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Evaluation of different Diet for Rearing *Corcyra cephalonica* Stainton (Lepidoptera: Pyralidae)

M. Soniya Devi[1], Usha[1], V.K. Mishra[1] and R. Yonzone[2*]
[1]Department of Entomology, College of Agriculture,
Rani Lakshmi Bai Central Agricultural University, Jhansi (Uttar Pradesh), India.
[2]Department of Plant Pathology, College of Agriculture (Extended Campus),
Uttar Banga Krishi Viswavidyalaya, Majhian, Dakshin Dinajpur (West Bengal), India.

(Corresponding author: R. Yonzone)*
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ABSTRACT: *Corcyra cephalonica* are important polyphagous storage pest which are used as a laboratory host for rearing as well as for mass production of various parasitoids and predators. For invitro and invivo studies of various biocontrol agents, mass rearing is one of an important aspects and *C. cephalonica* play an important role in mass production of the bioagents. However the population of *C. cephalonica* also needs to be maintain in-vitro for the desired production of the bioagents. Therefore, the present studies aims to evaluate performance of *C. cephalonica* in four different stored grains diet *i.e.*, rice, wheat, maize and sorghum for best rearing. Among the tested diets, the sorghum based diet provided minimum larval period, maximum larval weight, minimum pupal period, maximum pupal period, shorter developmental period and maximum adult longevity and proved to be the best for rearing of Corcyra. Also the higher fecundity was observed in sorghum which was observed to be at par with maize diet. Therefore considering the over all superior performance, sorghum based diet can be utilized for successful rearing of *C. cephalonica*.

Keywords: *Corcyra cephalonica*, rearing, diet, sorghum, fecundity.

INTRODUCTION

Corcyra cephalonica, commonly known as rice moth is one of the most important and destructive pestscausing huge losses to storage cereals including rice, wheat, maize, sorghum, groundnut, coffee, etc in Asia, Africa, North America and Europe (Atwal and Dhaliwal 2008; Kumar and Kumar 2001). In India, it is prevalent in Andhra Pradesh, Bihar Chandigarh, Delhi, Gujarat, Haryana, Meghalaya, Manipur, etc. The moths of *C. cephalonica* are nocturnal in habitat and oviposit single eggs or in groups of 3-5 each on the grains.The larvae prefer to feed on the broken grain or crushed grains and leave silken threads while feeding, also contaminates the grain by producing dense webbing masses (Meena and Bhargava 2003). Besides being harmful, Corcyra are also used for mass culturing of various entomophagous insects or parasitoids of the hymenopterans belonging to families Bethylidae, Braconidae, Platygastridae, Trichogrammatidae (Singhamuni *et al.*, 2015; Nasrin *et al.* 2016; Queiroz *et al.*, 2017) due to its adaptability to various rearing condition, amenable for mass production and good influence on the progeny of biocontrol agents. It is popularly utilized for the mass production of *Trichogramma* sp. (egg parasitoid), *Bracon hebetor* (larval parasitoid) and *Chrysoperla carnea* (predator) in the laboratory. *C. cephalonica* can be reared in various stored grains. Even though it has been used successfully there are variation in the production of eggs with time due to the biological nature of the material used, which subsequently affect the production cycle of different bioagents. Therefore it is necessary to find the most suitable diet where their development of Corcyra takes in a shorter period so that more number of desirable stage (egg/larva) of the insect could be produced within a limited time. Considering the above factors, the present investigation was carried out to study various biological parameters of *C. cephalonica* on different host.

MATERIALS AND METHODS

The present study was conducted at Biocontrol and Biofertilizer laboratory (Research laboratory), Rani Lakshmi Bai Central Agricultural University, Jhansi during 2022 to evaluate the effect of various diets (natural) *viz.* rice, maize, wheat and sorghumon the biology of rice moth, *C. cephalonica*.

The grains under study *i.e.*, rice, maize, wheat and sorghum were cleaned by removing the dirt's present in the grains. The grains were coarsely grinded in a mixer grinder and sterilized in hot air oven at 100°C for 30 minutes. 2.5 Kg of each grain were mixed with 5 g of yeast and 0.05 g of streptomycin sulphate (for prevention of microbial growth) and poured in the Corcyra rearing box. 1 cc of freshly laid Corcyra eggs were added in each box and cover it with lid having a wire mesh for aeration, light and observation. After 30 days, the boxes were monitored daily for moth emergence. The emerged moths were collected and transferred separately from each diet in the Corcyra oviposition cage. The food for the moth *i.e.*, honey

solution is provided inside the oviposition cage. The different biological parameters *i.e.,* fecundity, egg viability, incubation period, larval period, larval weight, pupal period, pupal weight, pupation percentage, total developmental period, adult emergence and adult longevitywere worked out.

Fecundity. Five pairs of moths from each diet were put into a oviposition cage and provided with honey solution. The eggs were collected each day from the paper which was kept below the oviposition cage. These eggs were placed in a petriplate counted with the help of a hand magnifying lens and then average fecundity of a female was worked out (from five replicates).

Eggs viability. The eggs as mentioned above were kept in a petriplate. The eggs which could not hatch were counted and from this the number of viable eggs was worked out.

Incubation period. The egg laid by each of five females were transferred to 5 petriplates (10 × 2 cm) separately, using camel hair brush and larvae emerged were observed daily.

Larval period. Twenty hatched larvae from the petri plates were transferred to six petri plates containing 100 g each of rearing diet (rice, wheat, maize and sorghum) The larval period was recorded from date of hatching to till the pupation.

Larval weight. From each jar of diet, five 25 day old larvae were taken at random from those diet. These were weighed in batches of five on electronic balance. After weight, the larvae were put back into the respective diet petriplate. The average weight per larva was calculated.

Pupation percentage. The same larvae, which were about to pupate, were kept under observation for recording the pupation percentage.

Pupal period. The pupae formed from first ten larvae were observed daily for the emergence of adult moths. The pupal period was calculated from the date of pupation to the date of emergence of moths.

Pupal weight. From the ten pupae kept for studying the pupal period, the weight of five matured pupae taken randomly from each replication of each diet was recorded. The average weight per pupa was worked out.

Total developmental period. The total developmental period was calculated by adding incubation period, larval period and pupal period.

Percent adult emergence. The actual number of moths emerged from pupae were counted and percent adult emergence was calculated. The percent of male and female adult moth emergence were also recorded

Adult longevity. The male and female moths on different diets were kept separately to record adult longevity. They were provided with 5 percent honey solution.

RESULTS AND DISCUSSION

Considering the growth and development of *Corcyra cephalanica* in different diets, the data presented in Table 1 depicted that the larval period of *C. cephalonica* on all the four diets (rice, wheat, maize and sorghum) ranged from 38.23 to 46.29 days. The shortest larval duration was observed in sorghum diet (38.23 days) while maximum duration in wheat diet (46.29 days). Maximum larval weight was found when reared in sorghum followed by maize, rice and wheat. Likewise, the shortest pupal period, maximum pupal weight, maximum pupation percent and shorter total developmental period was also found in sorghum *viz*., 9.70 days, 35.10 mg, 85% and 52.13 days, respectively. From the results, it is clear that the *C. cephalonica* were performing well in sorghum diet as compared to rice, wheat and maize diet.

Our findings are in close proximity with the findings of Kaur (2020); Ashwani Kumar *et al*. (2002) where they reported pupal period of 11.12 days and 7.78 days on sorghum. The total developmental period were 52.69 days and 45.82 days respectively.

Table 1: Influence of different diets on the growth and development of *C. cephalonica.*

Diet	Larval period (days)	Larval weight (mg)	Pupal period (days)	Pupal weight (mg)	Pupation %	Total developmental period (days)
Rice	44.37	41.82	12.01	32.38	76	60.76
Wheat	46.29	41.51	13.10	32.25	75	65.00
Maize	39.64	42.61	10.98	34.51	82	55.67
Sorghum	38.23	44.41	9.70	35.10	85	52.13
S.E. (m) ±	1.69	1.34	0.49	1.03	2.24	1.9
C.D. (5%)	5.06	4.03	1.47	3.08	6.7	5.7

Similarly, the performance of *C. cephalonica* were better when reared in sorghum rather than rice, wheat and maize. The higher number of per cent adult emergence was observed in sorghum (82.17 %) which was at par with maize diet (80.50 %). There was no significant difference in terms of adult longevity in all the diets and was ranged from 4.95 days to 6.02 days. The maximum egg laying capacity was observed in maize (300.17 eggs/moth) followed by sorghum (290.67 eggs/ moth) and are found to be at par with each other. The incubation period was observed to be minimum in sorghum followed by rice, maize and wheat diet. The higher better performance on sorghum diet have also been reported by Kaur (2020); Nathan *et al.* (2006) where they reported 56.66% and 68.0% emergence of larvae and adults reared on sorghum.

Table 2: Influence of different diets on the performance of *C. cephalonica* adult.

Diet	Per cent adult emergence	Adult longevity	Fecundity	Incubation period
Rice	64.17	5.23	245.83	4.38
Wheat	62.83	4.95	237.33	5.61
Maize	80.50	5.62	300.17	5.05
Sorghum	82.17	6.02	290.67	4.20
S.E. (m) ±	2.04	0.36	8.99	0.21
C.D. (5%)	6.13	NS	26.86	0.63

Kumar and Kumar (2002) also reported the highest Food efficiency index (FEI) in case of sorghum based food media as compared to other media tested.

CONCLUSIONS

Considering the various parameters taken under study for rearing of *C. cephalonica* in rice, wheat, maize and sorghum diet, it was evident that the insect when reared in sorghum performed superior over the other diets. The over all growth, development, and performance was observed better in sorghum diet. Therefore, it can be concluded that the sorghum being an efficient diet can be used for the mass production of the eggs of *C. cephalonica* as compared to the other tested diets.

FUTURE SCOPE

The selected diet (sorghum) is easily available, economical and performed better than the other diet. Sorghum can be utilized for egg and larval production of Corcyra. Furthermore, the preferred stage of the Corcyra can be used for mass production of various biocontrol agents like *Trichogramma*, *Bracon*, *Chrysoperla*, etc. Also, the production and employment of these bioagents will minimizes the chemical pesticide usage thereby making the environment healthy.

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Conflict of Interest. None.

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