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Comparative study of biology of rice moth, *Corcyra cephalonica* reared on different diets

Kale Aishwarya, PS Neharkar and SD Bantewad

Abstract

Laboratory experiment was carried out to study the “Comparative performance of different diet ingredients on growth and development of rice moth, *Corcyra cephalonica* (Stainton) under laboratory condition” at Department of Agricultural Entomology, College of Agriculture, VNMKV, Parbhani during 2020 – 2021. For investigating, the growth and development of rice moth, *Corcyra cephalonica* recorded various biological parameters on eight different diets including two solo grains viz. sorghum and bajra in combination of six diet with oilseed i.e. groundnut and soybean. In aspect to maximize the production of *Corcyra cephalonica* treatment T₅ i.e. Sorghum 2.5 kg + Groundnut 150 g and T₆ i.e. Bajra 2.5 kg + Groundnut 150 was found to outperform over all treatments. The maximum egg hatching percentage, pupal percentage, adult emergence percentage and fecundity of *Corcyra cephalonica* was observed in T₅ (Sorghum 2.5 kg + Groundnut 150 g) were 96 %, 90 %, 94 % and 313.67 eggs/female respectively. The minimum incubation period, larval period, pupal period and total development period of *Corcyra cephalonica* was observed in T₅ (Sorghum 2.5 kg + Groundnut 150 g) were 2.84 days, 29 days, 6.67 days and 49 days respectively.

Keywords: Biology, rice moth, different diets

Introduction

Our populous, fast-paced world demands quality food that is affordable and lots of it. When it comes to agriculture and need to meet our world’s growing needs, pesticide use is often a topic of controversy. Pesticides often increase crop yields but an abundance of crop yields is an anachronistic when the cost is human life. Farmers has become increasingly concerned about the use of pesticides and the possible adverse effects on human health, wildlife and overall environmental quality. Biological pest suppression among various methods of pest suppression is painstaking to be the most environment friendly, economic and everlasting tool of IPM strategies forming a part of sustainable agriculture. The rearing host diet media of *Corcyra cephalonica* is potentially of status to the nutritious quality of host eggs released into the environment as biological control agents (Hunter, 2003) [4]. Rearing of *Corcyra cephalonica* on effectual food stuffs resulted in production of powerful eggs and moths.

Material and Methods

The present investigation was conducted to study the “Comparative performance of different diet ingredients on growth and development of rice moth, *Corcyra cephalonica* (Stainton) under laboratory condition” at the laboratory of Insect parasitology research scheme, Department of Entomology, College of Agriculture, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani during the academic year 2020-2021.

Cereal based artificial diets like sorghum, bajra and oilseed like groundnut and soybean were mixed in different ingredients like yeast and streptomycin sulphate for enhancing the diet. Those diets ingredients were used according to the nutritional level required for growth and multiplication of rice moth. Initially all the grains were kept for sun drying. Then the grains were ground separately upto 3 to 4 parts of each in mixer grinder, so that larva can feed efficiently. Dietary components were sterilized in the oven at 100 °C for 30 min to remove all the sorts of pre-infestation. Wooden boxes used for rearing were first washed and kept for drying upto 2-3 days. Boxes were sterilized with cotton cloth soaked in 1% formalin solution. Nine treatments of host diets were undertaken with three replications. Hereafter each wooden boxes were filled with 2.5 kg of diet ingredients fixed with yeast and streptomycin sulphate. These boxes were sprinkled with egg culture of *Corcyra cephalonica* (1/4 cc in each box) on the top of mixture and lids were secured tightly and labelled. Boxes were kept in racks

protected by ant pans.

Regarding the study of biology of rice moth *Corcyra cephalonica*, on different diets following observations were recorded.

Egg hatching percentage: Fifty eggs were kept in petri-dish to observe hatching. The number of eggs hatched out of fifty was counted to determine the hatching percentage.

Incubation period: The eggs laid by each of ten females were transferred to 10 petriplates separately, using moist camel hair brush and larva emerged was observed daily. One set of ten eggs was kept for observation. Such ten sets were observed to record incubation period.

Larval period: The larvae hatched from each of the petri plates were transferred to ten petri plates with the help of moist camel hair brush having 100 g rearing diets. The larval period was recorded from date of hatching to till the date up to 50 percent larva spin the cocoons. The average of larvae for each treatment in each three replication was worked out along with total larval development.

Pupal period: The same larvae, which were about to pupate, were kept under observation for recording the pupal period. Each pupa was observed till adult emergence, average pupal period and pupation percentage was worked out.

Pupal percentage: The actual number of moths emerged from pupae was counted and per cent emergence was calculated.

Percent adult emergence: The actual number of moth emerged from pupae were counted and percent adult emergence was calculated.

Total development period: The total development period from egg laying to death of adult was computed by combining the data obtained from the observation of incubation period to adult longevity and given as total life cycle of *Corcyra cephalonica*.

Fecundity: The total number of eggs laid by each female in its life time was recorded and average fecundity was worked out. During this period, the pair adults were provided with 5 per cent honey solution.



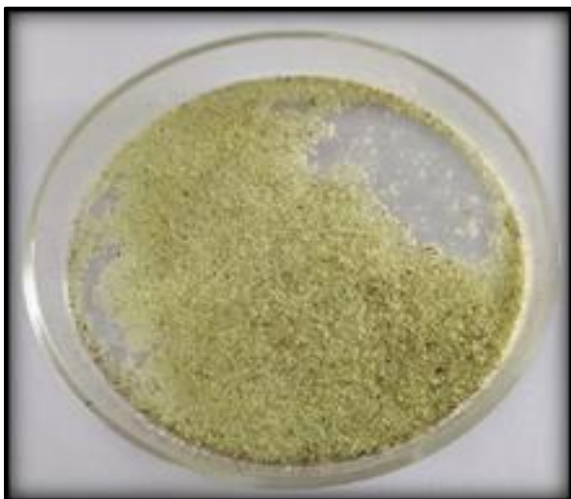
Larva



Pupa



Adult



Egg

Result and Discussion

The egg hatching percentage of *Corcyra cephalonica* on different diets varied from 76.34 to 96 percent with an average of 86.54 per cent. The maximum egg hatching percentage was observed 96 per cent in T₅ (Sorghum 2.5 kg + Groundnut 150 g). Lowest egg hatching percentage was observed in T₂ (Bajra 2.5 kg) with 76.34 per cent. Dharne (2018) [3] reported percentage of egg hatching was 86.00 per cent from treatment sorghum + groundnut.

Incubation period of *Corcyra cephalonica* on different diets ranged from 2.84 to 4 days with an average of 3.35 days. Shortest lifespan of incubation period of *Corcyra cephalonica* was noticed in T₅ (Sorghum 2.5 kg + Groundnut 150 g) i.e. 2.84 days. Longest period of incubation was recorded in T₄ (Bajra 2.5 kg + Soybean 150 g) with 4 days.

The larval period on different diets ranged from 29 to 40.67 days with an average of 34.75 days. It was observed that treatment T₅ i.e. Sorghum 2.5 kg + Groundnut 150 g shown the lowest larval period of 29 days. The highest larval period was recorded in T₄ (Bajra 2.5 kg + Soybean 150 g) with 40.67

days. Deulkar *et al.* (2012) [2] concluded that Sorghum + Groundnut have the mean larval period of 32.37 days. However, Bhandari *et al.* (2014) [1] assessed the lowest 29.28 days of larval period on corn + groundnut.

Table 1: Effect of different diets on egg hatching percentage, incubation period, larval period and pupal period of rice moth, *Corcyra cephalonica*.

Tr. No.	Treatments	Egg hatching percentage (%)	Incubation period (in days)	Larval period (in days)	Pupal period (in days)
T ₁	Sorghum 2.5 kg	85.67	3.50	36	8
T ₂	Bajra 2.5 kg	76.34	3.17	39.34	10.84
T ₃	Sorghum 2.5 kg + Soybean 150 g	88.67	3.34	35	9
T ₄	Bajra 2.5 kg + Soybean 150 g	80	4	40.67	13
T ₅	Sorghum 2.5 kg + Groundnut 150 g	96	2.84	29	6.67
T ₆	Bajra 2.5 kg + Groundnut 150 g	92.67	3	30	7.34
T ₇	Sorghum 1.25 kg + Bajra 1.25 kg + Soybean 150 g	83	3.84	35.34	8.17
T ₈	Sorghum 1.25 kg + Bajra 1.25 kg + Groundnut 150 g	90	3.17	32.67	7.5
	Range	76.34 – 96	2.84 - 4	29 – 40.67	6.67 – 13
	Mean	86.54	3.35	34.75	8.81
	'F' test	Sig.	Sig.	Sig.	Sig.
	SE(M)	1.178	0.242	0.799	0.503
	CD at 5%	3.53	0.728	2.39	1.509
	C.V %	2.36	12.55	3.98	9.89

The pupal period varied from 6.67 to 13 days with an average of 8.81 days. The shortest pupal period was 6.67 days observed in T₅ i.e. Sorghum 2.5 kg + Groundnut 150 g. Highest pupal period over all diets found on Bajra 2.5 kg + Soybean 150 g i.e. T₄ was 13 days. Similarly, Dharne (2018) [3] concluded that shortest pupal period was found in sorghum + groundnut and bajra + groundnut having 7.33 days and 7.83 days 30 respectively. Kumar *et al.* (2018) [5] revealed that diet sorghum 1000 g + groundnut 50 g shown the lowest pupation period with 7 days.

The pupal percentage of *Corcyra cephalonica* ranged from 70.67 to 90 per cent with a mean of 82.4 per cent. The maximum pupal percentage of *Corcyra cephalonica* was reported in T₅ (Sorghum 2.5 kg + Groundnut 150 g) with 90 per cent. The minimum pupal percentage was reported in T₄ i.e. Bajra 2.5 kg + Soybean 150 g with 70.67 per cent. Mehendale *et al.* (2014) [6] who proved that rearing of *Corcyra cephalonica* on different media varied the pupation percentage from 64.24 to 88.20 % with a mean of 75.66 %.

The percent adult emergence ranged from 71.34 to 94 per cent with an average of 84.04 per cent. The maximum adult emergence percentage were 94 per cent reported in T₅ (Sorghum 2.5 kg + Groundnut 150 g). The minimum adult emergence was observed in T₄ (Bajra 2.5 kg + Soybean 150

g) with 71.34 per cent

The total development period of *Corcyra cephalonica* on different diets varied from 49 to 62.67 days with an average of 55.4 days. Treatment T₅ i.e. Sorghum 2.5 kg + Groundnut 150 g was found to be the superior diet for *Corcyra cephalonica* with lowest development period i.e. 49 days over all the treatments. The highest total development period 62.67 days were recorded with treatment T₄ (Bajra 2.5 kg + Soybean 150 g). Observations of present study are in agreement with Osman (1986) [7] who studied that the shortest development time i.e. 42.82 days. However, Deulkar *et al.* (2012) [2] found that total development period of rice moth on Sorghum + Groundnut was 40.67 days.

The fecundity of rice moth varied from 218 to 313.67 with an average of 279.7 eggs/female. The maximum fecundity of 313.67 eggs/female was recorded on T₅ (Sorghum 2.5 kg + Groundnut 150 g). The minimum fecundity was observed in T₄ (Bajra 2.5 kg + Soybean 150 g) with 218 eggs per female. Mehendale *et al.* (2014) [6] reported the maximum egg laid by *Corcyra* females emerged were 611.54 eggs from sorghum + groundnut + powdered yeast. Kumar *et al.* (2018) [5] assessed that diet T₆ i.e. Sorghum 1000 g + Groundnut 50 g shown the highest fecundity with 312.33 eggs.

Table 2: Effect of different diets on pupal percentage, percent adult emergence, total development period and fecundity of rice moth, *Corcyra cephalonica*.

Tr. No.	Treatments	Pupal percentage (%)	Percent adult emergence (%)	Total development period (in days)	Fecundity (eggs/ female)
T ₁	Sorghum 2.5 kg	80	83.34	58.17	268.67
T ₂	Bajra 2.5 kg	75.34	76.67	59.67	256.67
T ₃	Sorghum 2.5 kg + Soybean 150 g	84.34	85	54	290
T ₄	Bajra 2.5 kg + Soybean 150 g	70.67	71.34	62.67	218
T ₅	Sorghum 2.5 kg + Groundnut 150 g	90	94	49	313.67
T ₆	Bajra 2.5 kg + Groundnut 150 g	87	92	51.17	310.3
T ₇	Sorghum 1.25 kg + Bajra 1.25 kg + Soybean 150 g	82.67	80	54.67	277.34
T ₈	Sorghum 1.25 kg + Bajra 1.25 kg + Groundnut 150g	89	90	53	302.67
	Range	70.67 - 90	71.34 - 94	49 – 62.67	218 – 313.67
	Mean	82.4	84.04	55.4	279.7
	'F' test	Sig.	Sig.	Sig.	Sig.

	SE(M)	1.086	0.912	0.781	3.470
	CD at 5%	3.257	2.73	2.34	10.40
	C.V %	2.28	1.88	2.45	2.14

Conclusion

These research finding concluded that among all the eight treatment used for rearing *Corcyra cephalonica* T₅ i.e. sorghum + groundnut 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 sorghum in combination with groundnut was found to outperform over all treatments.

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