as tested with acetocarmine. However, results of *in vivo* test showed that pollen stored either at room temperature or in a refrigerator had higher viability as determined by percent fruit set to deep freezer storage.

Key words: Pollen viability, pollen stroage, acetocarmine.

INTRODUCTION

Commonly in pollinating date palms pollen is used. For this, the male and female should bloom same time. Often emergence of inflorescence on female palms before male palms bloom causes scarcity of pollen in early spring. The storing of pollen from one season to the next offers a practical solution, providing it can be kept without appreciable loss of viability.

Very little experimental work has been done with pollen storage. As early as 2000 B.C. male flowers with pollen were stored in the dark under dry conditions (Kampfer, 1712, cit. by Pfundt, 1910).

Numerous investigations on storage of date pollen have been carried out elsewhere (Stout, 1924; Albert, 1930; Crawford, 1938; Aldrich and Crawford, 1941; Rahim, 1975). However, information concerning storage of date pollen in Saudi Arabia is lacking (Abo-Hassan *et al.*, 1982). In the present investigation pollen was stored at different temperatures till next season. Effect of storage conditions on pollen viability was determined. Viability of pollen in some of the males under study was also determined using the germination and *in vivo* techniques.

MATERIALS AND METHODS

This investigation was commenced in 1984 to determine the viability of pollen grains of the males selected in the Central Region which amounted to about 135 males.

Three matured spathes were collected from each of the selected males. For pollen extraction, the strands were cut off and spread in on paper sheets to dry. Then, the pollen grains were separated from the flower parts by using fine sieves (40 mesh). Viability of pollen grains of each sample was recorded.

temperature conditions:

a) Room temperature (25-30°C)
b) Referigerator (3-4°C)
c) Deep freezer (-20°C).

The pollen samples were stored in vials, 3 replicates each. The vials were kept in respective storing conditions until the next pollination season.

Pollen viability was determined by stainability of the pollen grains with 1 % acetocarmine (Moreira and Gurgel, 1941). Pollen grains that stained red were considered viable, whereas, the colourless grains were recorded as non-viable (Figure 1).

Along with the above test on pollen viability, an *in vivo* test was carried out. Female cultivar Nebut-Seif was pollinated with pollen obtained from 8 different males and stored under the above mentioned conditions. Measures were taken to prevent contamination by foreign pollen grains. Each of the pollination was pollinated in each replicate. Observations on fruit setting were carried out 50 days after pollination.

RESULTS AND DISCUSSION

Fresh Pollen Grains Viability

The data concerning viability of fresh pollen grains of the different males are shown in Table 1. As per acetocarmine grains was high in most of the males under investigation. The viability of the pollen grains was more than 75 per cent in 95.01 per cent of the males under study. The results are in general agreement with Al-Tahir and Asif (1981), who stated that variability existed in pollen quality including viability and germination.

Effect of Storage on Viability of Pollen Grains

a) Acetocarmine staining

Data presented in Table 2 showed that storing pollen grains either at room temperature (25-30°C), in a refrigerator (3-4°C) or in a deep freezer (-20°C) until the following pollinating season, had no apparent effect on pollen grains viability tested by acetocarmine. The mean pollen viability for pollen stored at above mentiond conditions was 88.4, 90.4 and 79.4, respectively. The viability of pollen stored under deep freezer conditions was a little less than the viability of other two conditions.

Comparing viability of pollen grains of the different males stored at room temperature, the data showed that viability was low in the Beheiri male as compared to other males. The percentage viability of the pollen grains reached 65.2 in this male. On the other hand, pollen grains of the Shakraa

Table 1. Viability (%) of fresh pollen tested with acetocarmine and germination

Test	Range of viability	Percentage of males in viability group		
		50	50-75	75
Acetocarmine	44.6-100.0	0.28	4.71	95.01

males retained high viability about 96.8 percent (Table 2).

Viability of pollen grains stored in a refrigerator was the least in the Sakhi male (80.6 percent) and highest in the Hallawi and Beheiri males (100 percent for both males).

Concerning viability of pollen grains stored in deep freezer, the least percentage of viability was observed in the Beheiri male (50.1 percent), whereas the highest percentage was observed in the Sakki male (87.4 percent).

The results also showed that viability of pollen grains was generally low when stored in deep freezer conditions compared to storage at room temperature and refrigerator conditions (Table 2).

b. *In vivo*

In this test, the percentage fruit set was used as indicative of pollen viability. Fruit set with pollen stored either at room temperature (25-30°C) or in a refrigerator (3-4°C) was about 40.4 percent as compared to 48.0 percent fruit set by fresh pollen. While, pollen stored in the deep freezer gave 34.1 percent fruit set.

Table 2. Effect of storage on pollen viability as detected with acetocarmine

Male CV	Percent viability of pollen		
	Room Temp. 25-30°C	Refrigerator 3-4°C	Deep freezer -20°C
Barhi	94.7	92.1	86.9
Succari	84.6	89.4	82.4
Khudari	90.2	92.3	80.9
Dekheini	92.5	85.6	80.7
Serry	86.1	82.4	71.6
Seleg	84.4	82.4	70.8
Khashram	92.6	92.5	82.1
Khalas	83.6	90.2	84.8
Sefri	89.2	94.1	86.0
Meneifi	93.1	89.8	87.1
Shakret El-Qassim	96.8	93.6	86.1
Kheskkar	95.8	95.1	80.6
Maktumi	90.3	93.8	64.8
Nebut Zamel	96.2	94.1	82.8
Nebut-Seif	87.1	87.6	80.3
Hallawi	92.1	100.0	87.0
Deheini	95.9	90.0	81.5
Khweldi	78.5	82.2	73.5
Sakhi	76.8	80.6	87.4
Beheiri	65.2	100.0	50.1
Unknown	91.7	90.0	80.2
Mean	88.4	90.4	79.4

Male CV	Percent fruit			
	Room Temp. 25-30°C	Refrigerator 3-4°C	Deep freezer -20°C	Fresh pollen
Barhi	35.1	41.1	48.4	52.5
Succari	50.8	53.6	42.4	52.0
Khudari	59.3	42.3	47.3	46.8
Dekheini	45.0	35.1	48.4	50.0
Seleg	36.4	38.3	49.9	48.5
Khalas	26.2	47.9	36.4	46.2
Nebut-Seif	31.9	39.2	40.2	44.5
Unknown	39.7	25.8	27.5	34.5
Mean	40.6	40.4	34.1	48.0

The results of viability of stored pollen are generally in agreement with the findings of other investigators (Pfundt, 1910; Stout, 1924; Albert, 1930; Crawford, 1938; Aldrich and Crawford, 1941; Rahim 1975; Abo-Hassan *et al.*, 1982). Pollen could be stored in fairly viable state until the following pollinating season under refrigeration or room temperature conditions.

LITERATURE CITED

Abo-Hassan, A.A., Taha A. Nasr and H.A. ElShuks 1982. Effect of type and storage of pollen on fruiting of Khudari dates. 1st Symposium on Date Palm. College of Agric. Sci. and Food, King Faisal Univ., Al-Hassa, 1982, pp. 102-106.

Albert, D.W. 1930. Viability of pollen and receptivity of pistillate flowers. Date Grower's Inst. Rpt. 7: 5-7.

Aldrich, W.W. and C.L. Crawford 1941. Second report upon cold storage of date pollen. Date Grower's Inst. Rpt. 18:5.

Al-Tahir, O.A. and M.I. Asif 1981. Stain testing of date pollen viability. Date Palm J. 1 (2): 233-237.

Crawford, C.L. 1938. Effectiveness of date pollen following cold storage. Amer. Soc. Hort. Sci. Proc., pp. 91-95.

Moreira, S. and J.H. Gurgel 1941. Pollen fertility and correlation with number of seeds in species and forms of the genus *Citrus*. Brogautia, SanPaulo. I: 669-711. Plant Breeding Abst. Vol. 4 (1976).

Pfundt, M. 1910. Der Einflub der lufltfeuchigkeit auf die lebensdauer des Blutenstaubes. Jahrb, Wiss. Bor., 47: 1-40.

Rahim, A.L. 1975. The pollination intervals of dates. 3rd Inter. Palm and Dates Conf. Bahgdad.

Stout, A.B. 1924. The viability of date pollen. I.N.Y. Bot. Gard. 25: 101-106.

Vasil, I.K. 1964. Effect of born on pollen germination and pollen tube growth. pp. 107-118. In Pollen Physiology and Fertilization. Ed H.F. Linsken. North-Holland Publ. Co. Amsterdam.

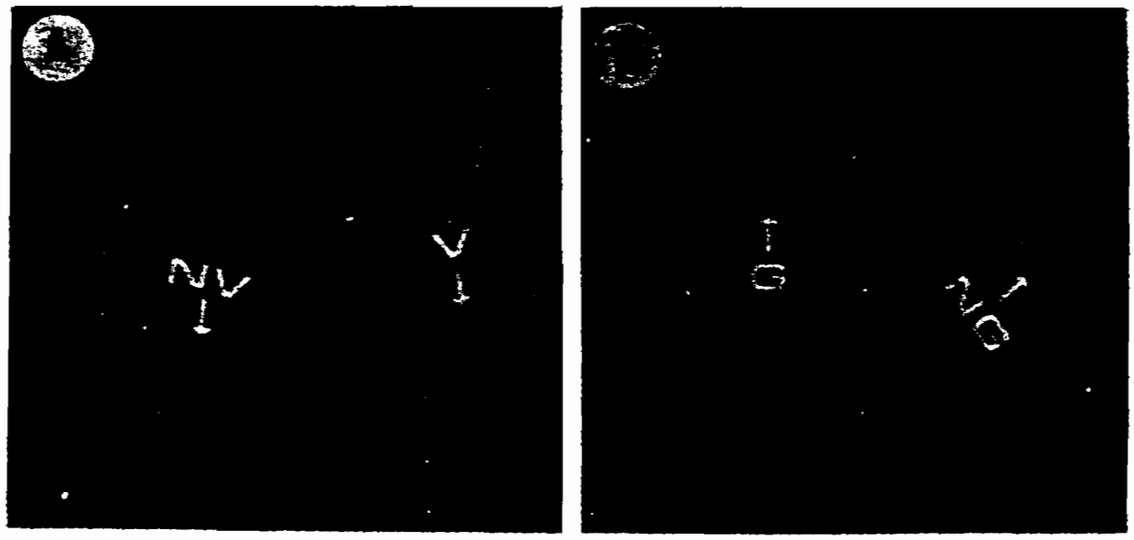

Figure 1. Viability of pollen grains.

A. Acetocarmine, red coloured pollen grains are viable (V), Colourless ones are not viable (NV).

B. Germination, germinating pollen grains are viable (G), nongerminating are not viable (NG).

تخزين حبوب اللقاح وعلاقته بالحيوية في نخيل البلح

محمد عبد الرحيم شاهين، طه عبد الله نصر ومحمد على باشا
قسم الانتاج النباتي ـ كلية الزراعة ـ جامعة الملك سعود
الرياض ـ المملكة العربية السعودية

الخلاصـــة

اشتمل هذا البحث على دراسة حيوية حبوب اللقاح الطازجة الحديثة، والمخزنة وذلك في ١٣٥ ذكرا من ذكور النخيل البذرية، باستخدام طريقتي الصبغ بصبغة الاسيتوكارمن والإنبات. وقد خزنت حبوب اللقاح في جو الغرفة العادى على درجة حرارة ٢٥ ـ ٣٠م وفي ثلاجة على درجة حرارة ٣ ـ ٤م، وفي مجمد على درجة حرارة ـ ٢٠م، كما درس تاثير حبوب اللقاح المخزنة على عقد الثمار كدليل لحيوية حبوب اللقاح والتي تعرف باسم in vivo .

وبينت النتائج أنه باستخدام صبغة الاسيتوكارمن كانت حيوية حبوب اللقاح الطازجة (الحديثة) تتراوح من ٤٤ر٦ ـ ١٠٠٪، بينما باستخدام طريقة الإنبات كانت الحيوية تتراوح من ٠ر٦ ـ ٩ر٩٣٪، وتوضح النتائج كذلك أن طرق التخزين المختلفة لم يكن لها تاثير ملموس على حيوية حبوب اللقاح بطريقة الصبغ بصبغة الاسيتوكارمن. كما بينت النتائج التي حصل عليها باستخدام طريقة in vivo أن حبوب اللقاح المخزونة على درجة حرارة الغرفة أو في ثلاجة بقيت حية حيث إن النسبة المئوية للثمار العاقدة كانت حوالى ٤٠٪ بمقارنتها بالثمار الصاقدة باستخدام حبوب اللقاح الطازجة (الحديثة) والبالغ نسبتها حوالى ٤٨٪

وتوضح هذه النتائج أنه يمكن تخزين حبوب اللقاح والاحتفاظ بها حية بدرجة كبيرة وهذا يسهم الى حد كبير في إنشاء (بنك اللقاح) ليكون مصدرا لإمداد مزارعو النخيل بحبوب اللقاح الجيدة واللازمة للتلقيح في الأوقات التي يحدث فيها نقص في حبوب اللقاح.

الكلمات الدليلية: حيوية حبوب اللقاح ، تخزين حبوب اللقاح ،الأسيتوكارمن .