



ISSN : 0973-7057

Int. Database Index: 616 www.mjl.clarivate.com

## Study on the biology of painted bug *Bagrada picta* Fabricius, and its eradication on the *Brassica napus* L., was conducted in Ramgarh, Jharkhand, India

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Received : 25<sup>th</sup> July, 2022 ; Revised : 25<sup>th</sup> August, 2022

**Abstract-** Ramgarh is a district town located at latitude: 23.38°N and longitude 85.34°E. Moderate temperature, more humidity and dense greenery makes it one of the most attractive districts. Its nature puts all the workmanship to create this place and reinforced all its beauty to it. It is surrounded three sides by hills and open at one side by planes. The hills, their slopes, a variety of soils, plants and animals makes it a natural resource of biodiversity it is a niche of various kinds of animal and insect population. These insects' pest destroys the agricultural and ornamental crops that gives economic losses to the farmers. The pest *B. picta* Fabricius is a common insect, people called it painted bug. It appears as bright black colour with reddish yellow spot. The pest was active during month of February to November. During extreme cold months it hidden under the heap of dried oil seed plants lying in the field. It destructs the mustard and rape plants cultivated in the field; the serious infestation makes 50 to 80 % loss of seed production. The seeds of *B.napus* (L). is very useful for the human being consume it as edible oil in food items, cosmetics. Its green plant is consumed direct and in cooked way as delicious items in kitchen. It is a cash crop; the farmers cultivate it for economic growth. This important cash crop is destroyed by the pest *B. picta* Fabricius, commonly known as painted bug. It was observed that the pest was active since February to December, during extreme cold season it heaps of dried leaves of the host plant in the field. The oviposition occurs underside of the leaves, stems and on the soil near the host plant singly or close together in cluster of 05 to 10, after incubation of 03 to 06 days the tinny nymphs appear and start to feed the soft leaves of host plants. Both nymph and adult are equal destructive to host plant. 07 to 09 overlapping generations were observed in a year. Prevention from this bug is very difficult, scent gland of bug makes emission which protect it from predatory arthropod attack. Some synthetic chemicals are advised to farmers to spray chloropyrifos, malathion and prophenofos are widely used insecticides control the bug.

**Key words:** *Bagrada picta*, *Brassica napus*, insecticides, agricultural and ornamental crops, economic losses

### INTRODUCTION

The topographical position and the climatic nature of Ramgarh is very much suitable for the growth of plant and animals, various type of animal species may observe in the dense forest, old and sloppy hills as well as the plains,

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presence of a number of insect population makes and increase the bio diversity as a natural laboratory. The painted bug *Bagrada picta* Fabricius was one of the serious pest to destruct the various type of cultivated and ornamental crops, damage the crops as well as the financial capacity of farmers of Ramgarh also damage. It was observed that the experimental vegetable *Brassica napus* (L) is an

important agribusiness product of Ramgarh and the farmers cultivate it on commercial level. The experimental bug was a serious pest damage this commercial crop *B. napus* (L) significantly, sometimes it damages the standing crop up to 50 to 80%. The infestation of the bug starts in the month of February and March, when the flowers of the host plants become visible. *B. picta* Fabricius was a serious pest of the plant *B. napus* (L), it damages the plant of all stages up to 80% of the standing crop. The plant *B. napus* (L), is a cash crop the damage of plant directly damages the financial condition of the farmers. The nymph and the adult equally damage the host plant. Both are equally destructive, they suck the cell-sap from leaves and developing pods which consequently turn yellow and fall off. Through the puncture point of the host plant is exposed cause bacterial and fungal attack. The resinous excretion of nymph and adult destroy the pods and the damaged parts visible white patches.

The bug become very active from the month of February to April when temperature become moderate, during cold season its activity decreases. In extreme cold it loses its activity and the adults were found under the heap of dried oil seed plants lying in the field. The adult bugs were very tenacious and can survive under scarcity of food. The experimental host plant *B. napus* L, is the primary host but in non-season periods of host plants many weeds and ornamental plants believe to be bridging host. It is the serious destructive bug of oil seed plants of Ramgarh the farmers and local agro businessmen get great loss by this bug this problem promotes the author to work on this topic.

Considerable works had been done by several workers on the life cycle of the bug *B. picta* Fabricius, on different Cruciferous plants but none of the researcher studied the life history of *B. picta* Fabricius on the crop *B. napus* (L), at Ramgarh. The present author deals the Study of the Biology of painted bug (*B. picta* Fabricius: Hemiptera, Heteroptera, pentatomidae), their destruction on the plant *B. napus* (L). A case study at Ramgarh (Jharkhand, India).

The activity of experimental bug was very high in the month of February to May. The female lays 05 to 10 barrel shaped eggs over 02 to 03 weeks about 90 to 170 eggs, after incubation of 03 to 20 days tiny nymphs hatch from egg and start feeding. After 05 moulting nymph develops in to adult. Adults and nymphs were equally destructive, 08 to 09 overlapping generations were observed in a year. It was observed *B. picta* Fabricius have been

detected on plant materials in trucks travelling across states as well as countries and spread their population.

Prevention from this bug was very difficult, no natural enemies have been reported. A peculiar emission from the scent glands makes it less prone to predatory arthropod attack. However, there are reports of some predators that prey on painted bugs, but these predators have significantly less impact on the regulation of bug population. These predators were *Rhynocoris segmentarius*, that feeds on adult and nymphs. Farmers were advised to use synthetic chemicals for rapid action, these were Chloropyrifos, Malathion and Prophenofos these are the widely used insecticides.

## MATERIALS & METHODS

Standard methodology was applied for the study of biology of painted bug (*B. picta* Fabricius: Hemiptera, Heteroptera, pentatomidae), their destruction on the plant *B. napus* (L). a case study at Ramgarh. The life history of the experimental pest and the nature of damaging the host plant were studied in the crop field as well as in the laboratory. The life history was studied during the year 2018-2020. Ten healthy selected plants of *B. napus* (L), were completely and carefully covered by a small mesh mosquito net separately. One pair (one male and one female) of experimental pest were introduced on the plant covered by mosquito net and observation was taken daily. One pair (one male and one female) of the experimental pest were kept in the cage of 20 cm x 20 cm x 30 cm. Space and fresh, soft leaves of host plant were provided for egg laying and hatching, this was food for newly hatched nymphs as well. In a separate cage some leaves of other plant were also provided to bug to observe their feeding interest and survival rate. The data were recorded for further study.

Methods of prevention of crop and control of pests by chemical and biological methods were applied, observed and recorded.

## OBSERVATION

The painted bug *B. picta* Fabricius is a serious economic pest destruct the vegetable *Brassica napus* (L), also infest many floral plants, and sometimes wild host plants surrounded to the crop field. The experimental host plant is a cash crop its infestation and losses in production directly decline the agro business status of farmers, caused by the pest *B. picta* Fabricius. Oviposition typically laid by

female on the underside of the leaves, stems and in the soils near the base of the host plants. Eggs were commonly laid in singly and close to gather in linear cluster consisting of 05 to 10 eggs daily up to 02 to 03 weeks. Each female can lay 90 to 170 eggs. The eggs hatched in 05 to 10 days, tinny nymphs were appeared. The pest activity was high in the morning between 10am to 4.00pm when temperature was more than 30°C. It started feeding after emergence of seedlings. Adults and nymphs were equally destructive. Ramgarh is a beautiful industrial town surrounded by hills, covered with green and dense forest and small agricultural field. It is one of the best places to study the ecological biodiversity, a niche of variety of plants and animals. The climatic condition of Ramgarh is suitable for the vegetable and crop cultivation. Therefore, a variety of animal species comfortably increase their population. The pest *B. picta* Fabricius, was also observed here, it is a polyphagous pest which generally infest vegetables as well as the rabbi crops. The experimental crop *B. napus* (L), is an important cash crop, common farmers of Ramgarh cultivate it as their capacity with vested interest. The experimental pest *B. picta* Fabricius, is a serious pest and damages 50 to 80 percent of the crop production. Infestation of crop by the experimental pest cease the financial state of the farmers and agribusiness of Ramgarh.

**Morphology of the adult pest:** The experimental adult bug was flat shield shaped, its size, were 05 to 07mm long and 03 to 04 mm wide, the scutellum was very large, proboscis was jointed in 04 parts. Females were slightly larger than males. Its colour was bright black with red and yellow spots and dots arrange in longitudinally lengthwise. Sometimes black, white and orange marking makes the bug attractive so the bug is commonly known as painted bug.

**Morphology of the eggs:** The oviposition typically occurs on the underside of leaves, stones and in the soil near the base of the host plants. Eggs commonly laid singly and close together in linear cluster consisting of approximately 05 to 10 eggs daily up to 90 to 170 eggs in season by a single female. Eggs were opaque, white barrel shaped later turn to light red hue. Tinny nymphs emerge out after 03 to 06 days of incubation.

**Morphology of the nymph:** *B. picta* bug has 05 nymphal stages. First instar were very tinny, their colour were bright red and have a slightly darkened to black spots

on their back, head, legs antennae, the abdomen remain red and develops some black bands and white dots. The first instar nymph does not feed until after moulting into second instar. Nymphs were resembling with adult except in their size and colour, they were smaller.

**Life cycle of pest:** *B. picta* Fabricius is a serious pest of the plants of cruciferous family. This bug is commonly called as painted bug. Their nymph emerges out with the growth of seedlings of mustered plant, its activity increases with onset of heat. Adult and nymph were equal destructive for the plant. In the early morning female laid egg singly or in linear arranged cluster of ten at underside of foliage, stalk, and pods or on the soil near the host plant. The process of oviposition continues over two to three weeks, after 03 to 20 days of incubation the eggs hatch and tinny nymph of bright red coloured were emerge out. Second instar nymph started to feed, after five moulting the nymph metamorphose in to adult it takes 10 days to 40 days. Nymph were very much resembling with adult except were smaller in size. Adult and nymph were equally destructive both nymph and adult suck cell sap from the host plant which gradually wilt and dry up. The nymph and adult bug also secrete assort of resinous materials which spoils the pods and leaves. Damage of leaves or pods results in the visible white patches, wilting, desiccation and scorching of feeding area. The activity of bug was higher in the month of March to June, and completed its life cycle in 13 to 19 days. Whereas in the month of November to February completed its life cycle in 35 to 65 days. The pest completed overlapping 09 generations in a year. The most destructive period of pest was the month February to April. It was observed that the average life span of male 25 days and female 21 days.

Prevention from this pest was very difficult, it develop a natural defence system an emission from the scent glands makes it less prone to arthropod attack, no natural enemies have been reported. Some of the predators *Rhynocoris segmentarius*, spiders (Araneae), mantis, predatory heteroptera (*Zelus* sp.) and mite (*Brochartia*) that feeds on adults and nymphs. These predators have significantly less impact on the regulation of bug population. Farmers are advised to apply synthetic chemicals as chloropyrifos, malathion and propheronofos insecticides may use to protect the experimental plant.

Table 1- Tabular representation of life-cycle of pest *Bagroda picta* Fabricius on host plant *Brassica napus* (L).

Name of the month	No. of eggs laid/day	Total no. of eggs laid	Incubation period to hatch nymphs in days	Nymph mature to adult in days	Life-cycle completed in day
March-June	07-10	150-170	03-04	10-15	13-19
July-October	06-10	100-120	04-08	18-22	22-30
November-February	05-09	90-100	10-20	25-45	35-65

#### SUGGESTIONS FOR PEST CONTROL:

1. Stubbles of old infested crops should be burnet.
2. The adults can be trapped using hand-pick methods applied in small area.
3. Biological control may be applied for it some known predators as *Rhynocoris segmentarius*, Araneae (spiders), Mentis (*Zelus* sp.).
4. Spraying Malathion 0.1% was also effective to reduce the damage of host plant some other chemicals as chloropyrifos, propheronofos were advised to apply.

#### DISCUSSION

*Bagrada picta* fabricius is a serious pest of the experimental host crop *Brassica napus* (L). Its infestation is so serious that the damage may 50 to 80 %. The month February to April was the period of pick infestation, its activity was highest during morning at 10.00 am to 4.00 pm when temperature was more than 30°C. Its activity directly influence with temperature.<sup>1,2</sup> During cold weather its activities decreases, the incubation of egg in the months of March to June was 03-04 days and in the months of November to February it was 10 to 20 days. The plant *Brassica napus* (L). is a cash crop influencing the agribusiness of the farmers of Ramgarh, the pest infestation on plants may observe by the white patches, wilting, desiccation and scorching of the feeding area of the leaves, stem and pods. The nymph and adults suck cell sap from the leaves, stem and pods, bug secrete a sort of resinous material which spoils the pods and decline the production of crops and decline the financial status of the farmers.<sup>3,4</sup> Moderate temperature, more than average rain fall, various types of forest and vegetation makes Ramgarh a natural nursery and a bank of biodiversity.<sup>5,6</sup> *Brassica napus* (L) is the primary host but in non-season of host plants many weeds and ornamental plant believe to be bridging host.<sup>7</sup> It had a higher degree of adaptation, in extreme cold month of December and January it ceases it's all activities and adults were found under the heap of dried oil seed plants

lying in the field. It was observed *Bagroda picta* Fabricius have been detected on plant materials in trucks travelling across states as well as countries and spread the population.

Prevention from *B. picta* Fabricius is very difficult no natural enemies have been reported, an emission from the scent glands makes it less prone to predatory arthropod attack. Farmers were advised to control the pest some synthetic chemicals may apply to kill the adults and nymphs.<sup>8,9</sup> Some of the predators as spiders (Araneae), mantis, *Zelus* sp. and mites (Brochartia) feed on adults and nymphs and control the pest population, but this control was not significant. Farmers were advised to quick control of pest population spray some dust of malathion, chloropyrifos, propheronofos.

#### REFERENCES

1. Upadhyay R. K. and Verma N. R. 2004. Studies on the physical characteristics of Subarnarekha river of Ranchi (Jharkhand). *Proc. Zool. Soc. India*. **3(2)**: 67-71.
2. Upadhyay R. K. and Verma N. R. 2005. Studies on common chemical characteristics of Subarnarekha river of Ranchi (Jharkhand). *Proc. Zool Soc. India* **4(2)**:33-41.
3. Upadhyay Rajesh Kumar. 2017. Impact of development: Threat to biodiversity of Ramgarh. *Biospectra*. **12(2)**:73-74
4. Upadhyay R. K. & Bakshi O. P. S. 2019. Studies of vegetable pests of Ramgarh (Jharkhand, India): A case study of cabbage Pests. *International Journal of Current Research*. **11(10)**: 7970-7971 .
5. Upadhyay Rajesh Kumar. 2022 a. Destruction of *Solanum lycopersicum* (L), by the pest *Helicoverpa armigera* Hubner, (Lepidoptera:Noctuidae) (tomato fruit worm) a case study at Ramgarh, Jharkhand, India. *Biospectra*. **17(1)**:113-118.

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6. **Upadhyay Rajesh Kumar. 2022 b.** Study of the life history of the pest Hubner (Lepidoptera: Noctuidae), on the pulse crop *Cajanus cajanus* (L) at Ramgarh (Jharkhand, India). *Proc. Zool. Soc. India.* **21(1):**71-77
7. **Upadhyay Rajesh Kumar. 2021.** Study of the *Crocidolomia binotalis* Zeller (Lepidoptera: pyralidae): its life history and biology on the vegetable plant *Brassica rape*. A case study at Ramgarh (Jharkhand, India). *Proc. Zool. Soc.India.* **20(2):**33-38
8. **Kumar M. and Tiwari Shyam Kumar. 2009.** Effect of celphos as fumigant on the Mortality of larva, pupa and adult of *Odioporous longicollis* -a serious Pest of Banana in Bihar. *Proc. Zool. Soc. India.* **8(2):**31-35.
9. **Prabhakar A. K. and Roy S. P. 2009.** Studies on the biology and life table of *Diaphania indica* Saunders (Lepidoptera: pyraustidae) on cucumber, cucurmis Sativus. *Proc. Zool. Soc. India.* **8(2):**43-50.
12. **Upadhyay Rajesh Kumar. 2020.** Studies on the biology of *Earias vitella* Fabricius (Lepidoptera, cymbidae) on the Plant *Abelmoschus esculentus* of Ramgarh (Jharkhand,India). *Proc. Zool. Soc. India.* **19 (2):**17-20.
13. **Upadhyay Rajesh Kumar. 2020.** A case study of the lifecycle of the *Pectinophora gossypiella* Saunders (Lepidoptera:Gelechiidae) of a cotton worm on the vegetable plant *Abelmoschus esculentus* of Ramgarh, Jharkhand, India. *Biospectra.* **15(2):**19-22.
14. **Upadhyay Rajesh Kumar. 2021.** Study of the pest *Epilachna vigintioctopunctata* Fabricius (Coleoptera: coccinellidae): a life cycle on the vegetable *Solanum tuberosum*, of Ramgarh (Jharkhand, India). *Proc. Zool. Soc. India.* **20(1):** 91-95
15. **Upadhyay Rajesh Kumar. 2009.** Studies on quantitative analysis of benthic macro invertebrates of Subernarekha River at Ranchi. Jharkhand, India.p.230-241. Biodiversity& wild life management. Alfa publication, New Delhi.

#### ADDITIONAL REFERENCES

10. **Mala Ruchi and Kumar Arun. 2019.** Effect of Temperature on the population density of aquatic insects. *Proc.Zool.Soc.India.* **18(2):**61 -65.
11. **Upadhyay R. K. & Bakshi O. P. S. 2020.** Study of serious pest of Brinjal at Ramgarh, (Jharkhand, India): prevention and control: *International Journal of Current Research.* **12(02):**10340-10342.
16. **Upadhyay R. K, Kumar P. R, Jamuar M. K. & Satyajit Kumar Singh. 2012.** Studies on the benthic fauna in the Ponds of Ramgarh, Jharkhand, India with respect to aquaculture. *Biospectra.* **7(3):** 47-56.

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