Journal of Tropical Agriculture 36 (1998) : 37-40

VARIETAL PREFERENCE, GROWTH AND DEVELOPMENT OF PESTS *NECROBIA RUFIPES* DE GEER AND *ORYZAEPHILUS SURINAMENSIS* LINN, IN STORED COPRA

T. Nalinakumari and K. V. Mammen
College of Agriculture, Vellayani 695 522, Trivandrum, India

Abstract : Copra is subjected to the attack of various insect pests during storage. *Necrobia rufipes* De Geer and *Oryzaephilussurinamensis* Linn. were found to be the most important. The varieties / cultivars tested were Chavakkad Dwarf Orange x West Coast Tall, Laccadive Micro, Gangabondam, West Coast Tall x Chavakkad Dwarf Orange, Chavakkad Dwarf Orange, West Coast Tall, Laccadive Ordinary, West Coast Tall x Chavakkad Dwarf Green and Chavakkad Dwarf Green. Data on larval period, larval mortality, Chavakkad Dwarf Green. Data on larval period, larval mortality, pupal period, pupal mortality, percentage of adult emergence, adult longevity and the fecundity of the beetles and incubation period of the eggs were recorded daily after releasing one day old larvae of the insects in these varieties. The growth index of the insects in each treatment was calculated by dividing the percentage of adult emerged with the mean number of days for adult formation. Studies conducted revealed that the severity of infestation varied with varieties and the growth index varied with respect to larval period, larval mortality, pupal period, pupal mortality, adult emergence, adult longevity and fecundity. In overall assessment of the study, CDO x WCT, LM and LO were identified as less desirable for keeping the population build up low, while CDG and WCT x CDG were better and the remaining varieties were found to be intermediate.

Key words : Coconut, copra, growth index, pest development.

INTRODUCTION

The coconut (*Cocos nucifera* Linn.) and its products constitute the major source of livelihood to a sizable section of rural population in the tropics. Copra which is the main product from coconut is subjected to deterioration during storage by various agencies which results in extensive losses. Copra deterioration sets in during different stages of preparation as well as during storage (Thampan, 1982). Reports of infestation of copra during storage are given by different workers (Mathen, 1961; Mansor, 1974; Rai and Singh, 1977 and Laborious *et al.*, 1980). Nalinakumari *et al.* (1992a, 1992b) found *Necrobia rufipes* and *Oryzaephilus surinamensis* as the most important pests attacking copra in Kerala. Being a crop of great economic importance, farmers cultivate number of varieties / cultivars of coconut, having varied quality and composition. Due to the variations in the quality of copra, the intensity of infestation and development of these pests also vary very much. However, no definite research results are available on these aspects. Hence, an investigation was undertaken to find out the development and growth index of the major pests in copra obtained from the commonly cultivated varieties / cultivars of coconut.

MATERIALS AND METHODS

Nine commonly grown coconut varieties /cultivars were chosen for the experiment. They were Chavakkad Dwarf Orange x West Coast Tall (CDO x WCT), Laccadive Micro (LM), Gangabondam(GB), West Coast Tall x Chavakkad Dwarf Orange (WCT x CDO), Chavakkad Dwarf Orange (CDO), West Coast Tall (WCT), Laccadive Ordinary (LO), West Coast Tall x Chavakkad Dwarf Green (WCT x CDG) and Chavakkad Dwarf Green (CDG). Mature nuts were collected and copra was prepared.

Copra from each variety / cultivar (5 g) was taken and kept in specimen tubes of 10 x 2.5 cm size. One first instar larva of the insect was released into each specimen tube, within 24 hours after emergence. After the release of the larva the tubes were kept undisturbed in wooden racks with 10 replications each. The data on the larval period, larval mortality, pupal period, pupal mortality, adult emergence, adult longevity, fecundity and the incubation period of eggs were recorded daily. The percentage of adult emergence was calculated with reference to the number of larvae released at the time of setting the experiment. Growth indices of the insect in each treatment were calculated by dividing the percentage of adults emerged with the mean number of days for adult formation (larval + pupal periods).

RESULTS AND DISCUSSION

The data relating to the experiment and the results of the statistical analysis are depicted in Table 1. *N. rufipes* had the longest mean larval duration of 63.98 days on CDO and it was closely followed by WCT x CDO (62.99 days), CDG (62.67 days), WCT x CDG and GB (61.33 days), CDG x WCT (60.65 days) and WCT (60.64 days). The least larval duration was in LM (52.27 days) and it was closely followed by LO (53.64 days). The longest mean pupal duration of nine days was in CDG and it was followed by CDO (8.66 days), GB and WCT x CDG(8.33 days) WCT (7.64 days), LM and WCT x CDO 97.33). Shortest mean pupal period of 6.33 was observed in CDO x WCT and LO.

Larval mortality, pupal mortality and adult emergence ranged from 10 to 30, 0 to 20 and 50 to 90 per cent respectively. The growth indices varied from 0.72 to 1.51 and based on these the varieties tested could be ranked as GB > CDG > WCT > x CDO = WCT x CDG > WCT > CDO x WCT > LO > LM.

The fecundity of *N. rufipes* reared in different varieties / cultivars and the incubation periods of the eggs laid by them did not show significant variations. The mean number of eggs laid and the mean incubation periods ranged from 1.17 to 6.48 days and from 4 to 5 days respectively. It was also noted that as soon as the eggs were laid by the female, they were consumed by the adult beetles and hence, the recorded mean number of eggs were very low.

Significant differences in adult longevity were noticed among varieties. The longevity ranged from 14.93 to 33.46 days. Significantly lower longevity was recorded in WCT x CDO (14.93 days) and it was on par with CDO (16.33 days), GB (16.66 days), WCT x CDG (17.08 days), CDO x WCT (19.89 days) and WCT (21.32 days). Significantly higher longevity was noted in CDG (23.63 days) and it was on par with LO (29.97 days). The highest longevity was in LM (33.46 days).

The mean larval period and pupal period of *O. surinamensis* showed significant variations in different varieties. The longest larval period of 18.66 days was recorded in GB and CDO which was on par with LM (18.33 days), WCT and CDG (17.66 days), CDO x WCT and WCT x CDO (17.33 days). Significantly shorter larval period were recorded in WCT x CDG (16.33 days) and in LO (16.65 days). Longest pupal period was observed in LM (7.66 days) and which was on par with LO, WCT and WCT x CDG. Shortest pupal period of 5.33 days was recorded in GB and was on par with WCT x CDO, CDO x WCT, CDO and CDG.

The percentage adult emergence ranged from 50 to 90 in various varieties / cultivars. The growth indices ranged from 1.88 to 3.81 and on this basis the varieties / cultivars tested could be ranked as LM > LO > WCT > WCT x CDG > CDO > CDG >GB > WCT x CDO > CDO x WCT.

Table 1. Development of the insect pests in stored copra obtained from different varieties / cultivars of coconut

Varieties / cultivars	Period, days			Mortality, %		Adult emergence %	Growth index	Fecundity	Egg period, days	Adult longevity, days
	Larval	Pupal	Total	Larval	Pupal					
N. rufipes										
CDO x WCT	60.65 (7.85)	6.31 (2.71)	67.00	20	00	80	1.19	1.59 (1.61)	4.32 (2.31)	19.89 (4.57)
LM	52.27 (7.30)	7.33 (2.89)	59.60	10	00	90	1.51	6.48 (2.74)	4.66 (2.38)	33.46 (5.87)
GB	61.33 (7.90)	8.33 (3.05)	69.66	30	20	50	0.72	3.27 (2.07)	4.32 (2.31)	16.66 (4.20)
WCT x CDO	62.99 (8.00)	7.33 (2.89)	70.32	30	00	70	1.00	1.17 (1.47)	4.33 (2.31)	14.95 (3.99)
CDO	63.98 (8.06)	8.66 (3.11)	72.64	20	10	70	0.96	2.55 (1.88)	4.66 (2.38)	16.33 (4.16)
WCT	60.64 (7.85)	7.64 (2.94)	68.29	30	00	70"	1.03	5.50 (2.55)	4.32 (2.31)	21.32 (4.72)
LO	53.64 (7.39)	6.33 (2.71)	60.00	10	00	90	1.50	2.56 (1.89)	5.00 (2.45)	29.97 (5.56)
WCT x CDG	61.33 (7.90)	8.33 (3.05)	69.66	10	20	70	1.00	1.49 (1.58)	4.32 (2.31)	17.08 (4.25)
CDG	62.67 (7.98)	9.00 (3.16)	71.67	30	10	60	0.84	1.20 (1.48)	4.00 (2.24)	23.63 (4.97)
0. Surinamensis										
CDO x WCT	17.33 (4.28)	6.33 (2.71)	23.66	00	10	90	3.81	98.80 (9.99)	3.32 (2.08)	84.15 (9.23)
LM	18.33 (4.40)	7.66 (2.94)	26.65	10	40	50	1.88	125.39 (11.24)	3.00 (2,00)	98.87 (9.94)
GB	18.66 (4.43)	5.33 (2.52)	24.00	20	00	80	3.33	65.76 (8.17)	3.32 (2.08)	78.64 (8.92)
WCT x CDO	17.33 (4.28)	6.00 (2.65)	23.33	10	JO	*SO*	3.43	80.93 (9.05)	3.65 (2.16)	81.64 (9.09)
CDO	18.66 (4.43)	6.33 (2.71)	25.00	20	10	70	2.80	65.59 (8; 16)	3.00 (2.00)	72.07 (8.55)
WCT	17.66 (4.32)	6.98 (2.83)	24.66	30	10	60	2.43	85.47 (9.30)	3.65 (2.16)	74.90 (8.71)
LO	16.65 (4.20)	7.00 (2.83)	23.65	20	30	50	2.11	108.99 (10.49)	3.32 (2.08)	88.75 (9.47)
WCT x CDG	16.33 (4.16)	6.98 (2.83)	23.33	30	10	60	2.57	52.05 (7.28)	3.00 (2.00)	55.12 (7.49)
CDG	17.66 (4.32)	6.33 (2.71)	24.00	30	00	70	2.92	48.59 (7.04)	3.65 (2.16)	63.45 (8.03

CD (0.05)	Larval period	Pupal period	Fecundity	Egg period	Adult longevity
N. rufipes	(0.30)	(0.19)	NS	NS	0.83
(>.surinamensis	(0.18)	(6.20)	(2.60)		NS

Figures in parentheses are transformed values, $\sqrt{x + 1}$

The fecundity of this insect reared on different varieties / cultivars showed significant differences. CDG recorded the least number of eggs (45.59) and was on par with that in WCT x CDG, CDO, GB, WCT x CDO and WCT. Highest number of eggs were observed in LM which was on par with LO and CDO x WCT. The mean incubation period and adult longevity ranged from 3 to 3.65 days and 55.12 to 97.87 days respectively.

In over all assessment CDO x WCT, LM and LO may be identified as less desirable for keeping the population build up low while CDG and WCT x CDG may be considered better and the remaining varieties may be treated as intermediate.

The suitability of the different varieties for insect multiplication showed that LM and LO were more favourable varieties for the multiplication of *N. rufipes.* The high growth indices in copra processed from LO and LM were contributed by the short larval and pupal durations and high percentage of adult emergence. The longevity of the adults of *N. rufipes* emerging from these two varieties and their fecundity were also high. Among the varieties chosen LO and LM had the highest oil content (72 and 75 per cent) compared with remaining varieties (66 to 68 per cent). This factor might have contributed to the higher growth indices of *N. rufipes* breeding on the varieties. The copra obtained from dwarf varieties of coconut was reportedly softer with a high proportion of wrinkled, distorted and rubbery nature (Thampan, 1982) and this might have rendered the same less suitable for the multiplication of *N. rufipes.* The growth indices of *O. surinamensis* in copra obtained from varieties LO and LM were least. This was caused by the low percentage of adult emergence and longer larval and pupal duration. The dwarf and GB varieties being less favourable to *N. rufipes* were found more suitable for the multiplication of *Q. surinamensis.* Thus the preference of these two insects to different varieties under study appeared to be different. This could be due to the varying physical and chemical characteristics of the nuts and nutritional requirements of the two species of insects.

REFERENCES

Laborious, A., Burgstaller, H. and Von Keyserlingk, N. 1980. Storage pests in Tonga and West Samoa. *AlafuaAgri. Bulletin* 5(3) : 59-61

Mathen, K., 1961. Storage of coconut products. *Warehousing News Letter.* 4 : 3

Nalinakumari, T., Mammen, K. V. and Mohandas, N. 1992a. Quantitative and qualitative loss caused by the fungus *Aspergillus flavus* Link. and insects *Necrobia rufipes* De Geer and *Oryzaephilus surinamensis* Linn. in stored copra. *J. Plant. Crops.* 21 : 223-226

Nalinakumari, T., Mammen, K. V. and Mohandas, N. 1992b. Occurrence and nature of damage caused by pests by stored copra. *Indian Coconut J.* 23 (7) : 7-9

Mansor, P. De. 1974. *Report to the Govt. of Gilberti and Elice Islands Colony on a Survey of Insects Pests of Crops. FAO UNDP Report,* p. 35

Rai, B. K. and Singh, W. 1977. Studies on insect pests of copra. *Bull. Grain Tech.* 15(3) : 197-205

Thampan, P. K. 1982. *Hand Book on Coconut Palm.* Oxford and IBH Publishing Co., New Delhi, p. 311