

**RECEPTIVITY OF INJURED AND AGED COCONUT PETIOLE FOR
OVIPOSITION BY RED PALM WEEVIL *RHYNCHOPHORUS FERRUGINEUS*
(COLEOPTERA: CURCULIONIDAE)**

RAJAN SHELKE¹, ANDREA CHERADIL²

Don Bosco College of Agriculture Sulcorna, Quepem- Goa, India 403 705
University of Debrecen, Faculty of Agricultural, Food Sciences and Environment

Management, Plant Protection Institute, Debrecen

*Corresponding author: rajanshelke6691@gmail.com

ABSTRACT

Red palm weevil, *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae) is a key pest of palm-based ecosystem. Globally *R. ferrugineus* is reported from 50 countries infecting 40 palm species. *R. ferrugineus* are attracted to wounded, damaged, dying palms or apparently healthy palms. *R. ferrugineus* gains entry into a palm when female weevils are drawn to palm tissue volatiles to lay eggs. The females use the rostrum to bore into palm tissue to form a hole for oviposition. Because of its cryptic feeding habit management of *R. ferrugineus* is difficult leading to death of palms. The laboratory study was conducted with the aim to assess the ovipositional preference of injured and aged coconut petiole (var. Benaulim) to red palm weevil *R. ferrugineus* (Coleoptera: Curculionidae). Results reveals that freshly injured coconut petiole was most preferred for egg laying by *R. ferrugineus* (mean egg lay: 4.11) and was statistically at par with one and two-day old, injured coconut petiole, indicating that injuries and wounds on coconut petiole between 0-2 days after damage emit palm volatiles that are most attractive to female *R. ferrugineus* adults for egg laying. It concludes that injured part should be treated with effective insecticides immediately after damage to prevent further losses.

Keywords: Coconut palm, red palm weevil, oviposition, volatiles.

INTRODUCTION

Coconut palm (*Cocos nucifera* L.) occupies a dominant role among the cultivated palm species in India as it provides livelihood securities to more than 10 million people in 18 States and 3 Union Territories of the country. The crop is cultivated in an area of 2.153 million ha with a total production of 21308 million nuts (CDB, 2020). The red palm weevil (RPW), *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae) also known as the Asian Palm Weevil is a key pest of palms (Arecaceae) in diverse agro-ecosystems the world over. Globally RPW is reported from 50 countries infecting 40 palm species (FALEIRO ET AL., 2020). RPW in particular are attracted to wounded, damaged, dying palms or apparently healthy palms (HUNSBERGER ET AL., 2000). RPW gains entry into a palm when female weevils are attracted to palm tissue volatiles to lay eggs. The latter hatch into damage inflicting grubs. Fresh wounds on frond bases (petioles) attract RPW females for oviposition, which results in infestation (ABRAHAM ET AL. 1998; FALEIRO 2006). RPW females use small mandibles at the distal tip of the distended rostrum to chew a hole into suitable host tissue before oviposition of a 2–3 mm long yellowish coloured egg. Eggs are often laid in close proximity to one another and take 2–4 days to enclose as small, first instar, legless larvae (GIBLIN-DAVIS et al.2013). Although there are several reports (ABRAHAM, 1971; ABRAHAM and KURIAN, 1975; FALEIRO 2006) recommending protection of injuries/wounds on palm tissue to prevent egg laying by RPW there are no studies to ascertain the receptivity of injured and aged palm tissue to egg laying by RPW. Laboratory studies were conducted to ascertain the ovipositional preference of injured and aged

coconut petiole (var. Benaulim) to red palm weevil *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae).

MATERIAL AND METHODS

The trials were conducted at the Department of Agricultural Entomology of Don Bosco College of Agriculture, Sulcorna, Quepem Goa, India (15.1060⁰ N, 74.1486⁰ E) during July, 2021. Coconut petiole (var. Benaulim) were made available from the College Farm.

Test Insects

Adult weevils used in the oviposition trials were collected from the coconut field using insecticide free food baited pheromone (FerrolureTM) based bucket traps and reconditioned in the laboratory for 2 weeks by allowing the adults to feed on sugarcane in plastic cages (28 ± 1 °C, 76 ± 3% RH) (FALEIRO ET AL., 2014).

Egg Laying (Oviposition)

Coconut petiole fibers from green fronds of coconut var. Benaulim prepared as a firm cylinder 5 cm long × 2 cm diameter was offered for egg laying to 5 fertile and gravid adult RPW females. These were caged together with 2 active adult male weevils in humid plastic boxes (60 × 40 × 35 cm) overnight in choice test trials to assess the extent of eggs laid in the (eight treatments) aged petiole tissue. The treatments (aged petioles after damage) were marked with color head pins. The number of eggs laid (oviposition) in and manually injured and aged coconut petiole were recorded by carefully extracting RPW eggs from the petiole fibers using a fine camel hairbrush. Each of the three oviposition trials was replicated thrice, while the trial was repeated three times.

Table 1: Treatment details

Sr. No.	Treatment	Coconut Petiole (Days After Injury)
1	Treatment 1	0 day old
2	Treatment 2	1 day old
3	Treatment 3	2 days old
4	Treatment 4	3 days old
5	Treatment 5	4 days old
6	Treatment 6	5 days old
7	Treatment 7	6 days old
8	Treatment 8	7 days old

The experiment was carried out in randomized block design with three replications.

Data on mean oviposition of three trials was subjected to statistical analysis (ANOVA) using the Web Agri Stat Package (WASP 1), available at <https://ccari.res.in/wasp/index.php>

RESULTS

Results presented in table 1 reveal that freshly injured coconut petiole was most preferred for egg laying by RPW (mean egg lay: 4.110) and was statistically at par with one and two-day old, injured coconut petiole, indicating that injuries and wounds on coconut petiole between 0-2 days after damage emit palm volatiles that are most attractive to female RPW adults for egg laying. Further table 1 also reveals that the receptivity of 3 to 7 days old, injured coconut petiole was statistically similar and reduced significantly as compared to 0 to 2 days old, injured coconut petiole.

Table 2. Oviposition by red palm weevil in injured and aged coconut petiole

Mean Number of Eggs Laid in Injured Coconut Petiole	
Treatment (Days After Injury)	Mean Oviposition
0 day old	4.110 a
1 day old	3.777 a
2 days old	2.890 ab
3 days old	0.443 b
4 days old	0.333 b
5 days old	0.777 b
6 days old	0.110 b
7 days old	0.443 b
CD (0.05)	2.889

DISCUSSION

The results of our study indicate that RPW prefer freshly injured coconut petiole this could be because of the volatiles/ pheromones emitted from the coconut palm tissues which acts as an attractant. *Rhynchophorus ferrugineus* is an internal tissue feeder ; symptoms do not manifest until the infection has progressed and significant damage has been done. Hence, early detection of /monitoring of RPW is a critical aspect of IPM. Based on our findings monitoring and protection of fresh wounds that attract RPW could assist to prevent infestation and keep the pest under check. These findings are consistent with previous reports in which several workers advocated for the protection of fresh injuries/wounds on the palm to prevent RPW egg laying. Abraham, 1971 recommended dressing of wounds on coconut palm with BHC + tar to prevent egg laying by RPW. More recently Faleiro and Al-Dawood, 2020 reported disruption of olfactory stimulation for oviposition in RPW by treating fresh wounds in date palm after frond and offshoot removal with palm volatile neutralizing insecticide like chlorpyrifos. Recent studies on Entomopathogenic fungi such as *Beauveria bassiana*, reported that RPW avoid the fungus, indicating that volatile organic compounds produced by the fungi have the ability to repel and disrupt RPW oviposition (J. JALINAS et al, 2022). The above-mentioned methods could be used to manage the infestation of RPW which is serious

pest in areas with palm cultivation.

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