



Seasonal incidence of *Nezara Viridula* on leguminous crops from Chhatrapati Sambhajnagar (M.S), India

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Abstract

Leguminous crops are cultivated on a small scale for subsistence by economically poor farming communities. These crops are currently underutilized or ignored, even though they provide a useful source of protein and can increase rural food security. Research and development work is being carried out to improve grain quality and increase the productivity of these crops, but both are affected by pest infestations. Hence, an incidence of stink bugs associated with leguminous crops was studied in the agricultural fields of Chh. Sambhajnagar district. *Nezara viridula* also called stink bug is one of the most important pentatomid insect pests in the world. It is cosmopolitan and highly polyphagous on many important food and fibre crops. It was observed that there is severe infection of stink bugs on leguminous crops which can affect the crop yield.

Keywords: *Nezara viridula*, stink bug, polyphagous, pest, leguminous crops, crop yield

Introduction

Pulses provide an excellent protein supplement to human vegetarian diets and play an important role in correcting widespread malnutrition in the country. Pulses provide nutritious food while maintaining soil fertility and productivity and boosting India's agricultural economy (Sujata *et al.*, 2017). India cultivates more than a dozen types of pulses and is considered the world's largest producer of pulses (Singh *et al.*, 2020) ^[15]. Among various constraints for low productivity, insect pests are one of the major biotic constraints for production. Crop yield and productivity of leguminous crops is affected by infestation of insect pests (Singh and Emden, 1979) ^[17]. Members of the family Pentatomidae are commonly called stink bugs. Since most species are phytophagous, they represent an economically important group of hemipteran pests. *Nezara viridula* also called stink bug is one of the most important pentatomid insect pests in the world. It shows severe infestation on various leguminous crops. *N. viridula* has been recorded from many mostly herbaceous, annual plant species. *N. viridula* is considered highly polyphagous, and leguminous hosts are disproportionately represented (Todd and Herzog, 1980) ^[19]. *N. viridula* is known to carry spores of parasitic infections from plant to plant, and can moreover exchange plant pathogens mechanically during nourishing (Kaiser and Vakili, 1978) ^[11]. *N. viridula* may assault all parts of a plant, counting the stems (Panizzi and Rossi, 1991) ^[13] and leaf veins, but the bugs feed on most parts of fruiting structures and developing shoots (Todd and Herzog, 1980) ^[19].

In the region of Chh. Sambhajnagar (M.S), India, the impact of *Nezara viridula* on leguminous crops has become a matter of concern for agricultural practitioners and researchers alike. Leguminous crops play a crucial role in Indian agriculture, contributing substantially to both food and fodder production. These crops include pulses such as lentils, chickpeas, and peas, which are integral components of the Indian diet. The Southern green stink bug, known for its voracious appetite, has the potential to inflict substantial damage to leguminous crops, leading to yield losses and

economic repercussions for farmers. Factors such as temperature, humidity, and crop phenology influence the population dynamics of this insect, making it imperative to conduct comprehensive studies on its seasonal occurrence. Chh. Sambhajnagar experiences diverse climatic conditions that can influence the prevalence of *Nezara viridula*. This study aims to investigate the seasonal incidence of *Nezara viridula* on leguminous crops in Chh. Sambhajnagar and potential impact on crop productivity. By gathering this information, researchers and farmers can collaboratively develop sustainable and environmentally friendly pest management strategies tailored to the local conditions, ensuring the long-term health and productivity of leguminous crops in the region.

Material and Methods

This study was conducted in Chh. Sambhajnagar district of Maharashtra, located at 19.8776° N 75.3423° E. Based on the convenience of season and cropping patterns, different sites from Chh. Sambhajnagar was selected to study of the infection of stink bugs associated with different leguminous crops. The adult stink bugs were collected from these sites during August 2022 to August 2023. Different methods such as the sweep net method, hand picking, and baiting were used for the collection of stink bugs. Specimens collected from various agricultural crop fields were killed in killing bottles, pinned, preserved dry, and labelled to indicate host plant, locality, and date. During the present study, the standard methodology suggested by Bergroth (1914) ^[2], Azim N. (2011) ^[1], Salini (2019), was adopted for the collection, preservation, and identification of stink bugs.

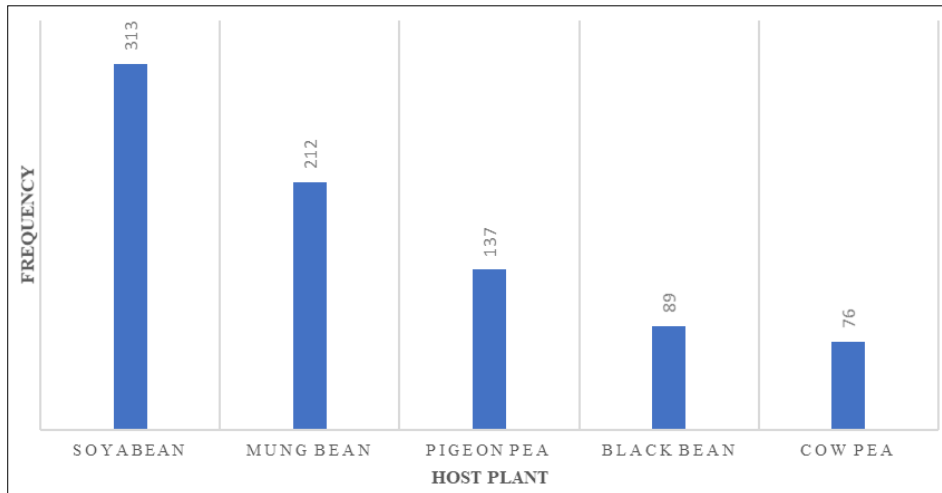
Result and Discussion

A total of 827 specimens of *Nezara viridula* were collected from different leguminous crop fields of Chh. Sambhajnagar district. Among these Soyabean suffered with a heavy infestation of 313 green stink bugs, 212 bugs were associated with Mung bean, 137 bugs were associated with Pigeon pea, and Black bean and Cowpea plants were less affected i.e., 89 and 76 bugs respectively.

Table 1: Host Plants of *Nezara viridula* from Chh. Sambhajinagar district

Sr. No.	Name of the Crop	Frequency (n)
1.	Soyabean (<i>Glycine max</i>)	313
2.	Mung bean (<i>Vigna radiata</i>)	212
3.	Pigeon pea (<i>Cajanus cajan</i>)	137
4.	Black bean (<i>Phaseolus vulgaris</i>)	89
5.	Cow pea (<i>Vigna unguiculata</i>)	76

Table 1 & Graph 1 shows the incidence of *Nezara viridula* on different leguminous crops. So, among all these leguminous crops, the most severe infestation of stink bugs was observed on soybeans while the least infestation was observed on cowpeas.



Graph 1: Frequency of *N. Viridula* among leguminous crops from Chh. Sambhajinagar district

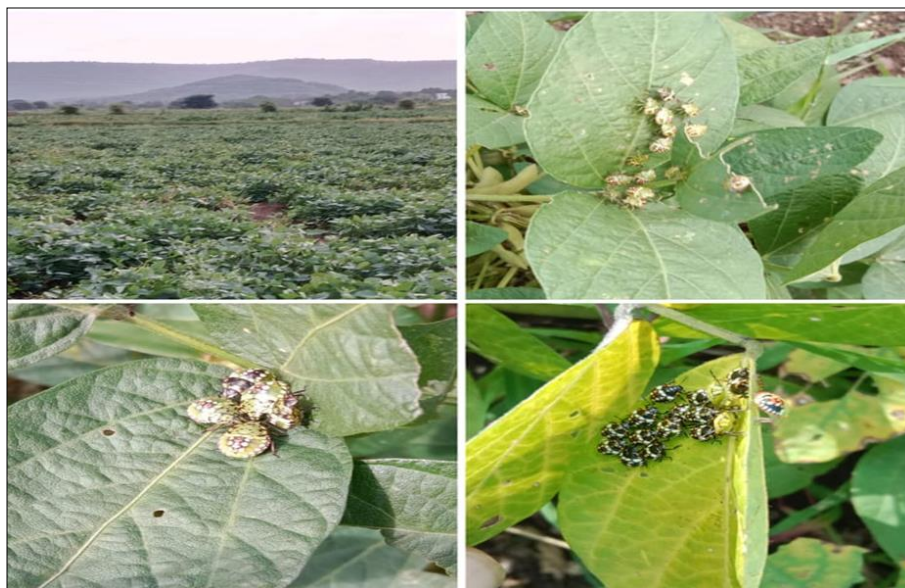


Photo Plate 1: Infestation of *N. viridula* on leguminous crops from Chh. Sambhajinagar

Damages: (CABI Report 2018, 2021 & Observations during Present Study)

- Green stink bugs feed on the liquid sap of the plants.
- It feeds on all plant parts, preferring growing shoots and developing fruit.
- Punctures on leaves and fruits.
- Dark brownish or black spots on fruits.
- Fruit growth is retarded and may drop from the plant.

Prevention: (CABI Report, 2018)

- Use of early maturing crop varieties as trap crops for control actions to reduce pest populations.

- Intercropping or rotating crops with non-related crops such as maize, sorghum, or vegetables.
- Use of proper sanitation practices.
- Active removal of dead plant parts and other weeds.
- Removal of remaining plant materials after harvesting.

Control and Monitoring: (Todd 1989, Drake 1920) [20, 71]

- Remove, burn, and bury dead plant parts.
- Spray plants with botanical extracts and soapy water.
- Release of suitable biocontrol agents.
- Observe the leaves, fruiting parts, and shoots.

- Use of hand-picking and sweep nets for capturing stink bugs and can destroy them with proper control practices.

Many entomologists have studied various aspects of damages made by green stink bugs. Bharathimeena *et al.*, (2008) ^[3] observed the seasonal incidence of *Nezara viridula* on Cowpea ecosystems of Kerala and observed severe infestation. Kandakoor *et al.*, (2012) ^[12] conducted a study on the incidence and abundance of sucking insect pests on groundnut and observed the activity of *N. viridula*. Abdul Faiz (2020) conducted a study on the abundance and nature of damage of hemipterans on black gram (*Vigna mungo*) crops in agricultural fields of Assam & observed severe damage to vital parts such as leaves, pods, and flowers. Chowdary *et al.*, 2020 ^[4] experimented on the succession of insect pest complexes and their natural enemies in pigeon pea *Cajanus Cajan* (L) and observed severe infestation of *N. viridula*. Hadiya *et al.*, (2020) ^[9] studied the impact of sowing periods on the incidence of sucking pests and revealed that the incidence of green stink bugs was significantly high. Singh *et al.*, (2022) ^[16] observed an infestation of 38 insect pests including *N. viridula* on mung bean. They also observed economic losses. Harshita *et al.*, (2020) ^[10] carried out a study on the seasonal incidence of major insect pests of vegetable pigeon pea (*Cajanus cajan* L.) and concluded that *N. viridula* was one of the most severe pests of pigeon pea crop. All these works indicate that severe infestations of insect pests can affect the yield of leguminous crops and *Nezara viridula* is a potential pest of many leguminous crops.

Conclusion

The present study on the seasonal incidence of *Nezara viridula* on leguminous crops in the agricultural fields of Chh. Sambhajanagar district revealed that a severe infestation of green stink bugs is affecting the yield of these crops. Further advanced research and management strategies are needed to combat the heavy infestations of such insect pests. These management strategies may include proper sanitation practices, utilization of suitable biocontrol agents, and use of various botanical extracts. Management should not be restricted to developing resistance to field pests but their resistance should also be expanded to the use of natural enemies, entomopathogenic fungi, and nematodes. In conclusion, this research emphasizes the importance of monitoring and managing the severe infestation of stink bugs in leguminous crops, offering insights into sustainable pest management practices for agricultural sustainability.

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