



# Susceptibility of Different Date Palm Varieties against *Parlatoria blanchardii* in Hyper Arid Region of Rajasthan

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## ABSTRACT

In this field investigation during 2017-2019, different varieties of Date Palm were investigated against *Parlatoria blanchardii*. Ten varieties were selected based on arid climate, and local regions. Nymph and adult insects were counted on 1 cm<sup>2</sup> area of the lower surface of date palm leaflets and recorded together opposite to each inspected date palm at weekly intervals. Out of ten varieties screened for their relative susceptibility against date palm scale, *P. blanchardii* and revealed that none of them was found free from the scale attack. The varieties having population less than 15.19/cm<sup>2</sup> were rated as less susceptible, those varieties having population more than 15.19/cm<sup>2</sup> scale and up to 25.63/cm<sup>2</sup> scale rated as moderately susceptible and the varieties having more than 25.63/cm<sup>2</sup> population rated as highly susceptible to scale insect. Considering this formula varieties viz., Zagloul and Zahidi were rated as less susceptible with highest yield production 127 kg and 130 kg per plant/ year respectively., Sewi, Shamran, Khasab, Khadrawy and Khuneizi as moderately susceptible, whereas, Halawy, Medjool and Barhee, were noticed highly susceptible to scale insect.

**Key Words-** Date palm, Halawy, Scale Insect, Variety, Medjool.

## INTRODUCTION

Date Palm (*Phoenix dactylifera* L.), a monocotyledonous and dioecious plant belong to family Arecaceae (Palmaceae), was domesticated some 6000 years ago in the Mesopotamian Region (Zohary and Hopf, 2000). In India, total field area under growing expanding to 16,000 ha in 2010-2011 from 8,973 ha in 2000-2001, escorted by the producing of 120,000 mt with highest area of datepalm growing in *Kachchh* territory of Gujarat (Shandilaya, 2012). Area under datepalm cultivation is now 19400 ha with production of 16635 Mt (Singh, 2018). The date palm cultivation was firstly introduced in Rajasthan, by the ruler Ganga Singh ji of the former Bikaner state. In Rajasthan, it's farming has great prospective in Jaisalmer, Barmer, Hanumangarh, Bikaner, Jodhpur, Sri Ganganagar, Nagour, Pali, Jalor and some portion of Churu district with provided irrigation

facility and therefore, date palm orchards have recently been established in these districts in about 850 ha area (Singh, 2018). Datepalm fruits are eaten as crisp fruits (half-ripe stage), dry date (*chhuhara*) and soft date (*pindkhajoor*). Leaves of date palm are used for making temporary huts, brooms, ropes, building material, fuel, baskets, and paper. Date palm seeds are usage in making of cattle and poultry feed, seeds oil is also suggested for use in nourishing and edible purpose (Abdul Afiq *et al*, 2013).

Date palm scale *P. blanchardii* (Targ.) is the most destructive pest, its adults and nymphs feed on leaf sap, sucking great amount of sap which contain macro and micro elements. High level of infestation result in early fresh leaves droop and fruit yield reduction (El-Said, 2000). This insect can cause heavy damage by sucking the plant sap that give low rates of photosynthesis and respiration which leads to curling, yellowing, drooping to

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leaves. A characteristic symptom of infestation by *P. blanchardii* is the appearance and accumulation of its scales on attacked palm parts (El-Said, 2000; El-Sherif *et al*, 2001; Blumberg, 2008).

Infestation of this pest in early stage of plantation saplings may die. *P. blanchardii* influences photosynthetic pigments like, chlorophyll-a and b and carotenoid, it also affects area of leaflet, moisture, dry weight and wax proportion, ultimately reduction of yield production as 30-50 kg per palm (Idris *et al*, 2006). It may hold out to 85-90 percent losses depending on resistance of varieties, intensification of infestation and orchard management (Ahmed, 2004). In order to prevent the loss caused by insect pests and produce a qualitative crop, it is must to manage the population of pest at appropriate time with convenient measures. Use of resistant varieties is admitted as an important tool in bio-intensive pest management system. The use of insect resistance varieties offers one such promising possibility. The insect resistant varieties provide insect control at no additional cost. Since certain varieties are more preferred by a pest as compared to other or some may hold the damage caused by the pest, the study of the population of scale insect on different varieties/genotype of date palm was done with a view to find out the least susceptible varieties.

## MATERIALS AND METHODS

The trial was carried out at Date Palm Research Center, SKRAU, Bikaner during two successive years (2017-18 and 2018-2019) with ten varieties *viz.*, Sewi, Shamran, Khasab, Khadrawy, Khuneizi, Halawy, Medjool and Barhee, Zaghloul and Zahidi, three plants of each variety were selected of date palm were screened for their relative susceptibility to date palm scale insect *P. blanchardii*. Twelve leaflets were taken from every palm from each of the north, east, south and west directions number of nymph and adult insects on 1 cm<sup>2</sup> area of lower surface of date palm leaflets was counted and recorded together opposite to each inspected date palm at weekly interval. Finally, mean population

of *P. blanchardii* was calculated and the values were then transformed to square root transformation  $\sqrt{X+0.5}$  (Gomez and Gomez, 1976). On the basis of population, susceptibility of date palm varieties to scale population was determined and varieties were categorized on the basis of peak scale population during the crop season, using the following formula (Jat *et al*, 1992).

## RESULTS AND DISCUSSION

In the present findings the pooled values (Table 1-3 & Fig 1) of both of the year revealed that varieties Zaghloul and Zahidi were observed as less susceptible to scale insect with highest yield production 127 kg and 130 kg per plant/ year, respectively. It was found that these varieties need to be recommended for cultivation to farmers keeping in view the production and pest resistance in hyper arid region of Rajasthan. The other varieties *viz.*, Sewi, Shamran, Khasab, Khadrawy and Khuneizi found moderately susceptible against *P. blanchardii* whereas Shamran and Khasab both varieties gave yield of 95 kg and 83.33 kg per plant/ year, respectively. There may be many climatic or morphological reasons for low yields but corresponding to our findings, these moderate varieties are needed to be improved as genetically or biotechnologically for higher yield production potential. Other varieties namely Halawy, Medjool and Barhee were found to be highly susceptible to scale insect infestation with yield of 98.67, 88.33 and 100.00 kg per plant/ year, respectively but showed tolerance against scale insect infestation and thus yield observed was very good. Contrary to the present studies, Anonymous (2000-01 & 2003-04) also reported Sewi as most susceptible variety to scale insect. Barhee, Halawy and Medjool varieties were rated as highly susceptible to scale insect in present findings. Anonymous (2000-01) reported variety Barhee as most tolerant against scale insect infestation also partially supported the present studies. The work on varieties Shamran and Khasab screened in the present investigation has not been traced in the literature; therefore, the

**Table: 1 Population of *P. blanchardii* on different varieties of date palm during (Pooled)**

Mean population of scale insect/cm <sup>2</sup> at fortnight interval																									
SN	Variety Name	OCT		NOV		DEC		JAN		FEB		MARCH		APRIL		MAY		JUNE		JULY		AUG		SEP	
		fortnight		fortnight		fortnight		fortnight		fortnight		Fortnight		fortnight		fortnight		fortnight		Fortnight		fortnight		fortnight	
		I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
1	Halawy	11.10*	11.60	15.10	16.10	20.67	22.67	26.67	27.50	25.83	22.17	16.33	15.00	10.50	9.08	5.00	2.50	6.92	5.50	7.42	6.42	6.92	9.43	10.77	11.77
		3.40**	3.47	3.91	4.05	4.58	4.81	5.21	5.29	5.13	4.70	4.06	3.84	3.31	3.09	2.26	1.71	2.71	2.40	2.81	2.60	2.60	3.00	3.18	3.30
2	Medjool	10.67	11.00	13.83	15.17	18.73	22.23	25.73	26.33	24.85	21.57	15.67	14.40	10.17	7.83	3.83	2.50	5.58	4.50	6.08	5.08	5.92	9.10	10.43	11.39
		3.34	3.39	3.78	3.95	4.38	4.73	5.10	5.15	5.00	4.67	4.01	3.85	3.15	2.82	1.95	1.66	2.45	2.10	2.52	2.34	2.47	2.99	3.19	3.30
3	Khadrawy	7.50	8.50	8.67	9.73	12.33	13.40	18.45	19.36	17.84	13.61	13.61	11.99	8.27	6.18	2.83	1.50	4.42	3.42	5.18	4.08	5.58	8.07	8.50	9.40
		2.82	3.00	3.02	3.19	3.58	3.73	4.34	4.43	4.26	3.73	3.76	3.49	2.94	2.58	1.74	1.37	2.21	1.88	2.37	2.13	2.30	2.73	2.80	2.93
4	Shamran	6.83	8.00	7.10	7.17	11.35	12.92	17.58	17.75	16.22	11.75	8.65	7.53	4.33	3.24	1.33	0.67	2.58	1.83	2.08	1.75	3.92	7.07	6.40	7.02
		2.71	2.90	2.75	2.77	3.39	3.62	4.10	4.11	3.90	3.39	2.96	2.81	2.19	1.88	1.27	1.05	1.69	1.35	1.58	1.50	2.01	2.58	2.46	2.52
5	Zahidi	5.50	6.53	6.83	6.67	10.00	11.32	12.66	13.46	11.83	7.50	6.17	5.17	2.50	1.42	0.00	0.00	1.17	0.83	0.75	0.42	3.25	3.53	4.70	5.31
		2.38	2.63	2.68	2.65	3.15	3.32	3.49	3.59	3.39	2.66	2.54	2.38	1.73	1.32	0.71	0.71	1.22	1.10	1.02	0.91	1.91	1.91	2.14	2.25
6	Barhee	10.33	10.87	12.67	13.83	18.17	19.82	25.67	26.53	25.17	20.83	15.17	13.73	9.83	7.50	3.67	2.17	5.25	4.50	5.75	4.42	5.58	8.87	10.20	11.09
		3.29	3.37	3.54	3.78	4.32	4.50	5.03	5.11	4.99	4.58	3.96	3.77	3.17	2.79	1.97	1.60	2.40	2.22	2.50	2.17	2.40	2.94	3.12	3.24
7	Khuneizi	8.00	8.80	9.44	9.40	12.40	13.40	21.18	22.18	20.31	16.09	14.17	12.78	9.03	6.75	2.83	1.50	4.50	3.83	5.08	4.08	5.58	8.20	9.20	10.16
		2.90	3.04	3.15	3.14	3.56	3.69	4.65	4.75	4.56	4.02	3.80	3.55	2.98	2.59	1.62	1.33	2.17	2.03	2.30	2.08	2.41	2.88	3.03	3.16
8	Khasab	7.50	8.17	8.50	8.83	11.50	12.53	18.41	19.72	18.08	14.32	11.06	9.87	6.83	5.08	2.17	1.17	3.50	2.50	3.42	2.75	5.25	7.20	7.53	8.49
		2.82	2.94	2.99	3.05	3.43	3.57	4.34	4.47	4.30	3.84	3.34	3.15	2.66	2.32	1.49	1.23	1.96	1.68	1.95	1.73	2.34	2.69	2.74	2.87
9	Zagloul	3.50	4.17	5.83	5.67	9.23	10.15	11.98	12.78	11.17	6.99	5.17	4.28	2.45	1.42	0.00	0.00	1.17	0.33	0.92	0.42	2.58	3.20	3.87	3.20
		1.97	2.13	2.51	2.48	3.11	3.24	3.49	3.58	3.38	2.67	2.32	2.12	1.71	1.34	0.71	0.71	1.19	0.88	1.10	0.93	1.62	1.84	1.98	1.84
10	Sewi	7.17	7.50	7.83	8.50	10.50	11.73	17.41	18.45	16.82	12.24	6.57	5.38	3.17	2.08	0.44	0.17	1.94	1.44	1.42	1.19	3.25	5.20	5.87	5.20
		2.75	2.81	2.86	2.99	3.29	3.46	4.10	4.19	4.03	3.53	2.65	2.40	1.86	1.58	0.92	0.80	1.43	1.31	1.32	1.24	1.82	2.30	2.42	2.29
SEm		0.13	0.28	0.23	0.15	0.24	0.25	0.30	0.29	0.30	0.32	0.31	0.34	0.28	0.28	0.30	0.22	0.22	0.30	0.26	0.19	0.17	0.16	0.17	0.23
CD at(P=0.05)		0.39	0.90	0.70	0.45	0.71	0.74	0.90	0.88	0.90	0.96	0.93	1.02	0.85	0.83	0.89	0.67	0.65	0.90	0.78	0.58	0.50	0.48	0.57	0.69

\* Average of 3 plants

\*\* Bold figures are  $\sqrt{X+0.5}$  values

**Table: 2** Categorization of date palm varieties against scale, *P. blanchardii*

Sr. No.	Scale Population cm <sup>2</sup> )	Category	Name of Varieties
1.	Below < 15.19	Less susceptible	Zagloul and Zahidi
2.	Between 15.19 to 25.63	Moderately susceptible	Sewi, Shamran, Khasab, Khadrawy and Khuneizi
3.	Above > 25.63	Highly susceptible	Halawy, Medjool and Barhee

Mean scale insect population (at peak level)  $\bar{X}$ =20.41 and  $\sigma$  = 5.22

**Table: 3** Yield of different Date palm varieties yield against *P. blanchardii* (Pooled)

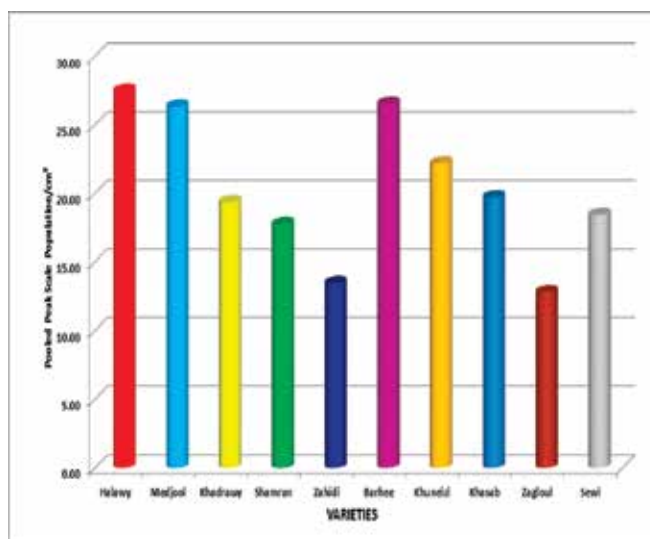
Variety	Yield (kg/plant/year)
Halawy	98.67
Medjool	88.33
Khadrawy	45.00
Shamran	95.00
Zahidi	130.00
Barhee	100.00
Khuneizi	48.33
Khasab	83.33
Zagloul	127.00
Sewi	55.00
SEm $\pm$	5.77
CD at 5%	10.75

performance of these could not be compared. There may be many biophysical and biochemical factors of varieties responsible for pest attack on different varieties. (Painter, 1951)

It is well known that certain varieties or strains of plants are less attacked by a specific insect pest than others because of natural resistance. In the cultural practices, resistant varieties are the most important tool in the pest management programmed against the menace of insect pests.

### CONCLUSION

To summarise the findings, further genetically modified or biotechnologically based work need to be undertaken in the future by plant breeders or biochemists in order to increase tolerance or yield output. Hence, farmers should choose these date



**Fig- 1** Peak population of *P. blanchardii* on different datepalm varieties (Pooled)

palm varieties namely Zagloul, Zahidi, Halawy, Medjool, and Barhee for insect tolerance and higher yield.

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