

RESEARCH ARTICLE

Relative abundance, borer density and infection percentage of maize stem borers (*Chilo partellus*) of Indore district of M.P., India

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| Manuscript details: | ABSTRACT |
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| <p>Received: 13.09.2017 Accepted: 15.12.2017 Published : 31.12.2017</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Aziz RU, Gaherwal S and Sameena (2017) Relative abundance, borer density and infection percentage of maize stem borers (<i>Chilo partellus</i>) of Indore district of M.P., India; <i>International J. of Life Sciences</i>, 5 (4): 683-686.</p> <p>Copyright: © 2017 Author (s), This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p> | <p>Field experiments were conducted to determine the distribution of stem borers (<i>Chilo partellus</i>) in four agro-ecological zones of Indore district of M. P. Our study evaluated that of the various insect pests attacking cereals crops in Indore, lepidopteran stem borer, <i>Chilo partellus</i> are by far the most injurious causing maize yield losses. Severe damage is caused by the larvae that feed on the plant from early stage up to maturity causing a devastating impact on maize yield. Their distribution follows a define pattern with <i>Chilo partellus</i> dominating and is most abundant and widely distributed species occurring at all sites. <i>C. partellus</i> distribution is highly influenced by altitude and moisture gradients. Present study was an attempt to evaluate the status of economically important cereal stem borers with emphasis on their distribution, borer density and percent infestation.</p> <p>Keywords: Stem borer species, <i>Chilo partellus</i>, agro-ecological zones, relative abundance, borer density.</p> |
| | <p>INTRODUCTION</p> <p>The majority of people in Asia have maize as their staple food (pingali, 2001). Its production is hampered by the larvae of the lepidopterous stem borer <i>C. partellus</i> and <i>Sesamia inferens</i> (Dejen <i>et al.</i>, 2014; Ebenebe <i>et al.</i>, 2013; overholt <i>et al.</i>, 2001). They are generally considered to be the most damaging insect pests of maize and sorghum in Asia. Their distribution, relative abundance and pest status are expected to vary with environmental conditions (Dejen <i>et al.</i>, 2014). <i>C. partellus</i> had proven to be a highly competitive colonizer in many areas of Asia including India, often becoming the most injurious stem borer and displacing native species (Kfir <i>et al.</i>, 2002). <i>C. partellus</i> was reported in India as one of the most destructive pests of maize and sorghum, and most important at altitudes below 1500 m above sea level (Dejen <i>et al.</i>, 2014). In India, <i>C. partellus</i> are also considered important stem borer species that contribute significantly to yield loss of cereal crops.</p> |

MATERIALS AND METHODS

Relative abundance, borer density and % infested plants of maize stem borers across the selected areas of Indore district of M.P. during 2015 and 2016.

Assessments were done in four regions of Indore district where the main cereal crop is maize by the method of (Overholt *et al.*, 2001). Sampling areas were selected at 6-17 km away along major roads and a total of 17-30 small maize fields measuring approximately 0.5 – 2.0 ha each were evaluated per region. A complex of overlapping growth stages of maize crops were recorded during both (tasseling and soft dough stage) seasonal assessments because of varying sowing dates due to different climatic conditions. Each maize field was divided in 5 quadrants and from each quadrant 15 plants were randomly selected, checked and uprooted for Relative abundance, borer density and % infested plants of maize stem borers at whorl stage.

RESULTS AND DISCUSSION

During 2015, *Chilo partellus* was recorded from all selected regions of Indore and *Sesamia inferens* was recorded from only three regions but was completely

absent from Mhow. Mangliya and Sanwer showed 100±0.0 % relative abundance of *Chilo partellus* and the least (88.67±0.2) relative abundance were showed in Mhow. The maximum relative abundance of *Sesamia inferens* was recorded in Sanwer (49.75±0.2) and minimum (21.33±0.1) relative abundance was recorded in Mangliya. Mhow was the region where only *Chilo partellus* was recorded and showed 0% relative abundance of *Sesamia inferens*. Borer density was maximum (5.78±0.2) in Mangliya and least (1.67± 0.0) in Mhow. % infested plants were maximum (83.71± 0.2) in Mangliya and least (57.23± 0.0) in Depalpur.

During 2016, *Chilo partellus* was recorded from all selected regions of Indore and *Sesamia inferens* was recorded from only Sanwer region but was completely absent from other three regions. Sanwer showed 100±0.0% relative abundance of *Chilo partellus* and the least (79.21±0.0) relative abundance were showed in Mhow. The maximum relative abundance of *Sesamia inferens* was recorded in Sanwer (33.54±0.0) and was completely absent from Mangliya, Mhow and Depalpur. These were the regions where only *Chilo partellus* was recorded. Borer density was maximum (5.01±0.2) in Sanwer and least (1.40± 0.0) in Mhow. % infested plants were maximum (82.59± 0.2) in Mangliya and least (51.53± 0.1) in Depalpur.

Table 1: Mean number of borers per plant (± SE) according to species, relative abundance (%) and percentage of infested plants of maize in four agro ecological zones (AEZ) in Indore district of M.P. during different seasons of 2015

| Regions of district Indore | | % infested plants | Borer density | Relative abundance (%) | |
|----------------------------|----------|-------------------|---------------|------------------------|-------------------------|
| | | | | <i>Chilo partellus</i> | <i>Sesamia inferens</i> |
| 1. | Mangliya | 83.71± 0.2 | 5.78± 0.2 | 100.00 ± 0.0 | 21.33±0.1 |
| 2. | Mhow | 62.13± 0.5 | 1.67± 0.0 | 88.67±0.2 | 0.0 |
| 3. | Depalpur | 57.23± 0.0 | 3.84± 0.3 | 97.28 ± 0.1 | 32.14±0.0 |
| 4. | Sanwer | 71.09± 0.1 | 5.32± 0.2 | 100.00 ± 0.0 | 49.75±0.2 |

Table 2: Mean number of borers per plant (± SE) according to species, relative abundance (%) and percentage of infested plants of maize in four agro ecological zones (AEZ) in Indore district of M.P. during different seasons of 2016.

| Regions of district Indore | | % infested plants | Borer density | Relative abundance (%) | |
|----------------------------|----------|-------------------|---------------|------------------------|-------------------------|
| | | | | <i>Chilo partellus</i> | <i>Sesamia inferens</i> |
| 1. | Mangliya | 66.01± 0.1 | 4.77± 0.2 | 98.06 ± 0.2 | 0 |
| 2. | Mhow | 59.63± 0.3 | 1.40± 0.0 | 79.21±0.0 | 0 |
| 3. | Depalpur | 51.20± 0.1 | 2.29± 0.1 | 91.83± 0.3 | 0 |
| 4. | Sanwer | 82.59 ± 0.2 | 5.01± 0.2 | 100.00 ± 0.2 | 33.54±0.0 |

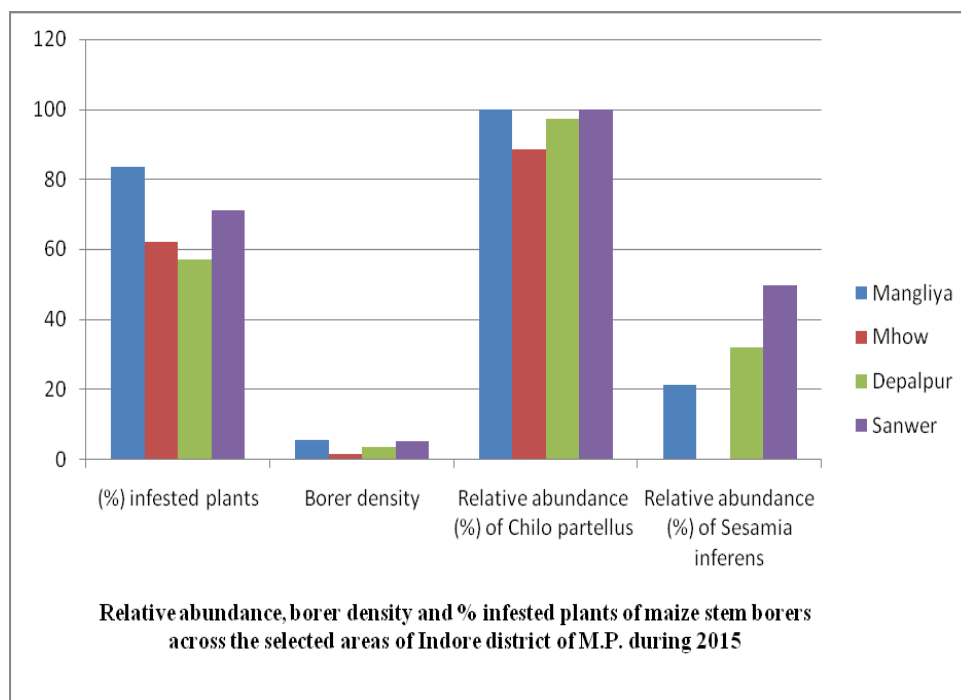


Figure 1: Mean number of borers per plant (\pm SE) according to species, relative abundance (%) and percentage of infested plants at tasseling of maize in four agro ecological zones (AEZ) in Indore district of M.P. during different seasons of 2015.

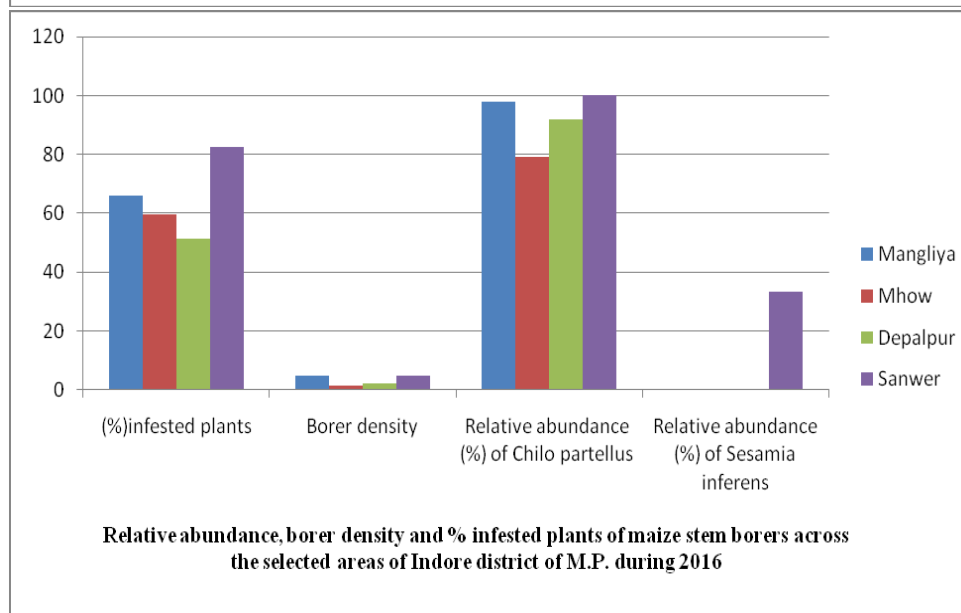


Figure 2: Mean number of borers per plant (\pm SE) according to species, relative abundance (%) and percentage of infested plants at tasseling of maize in four agro ecological zones (AEZ) in Indore district of M.P. during different seasons of 2016.

During the 2015 and 2016, *Chilo partellus* was recorded from all selected regions of Indore and *Sesamia inferens* was recorded from only Sanwer region but was completely absent from other three regions. Sanwer showed $100 \pm 0.0\%$ relative abundance of *Chilo partellus* and the least (79.21 ± 0.0) relative abundance were showed in Mhow. The maximum relative abundance of *Sesamia inferens* was recorded in Sanwer (33.54 ± 0.0) and was completely absent from Mangliya, Mhow and Depalpur. These were the regions where only *Chilo partellus* was recorded. Borer density was maximum (5.01 ± 0.2) in Sanwer and least

(1.40 ± 0.0) in Mhow. % infested plants were maximum (82.59 ± 0.2) in Mangliya and least (51.53 ± 0.1) in Depalpur.

DISCUSSION

It is thus clear from the data that Mangliya and Sanwer showed highest abundance of stem borers especially *Chilo partellus* and than *Sesamia inferens*. *Chilo partellus* was present in all selected regions but was highest recorded from Sanwer and *Sesamia inferens*

was altogether absent from all selected region except Sanwer. The differences in maize stem borers are due to climatic differences through moisture gradients, excessive heats, regular floods, violent winds and irregular rainfalls. The irregularity of rainfall leads to difference in sowing dates and as a result, different phonological stages of maize plant were recorded in all agro-ecological zones consequences in ear and stem borer infestations continuously.

Gupta *et al.* (2010) reported that in India, *C. partellus*, is one of the destructive and important pests of maize crops. Cugala, (2002) also reported that *C. partellus* and *B. fusca* are most important stem borer species in the lower and warmer areas and in the higher and cooler altitudes respectively. Trehan and Butani, (1974) reported highest injury caused by *C. partellus* was less in rabi-summer crop (9 to 17%) and more (7.5 to 27%) in kharif season. The above mentioned researchers also support the present investigation. The infestation levels of *Chilo partellus* were highest as compared to *Sesamia inferens* during the pre and post tassellings stage. These levels of high infestations are relatively similar to those observed by Kfir, (1992) in a area where on young plants maximum level of larval infestations were recorded during January and August. The larval numbers on old plants during March and November were at peak. This study is also in agreement with present investigation.

Mbapila *et al.* (2002) also targeted temperature as a primary factor for mortality, growth and development lepidopterans. *C. partellus* prefers maize more than sorghum (Mushore, 2005). *S. calamistis* and *C. partellus* have been observed on 24 wild plant species of family graminaceae. Among cereals, maize is injured more by maize stem borers as it possesses more of sugars, amino acids than any other gramineous hosts (Songa *et al.*, 2001). The above mentioned entomologists also proved the same and support present finding.

CONCLUSION

The present investigation shows the presence of various bioactive compounds which has important role in nutritive value of plant and proves its edible nature. Proximate analysis helps in standardization and detection of adulterants. More investigation and evaluation are needed in view of its nutraceutical properties.

Conflicts of interest: The authors stated that no conflicts of interest.

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