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## Incidence and intensity of bark eating caterpillar, *Inderbella spp.* infesting aonla trees

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#### Abstract

The studies on. Incidence and intensity of bark. eating caterpillar, *Inderbella sp.* revealed that in Agronomy Research Farm of ANDUAT, the minimum incidence was recorded in 1<sup>st</sup> SMW (65.73%) and maximum incidence was recorded in 48 SMW (86.89%). The average minimum number of active holes per infested tree were recorded in 1<sup>st</sup> SMW(.66) and maximum number of active holes were recorded in 36 SMW(7.36). In Main Experiment Station Horticulture of ANDUAT, the minimum incidence was recorded in 1<sup>st</sup> SMW (55.5%) and maximum incidence was recorded in 39 SMW (83.85%). The average minimum number of active holes per infested tree were recorded in 1<sup>st</sup> SMW(.56) and maximum number of active holes were recorded in 36 SMW(6.55). In Akma Research farm of ANDUAT, the minimum incidence was recorded in 33 SMW (44.78%) and maximum incidence was recorded in 48 SMW (83.85%). The average minimum number of active holes per infested tree were recorded in 33 SMW(.45) and maximum number of active holes were recorded in 35 SMW(3.33).

**Keywords:** bark eating caterpillar, incidence, intensity, aonla

#### Introduction

Indian gooseberry, (*Emblica officinali*) earlier considered a minor commercial fruit crop is turning into a major one. It is recognised as the king of the arid fruits. Its belong to family Euphorbiaceae and is vernacularly known as amla and aura in Hindi; dharti and amlaki in Sanskrit; amla and amlaki in Bengali. It is native of Tropical South Asia particularly central and southern India (Moortan, 1960). Popularly also known as Aonla, amla, amrit phal is found attacked various number of insect-pests causing considerable damage. In India, the major insect-pests like shoot gall maker (*Betousa stylophora*), bark eating caterpillar (*Inderbella quardinatata*) recorded as key pests, Nowthose, pomegranate butter fly (*Virchola isocrates*), cow bug (*Tricentrus congestus*), leaf roller or leaf rolling caterpillar (*Gacillaria acidula*), hairy caterpillar (*Selepa celtis*), aphids (*Schoutedeni aemblica*) and termite (*Odentotermis obesus*) have been recorded as minor pests on this plant (Chaudhary et al., 2005).

Bark-eating caterpillar, *Inderbella sp.* (Metarbelidae: Lepidoptera), is a polyphagous pest feeding on the bark of fruit, forest and avenue trees. The bark eating caterpillar is widely distributed throughout the Indian subcontinent, including Bangladesh, Myanmar, Sri Lanka and Pakistan (Sharma and Kumar, 1986).

Genus *Inderbella* has 13 different species, out of which three viz. *I. quadrinotata* (Walker), *I. tetraonis* (Moore) and *I. dea* (Swinhoe) have are found to be economic importance (Verma and Khurana, 1978). To reported about 70 host plants of the bark eating caterpillar representing fruit, avenue and forest trees.

The caterpillar of bark eating caterpillar is nocturnal nature and eats on the bark under shelter of web and bores into the trunk and branches. It retreats into the tunnel during day and continues to bore it to about 15 to 25 cm in length. Only one caterpillar is found inside a tunnel. Its infestation is indicated by the presence of peculiar winding web, prepared out of excretory pellets and frass spun together with silk, generally near the forks or angles on the stem and branches. In case of severe infestation moment of sap are stopped and plant ceases to flush (Verma and Khurana, 1978), thereby affecting fruit production

#### Method and Material

Studies on "Incidence and Intensity of Bark Eating Caterpillar *Inderbella sp.* Infesting Aonla trees. Were carried out in the Department of Entomology, college of Agriculture, A.N.D.U.A.&T. Kumarganj Ayodhya (U.P.) and in different Aonla growing location of

Agronomy Research Farm, Main Experiment Station Horticulture, Akma Research Farm of the Kumarganj during 2020.

The details of materials used and methods employed during the present investigation are presented in this chapter.

### Technical programme

#### To study about incidence and intensity of bark eating caterpillar *Inderbella spp.* Infesting Aonla trees

Location : Agronomy Research Farm, M.E.S. Horticulture, Akma Research Farm

Crop : Aonla

Variety : Narendra Aonla6,NA-7,NA-1,NA-9

Spacing : 6 × 6 m

No. of Plant : 50,50,50

The study on incidence and intensity of the bark eating caterpillar on Aonla crops was carried out in Agronomy Research Farm, Main Experiment Station Horticulture and Akma Research Farm region of the Ayodhya District during peak period of activity of the pest i.e. in month of September – October

In order to know the extent of infestation, the number of active holes/trees as evidenced ribbons on the stem and branches of the tree, indicating there by the number of larva/tree.

After taking these observation under Agronomy Research Farm, Main Experiment Station Horticulture and Akma Research Farm of the kumarganj Ayodhya, in index of caterpillar incidence was worked out as per Formula of Verma and Khurana (1976)<sup>[7]</sup> given below.

$$\% \text{ t trees infested } \times \text{ mean number of Active holes/infested tree}$$

$$\text{Index of borer/caterpillar} = \frac{\quad}{100}$$

100

**Table 1:** Incidence and intensity of bark eating caterpillar *Inderbella sp.* on Aonla Trees in Agronomy Research Farm

SMW	Incidence%	Mean number of active holes per tree	Index of caterpillar incidence
1	65.73	0.66	0.43
2	66.25	0.66	0.44
3	66.75	0.67	0.45
4	67.00	0.67	0.45
5	69.65	1.39	0.97
6	71.66	1.43	1.03
7	71.99	2.16	1.55
8	70.44	2.11	1.49
9	75.66	2.27	1.72
10	78.99	3.16	2.50
11	80.32	4.02	3.23
12	81.65	4.08	3.33
13	82.34	4.12	3.39
14	84.35	5.06	4.27
15	85.65	5.14	4.40
16	86.31	6.04	5.21
17	80.99	2.43	1.97
18	81.67	2.45	2.00
19	82.98	2.49	2.07
20	81.78	1.64	1.34
21	85.5	2.57	2.19
22	85.99	1.72	1.48
23	86	1.72	1.48
24	86.89	1.74	1.51
25	70.65	1.41	1.00
26	70.85	2.13	1.51
27	71.5	1.43	1.02
28	71	1.42	1.01

On the basis of this index, the host preference of bark eating caterpillar infesting Aonla trees was worked out. The host having highest index of caterpillar incidence was considered as the best followed by the lower values in the sequence

### Result and Discussion

The data of incidence and intensity of the bark eating caterpillar, *Inderbella sp.* was recorded in whole year of 2020 on aonla fruit trees and the counting number of active pores per infested tree which later were converted into index of caterpillar incidence. At Agronomy Research Farm., Main experiment station horticulture and Akma Research Farm regions Achrya Narendra Deva University of Agriculture and Technology kumarganj, Ayodhya of the eastern Uttar Pradesh.

#### Location First

At Agronomy Research Farm that the data recorded on incidence of bark eating caterpillar (*Inderbella sp.*) during 2020 have been presented in (Table 1 and Fig 1). the pest activity started 1<sup>st</sup> SMW and continue till 48 SMW. The incidence and intensity of bark eating caterpillar were notice for the 1<sup>st</sup> time during 1<sup>st</sup> SMW. There after activity of bark eating caterpillar continued through in fluctuating number through out the year. The minimum incidence in 1<sup>st</sup> SMW (65.73%) and increase till 24 SMW that moderate incidence (84.34%) and maximum incidence was recorded in 48 SMW (86.89%) that incidence was similar to the range of 33 to 48 SMW (80.32 to 86.89%) i.e. peak period of infestation of bark eating caterpillar on aonla. The average minimum number of active pores per infested tree were recorded in 1SMW (0.66) and infestation show increasing trend to 16 SMW (6.04) and maximum number of active pores per infested tree were recorded in 36 SWM (7.36).

29	71.75	1.44	1.03
30	72.25	2.17	1.57
31	72.85	2.19	1.59
32	74.5	2.98	2.22
33	80.25	4.82	3.86
34	80.5	5.64	4.54
35	81.35	5.69	4.63
36	81.75	7.36	6.01
37	82.65	6.61	5.46
38	83	6.64	5.51
39	83.85	7.55	6.33
40	83.9	4.20	3.52
41	84.34	2.53	2.13
42	84.5	1.69	1.43
43	84.65	2.54	2.15
44	85.3	3.41	2.91
45	85.5	2.57	2.19
46	85.99	1.72	1.48
47	86	1.72	1.48
48	86.34	1.74	1.51

### Location Second

At Main Experiment Station that the data recorded on incidence of bark eating caterpillar (*Indarbela* sp.) during 2020 have been presented in (Table 2 and Fig 1). the pest activity started 1<sup>st</sup> SMW and continue till 48 SMW. The incidence and intensity of bark eating caterpillar were notice for the 1<sup>st</sup> time during 1<sup>st</sup> SMW. There after activity of bark eating caterpillar continued through in fluctuating number through out the year. The minimum incidence in 1<sup>st</sup> SMW

(55.5%) and increase till 24SMW that moderate incidence (82.25%) and maximum incidence was recorded in 39 SMW(83.85%) that incidence was similar to the range of 35 to 48 SMW (81.5 to 83.65%) i.e. peak period of infestation of bark eating caterpillar on aonla. The average minimum number of active holes per infested tree were recorded in 1SMW (0.56) and infestation show increasing trend to 16 SMW (3.03) and maximum number of active hole /infested tree were recorded in 36 SWM (6.55).

**Table 2:** Incidence and intensity of bark eating caterpillar *Indarbela* sp. on Aonla Trees in Main Experiment Station Horticulture

SMW	Incidence%	Mean number of active holes per tree	Index of bark eating caterpillar incidence
1	55.5	0.56	0.31
2	56.75	0.57	0.32
3	57.2	0.57	0.33
4	59.72	0.60	0.36
5	60.5	1.21	0.73
6	61.98	1.24	0.77
7	62.2	1.24	0.77
8	60.66	1.21	0.74
9	65.53	1.97	1.29
10	68.99	2.07	1.43
11	70.53	2.82	1.99
12	71.66	2.87	2.05
13	72.84	2.19	1.59
14	74.98	3.00	2.25
15	75.74	3.03	2.29
16	76.32	3.82	2.91
17	70.97	1.42	1.01
18	71.74	1.43	1.03
19	72.84	1.46	1.06
20	71.87	1.44	1.03
21	73.84	1.48	1.09
22	74.83	2.24	1.68
23	74.99	3.00	2.25
24	76.66	3.07	2.35
25	60.65	1.21	0.74
26	60.95	0.61	0.37
27	70.5	1.41	0.99
28	71.24	1.42	1.02
29	71.75	1.44	1.03
30	72.15	1.44	1.04
31	72.85	1.46	1.06
32	73.1	2.19	1.60
33	73.5	3.68	2.70
34	75.5	4.53	3.42

35	81.5	5.71	4.65
36	81.89	6.55	5.36
37	81.9	5.73	4.70
38	83.5	5.85	4.88
39	83.85	5.03	4.22
40	84	3.36	2.82
41	80.5	3.22	2.59
42	81.25	2.44	1.98
43	81.75	2.45	2.00
44	82.63	4.96	4.10
45	82.89	3.32	2.75
46	82.99	2.49	2.07
47	83.4	1.67	1.39
48	83.65	1.67	1.40

### Location Third

At Akma Research Farm that the data recorded on incidence of bark eating caterpillar (*Indarbela* sp.) during 2020 have been presented in (Table 1 and Fig 1). the pest activity started 1<sup>st</sup> SMW and continue till 48 SMW. The incidence and intensity of bark eating caterpillar were notice for the 1<sup>st</sup> time during 1<sup>st</sup> SMW. There after activity of bark eating caterpillar continued through in fluctuating number through out the year. The minimum incidence in 33 SMW(44.78%)and increase till

48 SMW that moderate incidence (75.96%) and maximum incidence was recorded in 48 SMW (83.20%) that incidence was similar to the range of 18 to 24 SMW (73.05.32 to 75.96%) i.e. peak period of infestation of bark eating caterpillar on aonla. The average minimum number of active holes per infested tree were recorded in 33 SMW (0.45) and infestation show increasing trend to 22 SMW (3.19) and maximum number of active hole per infested tree were recorded in 35 SWM (3.33).

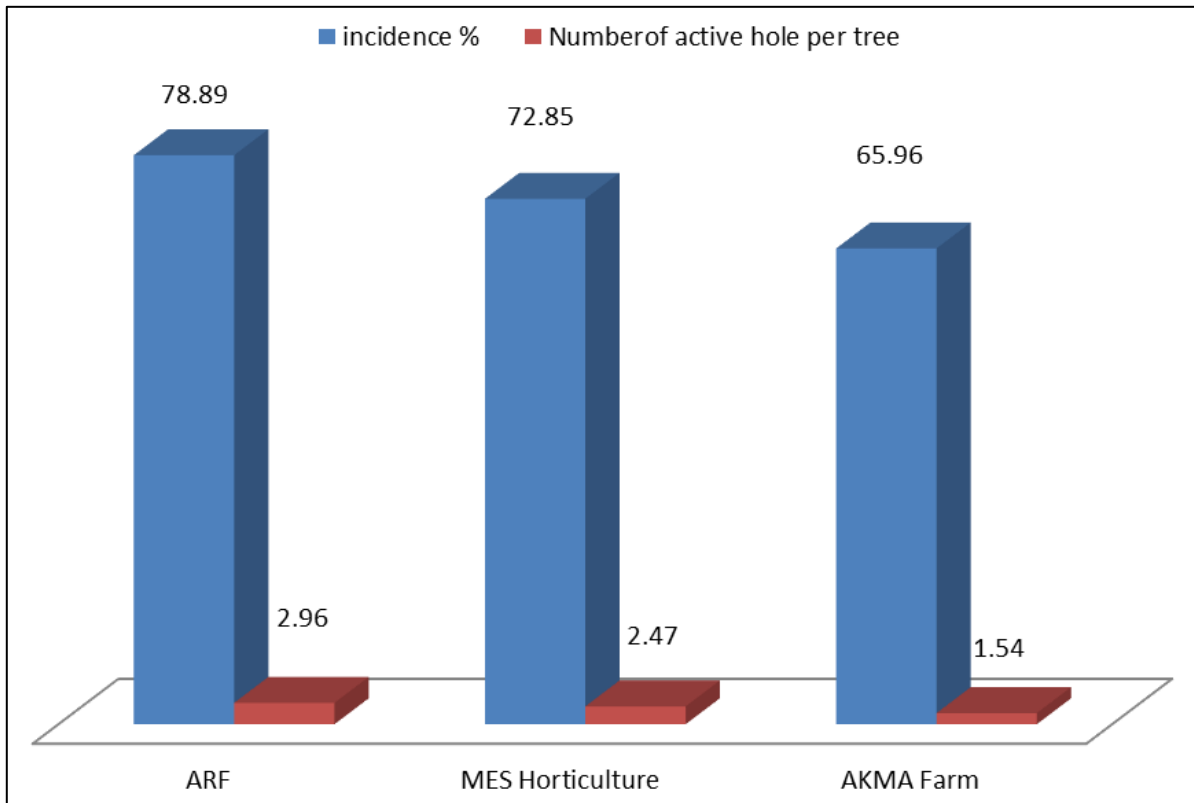
**Table 3:** Incidence and intensity of bark eating caterpillar *Indarbela* sp. on Aonla Trees in Akma Research Farm

SMW	Incidence%	Mean number of active pores per tree	Index of bark eating caterpillar incidence
1	55.69	0.56	0.31
2	52.53	0.53	0.28
3	51.96	0.52	0.27
4	61.68	0.62	0.38
5	68.50	1.37	0.94
6	67.00	1.34	0.90
7	63.99	1.28	0.82
8	64.65	1.29	0.84
9	64.94	1.95	1.27
10	66.92	2.01	1.34
11	69.63	2.09	1.45
12	70.94	2.84	2.01
13	77.69	3.11	2.41
14	74.97	2.25	1.69
15	72.49	2.17	1.58
16	60.04	1.20	0.72
17	64.63	1.29	0.84
18	73.05	1.46	1.07
19	74.53	1.49	1.11
20	78.10	1.56	1.22
21	73.61	1.47	1.08
22	79.65	3.19	2.54
23	78.76	2.36	1.86
24	75.96	2.28	1.73
25	54.86	0.55	0.30
26	52.00	0.52	0.27
27	61.10	1.22	0.75
28	68.04	1.36	0.93
29	68.87	1.38	0.95
30	59.52	1.19	0.71
31	77.81	1.56	1.21
32	72.38	2.17	1.57
33	44.78	0.45	0.20
34	46.44	0.46	0.22
35	83.20	3.33	2.77
36	76.36	2.29	1.75
37	75.38	2.26	1.70
38	52.25	0.52	0.27
39	54.60	0.55	0.30
40	46.06	0.46	0.21

41	72.38	1.45	1.05
42	75.26	2.26	1.70
43	47.70	0.95	0.46
44	76.65	3.07	2.35
45	37.50	0.37	0.14
46	76.30	2.29	1.75
47	77.78	1.56	1.21
48	67.16	1.34	0.90

**Table 4:** Mean percent incidence and intensity of bark eating caterpillar *Indarbela* sp. on aonla trees at three place.

Places	incidence%	Number of active hole per tree
ARF	78.89	2.96
MES Horticulture	72.85	2.47
AKMA Farm	65.96	1.54



**Fig 1:** Mean percent incidence and intensity of bark eating caterpillar *Indarbela* sp. on aonla trees at three pla

The above finding may incidence and intensity of bark eating caterpillar *Indarbela* sp. practices was almost similar finding by Verma. and Khurana (1976) [7] reported 60-100 per cent infestation of bark eating caterpillar in guava in some localities of Haryana, whereas in citrus, upto 80 per cent infestation, and in mango, 20to 60 per cent infestation was recorded in some of the localities surveyed. Thakur and Thakur (1998) recorded 52.90 per cent infestation of bark eating caterpillar in citrus. However, in the present study, the infestation was more than 90 per cent indicating thereby the increase in infestation with the passage of time. Shivankar and Rao (2004) have reported upto 76 per cent infestation on citrus in Maharashtra. Verma and Khurana (1976) [7] recorded an average of 3.0 active holes per tree in litchi. 1-4 in citrus, 1 to 6 in mango, 1to10 active holes/tree in guava, respectively. However, in aonla, they reported upto 32 active holes/tree, indicating thereby the. Preference for aonla by bark eating caterpillar, *Indarbela* sp. Shivankar and Rao (2004) recorded upto 3.8 webs/tree in Nagpur Mandarin at different locations in Maharashtra. Thakur and thakur (1998) recorded an average of 1.3 live

holes/tree of bark eating caterpillar, *I. quadrinotata* in citrus in the low hills of Himachal Pradesh, which is line with the findings of present study.

On the basis of index of caterpinar incidence, aonla (21.34) was recorded as the most preferred host. The respective values for guava, mango and Litchi were 1.85, 0.36 and 10.19 in Haryana (Verma and Khurana, 1976) [7], which differ from the present findings, except for: guava where almost a similar index (1.18) was calculated in the present study.

**Summary and Conclusion**

The study conducted in Agronomy Research Farm of ANDUAT kumarganj revealed that in incidence of bark eating caterpillar was low at 1<sup>st</sup> SMW(65.73%)and increase till 24 SMW high incidence was recorded in 48 SMW(86.89%) infestation of bark eating caterpillar on aonla. The average minimum number of active holes per infested tree were recorded in 1SMW (0.66) and infestation show increasing trend to 16 SMW (6.04) and maximum number of active hole per infested tree were recorded in 36 SWM (7.36). However, in Main Experiment Station the incidence of bark

eating caterpillar was low at 1<sup>st</sup> SMW (55.5%) and high incidence was recorded in 39 SMW (83.85%) infestation of bark eating caterpillar on aonla. The average minimum number of active holes per infested tree were recorded in 1SMW (0.56) and infestation show increasing trend to 16 SMW (3.03) and maximum number of active hole /infested tree were recorded in 36 SWM (6.55). At Akma Research Farm the incidence of bark eating caterpillar was low at 33 SMW (44.78%) and high incidence was recorded in 48 SMW (83.20%) infestation of bark eating caterpillar on aonla. The average minimum number of active holes per infested tree were recorded in 33 SMW (0.45) and infestation show increasing trend to 22SMW (3.19) and maximum number of active hole per infested tree were recorded in 35 SWM (3.33).

1. In Agronomy Research Farm the incidence of bark eating caterpillar was low at 1<sup>st</sup> SMW (65.73%) and high incidence was recorded in 48 SMW (86.89%) infestation of bark eating caterpillar on aonla.
2. In Main Experiment Station the incidence of bark eating caterpillar was low at 1<sup>st</sup> SMW (55.5%) and high incidence was recorded in 39 SMW (83.85%) that infestation of bark eating caterpillar on aonla.
3. In Akma Research Farm the incidence of bark eating caterpillar was low at 33 SMW (44.78%) and high incidence was recorded in 48 SMW (83.20%) infestation of bark eating caterpillar on aonla
4. In Agronomy Research Farm the average minimum number of active holes per infested tree were recorded in 1SMW (0.66) and maximum number of active hole per infested tree were recorded in 36 SWM (7.36)
5. In Main Experiment Station Horticulture the average minimum number of active holes per infested tree were recorded in 1SMW(0.56) and maximum number of active hole /infested tree were recorded in 36 SWM (6.55).
6. In Akma Research Farm the average minimum number of active holes per infested tree were recorded in 33 SMW (0.45) and maximum number of active hole per infested tree were recorded in 35 SWM (3.33)

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