

SHORT COMMUNICATION

Abundance of Cutworm (*Agrotis ipsilon*) and Biodiversity in potato Crop in the agro-ecosystem in Bihar (India)

Sabreen Haque and Manendra Kumar

Department of Zoology, Babasaheb Bhimrao Ambedkar Bihar University

Muzaffarpur-842001, Bihar, India.

Corresponding author's Email: sabreenhaque.923@gmail.com

ABSTRACT

Research was done in the month of November 2023, on the prevalence and species diversity of cutworms (*Agrotis spp.*) on potato crops in the Muzaffarpur district of Bihar. In the Muzaffarpur district, it was discovered that the potato crop suffered the worst damage in Dholi (27.32% plant mortality). Next to Dholi, Kanti (25.31% plant mortality), and Bochhan (23.25% plant mortality) was discovered and found to be the endemic places for the incidence of cutworm on potato crop among the various localities surveyed in Muzaffarpur district. In order to determine the species variety of the larvae, larvae from the potato-growing regions of the Muzaffarpur district were also collected. Out of 128 collected larvae from Dholi, it was discovered that 66 *Agrotis ipsilon* (Hufnagel) moths and 13 *Agrotis segetum* (Denis schiffmuller) moths emerged. While 118 larvae were gathered from other locations in the Muzaffarpur area, including Bochhan, from where 54 *Agrotis ipsilon* moths and 16 *Agrotis segetum* moths emerged. *Agrotis ipsilon* predominated in both areas, accounting for 83 percent in Dholi while 77 percent in Bochhan respectively, of the total larval populations in the Bihar locations of Dholi and Bochhan block of Muzaffarpur district.

Keywords: Potato, Incidence, Diversity, Cutworms, *Agrotis spp.*, Bihar

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INTRODUCTION

Potato is the most important crop of the world which is widely cultivated all over the world in different agro climatic zones. In India it is cultivated in over an area of 2.16 million hectares of land producing an estimated 60 million metric tonnes of potato. The largest potato producing state in India is Uttar Pradesh, accounting 31% of total potato production while in Bihar it is also produced in a huge amount accounting 13% of total potato production [9]. Cutworms, *Agrotis spp.* (Lepidoptera: Noctuidae), are among the numerous insect pest species that harm this crop. They are significant economic pests that are polyphagous and cosmopolitan, attacking potatoes as well as a variety of other crops like maize, cabbage, turnip, and others across the globe, including India. [12-14, 5-8]. These insects are active on the Indian plains from October to March [10, 1]. Rainfed potatoes are mostly grown in the kharif season, and during the first four leaf stages of growth, cutworms seriously harm the plants. Given that the degree of damage and variety of the pest vary from location to location and from time to time. A survey was conducted in several Agro-ecological regions of North Bihar to ascertain the degree of damage to the potato crop and the species diversity of cutworms in this crop.

MATERIAL AND METHODS

From the fourth week of November 2023 to the end of January 2024, in Kharif season, investigation was conducted. Various potato-growing regions were visited. Seven blocks in the Muzaffarpur district—Dholi, Kanti, Bochhan, Sakra, Katra, Musahri, and Gaighat—were selected to an open-field survey on the prevalence of cutworms. The total number of seedlings per square meter area, the number of seedlings that were harmed by cutworm larvae, and the percentage of damage were calculated based on observations of the larvae in fields of growing potato seedlings. The cutworm-damaged plants were

closely examined to determine whether any larvae were present in the area around the affected plants. By using the pit sampling method, the amount of damage caused by cutworm larvae in these areas was also measured (2 pits of 1m×1m size from single field and 2 fields per block). As a result, data was collected from 14 pits and 7 spots in each block. The crop was observed from the 2-3 leaf stage till it reached an enduring enough state to resist the damage.

Larvae were cultured on tender potato leaves in laboratory till their adulthood and identified the species in several potato growing areas in the Muzaffarpur district. Potatoes are sown in the district of Muzaffarpur in between last week of November and the end of January. Consequently, the prevalence of cutworms and the availability of seedlings in the field were related.

RESULTS AND DISCUSSION

Incidence of cutworms: Potato growing localities of Muzaffarpur district were systematically surveyed to find out the cutworm incidence. The results (Table 1) revealed that in Muzaffarpur district, the average maximum damage to potato plants was recorded in Dholi block (27.32% plant kill and 3.5 larvae/m²), in Kanti block (25.31% plant kill and 2.65 larvae / m²), in Bochhan block (23.25% plant kill and 2.35 larvae/m²), in Sakra block (21.00% plant kill and 2.00 larvae /m²), in Katra block (18.25% plant kill and 1.87 larvae /m²), in Musahri (16.67% plant kill and 1.33 larvae /m²), Whereas, Gaighat recorded minimum damage (15.00% plant kill and 0.33 larvae /m²).

The maximum average incidence recorded at Dholi block with (27.32%) was at par with the Kanti block (25.31%) , while maximum larval population was recorded at Dholi with 3.5 larval population per square metre area followed by Kanti (2.65), Bochhan (2.35) and Sakra block (2.00).

The present result revealed that the average cutworm incidence varied from 15.00 to 27.32 percent in Muzaffarpur district with the variation in the larval population of 0.33 to 3.5/m² in different blocks of Muzaffarpur district.

The present findings are in conformity to those of Thakur and Kashyap [11] who observed *Agrotis ipsilon* causing extensive damage to potato crop. Verma and Verma [14] reported that *Agrotis ipsilon* and *Agrotis segetum* were the two major cutworm species associated with various crops in different states of India. According to Anonymous [1], 3-18% infestation by these species was repeated in different vegetable crops. Kishore & Mishra [5] and Das & Ram [4] also reported 12.7% damage to potato tubers by cutworms in Bihar.

Table 1. Incidence of cutworm caterpillar on potato crop in endemic areas of Muzaffarpur district at 2-3 leaf stage.

Location	Average incidence (%)	Larval population/m ²
Dholi	27.32	3.50
Bochhan	23.25	2.35
Sakra	21.00	2.00
Mushahri	16.67	1.33
Gaighat	15.00	0.33
Katra	18.25	1.87
Kanti	25.31	2.65

Species Diversity

The data contained in Table 2 reveals that out of 7 blocks of Muzaffarpur district from where cutworm larvae were collected for identification of species, only Musahri block had the incidence of *Agrotis ipsilon* alone. while in rest of the localities both the species were present. In Muzaffarpur district the maximum number of larvae was collected from Dholi that is 128, out of which 79 pupated and emerged as adults. Out of these adults, there were 66 *Agrotis ipsilon* moths and 13 *Agrotis segetum* moths emerged. The minimum number of larvae 24 was collected from Gaighat block, out of which 15 pupated and emerged as adults (10 *Agrotis ipsilon* & 5 *Agrotis segetum*).

This is also evident from the result that out of total 386 larvae collected, 79.16 percent emerged as *Agrotis ipsilon* and 20.83% as *Agrotis segetum* in Muzaffarpur district. It was thus concluded that *Agrotis ipsilon* was predominant over *Agrotis segetum*. It was also clearly indicated from the above results that only two species of cutworms were prevalent on potato growing areas of Muzaffarpur district of Bihar.

Table 2: Relative proportion of cutworm species in potato crop at different localities of Muzaffarpur district of Bihar.

Locality	No. of larvae		Moth emerged	
	Collected	Pupated	<i>A. ipsilon</i>	<i>A. segetum</i>
Dholi	128	79	66	13
Bochhan	118	70	54	16
Sakra	34	22	17	5
Mushahri	31	22	22	0
Gaighat	24	15	10	5
Katra	26	17	13	4
Kanti	25	15	8	7
Total	386	240	190	50
% of total			79.16%	20.83%

Verma and Verma [14] claimed that *Agrotis segetum* predominated in various regions of the state, did not corroborate the current findings. According to Chandel and Chandla [3] potato was damaged by mainly *Agrotis ipsilon* and *Agrotis segetum*. Chandel and Chandla [3] reported that five species of cutworms—*Agrotis ipsilon*, *Agrotis segetum*, *Agrotis flammatrix*, *Agrotis spinifera*, and *Agrotis interact*—damage potato crops in India, with the first two being the greatest harmful.

Species prevalence is dependent on a variety of biotic and abiotic factors, such as soil, climate, land use patterns, and cropping systems. As a result, the species prevalence may differ from location to location.

CONCLUSION

It can be concluded that Dholi and Bochhan, were the most endemic localities for cutworm incidence on potato crop. Two species viz. *Agrotis ipsilon* and *Agrotis segetum* were recorded and *Agrotis ipsilon* was predominant and comprised 79.16% of the total larval population in Muzaffarpur district.

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