

Evaluation of Certain Food Baits for Red Palm Weevil Pheromone Traps

C. Muthiah*, R. Rethinaraja*, S. Rajarathinam* and C. P. Radhakrishnan Nair**

Coconut Research Station, Tamil Nadu Agricultural University, Veppankulam - 614 906

Introduction

The red palm weevil *Rhynchophorus ferrugineus* F. is a dreadful pest that attacks coconut palm in India and many countries in South and South East Asia. Besides coconut palm, it also causes irreparable damage to date palm, oil palm, and palmyrah. In both coconut and date palm the females of red palm weevil lay eggs in the wounds on young palms, mostly those in the age group of 5 to 20 years. The grubs on hatching feed on the surrounding plant tissues often leading to the formation of tunnels. The grubs bore into the tissues, feed internally and ultimately kill the palm. All stages of the pest are completed inside the palm trunk. Hidden nature of this pest makes the early detection of infestation and taking up timely curative control measures very difficult.

An integrated pest management programme (IPM) was first developed on coconut for the control of this pest (Abraham *et al.*, 1989) in which trapping the weevil using coconut log trap was included as a major component. Abraham (1987) first revealed the presence of pheromones in male *R. ferrugineus*. Later, Hallet. *et al* (1993) isolated male aggregation pheromone ferrolure, a blend of ferrugineol and ferrugineone from male *R. ferrugineus*. The bucket trap for setting the pheromone in the field was designed by Oehlschlager *et al* (1993). This trap was suitably modified to enhance weevil capture. Abraham *et al.*, (1989) incorporated pheromone trapping as an effective contrivance in the IPM of red palm weevil. Abraham *et al.*, (1999) reported that effective

weevil trapping is possible only if pheromone lure is used along with the food bait. Different food bait materials were used in pheromone trap in India but a comparative study has not been conducted to find out the most effective food bait which will attract more weevils to the trap. Hence in the present study, different food baits were evaluated for its efficacy along with pheromone in attracting more number of weevils.

Materials and Methods

Pheromone traps were made as described by Abraham *et al* (1998) using ten litre capacity plastic buckets with lids. Four windows (1.5 cm x 5 cm) were made equidistantly at the top of the bucket just below the upper rim. To provide better grip for the attracted weevils, jute cloth was stuck on the outer side of the bucket. This enables the attracted weevils to get into the bucket. The pheromone lure was hung on the inner side of the lid using a metal

wire. Different food bait materials as attractants such as pineapple juice, coconut toddy, rice gruel, palmyrah fruit pulp and tender coconut water were used as the test materials.

In all, 28 bucket traps were used, in 4 replications (7 traps in each replication). A distance of 25 m was maintained between treatments and 250 m between replications. Each bucket contained the different food materials + 5 gm yeast + 5 ml glacial acetic acid + carbaryl 2 gm in sufficient water to form one litre (Table 1) Yeast, glacial acetic acid and carbaryl were added to the food material for fast fermentation and to kill the trapped weevils respectively.

The field experiments were conducted during 2000 and 2001 for 20 weeks at Coconut Research Station, Veppankulam. Observations were taken once in a week and at the same time the traps were cleaned by washing and replacing the old food bait

Table 1. Treatment details and different food baits used

Treatment material	Quantity used	Supplementary materials used
Sugarcane pieces crushed	200 gm	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Pineapple - crushed	200 gm	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Coconut toddy	200 ml	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Palmyrah fruit pulp	300 g	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Rice gruel	1 lit.	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Tender coconut water	1 lit.	Yeast 5 gm + glacial acetic acid 5 ml + carbaryl 2 gm
Control - water alone	1 lit.	Carbaryl 2 gm

** Principal Scientist, CPCRI, Kayamkulam



with fresh ones at 15 days interval. The number of weevils trapped every week were recorded and the data obtained were statistically analysed using

analysis of variance technique after the $X+0.5$ transformation of the original values.

Table 2. Effect of pheromone in combination with attractants in the attraction of red palm weevil, 2000

Treatment	Mean number of weevils attracted on				Grand Mean week
	5th week	10th week	15th week	20th week	
Pheromone + Sugarcane pieces crushed	5.59 (2.46)	6.06 (2.56)	2.19 (1.64)	0.93 (1.19)	3.69 ^c (1.54)
Pheromone + Pineapple - crushed	6.07 (2.56)	4.06 (2.13)	1.79 (1.51)	0.39 (0.94)	3.07 ^c (1.42)
Pheromone + Coconut toddy	13.19 (3.7)	10.66 (3.34)	4.19 (2.16)	1.13 (1.27)	7.29 ^b (1.98)
Pheromone + Palmyrah fruit pulp	16.99 (4.18)	14.26 (3.84)	9.53 (3.16)	2.86 (1.83)	10.91 ^a (2.40)
Pheromone + Rice gruel	7.79 (2.87)	2.66 (1.77)	0.79 (1.13)	0.33 (.91)	2.89 ^d (1.35)
Pheromone + Tender coconut water	14.39 (3.85)	12.86 (3.65)	6.99 (2.73)	2.13 (1.62)	9.09 ^a (2.21)
Pheromone alone (Control)	5.39 (2.42)	3.26 (1.93)	1.59 (1.44)	1.19 (1.3)	2.85 ^d (1.42)
SE					0.46
CD					0.98

(Figures in parenthesis denote transformed values) In a column, means superscribed by a common letter are not significantly different

Table 3. Effect of pheromone in combination with attractants in the attraction of red palm weevil, 2001

Treatment	Mean number of weevils attracted on				Grand Mean week
	5th week	10th week	15th week	20th week	
Pheromone + Coconut leaf petiole	7.79 (2.87)	6.79 (2.70)	6.13 (2.57)	0.79 (1.13)	5.37 ^f (1.78)
Pheromone + Pineapple - crushed	9.19 (3.11)	9.53 (3.16)	7.39 (2.80)	1.19 (1.3)	6.82 ^e (1.97)
Pheromone + Coconut toddy	14.15 (3.82)	13.46 (3.73)	10.59 (3.33)	6.53 (2.65)	11.18 ^c (2.49)
Pheromone + Palmyrah fruit pulp	18.59 (4.01)	17.39 (4.22)	20.86 (4.62)	9.39 (3.14)	15.80 ^a (2.90)
Pheromone + Rice gruel	8.13 (2.93)	8.99 (3.08)	8.93 (3.07)	6.33 (2.61)	8.09 ^d (2.18)
Pheromone + Tender coconut water	12.39 (3.59)	13.79 (3.78)	17.33 (4.22)	10.26 (3.28)	13.44 ^b (2.71)
Pheromone alone (Control)	7.19 (2.77)	4.13 (2.15)	4.06 (2.13)	2.73 (1.79)	4.52 (1.71)
SE					0.53
CD					1.12

Results and Discussion

The results on the field experiment conducted during 2000 (Table 2) showed that the treatments involving pheromone in combination with different food baits as attractants captured significantly more number of weevils than pheromone alone. Among the different treatments pheromone + palmyrah fruit juice captured significantly more number (10.91 weevils/week) of weevils and it was on par with pheromone + tender coconut water (9.09 weevils/week), where as, in control traps without any food attractant captured less number of weevils (2.85 weevils/week). In the second year of study during 2001 also (Table 3) similar trend was observed. The treatment with pheromone + palmyrah fruit juice captured significantly more (15.80 weevils/week) weevils followed by pheromone + tender coconut water (13.44 weevils/week). The treatment involving pheromone alone captured only a minimum number of weevils (4.52 weevils/week). The present results confirm the findings of Kurian et al (1984) reported that pineapple was superior in weevil catch to grapes and inferior to coconut toddy when applied in coconut log traps. Saritha Nair et al., 2000 reported that the weevil capture was highest in ripe plantain or sugarcane used as food bait. However, in the present study, in pheromone traps with sugarcane juice or pineapple juice captured less number of weevils than the pheromone traps with coconut toddy. The effect of pheromone lure was observed even for 20 weeks. The results confirm the findings of Falerio et al., 1998 who reported the field life of about five months for ferrolure in coastal belts of South Western India.

It can be concluded from the above study that, in red palm weevil pheromone traps, highest weevil capture can be obtained by using palmyrah fruit juice, and tender coconut water as food bait. The lowest



number of weevil capture in control trap in which no food bait was placed showed that for effective trapping, food bait is essential. The pheromone lures attract weevils from distance towards the pheromone trap while the food volatiles orient the attracted weevils to enter into it.

Acknowledgement

The funds provided by National Agricultural Technology Project PSR (Coastal - Agri - Horticulture) for this study is duly acknowledged.

References

Abraham, V. A. 1987. Study of sex pheromones and other attractants for the management of major pests of coconut. *Final report of research project, Central Plantation Crops Research Institute, Kasaragod, India*. pp. 1-8.

Abraham, V. A., Abdulla Koya, K. M. and Kurian, C. 1989. Integrated Management of *Rhynchophorus*

Red palm weevil. *Rhynchophorus ferrugineus* F. in coconut gardens. *J. Plant. Crops* 16 (suppl) : 159-162.

Abraham, V. A., Saritha S. Nair and Radhakrishnan Nair, C. P. 1999. A comparative study on the efficiency of pheromone lures in trapping red palm weevil, *Rhynchophorus ferrugineus* Oliv. (Coleoptera : Curculionidae) in coconut gardens. *Indian Coconut. J.* 30 : 1-2.

Abraham, V.A., Al-Shuaibi, M.A., Faleiro, J.R., Abozuhairah, R.A. and Vidyasagara, P.S.P.V. 1998. An Integrated Management Approach for Red Palm Weevil, *Rhynchophorus ferrugineus* Oliv. - A key pest of Date palm in the Middle East. *Agricultural Sciences* 3 : 77-83.

Falerio, J.R., Abraham, V.A. and Mahmood Abdulla Al-Shuaibi. 1998. Role of pheromone trapping in the management of

red palm weevil. *Indian Coconut J.* 29 : 1-3

Kurian, C., Abraham, V.A. and Ponnammma, K. N. 1984. Attractants - An aid in red palm weevil management. *Proc. PLACROSYM-V*, Dec. 15-18, 1982, Kasaragod, India : 581585.

Oehlschlager, A.C., Chinehilla, C.M., Gonzalez, L.M., Jiron, L.F., Mexzon, R. and Morgan, B. 1993. Development of a pheromone - based trapping system for *Rhynchophorus palmarum* (L) (Coleoptera : Curculionidae). *J. Econ, Entomol*, 86 : 1381-1392.

Saritha S. Nair, Abraham, V.A. and Radhakrishnan Nair, C. P. 2000. Efficiency of different food baits in combination with pheromone lures in trapping adults of red palm weevil, *Rhynchophorus ferrugineus* Oliv. (Coleoptera : Curculionidae) *Pestology* 24 (6) : 3-5.

HACCP CERTIFICATION CENTRE

An important aspect of developing the Food Processing Industries in Kerala is the need for creating awareness regarding the Food Quality and Safety. The Hazard Analysis Critical Control Point (HACCP) based approach for Food safety Management has become global requirement of international trade as measure of installing higher confidence in food safety.

To bridge the gap in awareness regarding HACCP and to help state's all food related processing and service industry to obtain global standards of food safety, the Department of Industries has finalized an action plan on food quality and safety.

The Government has set up a National Centre for HACCP Certification at Trivandrum in Kerala with the objectives to develop a team of experts in design implementation audit and certification of food safety system. The centre will be associated with Kerala Bureau of Industrial Promotion (KBIP) which has been identified as the Nodal Agency for HACCP Certification. Ministry of Food Processing Industry, Govt. of India has assured assistance to the agency.

Functions of the Centre are : operate in collaboration with all the stakeholders in the food chain in the application HACCP based food safety system, develop sector specific guidelines tailored to suit to the needs of State/Centre, to audit and certify the food safety in the food business operations to provide guidance to the consumers world over, to meet country's obligations as a signatory of WTO and equip the industry to compete in the global markets, maintain the system effectively through continuous review and improvement, collect and collate current data as well as information of food safety, disseminate the same to all the stakeholders, establish linkages between National and International organisations related to food safety and participate effectively in the food standard development process of the Codex Alimentarius Commission.

- Kerala Calling