Journal of Spices and Aromatic Crops 11 (2) : 132-134 (2002)

Evaluation of biorationals against thrips (*Sciothrips cardamomi* Ramk.) and shoot and capsule borer (*Conogethes punctiferalis* Guen.) in cardamom

A Joseph Rajkumar, P Sainamole Kurian, S Backiyarani & M Murugan

Cardamom Research Station
Kerala Agricultural University
Pampadumpara - 685 556, Idukki, Kerala, India.

Received 18 May 2002; Revised 22 October 2002; Accepted 27 November 2002.

Abstract

A field experiment was conducted to evaluate the efficacy of biorationals in the management of thrips and shoot and capsule borer of cardamom. Among the biorationals evaluated, fish oil insecticidal soap (FOIS) (Na) 2.5% + tobacco extract 2.5% significantly reduced the damage caused by thrips. None of the treatments is effective for the control of shoot and capsule borer infestation on the capsules and all the treatments were on par with the control. Spraying quinalphos (0.05%) reduced the damage caused by thrips (6%) and increased the yield (391 g plant^{-1}). Foraging activity of honey bees was highest in control plots.

Key words: *Conogethes punctiferalis, Elettaria cardamomum,* honey bees, pest management, *Sciothrips cardamomi.*

Cardamom, *Elettaria cardamomum* Maton, is a high valued spice crop that brings profitable returns under intensive cultivation. Popularly known as the 'queen of spices', cardamom occupies 32,000 hectares in the cardamom hill reserves of Idukki District, Kerala. It is a highly cross-pollinated, shade loving perennial herb. The average production ranges from 50 to 600 kg per hectare with the adoption of high yielding varieties and intensive cultivation practices. In many cardamom plantations, insecticides are sprayed at regular and short intervals (20 to 25 days) irrespective of pest incidence with the sole aim of producing capsules free from itch and bore holes and thus making the pest management costly and sometimes ineffective (Varadarasan 2001). In the light of globalization policy and rapidly expanding organic spices market, use of biorationals in the management of cardamom thrips and shoot and capsule borer was undertaken with the objective of producing cardamom free from pesticide residues.

An experiment was conducted during 1999-2000 to 2000-2001 at Cardamom Research Station, Pampadumpara, Idukki District, Kerala to evaluate the efficacy of biorationals against thrips and shoot and capsule borer infestation. The following eight treatments including control were superimposed on three-year old cardamom plants (PV-1, Malabar type) in a randomized block design having four replications with six plants in each.

T1- Fish Oil Insecticidal Soap (FOIS) (Sodium [Na] based) (2.5%)

T2-FOIS (Potassium [K] based) (2.5%)

T3-FOIS (K) + tobacco extract (2.5%)

T4-FOIS (Na) + tobacco extract (2.5%)

T5-Nimbecidine (0.2%)

T6-Garlic extract (2.5%) + Nimbecidine (0.2%)

T7-Quinalphos (0.05%)

T8-Control

The treatments were applied seven times (four times at monthly interval from February to May and three times at 45 days interval from August to January) in a year as per the KAU package of practices for cardamom (KAU 1993). FOIS and Nimbecidine were obtained from M/s Kerala Oils Limited, Kozhikode and M/s T. Stanes, Chennai, respectively. Tobacco (500 g), purchased locally, was cut into small pieces and soaked in 10 litres of water, a day prior to spraying. FOIS Na or K (500 g) was separately mixed in 10 litres of water. Tobacco decoction and FOIS solution were mixed to form a homogenous solution and filtered through muslin cloth before spraying. In a similar way 500 g of garlic was crushed slightly and soaked overnight in 10 litres of water. It was then filtered through muslin cloth. To the filtrate, 20 ml of Nimbecidine was added and made to 20 litres. The spray fluid was delivered as fine mist using hand operated Knap-sack ASPEE sprayer on three-fourth of the tiller from the base and entire panicles during morning hours. Population of foraging honey bees was also recorded during peak foraging time for five minutes on selected plants in each replication one day after spraying. During harvest, randomly selected 250 capsules in each treatment were scored for itch and bore hole symptoms and expressed as percentage and analysed using Duncan's Multiple Range Test (Gomez & Gomez 1984). Dry capsule yield was also recorded.

The results are presented in Table 1. It is evident from the data that the least infestation (6.00%) by thrips was observed in quinalphos treatment (T7). All other treatments, except T4 and T7 were on par with control and maximum thrips damage of 54.5% was observed in Nimbecidine (T5) treated plots. None of the biorationals evaluated in the study had a significant effect in reducing the damage caused by thrips except FOIS (Na) 2.5% + tobacco extract 2.5%. Shoot and capsule borer infestation on the capsules ranged from 1.75% to 2.25% and all the treatments were statistically on par. Maximum dry capsule yield was also observed in T7 (391 g plant^{-1}) and mini-

Table 1. Effect of biorationals on thrips, capsule borer, honey bees and yield of cardamom

Treatment	Thrips (%)*	Capsule borer (%)**	Dry yield (g plant^{-1})	Mean number of bee visits per plant for 5 minutes one day after spraying**
T1 FOIS (Na) 2.5%	53.75 (47.16)^{c}	1.75 (1.29)	187.25^{c}	0.50 (0.97)^{c}
T2 FOIS (K) 2.5%	53.00 (46.72)^{c}	2.00 (1.39)	187.75^{c}	0.75 (1.09)^{c}
T3 FOIS (K) 2.5% + tobacco extract 2.5%	53.00 (46.72)^{c}	2.25 (1.47)	181.25^{c}	0.25 (0.84)^{c}
T4 FOIS (Na) 2.5% + tobacco extract 2.5%	37.00 (37.31)^{b}	1.75 (1.31)	196.75^{bc}	1.00 (1.22)^{bc}
T5 Nimbecidine (0.2%)	54.50 (47.58)^{c}	2.00 (1.39)	183.75^{c}	1.00 (1.18)^{bc}
T6 Nimbecidine (0.2%) + garlic extract (2.5%)	53.25 (46.87)^{c}	2.25 (1.47)	182.75^{c}	1.00 (1.15)^{c}
T7 Quinalphos (0.05%)	06.00 (14.06)^{a}	1.75 (1.31)	391.00^{a}	2.00 (1.56)^{ab}
T8 Control	54.00 (47.30)^{c}	2.00 (1.39)	217.50^{b}	3.00 (1.86)^{a}

*Values in parentheses are arc-sine transformed

** Values in parentheses are square-root transformed

Values superscribed with same alphabet(s) are not significantly different by DMRT (P=0.05)

mum in T3 (181.25 g plant^{-1}). Yield was on par in all treatments with biorationals and it was significantly higher in control and plots treated with quinalphos. Quinalphos 0.05% had a very significant effect in reducing the damage caused by thrips with higher yield. Mean number of honey bee visits per plant for five minutes was highest in control (3.00) and lowest in FOIS (K) + tobacco treated plot (0.25). The honey bee visits in quinalphos, FOIS (Na) + tobacco and Nimbecidine treated plots were statistically at par. Highest and significant bee activity was, however, observed in control and that the treatments with biorationals as well as quinalphos may have a repellant effect immediately after spraying. Visit of 3 honey bees every five minutes is ideal for successful pollination and fruit set in cardamom. Honey bee pollination resulted in better quality capsules of uniform shape and bigger size (Kuruvilla *et al.* 1995). Previous studies indicated that all the neem products and the insecticide evaluated were on par with each other. The highest yield was observed in plots treated with neem products (AICRPS 1998, 1999). However, Thyagaraj *et al.* (2002) found that neem products were ineffective against cardamom thrips and shoot and capsule borer and chemical insecticides were significantly superior over the botanicals. Bhat (2000) has also reported adverse effect of neem on arecanut production with phytotoxicity on inflorescence and button shedding as well. Though, insect growth regulatory activity of botanicals and biorationals was well established against major insect pests of economic importance (Schmutterer 1990), our study highlighted the inefficacy of biorationals except FOIS (Na) 2.5% + tobacco extract 2.5%. Emergence of panicle and blooming of flowers, which are otherwise choked due to feeding by thrips are overcome by insecticide application resulting in maximum yield of cardamom in plots treated with quinalphos. It is further suggested that more frequent application and higher concentration of biorationals shall be attempted in future studies. Timely and judicious use of insecticides may still be the option in the management of thrips on cardamom in Idukki District, Kerala at this point of time.

References

All India Coordinated Research Project on Spices (AICRPS) 1998 Annual Report 1997-1998. Indian Institute of Spices Research, Calicut, Kerala.

All India Coordinated Research Project on Spices (AICRPS) 1999 Annual Report 1998-1999. Indian Institute of Spices Research, Calicut, Kerala.

Bhat V R 2000 Gameticidal effect of plant based pesticides in arecanut. Indian Farming 50 (7) : 33-36.

Gomez K A & Gomez A A 1984 Statistical Procedures of Agricultural Research (2nd Edition). John Wiley & Sons, Singapore.

Kerala Agricultural University (KAU) 1993 Package of Practices Recommendations 'Crops'. Directorate of Extension, Mannuthy, Thrissur, Kerala.

Kuruvilla K M, Radhakrishnan V V & Madhusoodanan K J 1995 Small cardamom plantations–Floristic calendar and bee pasturage trees. J. Environ. Res. 3 (1&2) : 32-33.

Schmutterer H 1990 Properties and potential of natural pesticides from the neem tree, *Azadirachta indica*. Ann. Rev. Entomol. 35 : 271-297.

Thyagaraj N E, Singh P K & Chakravarthy A K 2002 Effect of plant based insecticides on cardamom thrips *Sciothrips cardamomi* (Ramk.) and shoot and fruit borer *Conogethes punctiferalis* (Gueneae) infestation. Insect Environment 7 (4) : 179-180.

Varadarasan S 2001 Insect pest management in cardamom- key to reduce cost of production. Spice India 14 (7) : 19-22.