



Pericallia ricini-A review

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Abstract

Every year India suffers a heavy loss through insect pest infestation both in field and storage. The seriousness of the attack is decided by the feeding efficiency, host plant relationship, nature of the injuries inflicted and the susceptibility of the plant to attack. In recent years there is a significant lowering in the losses caused by insects because of the awareness of farmers and increase in scientific knowledge. To control any pest, it is essential to have a correct idea about the identification of the insect pest, its biology, distribution, food range, damaging stage, mode of damage and the nutritional ecology. *Pericallia ricini* is found all over India and is commonly known as castor hairy caterpillar. The black hairy caterpillar is a gluttonous leaf eater of a mixture of vegetables which is one of the most important notable pest in the world. There are several papers related to the control of *P. ricini* but limited number of papers related to the complete biology of this significant insect pest. Researchers should only if known the biology of the pest, they donate the controlling measures to any insect pest. Hence, the lacking of information related to biology of *P. ricini*, this review paper provide the better understanding about *P. ricini* and develop the knowledge about control strategies in both short and long term.

Keywords: *Pericallia ricini*, black hairy caterpillar

Introduction

Insects are regarded as the most successful group within the Animal Kingdom, over 80 percent of all living beings are insects [1]. More than half of the world's distinguished animal species are insects in which lepidoptera is the second largest and the most diverse order in the class of insecta [2]. They are man's chief competitors on earth and to some extent his benefactors. The unceasing struggle between man and his insect enemies started even before the dawn of civilization. In spite of the numerous advance made by man in evolving newer and deadlier weapons to fight the war against insects, he has not succeeded in controlling the thousands of serious pests which damages his food and other agricultural products [3], destroy his possessions and even attack himself and transmit diseases and also injure his domestic animals.

Moreover, India is an agricultural land having different climatic conditions due to which, it is possible to grow every crop and attends an outstanding position in the world with respect to several agricultural products [4]. The speedy development of agriculture is vital in the progress of our country. Today, India ranks second worldwide in farm output. It has a large and diverse agriculture and is one of the world's leading producers as well as a major consumer with an expanding population to feed [5]. Gillespie and Kadiyala [5] reported that India has a large and diverse agriculture and is one of the world's leading producers as well as a major consumer with an expanding population to feed.

Every year India suffers a heavy loss through insect pest infestation both in field and storage [4]. To control any pest, it is essential to have a correct idea about the identification of the insect pest, its biology, distribution, food range, damaging stage, mode of damage and the nutritional ecology. The research on various aspects of *Pericallia ricini* will lead to better understanding of the pest problem and

ultimately pave the way for its effective control. Moreover, this review will also help to a better understanding about *P. ricini* and develop short and long term control strategies of *P. ricini*.

Pest status of *P. ricini*

The polyphagous wooly bear moth *Pericallia ricini* (Lepidoptera: Arctiidae) is a serious pest with a wide range of hosts in India and many parts of the world on and it is a serious pest on *Ricinus communis* commonly called castor plant. Castor, *R. communis* is one of the cash cultivated in dry lands as monocrop or mixed crop with ground nut, chilly, cotton and cowpea. It is the major pest of castor, gingelly, cotton, country bean, bringal, drum stick, coccina, banana, calotropis, sunflower, oleander, tea, sweet potato, pumpkin [6] and vanilla [7]. Castor (*R. communis*) is an important crop grown in tropical and sub-tropical regions of the world. Castor cake is used in agriculture as organic manure due to its high nitrogen content. The world castor seed production has fluctuated from a low of 937,000 tones to a high of 1,488,000 tones. India is the world's largest producer of castor seed and dominates the international castor oil trade. It contributes about 62 percent of the world production and ranks first [8]. The top producer of castor seed in India is Gujrat, with 86 percent share, followed by Rajasthan and Andhra Pradesh. Among the several factors that contribute to low productivity of castor, the insect pests constitute the major factor. Crop suffers heavily due to attack of various pests, which reduces their yield. During the northeast monsoon, *P. ricini* lays eggs on the leaves of the normal host plant *R. communis*. It is considered as a minor pest in south Indian by agriculture entomologist. *P. ricini* control is the most complex agricultural insect pest management problem faced in the field because of the large host range, high fecundity and resistance against chemical insecticides around the world including Pakistan,

Bangladesh and Srilanka. The larvae cause heavy damage to many economical important crops in the larval duration of 20 to 30 days.

Identification

Eggs: The female moths lay eggs in large number on the lower surface of leaf. Eggs are transparent, white to yellow in color. Eggs are spherical and it is about 8mm long and 0.2mg live weight. Their eggs hatch into slender transparent larva (Figure:1).

Larvae: The caterpillars are found on the ventral side of the leaves and the larva usually has five instar stages. First instar larvae about 0.5cm- 0.7cm long (Figure: 2). It is greenish yellow color with black spots on both sides of its body. Prominent segmentation of the larva appears only during the second instar stage. Second instar larvae about 0.5cm- 1.5cm long. The second larva colored yellow and slightly bigger than the first instar (Figure: 3). The tufts of minute hairs are present in all over the body. However the third instar larva is black in color with yellow line is present in mid dorsal line of the larva (Figure: 4). Third instar larvae about 2.0cm- 2.5cm long. In Fourth instar larvae, the black spots merge together and appears as full black color larva. It is about 3.5cm- 4.0cm (Figure: 5). In the fifth instar larva is reddish brown in color with numerous tufts of hair, during this stage the larva feeds voraciously (Figure: 6). Full grown larvae are about 5.0cm -5.5cm long can be separated from other species. The larvae feed on young and full grown plant leaves and fruits. In heavy infestation only stem and branches are left behind.

Pupae: *P.ricini* pupae are dark brown in color. It is about 2.0cm long (Figure: 7).

Adults: *P. ricini* moth is stoutly built and is brownish orange. The forewings are marked with dark speck and a dark spots of varying size on the upper and lower side. Adults can also be identified using hind wings. The hind wings are orange in color with a broad blackish patch in the dark section of the wing (Figure: 8).

Classification

Kingdom: Animalia

Class: Insecta

Order: Lepidoptera

Family: Arctiidae

Genus: *Pericallia*

Species: *ricini*

Life cycle

P. ricini females tend to lay eggs on the lower portion of host plants. Usually moth preferred leaves over other parts of the plant. Mean total larval period ranges 20- 30 days under normal field condition. A temperature of 26⁰c ±2⁰c has been found to be favorable for larval growth. Soon after emergence, the larva first eats the chlorophyll content of the leaves. The larval durations recorded were 20 to 30 days. An egg has been hatched into first instar larvae of about 4-5 days interval. Likewise first and second instar larvae takes 4-5days time interval for hatching into second and third instar larvae respectively. Fourth instar larvae takes 3-4 days' time interval for transferred into fifth instar. Fifth instar larvae takes 5 days for moulted into pupae. The pupal

stage lasts for 5-8 days. During larval stage, fourth and fifth instar larvae of *P.ricini* are causing very severe damage to most of the cash crops.

Control strategies

The mainstay for *P.ricini* control has been the use of chemicals. However, with the emergence of Integrated Pest Management (IPM), other control strategies, such as cultural and physical control, varietal resistance, natural control including parasites, predators and by manipulation of microbial agents (e.g. Bacteria, virus, fungi, nematodes and protozoa) are also being explored.

Chemical Pesticide namely diflubenzuron affects the chitin deposition in the cuticle of *P.ricini* and also it leads to larval- pupal deformities and abnormal pupae and adults were produced ^[9]. Chemical pesticide Penfluron also produced sterility in adult insects ^[10].

Application of Botanicals also caused major effects on *P.ricini*. The flower extracts of *Delonix regia* affects oviposition, larval and pupal activities of *P.ricini* ^[11]. Antifeedant and growth regulatory activities such as delayed moult, prolonged larval duration, larval and pupal mortality also affected by Salanine which is isolated from neem oil in *P.ricini* ^[12]. Gnanamani and Dhanasekaran ^[13] explained that the Botanical insecticide, Azadirachtin interrupted physiological processes such as apolysis and ecdysis and persuaded morphological deformities at both larval and pupal stages of *P. ricini*. Moreover, Ethyl acetate of *Tragia involucrata* induced growth inhibitory effects against this *P. ricini* ^[14]. Sandeep Kumar and Krishna Kumar ^[15] clearly suggested that the medicinal plant, *W. somnifera* affected the moulting and metamorphosis of *P.ricini*. Plumbagin, a 1, 4-Naphthalenedione isolated from the *Plumbago indica*, exhibited growth regulating activity and also interfere in moulting process, ecdysis and adult emergence in *P.ricini* ^[16].

In the case of entomopathogenic fungi, *Beauveria bassiana* ^[17], *Verticillium lecanii* and *Paecilomyces fumosoroseus* ^[18] and entomophagous predator, *Eocanthecona furcellata* have also been used as a Biological control agent against *P.ricini*.



Fig 1: *Pericallia ricini* -Eggs.



Fig 2: *Pericallia ricini* -First Instar.



Fig 3: *Pericallia ricini* - Second Instar.



Fig 4: *Pericallia ricini* - Third Instar.



Fig 5: *Pericallia ricini* - fourth Instar.



Fig 6: *Pericallia ricini* - Fifth Instar.



Fig 7: *Pericallia ricini* -Pupa.



Fig 8: *Pericallia ricini* -Adult Moths.

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