

Response of different date palm cultivars to varying concentration of ethephon on yields and yield attributing characters

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ABSTRACT : The study revealed that the maximum fruit size (length, breadth and volume) was observed in variety Halawy. The highest number of fruits per strand, number of bunches per tree and bunch weights were recorded highest under variety Zahidi. But yield was observed maximum in variety Halawy (per tree). The number of days in attaining fruit colour after colour breaking stage was counted minimum in Zahidi and maturity in Halawy. The fruit length, breadth and volume were found maximum under the treatment of ethephon at 1000 ppm when it was applied after colour breaking stage. The application of ethephon also produced more bunch weight and yield per tree. The less number of days in attaining fruit colour and maturity were counted minimum under the concentration of 1000 ppm then the control and other concentrations employed.

Key Words: Ethephon, varieties, phosphorus, chlorophyll, magnesium, fruit quality.

Date palm (*Phoenix dactylifera* L.) is an ancient indigenous fruit to countries around Persian Gulf. It belongs to genus Phoenix of the family Palmae. Its cultivation was practiced in southern Iran as early as 4000 B.C. In India, it is believed to be present in 2000 B.C. was revealed by the excavation of Mohanjodra (Chandra *et al.*, 1995). At present, India import date fruits in the form of pind khajoor (soft dates) and dry dates (Chuhara) from Gulf countries which involves foreign exchange of about 5.30 million \$. The cultivation of date palm on commercial basis in the Thar desert will help in saving million rupees of foreign exchange which is incurred on import of date palm fruits. It is most suitable fruit tree for cultivation in hot and dry regions having sufficient irrigation facilities. Date palm requires sandy to sandy loam soil, high temperature and ample water. The ideal mean temperature for flowering and fruit ripening of date palm have been found to be 25 °C and 40 °C respectively. A total of 3000 degree days of heat summation units are required for full maturity of date palm berries. In western part of Rajasthan, rain fall is very less (240mm) erratic. Rain

cause less damage at early stages of fruits development, but even light rains at later stages of fruit ripening can cause heavy damage. It requires rain free conditions during the fruiting season particularly at the time of ripening of fruits. Due to the above reason its scope is very wide to grow it in arid regions of the country. Ripening is terminal period of maturation when fruit attains maximum edible quality. Techniques to induce early and uniform ripening of the fruits provide an opportunity to obtain premium price of the produce in the market. Early ripening also escapes nearly rains, which is an important limiting factor in commercial cultivation of date palm in northern India. Ethephon (2-chloro-ethylene phosphonic acid) an ethylene releasing chemical has climacteric effect and induces early ripening before the commencement of rain. It is very much needed to prevent spoilage of the fruits. For early and uniform ripening of berries in date palm an experiment on the effect of ethephon spray was carried out.

Materials and Methods

The study was conducted at Date palm Research

Table-1: Performance of date palm varieties and effect of ethephon concentrations (ppm) on length, breadth, volume, number of fruit per strand, number of strand per bunch.

Treatments	Length (cm)	Breadth (cm)	Volume (cc)	Number of fruit/strand	Number of strand/bunch
(A) Varieties					
Halawy	3.67	2.51	8.99	1408	55.25
Khadrawy	2.85	2.81	7.55	12.96	47.75
Zahidi	3.31	2.32	8.52	15.15	57.92
Shamran	2.93	2.12	7.38	12.90	47.50
SEm	0.03	0.06	0.19	0.18	0.79
CD at 5%	0.13	0.23	0.68	0.64	2.75
(B) Ethephon (ppm)					
0	2.98	2.51	7.09	13.69	52.00
500	3.18	2.18	7.95	13.73	51.58
1000	3.28	2.32	8.70	13.81	52.42
1500	3.31	2.12	8.71	13.85	52.42
SEm	0.02	0.06	0.19	0.16	0.63
CD at 5%	0.08	0.23	0.57	NS	NS

Station, RAU, Bikaner in split plot design with three replications during 2004. The four varieties were taken in main plot and four ethephon concentrations were used in sub-plot. The date palm trees of uniform size vigour and that bearing stage at 20 years old were chosen in the orchard of date palm cultivar Halawy, Khadrawy, Zahidi and Shamran. Each selected tree represented for one treatment in each replication. In all 48 full grown date palm trees were selected for this study and mentioned with cultural practices during course of investigation. The solution of ethephon was prepared by dissolving its required amount in water as per treatment just before its use. The different concentrations were sprayed at colour breaking stage of fruit. The fruits were harvested at the doka stage from first week of July to 31 July, 2004. Observations on physical characteristics

were recorded and subjected to statistical analysis.

Results and Discussion

Varietal response of date palm

The response of different varieties to each other was found significant in this study. The significantly higher fruit size (length, breadth and volume) was obtained in variety Halawy as compared to Khadrawy, Zahidi and Shamran. It may be due to genetic features of variety reported by Baccha and Shaheen (1986). The significant higher number of fruits/strand and number of strand per bunch was observed in date palm variety Zahidi. But the number of bunches per tree was significantly higher in variety Halawy over Khadrawy and Shamran and remain statistically at par to Zahidi (Table 1). The higher number of fruits per strand might be due to high rate of fruit set and

Table-2: Performance of date palm varieties and effect of ethephon concentrations (ppm) on Yield attributing character of cashew.

Treatments	Number of bunches/tree	Bunch weight	Yield of fruit/tree	Number of days taken to develop fruit colour	Number of days taken in maturity
(A) Varieties					
Halawy	6.83	6.50	44.47	11.58	30.67
Khadrawy	5.17	4.32	22.42	12.92	36.67
Zahidi	6.25	6.94	43.29	10.68	40.50
Shamran	5.58	4.22	23.59	13.33	33.92
SEm	0.28	0.158	1.491	0.093	0.661
CD at 5%	0.97	0.548	5.161	0.322	2.28
(B) Ethephon (ppm)					
0	5.67	4.48	27.90	14.08	39.75
500	5.92	5.13	30.93	13.08	37.83
1000	6.25	5.87	37.50	10.83	32.58
1500	6.00	6.10	37.54	10.42	31.58
SEm	0.21	0.122	1.350	0.198	0.380
CD at 5%	NS	0.358	3.940	0.579	1.110

retention of fruit in a particular variety. Similar result was observed by Chohan *et al.* (1972). The yield of fruit per tree was found significantly higher in date palm variety Halawy due to genetic make up of cultivar and due to more number of bunches per plant than the other varieties (Table-1). The fruit weight was also higher in cultivar Halawy, this might be another reason of increased yield of fruit per tree in Halawy cultivar. Similar result were also recorded by Pareek and Muthana (1978). The number of days taken to develop fruit colour was observed significantly more in cultivar Zahidi due to genetic makeup of cultivar. The variety Halawy recorded less number of days to attain maturity due to less heat summation units required in variety Halawy

as compared to other cultivars (Table-2). Similar result have been reported by Chandra *et al.*, (1990).

Effect of ethephon

Application of varying concentrations of ethephon from 0 to 1000 ppm significantly increase the fruit length, breadth and volume of fruit but maximum values were obtained under 1000 ppm of ethephon (Table-1). The possible reason may be release of ethylene gas by ethephon which might have enhanced physiological activity of cell enlargement. Application of ethephon had remarkable influence on weight of individual fruit bunch and yield per tree in variety Halawy as compared to other cultivar might be due to involvement of ethephon in cell enlarge-

ment activity leading to increased size of fruit and bunch weight ultimately to yield of fruits per tree. Similar results have been reported by Biswas *et al.* (1988) improvement of fruit quality of Guava.

The application of ethephon at 1000 ppm curtailed the number of days taken to colour development and fruit maturity might be due to synthesis of pigment and degradation of chlorophyll in treated plant by ethephon. The early maturity was also observed due to increase climacteric respiration and loss of mallic???? acid in treated fruits. Similar findings have been reported by Sandhu *et al.* (1989) while working on ber fruits.

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