

Effect of Pollination Time on Fruit set and Fruit Quality of Mishrig Wad Laggai Date palm under Khartoum Conditions

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Abstract

Artificial pollination of date palm is essential for commercial production. The main objective of this work was to evaluate the effect of different day time pollination on fruit set and fruit quality of Mishrig Wad Laggai,(MWL), the most popular semi-soft variety grown commercially in the Sudan (Mason, 1925).

This experiment was conducted in three successive seasons during 2000, 2001 and 2002 on 36 female date palms. Three replicates three trees per plot. Four treatments, pollination early morning (6-7 am), pollination before noon (9– 10 am) pollination after noon (1 – 2 pm) and pollination after sunset (5 -6 am). High fruit set and high yield were obtained from pollination Mishrig Wad Laggai date palm before sun set, while the lowest values were obtained when pollination was carried out in the early morning.

Introduction

The main objective of this work was to optimize the pollination practices bearing in mind that pollen grain germination are closely related with both environmental conditions and stigma receptivity (Brown et al. 1969). High relative humidity was shown to damage date pollen grain by washing (Albert 1930). It was also reported that high temperature results in poor germination of pollen grains (Reuther and Grawford, 1964, Fruit and Ream 1968). This work was conducted to evaluate the effect of different day time of pollination on fruit set and fruit quality.

Materials and Methods

This study was conducted in three successive seasons during 2000, 2001 and 2002 on 20-years-old 36 uniform and healthy female date palm and subjected to the normal cultural practices. Seven female spathes of nearly equal size were selected and tagged on each selected palm tree. Each female spathe was pollinated just after its opening by 7 male strands (nearly equal in length) collected from the same seedling male. Pollination was carried out during the first - second week of February inn each year.

Four treatments representing time of pollination were:-

- A- Early morning (6-7 am)
- B- B-Before noon (10-11am).
- C- C-After noon (1-2 pm).
- D- D-Before sun set (6-7 pm)

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Each treatments was represented by 9 trees, 3 replicates (three trees/plot). Data concerning temperature (°) and relative humidity (%) during the pollination periods are given in Appendix (1). Fruit set was reordered after 30 days from pollination in each season. At harvest time during the third week of September, yearly bunches of each tree were picked, then weighed and the average bunch weight was calculated. Sample of 50 fruits were picked randomly from each tree to determine the physical and chemical characteristics included the determine of average chemical characteristics included the determination of total sugars by the modified schaffer – Hartman method (1921) by the A.O.A.C methods (1960). Data were analyzed statistically according to Snedecor.

Results and Discussion

From the data presented in Tables 1 and 2 it is obvious that there were significant differences in most of the characteristics studied between the treatments. Results of the three season have revealed that treatment D significantly increased the percentage of fruit set as compared to that of the treatment A. The increase in fruit set percentage which occurred by the treatment D (pollination before sun set) may be due to the optimum environmental conditions at this time of the day i.e. the decline in temperature in the after noon associated with adequate humidity (Appendix 1). The pollen tube can easily germinate and elongate to penetrate the stigma and style of the female flower resulting in better fertilization and fruit set (Brown *et al.*, 1969).

On the other hand the lowest fruit set percentage obtained from the early morning pollination (treatment A) may be due to the of increase in relative humidity in increasing stigma moisture content which results in damage of pollen grains, in addition to uneven pollen grains distribution (Albert 1930).

Also the decrease in yield per tree in treatment C (afternoon) compared to treatment D (before sun set) could be attributed to the effect of high temperature at this time (Appendix 1) which results in poor germination and probably death of pollen grains especially when combined with low humidity. This suggestion was based on the findings of Reuter and Crawford (1946) and Furr and Ream (1968). It is clear from Table 1 and 2 that pollinating MWL date palm before sun set significantly increased the average yield as compared with other treatments .Data also indicated that pollination before sun set gave fruit of high quality in most physical and chemical properties as compared with other treatments.

Recommendations

From the data obtained it could be concluded that the best time for pollinating MWL date palm was afternoon and before sunset.

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Temperature (C) and RH (%) at AL Halfia, During Pollination Periods of MWL date palm.

Treatm ent	(A)						(B)						(C)						(D)					
	Early morning (6-7) am			Before Noon (10-11) am			After Noon (1-2) PM			Before sun set (6-7) PM														
	Temp.	RH%		Temp.	RH%		Temp.	RH%		Temp.	RH%													
	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002
7 Feb.	20.1	19.1	21	59	69	72	26.1	25.9	21.2	21.4	23.1	22.0	40.0	38.7	39.9	20.5	21.3	21.4	34	32.7	33.9	39	47	51
8 "	20.0	22	20.9	76	74	69	26.0	25.4	25.2	20.7	19.4	21	34.8	36.5	37.8	16.8	18.1	20.2	30	32.5	31.9	56	54	49
9 "	21.9	19.9	22	57	70	65	27.9	25.1	27.2	19.5	20.9	19	32.0	38.9	40.1	12.5	19.9	17.1	26.4	31.4	32.8	39	51	45
10 "	22.0	20.4	19.9	74	71	68	28	27.4	25.1	19.4	21.5	20	38.1	32.7	33.0	15.9	20.4	19.2	26.3	25.0	29.7	64	51	48
11 "	21.4	19.8	20.1	69	55	70	27.4	25.1	24.7	12.4	18.9	21	31.6	38.1	32.5	15.6	14.7	19.1	26.4	27.8	29.9	49	45	50
12 "	19.9	18.7	22	60	63	69	26.9	27.8	25.1	18.7	18.5	19.9	34.4	35.6	36.0	16.0	18.4	18.9	25.4	24.9	25.1	45	53	49
13 "	21.0	22	19.8	73	56	72	27	25.4	26.1	19.4	21.2	20	34.6	35.2	34.9	16.4	20.1	19.2	29.0	28.0	27.0	53	59	58
14 "	19.9	19.9	21	78	76	71	25.9	26.1	25.4	18.5	20.1	22	33.7	34.2	37	16.6	19.9	20.1	29.2	30.1	28.4	58	36	51
15 "	17.5	22	19.8	73	74	68	25.5	24.9	27	19.4	19.9	20.9	38.0	35.1	34.2	16.7	18.7	19.4	30.4	31.7	29.1	53	54	48
16 "	18.8	20	21	66	72	68	24.8	25.1	24.9	21.4	20.4	21.4	38.4	36.5	35.4	20.0	19.0	20.1	30.9	32	31.7	46	52	49
17 "	19.1	22	20.1	58	68	70	25.1	25.2	25.4	20.9	19.9	19.9	39.4	32.7	35.8	20.4	19.0	18.9	31.3	29.5	31.4	44	54	59
18 "	20.8	21.2	19.8	65	67	69	26.8	27.9	25.8	22.0	18.9	19.9	39.5	32.5	39.1	21.4	16.4	18.5	30.4	30.9	30.4	45	47	49
19 "	20.7	20.5	19.7	58	74	62	26.7	25.9	24.8	22.1	20.1	21.5	38.8	39.1	34.0	21.5	17.9	20.5	30.9	31.5	31.9	59	54	58
20 "	21.3	20.2	21.9	69	58	65	27.3	25.9	26.1	21.4	20	20.5	40.1	38.2	35.9	20.8	19.4	19.9	33.6	32.7	31.8	49	51	58
21 "	20.2	21.2	19.3	68	71	67	26.2	28.1	25.1	20.8	22	19.5	39.8	34.9	38.1	19.9	20.0	18.0	32.4	34.0	33.1	51	54	47

- Data obtained from Gandial Company Meteorological

Table 1. Effect of day time of pollination on fruit set and yield.

Time of pollination	Fruit (%)			Yield/tree (kg)		
	2000	2001	2002	2000	2001	2002
A/Early morning 6-7 am	62.1 d	55.3 d	62.5 d	368 d	350 d	372 d
B/before noon 10-11 am	69.3 c	63.0 c	69.7 c	409 c	335 d	418 c
C/After noon 1-2 PM	73.9 b	71.4 b	75.9 b	437 b	421 b	445 b
D/Before son set 6-7 PM	80.7 a	78.2 a	86.8 a	465 a	449 a	480 a

Values followed by the same letter are not statistically different at 0.01 levels.

Table 2. Effect of day time of pollination on fruit quality.

Time of pollination	Fruit weight (g)			Fruit volume CC/fruits			Total sugars (%)		
	2000	2001	2002	2000	2001	2002	2000	2001	2002
A/Early morning 6-7 am	6.3 d	6.5 d	6.2 d	12.3 d	12.7 d	12.3 d	65.2 d	64.9 d	64.8 d
B/before noon 10-11 am	7.5 c	7.8 c	7.03 c	13.5 c	13.7 c	13.5 c	68.9 c	68.2 c	68.7 c
C/After noon 1-2 PM	9.0 b	8.9 b	8.7 b	14.3 b	15.2 b	14.9 b	74.0 b	73.8 b	73.9 b
D/Before son set 6-7 PM	10.12a	11.0 a	10.8 a	16.8 a	17.0 a	16.7 a	77.07a	73.5 a	75.1 a

* Calculated as g per 100 g fresh weigh,

Values followed by the same letters are not statistically different at 0.01 level.