

## To study the effects of different foods on biology of Rice moth, *Corcyra cephalonica* (Stainton)

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### Abstract

Laboratory experiment was carried out "To study the effects of different foods on biology of Rice moth, *Corcyra cephalonica* (Stainton) under laboratory condition" at Biocontrol Laboratory Entomology, Shaheed Gundadhar College of Agriculture and Research Station, Kumhrawand, Jagdalpur, Bastar, (C.G). For investigating, the growth and development of rice moth, *Corcyra cephalonica* recorded various biological parameters on four different diets. In aspect to maximize the production of *Corcyra cephalonica* treatment T<sub>1</sub> Maize was found to outperform over all treatments. The maximum egg hatching percentage, total adult emergence percentage, total male and female adult emergence percentage, adult longevity male and female (days) and fecundity of *Corcyra cephalonica* was observed in T<sub>1</sub> (Maize) were 84.20 %, 88 %, 48%, 41%, 8.20 days, 9.20 days and 314.40 eggs/female respectively. The minimum incubation period, larval period and pupal period of *Corcyra cephalonica* was observed in T<sub>1</sub> (Maize) were 3.80 days, 29.80 days and 8.20 days respectively.

**Keywords** Biology, rice moth, different diets

### Introduction

*Corcyra cephalonica* (Stainton), the rice moth, (Lepidoptera: Pyralidae) is one of the most important pests of stored grains. It feeds on many hosts, viz., rice, sorghum, wheat, groundnut, gram, cotton seed; *C. cephalonica* has been utilized in a variety of biocontrol research, development, and extension units to produce plenty of natural enemies in mass. Whenever it involves entomophagous insect mass culture, The moth *C. cephalonica* is one of the most commonly used factitious hosts for *Trichogramma* production in several places across the world. Mated females deposit 100–200 eggs near food sources. Eggs hatch in 4–10 days. To keep fed and grow inside, the larva creates a feeding tube gallery made of silken web and food particles. When completely mature, they produce white cocoons and pupate. Adults emerge from pupae in 4 to 8 weeks and continue their life cycle. Pupae are commonly discovered in food; however they can also be found between pallets and bags. Adults emerge from pupae in 4 to 8 weeks and continue their life cycle, Rice moth is being utilized in various biocontrol research, developmental and extension units for mass production of number of natural enemies (Jalali and Singh, 1992). In an attempt to minimize cost of production by optimizing the grain utilization by *C. cephalonica* experiment was conducted to find out suitable media and ideal temperature for storage of the eggs of Rice meal moth.

### Material and Methods

#### Egg hatching percentage

To assess egg hatching, 50 eggs per treatment were placed in a petri dish. The hatching percentage was determined by counting the number of eggs that successfully hatched out of the 50.

#### Incubation period

Eggs laid by five female moths per diet were transferred to twenty petri dishes (10x2 cm) using a moist camel hairbrush. Ten eggs from each diet were observed. The

incubation period was recorded as the time from egg laying to hatching larvae for each of the 20 sets per diet.

#### Larval period

Hatched larvae from each petri dish were transferred to twenty petri dishes containing 100 g of rearing material, using a moist camel hairbrush. Twenty replicates were maintained, each with an average of ten larvae per treatment. The larval period was recorded from egg hatching to the formation of the pre-pupa or when 50% of larvae began spinning cocoons.

#### Pupal period

Ten larvae per treatment, nearing pupation, were monitored to determine the pupal period. Daily observations were conducted until adult emergence. The pupal period was measured from the onset of pupation to adult emergence.

#### Adult longevity of male and female moths

Ten male and ten female moths from each diet were individually housed in plastic containers covered with muslin cloth and secured with a rubber band. A 5% honey solution was provided as nourishment. Longevity was recorded as the time from adult emergence to death for each moth.

#### Fecundity

Ten adult male and female moths per diet were placed in egg-laying cages and provided with a 5% honey solution. Eggs were collected daily and cleaned using fine sieves. Fecundity was quantified by counting the total number of eggs laid by each female over her lifetime.

#### Per cent adult emergence

The percentage of moths that emerged as adults was calculated by counting the actual number of moths that emerged from pupae. Also recorded was the percentage of adult male and female moths that emerged.

### 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.

### Result and Discussion

The comparative study of four different diets maize, barley, rice and wheat were studied on biological parameters of *C. cephalonica*. The preference of the *Corcyra cephalonica* was assessed on the basis of their effects on the hatching per cent, incubation period, larval period, pupal period, adult emergence, adult longevity of adult and fecundity. The effects of different food media on some biological parameters of *C. cephalonica* are based on results are presented Table 1.

#### Egg hatching percentage

The data present (Table 1) observed in the egg hatching percentage ranged from 72.40 to 84.20 per cent. The egg hatching percentage was observed on different diets in the treatment T<sub>1</sub> (maize) 84.20 per cent maximum, followed by T<sub>4</sub> (rice) (79.60%), T<sub>2</sub> (wheat) (77.60%) and T<sub>3</sub> (barley) (72.40%) respectively.

These results are also partially supported by (2021) observed the egg hatching percent range of 58.33 to 88.33 per cent. They observed minimum egg hatching percentage in T<sub>3</sub>(wheat 100%) 58.33 percent and maximum 88.33 percentage on T<sub>7</sub> [bajra (32.33) +maize (32.33) + wheat (32.33)].

#### Incubation period

From the data present (Table 1) the egg incubation period ranged from 3.80 to 5.60 days. The shortest incubation period was noted in T<sub>1</sub> (maize) (3.80 days), followed by T<sub>4</sub> (rice) 4.40 days, T<sub>2</sub> (wheat) 5.00 days and longest incubation period was observed in T<sub>3</sub> (barley) 5.60 days respectively.

The observations made in this study are somewhat correlated with those of Kumar *et al.* (2002) [9], they reported that the incubation period for maize is 3.15 days, rice 3.64 days and wheat 3.89 days. Bharti *et al.* (2017) [3] was reported that the shortest incubation period of 6 days was found in T<sub>2</sub> (Maize).

#### Larval period

The finding data shown (Table 1) the larval period ranged from 29.80 to 36.40 days. The shorter larval period was found in T<sub>1</sub> (maize) (29.80 days), followed by T<sub>4</sub> (rice) (33.40 days), T<sub>2</sub> (wheat) (33.80 days) and longer larval period was observed in T<sub>3</sub> (barley) (36.40 days) respectively.

These results are in close agreement with Kumar *et al.* (2002) [9] who documented 23 days on maize, 33 days on wheat and 35 days on rice. Mbata (1989) [10e] also reported

larval development period of 23.48 and 35.75 days on maize and rice respectively.

#### Pupal period

From the data presented (Table 1) observed that pupal period ranged from 8.20 to 13.60 days. The lowest pupal period was observed in T<sub>1</sub> (maize) (8.20 days) which was at par with T<sub>4</sub> (rice) (8.40 days), followed by T<sub>2</sub> (wheat) (10.20 days) and the maximum pupal period was observed in T<sub>3</sub> (barley) (13.60 days) respectively.

A similar trend of 8.33 days of lowest pupal period maize and 14 days of highest pupal period rice was reported by Bhardwaj *et al.* (2016) [2]. Concurrent variations were documented by Bhandari *et al.* (2016) [1], he observed lowest pupal period 9.02 days on milled corn and longest pupal period was found on rice (10.33days).

#### Adult longevity

The data present (Table 1) observed that adult male and female longevity ranged from 5.20 to 8.20 days and 6.80 to 9.20 days respectively. The maximum adult male longevity of *C. cephalonica*, observed in T<sub>1</sub> (maize) (8.20 days), followed by T<sub>4</sub> (rice) (6.11 days), T<sub>2</sub> (wheat) (5.80 days) and T<sub>3</sub> (barley) (5.20 days). The maximum adult female longevity was recorded in T<sub>1</sub> (maize) (9.20 days), which was at par with T<sub>4</sub> (rice) (8.40 days), followed by T<sub>2</sub> (wheat) (7.20 days) and T<sub>3</sub> (barley) (6.80 days) respectively.

The result corresponds with the finding reported by Chaudhary (2021) [4] who supported the data by reporting that adult male longevity is highest in maize 95%+ yeast5% (6.40 days) and lowest in wheat 100% (5.10 days.) The maximum adult female longevity was observed in maize 95%+ yeast5% (7.50 days) and the minimum female longevity was observed in wheat 100% (6.50 days) respectively. Kaur (2021) [7] was reported in longest adult female longevity on T<sub>4</sub> [maize (48.5%) + sorghum (48.5%) + groundnut (48.5%)] 9.33 days respectively.

#### Fecundity

The data present (Table 1) observed in fecundity (no. of eggs per female) of the rice moth, *Corcyra cephalonica* its ranged from 239 to 314.40 eggs laid per female. The highest fecundity (number of eggs laid per female) observed in T<sub>1</sub> (maize) 314.40 eggs/ female, at par with T<sub>4</sub> (rice) 260.80 eggs/ female, followed by T<sub>2</sub> (wheat) 259.40 eggs/ female and T<sub>3</sub> (barley) 239.00 eggs/ female respectively.

The results correspond with the finding reported by Kumar *et al.* (2002) [9], who supported the data by reporting that highest fecundity (no. of eggs/ female) on maize (321.80) and least (226.40) on rice. Our finding is in close proximity with the finding of Devi *et al.* (2023) [5] where they reported the higher fecundity (number of eggs / female) on maize (300.17) and the lowest fecundity on wheat (237.33) respectively.

**Table:1** Effect of different diets on biological of *Corcyra cephalonica* (Stainton)

Treatment	Diets	Egg Hatching (%)	Incubatio Period (days)	Larval Period (days)	Pupal Period (days)	Adult longevity (days)		Fecundity (No. of eggs / female)
						Male	Female	
T <sub>1</sub>	Maize	84.20 * (66.67)	3.80 ** (2.10)	29.80 ** (5.40)	8.20 ** (3.02)	8.20 ** (3.03)	9.20 * (3.19)	314.40 ** (17.76)
T <sub>2</sub>	Wheat	77.60 (61.74)	5.00 (2.44)	33.80 (5.90)	10.20 (3.34)	5.80 (2.60)	7.20 (2.86)	259.40 (16.10)
T <sub>3</sub>	Barley	72.40 (58.31)	5.60 (2.56)	36.40 (6.11)	13.60 (3.81)	5.20 (2.49)	6.80 (2.79)	239.00 (15.43)
T <sub>4</sub>	Rice	79.60 (63.19)	4.40 (2.32)	33.40 (5.80)	8.40 (3.06)	6.11 (2.79)	8.40 (3.06)	260.80 (16.16)
SE(m)±		1.05	0.07	0.10	0.08	0.06	0.08	0.53
C.D. at 5%		3.20	0.21	0.31	0.26	0.20	0.24	1.64

Figures in the parenthesis are arc sin transformation \*\*Figures in the parenthesis are square root transformation.

### Effect of diets on adult emergence of *Corcyra cephalonica*

The data present (Table 2) observed in the total adult emergence, adult male and female emergence ranged from 66% to 88%, 34% to 48% and 32% to 41% respectively. The highest total adult emergence was found on T<sub>1</sub> (maize) 88.00 per cent, followed by T<sub>4</sub> (rice) 76.00 per cent, T<sub>2</sub> (wheat) 72.00 per cent and T<sub>3</sub> (barley) 66.00 per cent respectively. The highest adult male emergence was found in T<sub>1</sub> (maize) 48.00 per cent at par with T<sub>4</sub> (rice) 44.00 per cent, followed by T<sub>2</sub> (wheat) 42.00 per cent and T<sub>3</sub> (barley)

34.00 per cent. In female the highest adult female emergence was observed on T<sub>1</sub> (maize) 41.00 per cent at par with T<sub>4</sub> (rice) 36.00 per cent, followed by T<sub>2</sub> (wheat) 34.00 per cent and T<sub>3</sub> (barley) 32.00 per cent respectively.

Our finding is in close proximity with the finding of Devi *et al.* (2023) [5] where they reported the highest adult emergence per cent on maize 80.50 per cent. Kumar and Shenhmar (2001) [8] who reported that total number of adult emergences 1036.83, per cent adult male emergence and per cent female emergence highest on maize 86.27 per cent and 50.11 per cent respectively.

**Table 2:** Effect of diets on adult emergence of *Corcyra cephalonica*

Treatments	Diets	Total adult emergence (%)	Male emergence (%)	Female emergence (%)
T <sub>1</sub>	Maize	88.00 (69.91)	48.00 (43.82)	41.00 (40.36)
T <sub>2</sub>	Wheat	72.00 (58.09)	42.00 (39.16)	34.00 (35.59)
T <sub>3</sub>	Barley	66.00 (54.35)	34.00 (35.60)	32.00 (34.40)
T <sub>4</sub>	Rice	76.00 (60.75)	44.00 (41.52)	36.00 (36.80)
SE(m)±		1.51	1.49	1.33
C.D. at 5%		4.59	4.52	4.03

Figures in the parenthesis are arc sin transformation

### Conclusions

This research finding concluded that among all the four-treatment used for rearing *Corcyra cephalonica* T<sub>1</sub> Maize given the best result for all biological parameters performed along with high quantity and quality eggs. In aspect to maximize the production of *Corcyra cephalonica* coarsely ground Maize was found to outperform over all treatments.

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