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SHORT NOTE

LONGEVITY AND COMPARATIVE EFFICACY OF AGGREGATION PHEROMONE LURES AGAINST RED PALM WEEVIL, *Rhynchophorus ferrugineus* (Olivier) (COLEOPTERA: CURCULIONIDAE)

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The red palm weevil, *Rhynchophorus ferrugineus* (Olivier), the most serious pest of coconut, *Cocos nucifera* L. infests palms of 3 to 20 years age. As the red palm weevil is a concealed tissue borer, it is very difficult to detect early infestation for timely control measures (Abraham *et al.*, 1998). Under such situations, pheromone traps play an important role in monitoring and detecting early infestation. Kurian *et al.* (1984) successfully used coconut log traps baited with toddy + yeast + insecticide to attract and kill the adult weevils. After the discovery of aggregation pheromone 'Ferrolure' by Hallet *et al.* (1993), a bucket trapping system was designed by Oehlshlager *et al.* (1993a) containing pheromone, food bait, yeast tablets and insecticide to capture red palm weevil adults. Since 1994, pheromone traps containing aggregation pheromone have been widely used to manage red palm weevil in Asia and in America (Gunawardena and Herath, 1995; Oehlschlager, 1995) and also in Middle East countries (Abraham *et al.*, 1998). Since then, many firms are synthesizing these pheromone lures and made available for commercial usage. Various factors such as quantity of lure used in the pheromone sachet, purity of the lures, nature of septa, rate of release of pheromone, *etc.*, decide the efficiency. The direct field evaluation is the only easy and best method to verify the efficacy of the commercial lures. In the present study, five lures obtained from two different firms were tested for their efficacy in attracting red palm weevils in coconut gardens in Karnataka, India using standard bucket traps.

The study was conducted from January to December 2001 to asses the longevity and trapping potential of five lures *viz.*, 250 mg; 800 mg (supplied by Chem Tica International) 400, 900 and 1100mg (supplied by ISCA technologies) using standard bucket trap. The study was conducted in four selected locations of Tumkur district (13.20' N, 77.08'E) of Karnataka. The palms were about 15 years of age. The trap was a fifteen-litre capacity green plastic bucket with a lid, having five circular windows of 5 cm diameter placed equidistantly, 3 cm below the rim of the bucket. Jute threads were wrapped on the exterior of the bucket to provide better grip to attracted weevils and to allow their entry into the trap. The pheromone lure was hung on the inner side of the lid using a metal wire. Each trap was filled with 200 gm of cut pieces of ripened pineapple as food bait and, 2-3 yeast tablets were added to increase the fermentation as the odour enhances the attraction. Two litres of 0.1 % Carbaryl solution was used in the bucket trap to kill the trapped weevils. An untreated control was maintained along with the five treatments in all

the four replications where only food bait was used without pheromone lure. All the traps were set at the height of 1.52m from ground level and the experiments were conducted using Randomized Block Design in four locations, each location being a replicate. One trap was placed for every two hectare to avoid the trap interference. Observations on number of weevils captured were recorded once a week during which the food bait and insecticidal solutions were replaced. Observations were taken until the lure exhausted completely in the pheromone sachet and weevil catches were dropped to zero. The data were square root transformed and statistically analyzed using ANOVA with critical difference (CD) as test criterion.

It was revealed from the experiment that the longevity and efficiency of pheromone lures varied irrespective of the quantity loaded inside the commercial formulations of pheromone sachet (Table 1). The results indicated that 1100 mg ferrolure registered highest mean longevity of 51 weeks, followed by 800mg lure with mean longevity of 35 weeks, which is far superior to 900 mg lure. The trend was similar in total number of weevils attracted. The 250mg lure attracted 2.97±0.27 adults per trap per week during its longevity of 14.75 weeks, which is higher than 16.75 weeks activity period of 400 mg lure (2.41±0.42/trap/week). The level of attraction in 1100mg (5.57±0.46/trap/week) and 800mg (5.32±0.60/trap/week) is higher than other lures during their longevity of 51 weeks and 35 weeks period, respectively. The weevils captured in the pheromone traps were female biased in all the lures, which varied from 1:1.63 to 1:2.12 in favour of females. Such a predominance of females in pheromone trap catches of red palm weevils have been observed by Faleiro and Chellapan (1999) and Abraham *et al.* (1998).

Using the above experimental data, a comparision of the number of adults trapped over twelve weeks was made to know the relative attractive potential of the lures (Fig.1). The lure of 1100 mg registered the best average catch of 5.02 ± 1.61 weevils per trap per week, which is statistically on par with 800 mg lure (4.99 ± 0.93 weevils/trap/week). The 250 mg lure caught 3.14±0.51 per trap per week which was statistically on par with both 400 mg and 900 mg lure, which

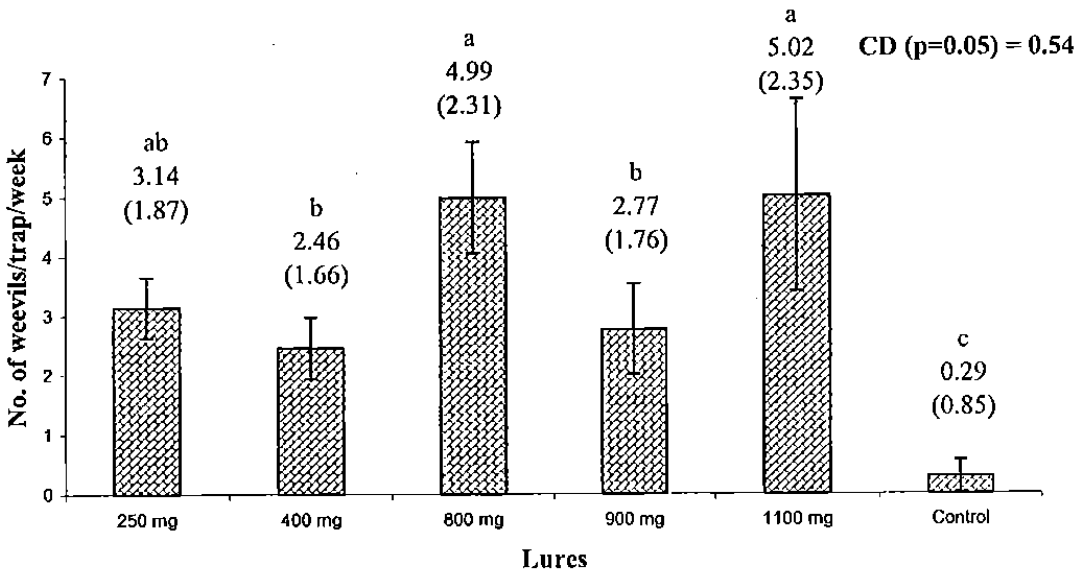

Fig 1. Mean weekly trap catches of red palm weevils in different commercial lures

Note: Means followed by same letters are statistically on par; Figures in the parenthesis denote square root transformed values

Table 1 : Longevity of commercial aggregation pheromone lures of *R. ferrugineus*

Lures	Mean Longevity of lure (in weeks)#	Number of weevils caught		Total	Sex ratio	Mean catch/trap/week
		Male	Female			
250 mg*	14.75	60	116	176	1:1.93	2.97±0.27
400 mg**	17.75	58	98	156	1:1.68	2.41±0.42
800 mg*	35.00	267	479	746	1:1.79	5.32±0.60
900 mg**	29.75	164	268	432	1:1.63	3.79±0.26
1100 mg**	51.00	405	733	1138	1:1.80	5.57±0.46
Control (without lure)	-	17	36	53	1:2.12	0.37±0.12
CD (p = 0.05)	2.27					

* Source of lure - Chem Tica International, Costa Rica
** Source of lure - ISCA Technologies, California
# Mean of four replications

captured 2.46 ± 0.52 and 2.77 ± 0.76 weevils per trap per week, respectively. Such a variation in commercial formulations in attracting adult weevils was earlier reported by Abraham (1999), Faleiro and Chellapan (1999) and Faleiro *et al.* (2000). So this trial indicated the superiority of 1100 mg and 800mg over other lures in terms of longevity as well as in efficacy in attracting adult red palm weevils.

Thus, the above observations clearly indicated that performance of synthetic lures might depend on soundness of technology involved in manufacturing. The efficiency of synthetic lures also depends on the composition, quantity, release rate, purity, etc. The rational conclusion could be that, all commercial sources are not equally efficient and careful selection of the source is important for better results.

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REFERENCES

Abraham, V. A., Al Shuaibi, M.A., Faleiro, J. R., Abozuhairah, R. A. and Vidyasagar, 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 Science*, **3**: 77-83.

Abraham, V. A., Nair S. S. and Radhakrishnan Nair, C. D. 1999. A comparative study on the efficacy of pheromone lures in trapping red palm weevil, *Rhynchophorus palmarum* (L) (Coleoptera: Curculionidae) in coconut gardens. *Indian Coconut Journal*, **30**: 1-2.

Faleiro, J. R., Abraham, V. A., Nabil Noubi , M. A., Al Shuaibi. and Premkumar, T. 2000. Field evaluation of red palm weevil, *Rhynchophorus ferrugineus* Oliv. Pheromone (Ferrugineol) lures. *Indian Journal of Entomology*, **62**(4): 427-433.

Faleiro, J. R and Chellapan, M. 1999. Attraction of red palm weevil, *Rhynchophorus ferrugineus* Oliv. To ferrugineol based pheromone lures in coconut gardens. *Journal of Tropical Agriculture*, **37**: 60 – 63.

Gunawardana, M. E. and Herath , H. M. W. K. B. 1995. Enhancement of activity of ferrugineol by N-pentanol in an attractant baited trap for the coconut pest *Rhynchophorus ferrugineus* (F.). *Journal of National Science Council of Sri Lanka,* **23**: 81-86.

Hallett, R. H., Gries, G., Borden, J. M., Czyzewska, E., Oehlschlager, A. C., Pierce Jr, H. D., Angerilli, N. P. D. and Rouf, A. 1993. Aggregation pheromone of Asian palm weevils *Rhynchophorus ferrugineus* and *Rhynchophorus palmarum. Naturwissenschafften,* **80**: 328-331.

Kurian, C., Abraham, V. A. and Ponnamma, K. N. 1984. Attractants- an aid in red palm weevil management. Proc. PLACROSYM-V, Dec 15-18, 1982, Kasargod, India.

Oehlschlager, A. C. 1995. *Rhynchophorus ferrugineus* a pest of date palm in the Middle East : Current and future strategies for the management of weevil population. Paper presented in the Expert Consultation on Date Palm pest problems and their control in the Near East. Organized by FAO regional office for the Near East. Cairo, Egypt, 22-26 April 1995, Al-Ain, UAE, pp 1-29.

Oehlschlager, A.C., Chinchilla, C. C., Gonzalez, L. N., Jifron, L. F., Mexzon, L. and Morgan, B. 1993a. Development of a pheromone based trapping system for American palm weevil *Rhynchophorus palmarum* (L) (Coleoptera: curculionidae). *Journal of Economic Entomology*, **86**: 1381-1392.

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