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Evaluation of different rearing media for *Corcyra cephalonica* (Stainton)

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ABSTRACT: **To determine the suitable food media for the mass production of *Corcyra cephalonica* (Stainton), eleven types of food media *viz.*, sorghum, pearlmillet, maize, coarse rice, wheat bran, rice husk, sorghum + rice husk (9:1), pearl millet + rice husk (9:1), pearl millet + rice husk + wheat bran (5:1:1), maize + rice husk (9:1) and rice + rice husk (9:1) were used for rearing. Observations were taken on average development period, percentage of moth emergence and weight of eggs. Food efficiency index (FEI) was calculated by dividing the product of percent emergence and egg weight by average development period. The FEI was highest in case of sorghum followed by pearlmillet, maize, pearlmillet + rice husk + wheat bran, sorghum + rice husk, wheat bran and rice, while in other food media it was extremely low.**

KEY WORDS: *Corcyra cephalonica*, rearing media

Rice meal moth, *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae) a stored grain pest has proved to be one of the most efficient surrogate hosts for rearing a wide range of biological control agents. The important among them are egg parasitoids- *Trichogramma* spp.; egg-larval parasitoid- *Chelonus blackburni*; larval parasitoids- *Bracon* spp., *Goniozus nephantidis, Apanteles* spp.; insect predators-*Chrysoperla carnea, Mallada boninensis* and *Cyrtorhinus lividipennis.* Besides, some entomopathogenic nematodes such as *Steinernema feltiae* are also reared on the larvae of *C. cephalonica* (Kumar and Murthy, 2000). An efficient and low cost mass rearing medium for this insect is most essential to minimize the production cost of biological control agents. Earlier studies showed that the combination of different diets can improve the ratio of females to males, the reproductive potential (Zhu and Xie, 1983) and increase fecundity (Rao *et al.*, 1980). In the present study, the food efficiency index (FEI) has been worked out which has been used as a criterion for determining the suitability of different rearing medium for *C. cephalonica.*

MATERIALS AND METHODS

Eleven types of food media *viz.*, sorghum, pearlmillet, maize, coarse rice, wheat bran, rice husk, sorghum+rice husk (9:1), pearlmillet+rice husk+wheat bran (5:1:1), maize+rice husk (9:1) and rice+ rice husk (9:1) were chosen for studying the

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suitability of rearing medium for *C. cephalonica* at Biological Control Laboratory of National Centre for Integrated Pest Management, New Delhi. Two kilograms of rearing medium of each category was kept in wooden boxes (48x28x15cm). Four thousand *Corcyra* eggs (0-24 h old) were added to each box and the contents were thoroughly mixed to have uniform distribution of eggs in food. Each treatment was replicated four times, thus there being a total of forty-four boxes. These boxes were covered with tight fitting wooden lids. The lids were provided with two windows (10x10cm) covered with double-layered fine copper wire mesh, one cm apart. The boxes were kept in a room having controlled temperature (28±1°C) and relative humidity (80±5%).

After 25 days, they were observed daily for the emergence of moths. The moths were removed from all the cages once in a day and the total number of moths emerged were recorded separately for each cage. Emergence of moths was recorded for forty days. First day of moth emergence from each box was considered for developmental period. Percentage emergence of moths was calculated as (Total number of moth emerged x 100)/4000 (total number eggs used for charging each box).

Average development period was calculated by multiplying the development period with the number of moths emerged that day. The product of these two were summed up for forty days. The sum was then divided by the total number of moths emerged in forty days.

$$\text{Average development period} = \frac{A_1 * N_1 + A_2 * N_2 + \ldots\ldots A_{40} * N_{40}}{(N_1 + N_2 + \ldots\ldots N_{40})}$$

A_1 = number of days after charging the boxes, when the first moth emerged

N_1 = number of moths emerged on the first day of emergence

Twenty moths from each treatment were kept in small oviposition cages overnight. Eggs were collected next day. One hundred eggs from each cage were counted. They were weighed in a precision balance and their weight recorded. Each treatment was replicated four times. Based on the above biological parameters the food efficiency index of different rearing media were calculated as:

$$\text{Food efficiency index (FEI)} = \frac{\text{Percentage moth emerged x weight of 100 eggs}}{\text{Average development period}}$$

The data were analyzed using Duncan's multiple range test.

RESULTS AND DISCUSSION

Corcyra cephalonica developed on all the food media except rice husk. Moth emergence started after 34 days of infesting the media with *Corcyra* eggs in all the treatments except in rice and in rice + husk. In these two food media, the moth emergence started after 46 and 48days, respectively. The number of moths collected was recorded for forty days from the date of start of emergence from each cage. The emergence of moths continued even after 40 days, but since the second - generation moths were likely to emerge after forty days, the moths emerging after forty days were not included in the calculations. Maximum of 37.04 percent moths emerged from sorghum followed by pearlmillet and maize in which it was 31.99 and 25.48 percent, respectively (Table 1). Statistically, moth emergence in sorghum and pearlmillet treatments was on par. Jalali and Singh (1992) used 2000 eggs per kilogram of sorghum and obtained 12.9 percent recovery. It was observed that mixing of rice husk drastically reduced the moth emergence in all the food media. The most striking case was observed in pearlmillet, where the emergence was reduced from 31.99 to 5.15 percent when rice husk was mixed. When wheat bran was also added to the mixture of pearlmillet and rice husk the percent emergence of moths significantly increased from 5.15 to 13.5.

Rearing *Corcyra* on efficient food media resulted in production of robust moths and robust eggs. The size of the egg was considered as one of the criteria for assessing the health of the insect. For rearing of egg parasitoids such as *Trichogramma* spp., utilization of robust host eggs is important. The weight of the egg, therefore, was considered as a measure of size of the egg. Maximum

Table 1. Effect of different rearing media on the biological parameters of *C. cephalonica*

Sl. No.	Media	Percent emergence of moths	Wt. of 100 eggs (mg)	Av. developmental period from egg to adult (days)	Food Efficiency Index (FEI)
1.	Sorghum	37.04^{a}	4.25^{bc}	50.12^{ab}	3.14^{a}
2.	Pearlmillet	31.99^{a}	3.93^{def}	47.56^{a}	2.64^{b}
3.	Maize	25.48^{b}	4.57^{a}	52.04^{b}	2.27^{b}
4.	Rice	12.38^{cd}	4.08^{cd}	65.64^{d}	0.77^{cd}
5.	Wheat bran	15.42^{c}	3.96^{def}	60.46^{c}	1.01^{c}
6.	Rice husk	-	-	-	-
7.	Sorghum+Rice husk (9:1)	12.80^{cd}	4.32^{b}	49.31^{ab}	1.09^{c}
8.	Pearlmillet + Rice husk (9:1)	5.15^{e}	3.80^{f}	46.66^{a}	0.42^{d}
9	Pearlmillet +Rice husk +Wheat bran (5:1:1)	13.50^{c}	4.05^{cde}	47.64^{a}	1.13^{c}
10.	Maize+Rice husk (9:1)	6.90^{de}	4.11^{bcd}	47.89^{a}	0.60^{cd}
11.	Rice+Rice husk (9:1)	5.48^{e}	3.83^{ef}	61.01^{c}	0.34^{d}
	LSD	5.86	0.21	3.15	0.50

In each column, means superscripted by same letter (s) are not significantly different ($p<0.05$) by Duncan's multiple range test.

weight of 4.57 mg was recorded for 100 eggs laid by moths reared on maize, followed by 4.32, 4.25, 4.11 and 4.08 mg from sorghum + rice husk, sorghum, maize + rice husk and rice respectively. The eggs from other diet media weighed lesser. Rao *et al.* (1980) reared *C. cephalonica* both in sorghum flour and sorghum floor mixed with rice husk. They recorded more larval weight when reared in the latter.

Shorter development period is a desired trait in the mass production of any insect. The faster development of the insect indicates the efficiency of the rearing medium. *Corcyra* could develop in a shortest period of 47.56 days in pearmillet followed by 50.12, 52.04, 60.46 and 65.64 days in sorghum, maize, wheat bran and rice, respectively. It was noted that mixing of rice husk resulted in hastening the development of the insect. The development period in case of maize was found to be significantly reduced on mixing rice husk. Rice husk may have some phagostimulant, which may have induced faster development. It seems quite plausible that the serrated margin of rice husk caused abrasion to the larvae, which resulted in their death, hence, the poor recovery of moths was noticed wherever rice husk was added.

The different rearing media were superior with respect to different biological parameters. Hence to determine the best medium, a food efficiency index was computed which clearly established the superiority of sorghum over other media, the next

best food media being pearlmillet and maize. Though rice husk could reduce the development period, it markedly reduced the percentage emergence of moths probably because of its abrasive property. It would be worth investigating a little quantity of fine powder of rice husk mixed with food grains, which might improve the performance of the medium for utilization in commercial production of *Corcyra*. Further, in the regions where pearlmillet or maize is available at very low cost, these could be used in place of sorghum.

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