

## Seasonal Incidence of Citrus Trunk Borer (*Anoplophora versteegi* Ritsema) on Khasi Mandarin in Meghalaya

Kanchan Saikia<sup>1</sup>, N.S. Azad Thakur<sup>1</sup> and Alemla Ao<sup>2</sup>

### Abstract

The adults of citrus trunk borer first appeared in the third week March to second week of April. Female beetles appeared earlier than male. The beetle population reached the peak on first to third week of May, after which the population declined and completely disappeared from the orchard from the fourth week of July to second week of August. The number of female beetles was found to be outnumbered the male sex during this population growth phase and the number of male beetles /plant was found to be more than females during population declining phase. Adult beetle population of citrus trunk borer was negatively correlated with minimum temperature and positively correlated with bright sunshine hours and wind speed.

**Keywords** : Trunk borer, citrus, seasonal incidence

### Introduction

Khasi mandarin (*Citrus reticulata* Blanco) is a high quality mandarin variety that covers the largest area in the entire North-eastern region. This important commercial fruit crop is attacked by various insect pests, of which citrus trunk borer, *Anoplophora versteegi* Ritsema (Coleoptera: Cerambycidae) is the most serious one (Shylesha et al. 2006) and responsible for citrus decline in north eastern region. Azad Thakur and Shylesha (1996) found 60-80 per cent damage to Khasi mandarin plants due to the citrus trunk borer in Meghalaya. Considering the seriousness of its problem the present investigation was carried out to study the seasonal incidence of the adult beetle on Khasi mandarin in relation to weather conditions.

<sup>1</sup>Division of Entomology, ICAR Research Complex for NEH Region, Umiam, India

<sup>2</sup>Department of Entomology, SASRD, Nagaland University, Medziphema, India

### Materials and methods

Seasonal incidence of adult *A. versteegi* was studied in the Division of Entomology, ICAR Research Complex for NEH Region, Umiam, On each sampling occasion, ten randomly selected citrus plants jerked suddenly. Adult beetles fallen Meghalaya during March to August in 2009 and 2010. The presence of adult beetle on Khasi mandarin plants was recorded at weekly intervals. on the ground in a sudden jerk of the mandarin plant were counted. The counting of adult beetles numbers was initiated from first week of March and continued till the collapse of field population. The counting was done *in situ*. The number of adult beetles per plants was correlated with meteorological parameters *viz.*, maximum and minimum temperature and relative humidity, rainfall, number of rainy days, bright sunshine hours and wind speed during the period of experiment.

### Results and discussions

The appearance of adult beetle on Khasi mandarin plants was first recorded on 16<sup>th</sup> March, 2009 and 9<sup>th</sup> April, 2010 with an average population level of 0.01 beetles/plant in both the year (Table 1 and 2). Female beetles of citrus trunk borer appeared earlier than male. Han *et al.* (2007) also reported that the female beetles of pine sawyer (*Monochamus saltuarius*) emerged slightly earlier than males similar to the present findings. The appearance of male beetle was first noticed on 6<sup>th</sup> April, 2009 and on 23<sup>rd</sup> April, 2010, when sex ratio (female : male) was 1: 0.33 and 1: 0.50, respectively (Table 1 and 2). The beetle population of citrus trunk borer gradually increased in successive weekly counts and reached the peak population of 1.3 beetles /plant on 18<sup>th</sup> May in the year 2009 and 1.6 beetles /plant on 7<sup>th</sup> May during 2010. Thereafter, beetle population declined and totally disappeared from the orchard from the fourth week of July to second week of August. The female beetles outnumbered the male during this population growth phase. However, the number of male

beetles /plant was found to be more than females during population declining phase. The number of male beetles/plant was found to be more than females on 15<sup>th</sup> June, 2009 onwards till 6<sup>th</sup> July, 2009 and the sex ratio (Female : Male) varied from 1:1.5 to 1: 2.0 during that period. Similarly, male beetle was found to outnumber the female beetle from 4<sup>th</sup> June to 25<sup>th</sup> June in the year 2010 and sex ratio (Female : Male) varied from 1:1.50 to 1: 2.00. Thereafter, beetle population was found to maintain a sex ratio of 1: 1 for next three consecutive weeks in the year 2009 and two consecutive weeks in the year (Table 2). Shukla and Gangwar (1989) observed the appearance adult trunk borer in the last week of March to second week of April in the state of Meghalaya. However, Azad Thakur and Shylesha (1996) recorded the beetle emergence from the last week of March to end of September where more than ninety per cent of the beetles emerged during the period of first week of April to end of August. Padmanaban and Rai (2001) observed the beetle emergence at Basar, Arunachal Pradesh from last week of April to fourth week of June. The variation in the emergence might be due to the favourable weather prevailing during the period of adult emergence.

The beetle population of citrus trunk borer during weekly intervals when examined critically in relation to meteorological parameters revealed that the adult beetles appeared in the Khasi mandarin orchard when weekly averages of maximum and minimum temperature were above 25.87 and 11.86°C, respectively and there was sudden fall of average morning and evening relative humidity. Beetle population was negatively correlated with the minimum temperature (Table 3) and showed significant impact on beetle population in the year 2010. The studies further showed that gradual rise in winter minimum temperature increased the beetle population and further rise in summer minimum temperature declined the beetle population. In the present study, the population reached its peak on 18<sup>th</sup> May, 2009 and 7<sup>th</sup> May, 2010 when average maximum temperature ranged from 25.41 to 29.96°C and 27.79 to 32.61°C, respectively during ascending phase of population growth and minimum temperature from 12.84 to 18.27°C and 15.19 to 19.93°C, respectively. Padmanaban and Rai (2001) observed the beetle emergence from last week of April to fourth week of June at Basar, Arunachal Pradesh when the maximum temperature varied from 15.3°C to 26.5°C.

It is evident that the emergence of adult was associated with the initiation of rainfall. Delay in initiation of rainfall delayed in emergence of trunk borer beetle in the year 2010. Heavy daily rainfall from third week of May onwards caused decline in beetle population. Padmanaban and Rai (2001) also reported the emergence of citrus trunk borer beetle when rain fall and number of rainy days/month varied from 64.5 to 105 mm and 5 to 7 days, respectively. Adult beetle population of citrus trunk borer was positively correlated with bright sunshine hours and wind speed (Table 3). According to Azad Thakur and Shylesha (1996) emergence occurred during bright sunshine hours of the day and beetles remained active under bright sunshine conditions similar to the present findings.

## References

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**Table 1:** Seasonal incidence of *Anoplophora versteegi* adults during 2009

Date of observation	Number of adult beetles/ plant			Sex ratio (Female : Male)
	Female	Male	Total	
16.3.09	0.1	0	0.1	1:0
23.3.09	0.2	0	0.2	1:0
30.3.09	0.3	0	0.3	1:0
06.4.09	0.6	0.2	0.8	1: 0.33
13.4.09	0.7	0.1	0.8	1: 0.14
20.4.09	0.5	0.2	0.7	1: 0.40
27.4.09	0.5	0.4	0.9	1: 0.80
04.5.09	0.7	0.2	0.9	1: 0.29
11.5.09	0.9	0.1	1	1: 0.11
18.5.09	0.9	0.4	1.3	1: 0.44
25.5.09	0.8	0.4	1.2	1: 0.50
01.6.09	0.5	0.4	0.9	1: 0.80
08.6.09	0.4	0.3	0.7	1: 0.75
15.6.09	0.2	0.4	0.6	1: 2.00
22.6.09	0.2	0.3	0.5	1: 1.50
29.6.09	0.1	0.2	0.3	1: 2.00
06.7.09	0.1	0.2	0.3	1: 2.00
13.7.09	0.1	0.1	0.2	1: 1.00
20.7.09	0.1	0.1	0.2	1: 1.00
27.7.09	0.1	0.1	0.2	1: 1.00
03.8.09	0	0.1	0.1	0: 1.00
10.8.09	0	0	0	-
17.8.09	0	0	0	-

**Table 2:** Seasonal incidence of *Anoplophora versteegi* adults during 2010

Date of observation	Number of adult beetles/ plant			Sex ratio (Female : Male)
	Female	Male	Total	
09-04-2010	0.1	0	0.1	1:0
16-04-2010	0.2	0	0.2	1:0
23-04-2010	0.4	0.2	0.6	1:0.50
30-04-2010	0.7	0.4	1.1	1: 0.57
07-05-2010	0.8	0.8	1.6	1: 1.00
14-05-2010	0.7	0.6	1.3	1: 0.86
21-05-2010	0.6	0.6	1.2	1: 1.00
28-05-2010	0.5	0.4	0.9	1: 0.80
04-06-2010	0.3	0.4	0.7	1: 1.33
11-06-2010	0.2	0.4	0.6	1: 2.00
18-06-2010	0.2	0.3	0.5	1: 1.50
25-06-2010	0.1	0.2	0.3	1: 2.00
02-07-2010	0.1	0.1	0.2	1: 1.00
09-07-2010	0.1	0.1	0.2	1: 1.00
16-07-2010	0	0.1	0.1	0: 1.00
23-07-2010	0	0	0	-
30-07-2010	0	0	0	-

**Table 3:** Correlation co-efficient between adult beetle population and weather parameters during 2009 and 2010

Weather Parameters	Correlation co-efficient (r)	
	2009	2010
Maximum temperature (°C)	-0.06	-0.10
Minimum temperature (°C)	-0.27	-0.72*
Morning Relative humidity (%)	-0.37	-0.18
Evening Relative humidity (%)	-0.04	-0.17
Rainfall (mm)	-0.26	-0.24
Number of rainy days /weekly	-0.03	-0.03
Sun shine hours (Hours)	0.38	0.29
Wind speed (km/hour)	0.41	0.19

\* Significant at p=0.05

