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## Efficacy of different plant products against rice moth (*Corcyra cephalonica*, Stainton) in rice

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### Abstract

The present investigation entitled “Efficacy of different plant products against rice moth (*Corcyra cephalonica*, Stainton) in rice” was carried out under laboratory condition, Department of Entomology, Rajasthan College of Agriculture, MPUAT, Udaipur during august, 2017. The plant products were used viz; neem seed powder, custard apple seed powder, neem leaf powder, karanj leaf powder, custard apple leaf powder, eucalyptus leaf powder @ 2.5gm per 250gm grains of each treatment to observe the larval mortality (at 5 day interval upto 40 days), pupal mortality and adult emergence. It was observed that the highest larval mortality (83.00%), pupal mortality (10.00%) and minimum adult emergence (7.00%) were recorded in rice grains treated with neem seed powder and second highest larval mortality (82.00%), pupal mortality (10.00%) and minimum adult emergence (8.00%) were recorded in rice grains treated with custard apple seed powder after 40 days of pest release. This result revealed that the neem seed powder and custard apple seed powder was most effective among plant products. The minimum larval mortality (68.00%), pupal mortality (6.00%) and maximum adult emergence (26.00%) were recorded in eucalyptus leaf powder.

**Keywords:** Efficacy, rice moth, *C. cephalonica*, plant products

### 1. Introduction

The rice moth, *Corcyra cephalonica* Stainton (Pyralidae: lepidoptera) is one of the most destructive pest of stored cereals in Asia, Africa, North America and Europe causing severe economic losses [3]. It attacks rice, wheat, corn, sorghum, groundnut, cotton seeds, coffee, spices and cocoa beans under storage conditions. More than 20,000 species of field and storage pests destroy approximately one-third of the world’s food production, valued annually at more than \$100 billion among which, the highest losses (43%) occur in the developing world [18]. The quantitative and qualitative damage to stored grains and grain product from the insect-pests may amount to 20-30% in the tropical zone and 5-10% in the temperate zone [21]. In India, there are about 500 species of insects associated with stored grain products. Among these, nearly 100 species of insect-pests of stored product cause economic losses [12]. The adults are nocturnal and each female lays about 90-300 eggs with an incubation period of 5 days, 23-25 days of larval period, 10 days of pupal period and adult life span of 1 week [5]. The larvae cause damage to broken grains by forming silken webs and feeding inside them. When infestation is high the entire stock of grains may be converted into a webbed mass [6]. The pest causes both quantitative and qualitative losses. Storing grain in store houses, to keep them free from being damaged by insect pests is a problem confronted by every householder, whether a cultivator or user. The success achieved so far in making the stored grains free from insect pests has been based largely on pesticidal usage. Increasing awareness of the hazards caused due to the use of chemical pesticides and several reported cases of food poisoning has created renewed interest in the use of plant products as grain protectants [2]. There are encouraging reports on the use of certain indigenous plant products as grain protectants [7, 4, 17]. Contrary to the chemical insecticides, plant based products are eco-friendly in nature, economically viable, have least adverse effect on seed germination, non-toxic to mammals and are easily available. Hence, they assumed significance as an important component of insect pest management and hold a promising role as alternatives to chemical insecticides, to reduce pesticide load in the environment. Hence the present investigations entitled “efficacy of different plant products against rice moth in rice” was carried out.

## 2. Materials and Method

**2.1 Experimental details:** The present experiment was conducted on the efficacy of different plant products against *C. cephalonica* in rice. Different plant products were used viz; neem seed powder, custard apple seed powder, neem leaf powder, karanj leaf powder, custard apple leaf powder, eucalyptus leaf powder and control. All treatments were replicated four times in completely randomized design. The seeds of neem and custard; and leaves of neem, custard apple, karanj and eucalyptus were dried in shade at room temperature. The dried seeds and leaves were then ground into fine powder and passed through 60 mesh size sieve. About 2.5g of this powder was then mixed with 250g of rice

grains placed in each container separately for each treatment. Freshly hatched larvae of *C. cephalonica* (25 in number), obtained from the nucleus culture were released into each container and covered with muslin cloth and tightened with the help of rubber bands.

**2.2 Observations:** The observations on larval mortality were taken at five days interval; whereas, pupal mortality and adult emergence were recorded after pupal formation and adult emergence after completion of pupal period. The mortality recorded was corrected using the Abbott's formula <sup>[1]</sup>.

$$\text{Corrected mortality} = \frac{\text{Per cent mortality in treatment} - \text{Per cent mortality in control}}{100 - \text{per cent mortality control}} \times 100$$

### 2.3 Statistical Analysis

Statistical analysis was performed using MS-excel. Data was submitted to analysis of variance (ANOVA). Percentage data was turned into angular transformed value by using angular transformation.

## 3. Results and Discussion

During the present study of eco-friendly management of *C. cephalonica*, different plant protectants viz., neem seed powder, neem leaf powder, custard apple seed powder, custard leaf powder, karanj leaf powder, eucalyptus leaf powder were mixed with rice grains to evaluate their efficacy against *C. cephalonica* on the basis of larval mortality, pupal mortality and adult emergence.

### 3.1 Larval mortality (Table 1)

During the study of larval mortality, the observations on mean larval mortality was calculated at 5 day interval and start's from 5th day to 40th day after release on treated rice grains with different plant products @ 2.5g/250g grains. A significantly higher mortality was recorded in all the plant products as compare to control. The larval mortality gradually increased with the increment in the days of release. At 5th day highest larval mortality 50.00 per cent was recorded in neem seed powder. The custard apple seed powder (48.00 per cent) and neem leaf powder with (44.00 per cent) larval mortality was found at par with each other while the lowest larval mortality was recorded in eucalyptus leaf powder was 36.00 per cent. The karanj leaf powder (40.00 per cent) and custard leaf powder (38.00 per cent) also found effective based on larval mortality. At 10th day the maximum larval mortality at 10 days after release in rice grain treated with neem seed powder was 56.00 per cent which was significantly at par with custard apple seed powder (54.00 per cent) The larval mortality in The lowest larval mortality recorded in eucalyptus leaf powder was 38.00 per cent which was found at par with custard apple leaf powder recorded 40.00 per cent. The neem leaf powder was recorded 45.00 per cent larval mortality which was found at par with Karanj leaf Powder (43.00). At 15th day after release highest mortality 78.00 per cent was recorded in both neem seed powder and in custard apple seed powder which was at par with neem leaf powder (75.00 per cent) and the next most effective treatment was karanj leaf powder with 65.00 per cent mortality. The lowest mortality in eucalyptus leaf powder recorded was 45.00 per cent followed by 52.00 per cent in custard leaf powder. At

20th day highest mortality 78.00 per cent was recorded in both neem seed powder and custard apple seed powder which were found at par with neem leaf powder (75.00 per cent). The next effective treatment was karanj leaf powder with 68.00 per cent mortality followed by custard leaf powder (65.00 per cent). The lowest mortality was recorded in eucalyptus leaf powder (58.00 per cent). After 25 days of release highest mortality 80.00 per cent was recorded in neem seed powder which was found at par with 78.00 per cent in custard apple seed powder. The neem leaf powder caused 76.00 per cent mortality. The karanj leaf powder recorded 70.00 per cent larval mortality followed by 65.00 per cent in custard leaf powder. The lowest mortality in eucalyptus leaf powder was recorded 60.00 per cent larval mortality. The larval mortality 83.00 per cent in neem seed powder, 77.00 per cent in neem leaf powder, 82.00 per cent custard apple seed powder, 70.00 per cent in custard apple leaf powder were same in 30th, 35th, 40th day of release. At 30th day larval mortality 72.00 per cent in karanj leaf powder and 65.00 per cent in eucalyptus leaf powder which is same in eucalyptus leaf powder of 35th day of release. In 35th, 40th day the larval mortality 75.00 per cent in karanj leaf powder is same. The larval mortality 68.00 per cent in eucalyptus leaf powder on 40th day of release. The best treatment was neem seed powder with highest larval mortality in all days of observation. And lowest larval mortality recorded in eucalyptus leaf powder. These results were also found to be in accordance with the previous studies of Yadav and bhargava <sup>[20]</sup> use neem (*Azadirachta indica*) extract, karanj (*Pongamia glabra*) extract, eucalyptus (*Eucalyptus spp.*) extract for management of *C. cephalonica* on sorghum reported that neem extract proved best in reduction of adult emergence. Similar study done by Kumar *et al.* <sup>[10]</sup> reported that, custard apple seed powder @1.0% was effective in controlling *S. oryzae* on sorghum grains which reveals same result given by present findings. Another study by Veeranki and Reddy <sup>[19]</sup> reported that custard apple seed powder, neem leaf, seed kernel powder and inert dusts (attapulgitite and palygorskite) as effective treatment against *C. cephalonica* and *S. cerealella*, also support the present findings. Pathak and Tiwari <sup>[16]</sup> reported 100% mortality at 0.16% dose level of neem seed kernel extract which may be considered as extremely toxic to the pest. Similar result in accordance with present study by Khan and Thakare <sup>[11]</sup> who reported that larval period of one week old *Corcyra* larvae was significantly enhanced at 5 percent level when fed on grains treated with neem seed

powder at 1.0 percent. These results were also found to be in accordance with the previous studies of Jadhav and Ghule<sup>[8]</sup> pointed out that azadirachtin (10, 15, and 20% v/w) mixed with host caused a decrease in the total body weight and haemolymph proteins of *C. cephalonica* larvae. Another work by Meena *et al.*<sup>[13]</sup> reported that neem kernel powder was found most effective among ten powders when compare to present findings reveals same result. These results were also found to be in accordance with the previous studies of Jain and Kumar<sup>[9]</sup> studied the efficacy of neem leaf and kernel powder against the rice moth in bean by feeding the larvae with treated sorghum and found that neem kernel and leaf powder (2.5 and 5.0% each) were both toxic to *Corcyra* larvae. The neem treatments reduced larval weight and increase larval mortality.

### 3.2 Pupal mortality and Adult emergence

The maximum pupal mortality (10.00 per cent) was recorded in both neem seed powder and custard apple seed powder those were found at par with neem leaf powder (9.00 per cent) (Table 2). The karanj leaf powder recorded 8.00 per cent mortality followed by custard apple leaf powder (7.00 per cent). The minimum pupal mortality (6.00%) was recorded in

grains treated with eucalyptus leaf powder. The present findings can be compared with those of Pathak and Tiwari<sup>[15]</sup> studied the pupicidal effects of neem seed extract on the third instar larvae of *C. cephalonica*. The minimum adult emergence (7.00%) was observed with neem seed powder which was found at par with custard apple seed powder (8.00 per cent) (Table 2). The neem leaf powder, karanj leaf powder, custard apple leaf powder and eucalyptus leaf powder also observed effective in term of reducing the male emergence with 14.00, 17.00, 23.00 and 26.00 per cent male emergence, respectively. The present findings can be compared with those of Patel and Patel<sup>[14]</sup> observed mixing of neem and eucalyptus leaf powder at 2 per cent and mustard oil at 0.5 per cent were interfere with adults emergence, development period and growth index of the pest as well as weight loss of grains. These results were also found to be in accordance with the previous studies of Jain and Kumar<sup>[9]</sup> studied the efficacy of neem leaf and kernel powder against the rice moth in bean by feeding the larvae with treated sorghum and found that neem kernel and leaf powder (2.5 and 5.0% each) were both toxic to *Corcyra* larvae. The neem treatments reduced pupal weight, adult emergence and longevity.

**Table 1:** Effect of different plant products on the larval mortality of *C. cephalonica* in rice

Treatments	Per cent larval mortality at							
	5DAR	10DAR	15DAR	20DAR	25DAR	30DAR	35DAR	40DAR
Neem seed powder	50.00 (45)	56.00 (48.45)	78.00 (62.05)	78.00 (62.05)	80.00 (63.14)	83.00 (65.22)	83.00 (65.22)	83.00 (65.22)
Neem leaf powder	44.00 (41.55)	45.00 (42.13)	75.00 (60.01)	75.00 (60.01)	76.00 (60.35)	77.00 (60.75)	77.00 (60.75)	77.00 (60.75)
Custard apple seed powder	48.00 (43.85)	54.00 (47.30)	78.00 (62.05)	78.00 (62.05)	78.00 (62.05)	82.00 (64.37)	82.00 (64.37)	82.00 (64.37)
Custard apple leaf powder	38.00 (38.05)	40.00 (39.23)	52.00 (46.15)	65.00 (53.74)	65.00 (53.74)	70.00 (56.02)	70.00 (56.02)	70.00 (56.02)
Karanj leaf Powder	40.00 (39.23)	43.00 (40.97)	65.00 (53.74)	68.00 (55.55)	70.00 (56.41)	72.00 (57.31)	75.00 (59.33)	75.00 (59.33)
Eucalyptus leaf powder	36.00 (36.87)	38.00 (38.05)	45.00 (42.13)	58.00 (49.61)	60.00 (50.28)	65.00 (52.86)	65.00 (52.86)	68.00 (54.74)
Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEm±	0.506	0.593	0.771	0.855	0.923	0.914	0.949	0.919
C.D. (P=0.05)	1.488	1.745	2.267	2.516	2.714	2.689	2.791	2.703

Dose-@2.5g/250g of grains for each treatment

Figures in parentheses are angular retransformed values

DAR- Days after release

**Table 2:** Effect of different plant products on the pupal mortality and adult emergence of *C. cephalonica* in rice

Treatments	Dose (g/250g grains)	Pupal mortality (%)	Adult emergence (%)
Neem seed Powder	2.5	10.00 (14.28)	7.00 (15.21)
Neem leaf Powder	2.5	9.00 (13.13)	14.00 (21.95)
Custard apple seed powder	2.5	10.00 (15.53)	8.00 (16.26)
Custard apple leaf powder	2.5	7.00 (10.18)	23.00 (28.66)
Karanj leaf Powder	2.5	8.00 (11.78)	17.00 (24.32)
Eucalyptus leaf Powder	2.5	6.00 (8.30)	26.00 (34.66)
Control	2.5	0.00	82.00 (64.93)
SEm±		0.826	0.861
C.D (P=0.05)		2.429	2.533

Figures in parentheses are angular retransformed values

### 4. Conclusion

From the present study it can be concluded that efficacy of different plant products against rice moth (*Corcyra cephalonica*, Stainton) in rice, the highest larval mortality, pupal mortality and minimum adult emergence was found in neem seed powder and custard apple seed powder and lowest larval mortality, pupal mortality and maximum adult emergence in eucalyptus leaf powder. Present study evaluates the efficacies of neem seed powder and custard apple seed powder against *C. cephalonica* in rice was most effective. Therefore the present findings will certainly provide input for finding efficacy of different plant products against rice moth (*Corcyra cephalonica*, Stainton) in rice.

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