GAU Res. J. 2000. 25 (2) : 9-14

Survey, Distribution, Extent of Damage, Field Behaviour and Biology of Red Palm Weevil, *Rhynchophorus ferrugineus* Oliv. on Date Groves of Kachchh (Gujarat)

C. M. Muralidharan, N. N. Sodagar and U. R. Vaghasia**

Date Palm Research Station, Gujarat Agricultural University, Mundra - Kachchh - 370 140

ABSTRACT

Extensive survey conducted during 1993 - 1995 in the date palm growing areas of Kachchh revealed that Red palm weevil is a serious pest of this crop and distributed in almost entire date palm growing areas of this region. The infestation was more in areas away from the coast and young plants (2-5 years) are more prone to weevil infestation. The point of attachment of suckers to mother palm is the most vulnerable portion to weevil attack and many generations are completed in a single palm. The difficulty in early detection, unawareness among farmers, absence of systematic plantations, poor orchard management etc. are some of the reasons for the endemic problems of this pest in date groves of Kachchh. Biology of the weevil studied on date palm indicated that an average of 67.3 days is required for an egg to become adult under laboratory conditions. The female lays 206 + -24.03 eggs in captivity. Longevity of adult male and female was observed to be 70 + -6.95 and 58 + -3.49 respectively.

(Received on 8th Sept. 1998)

INTRODUCTION

Date plam, *Phoenix dactylifera* Linn.) is the main crop of Arabian countries and its cultivation in India is quite unknown besides the fact that it has grown extensively in the arid region of North - West India. The date palm gróves wide spread on them coastal belt of Kachchh (Fig. 1) and this is the only area in India where date palm is commercially cultivated. Being a salt and drought tolerant crop, it is well adapted to the arid conditions of Kachchh giving good remuneration to farmers. Its cultivation is slowly spreading to coastal Saurashtra and North Gujarat and it is becoming an important horticultural crop of the state.

Among various constraints for successful cultivation of the crop, insect pests cause real concern and red palm weevil, (*Rhynchophorus ferrugineus* Oliv.) is the most serious one. A lot of information is available regarding the insect pests of date palm in other part of the world (Carpenter and Elmer, 1978), however most of the available information on red palm weevil is with respect to coconut *(Cocos nucifera)* only (Divakaran Pillai, 1984) and no information is available on its distribution, extent of damage, field behaviour, biology etc. in relation to date groves of Kachchh, which are briefly discussed in this communication.

MATERIALS AND METHODS

To find distribution, extent of damage and field behaviour of *R ferrugineus,* a roving survey was conducted during 1992-95 in the

** Present address : Zonal Research Station, GAU, Bhachau - Kachchh - 370 140.

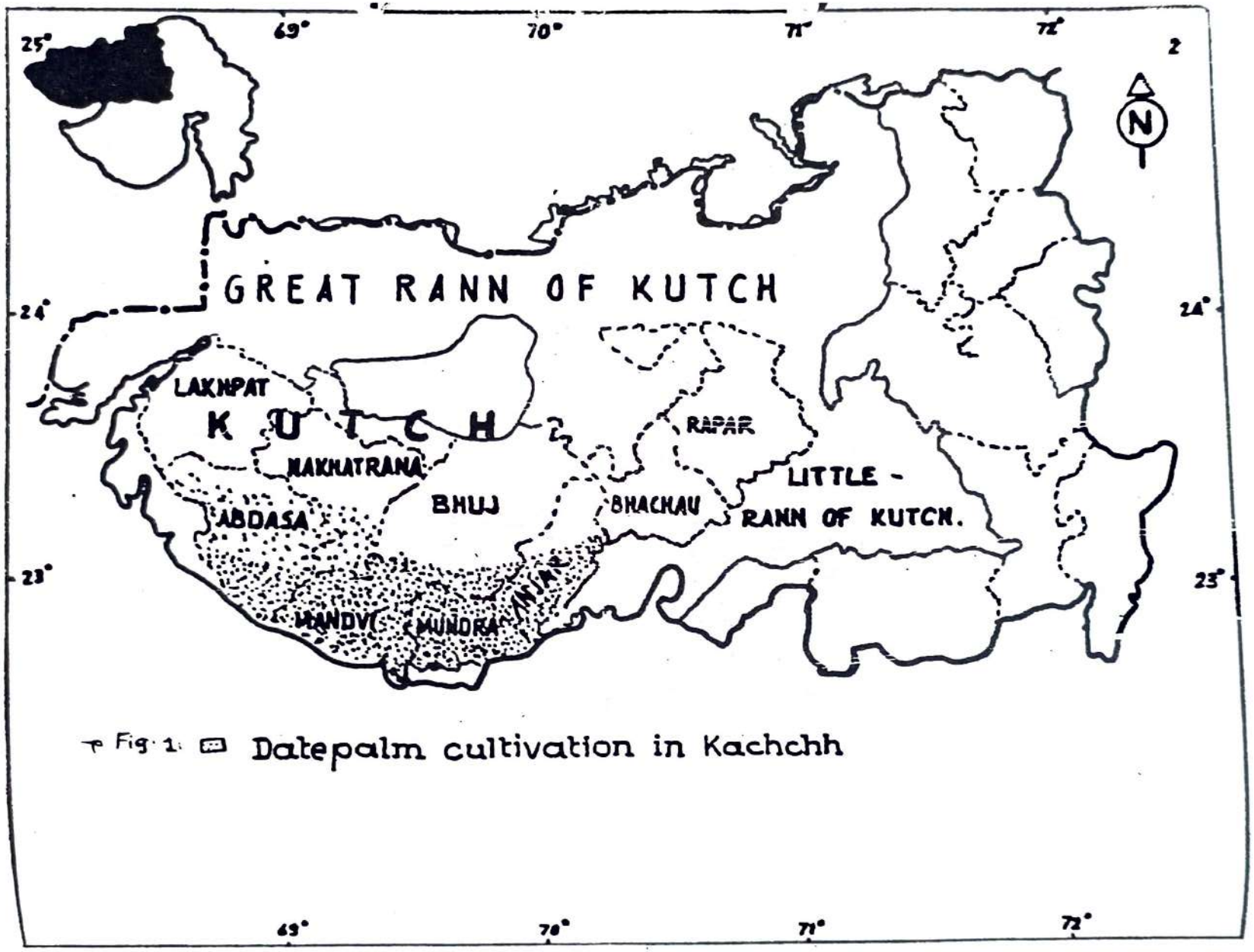

Fig. 1: Datepalm cultivation in Kachchh

date palm growing areas of Kachchh. A total of 110 gardens were visited covering 28 villages. In each garden total number of palms (Age wise) and weevil infestation in each group were noted. In infested palms, the point of entry, external symptoms etc. were noted and number of grubs, pupae and adults/ palm was recorded after cutting open the heavily infested palms. The farmer's practice to detect the infestation and traditional methods for the management of this pest also recorded. The biology of *R. ferrugineus* on date palm was studied during 1993 at Date Palm Research Staion, Mundra under room temperature (Maximum 32.49°C, Minimum 27.29°C, RH 72%). Adults collected from infested date palms formed the nucleus culture of the study. Freshly emerged adults were paired and kept in plastic jars (500-ml capacity) and soft petioles of date palm were provided for oviposition. The freshly hatched grubs were reared on small sized date palm suckers till adult emergence. The time taken for completion of all developmental stages, number of eggs laid/female, adult longevity, fertility of eggs (% age) etc. was recorded.

RESULTS AND DISCUSSION

(i) Distribution and extent of damage

The details of survey conducted in 28 villages (covering 110 gardens) and the occurrence and extent of damage caused by the red palm weevil are presented in table 1. The survey indicated that the red palm weevil infestation was found in almost all the date palm growing areas of Kachchh irrespective of the locality. Among the 110 gardens visited the infestation was observed in 78 gardens (70.90%). The percentage infestations varied from 0.38% in Bhuj taluka to 1.02% in Anjar taluka. In each locality some hot pockets of this pest were also observed, were the extent of damage was very severe. Such pockets are observed in Desalpur (Mundra taluka), Khedoi, Weedi and Luharia (Anjar taluka) and Gadval in Abdassa taluka. The study also revealed that the extent of damage by the weevil was more in areas away from the coast (Anjar

TABLE 1

Distribution of extent of damage by Red palm weevil in different villages of Kachchh.

Taluka	Villages surveyed	No. of gardens visited	Red Palm Weevil		
			Presence	Absence	Infestation %
1. Mundra	Dhrub	25	22	3	0.68
	Zarpara	9	8	1	0.65
	Mundra	7	6	1	0.33
	Borana	6	4	2	0.24
	Vadala	1	0	1	0
	Navinar	1	1	0	0.4
	Desalpar	3	3	0	1.98
	Bhujpar	3	2	1	0.3
	Somogoga	2	1	1	0.33

1	2	3	4	5	6	7
		Sadan	2	2	0	0.36
		Motakapaya	1	0	1	0
		Pragpar	1	0	1	0
		Patri	1	1	0	0.6
2.	Anjar	Khedoi	19	19	0	1.46
		Anjar	3	2	1	0.86
		Weedi	2	2	0	1.52
		Wada	2	0	2	0
		Luhariya	1	1	0	1.74
		Pantia	1	1	0	0.56
3.	Bhuj	Madhapar	2	2	0	0.39
		Kera	1	1	0	0.38
4.	Mandvi	Rayan	2	2	0	0.29
		Gundiyali	4	3	1	0.54
		Mandvi	1	0	1	0
5.	Abdasa	Tera	5	0	5	0
		Gandaval	3	3	0	1.18
		Hajipar	1	0	1	0
		Kothara	1	0	1	0
	Total	28	110	78	32	0.84

and Khedoi), where palms were generally irrigated by well water.

(ii) Field behaviour and some reasons for heavy infestations

a. Mode of entry

The field behaviour and symptamatology of the weevil is almost similar to that in coconut plantation, which is well documented by Nirula (1956). As in all palms, the early detection of this pest is very difficult. Our observation, during survey indicated that the point of attachment of suckers to mother palm was most vulnerable portion of the weevil attack in date palm. Like in coconut it never enters through the cut portion of the petiole or the crown (if crown is already infested with rhinoceros beetle, there is a possibility of entry from the top). Out of the 430 infested palms observed, only two were found infested from the top.

b. Age of plam

Like in other plams, young date plams of 2-5 years were more susceptible to weevil attack, whereas old palms (>50 years) recorded only negligeable damage by this weevil. Among the infested palms 2.01% infestation was found in 2-5 years age group whereas older palms (21-50 years) recorded only 0.05% infestation. The vulnerability of Rhynchophorus spp. to young and stress trees were also reported by Giblin Davis and Howard (1989). The presence of more suckers and sappy nature of young palms may contribute for the increased infestation in young palms. Moreover young palms were more prone to injuries during field operations which helped the weevil to eggs in the exposed tissues.

Field activity

During survey adults active in the field were not seen. This might be due to the fact the weevils were more active from sunrise to 9 a.m. and from 5 p.m. to sunset as reported by Nirula (1956).The observations on infested palms revealed a heterogenous population at all developmental stages (Grubs, pupae, adult etc.) indicating that many generations might complete in the same palm until it died. As many as 103 grubs, 28 pupae and 18 adults were recorded in a infested palm (Table 2), indicating the prolific breeding habit of the pest. It was also noted that the grubs normally migrated towards the leaf base for pupation as number of pupae was more at the leaf base. That helped the weevil to come out easily. Many farmers were of the view that sweetest palms were more prone to weevil attack.

TABLE 2

Population of Red palm weevil in infested palms.

Date of Collection	*Village*	*Red palm weevil population*					*Sex Ratio*
		Grubs	*Pupae*	*Adults*	*Male*	*Female*	*Male : Female*
12-12-93	Dhrub	25	13	7	3	4	1 : 1.33
18-12-93	Dhrub	103	28	18	4	14	1 : 3.50
09-12-93	Khedoi	85	16	34	18	16	1 : 0.89
11-01-94	Dhrub	15	8	27	11	16	1 : 1.45
18-08-94	Dhrub	8	14	21	9	12	1 : 1.33
01-10-95	Mundra	47	19	14	8	6	1 : 0.75
28-10-95	Gundiyala	10	7	17	7	10	1 : 1.43
24-03-95	Gadaval	–	–	16	6	10	1 : 1.67
03-11-95	Somogaga	6	6	–	–	–	–

(iii) Reasons for heavy infestation

The observations made during survey led to arrive at following possible reasons for the heavy infestations of red palm weevil in the date groves of Kachchh.

1. Difficulty in early detection : Unless closely examined, there is no immediate external symptoms on the palm, after invasion of the weevil. Farmers recognize the infested palms very late and by that time it damage a major portion of the trunk.

2. Adoption of crude methods of control : Only very few farmers followed the recommended plant protection measures to manage this pest. Farmers normally pour burnt oil, boiled water, etc. on infested portion of the palm which kill only very few grubs and the remanining further damage the palm.

3. Religious farmers : The farmers of this area never kill the weevils/grubs due to religious reasons. If a male palm is infested with weevil it is left as such without destroying weevel, which facilitate the further breeding of the pest.

4. Toddy taping : In certain village (Khedio, Zarpara, etc.), male palms were used for toddy extraction an intoxicating liquid) by making cuts/holes below the crown which attract adults weevils that further inflict damage to other palms.

5. Absence of systematic plantations and poor orchard management : The farmers of this area plan seedlings close on boundaries and do not care for timely removal of suckers, unwanted male palms, pruning and other orchard management practices. Thus, uncared gardens form good breeding sites for the weevil.

Biology

The life history of red palm weevil on coconut was studied by Nirula (1956) and Rahalkar *et al.* (1972) successfully reared this pest on sugarcane under laboratory conditions. The developmental periods of various stages of red palm weevil, when reared on date palm is given in table 3. The study indicated that the developmental periods were more or less comparable to that on coconut. The larval period was 44.6 + 0.89 days on date palm as against 55 days when reared on coconut. The pupal stage lasted about 20 + 0.49 days and the newly emerged females started egg laying after a short oviposition period of 6.5 +-0.54 days. The oviposition continued 43.9+-2.35 days laying an average of 206+24.03 eggs. The adult longevity of male and female when reared on date palm was 70.7+6.95 days and 58.5+3.49 days respectively which were 43 and 18 days less as compared to coconut. Thus , 67.3 days were required for an egg to become adult when reared on date palm. The entire life cycle completed within 37 days for male and 125 days for female.

TABLE 3

Development of *Rhyncophorus ferrugineus*, when reared on date palm.

Sr. No.	*Criteria*	*Period (in days)**
1.	Pre- Oviposition period	6.5 + – 0.5
2.	Oviposition period	43.9 + – 2.33
3.	Incubation period	2.4 + -0.22
4.	Larval period	44.6 + – 0.89
5.	Pupul period	20.3 + – 0.49
6.	Adult longivity	
	(a) Male	70.7 + – 6.65
	(b) Female	58.5 + – 3.49
7.	Frecundity	206.3 + – 24.03
8.	(Eggs/Female)	88.84 + – 1.81
	Fertility of eggs (%)	

REFERENCES

Carpenter, J. B. and H . S. Elmar . 1978. Pests and diseases of the date palm . U.S Dept. of Agric. Agriculture Hand Book , No. 527 , 9-10.

Divakaran Pillai , 1984. A bibliography of red palm weevil on coconut. *Indian Cocon. J.* **15** (2) : 5 - 8.

Elmar , H. S. 1982. Improvement of date palm , phase II. Consulting report on date palm insect pests, FAO 1-3.

Giblin Davis. R. and F. W. Howard. 1989. Vulnerability of stressed palms to attack by *Rhynchophorus cruentatus* (Coleoptera : Crucilionidae) and insecticidal control of the pest . *J. Econ. Entomol.* **82** (4) : 1185- 1190.

Nirula K. K. 1956 . Investigations on the pests of coconut palm . Part IV, *Rhynchophorus ferrugineus Indian Coco. J.* **9** (4): 229 -24.

Rahalkar, G. W., M. R. Harwalkar and H. D. Rananavare .1972. Development of weevil, *Rhynchophorus ferrugineus* Oliv. on sugarcane. *Ind. J.Ent.* **34** : 213 – 15.