International Journal of Agriculture and Plant Science
www.agriculturejournal.in
Online ISSN: 2664-7664
Received: 25-05-2026, Accepted: 25-06-2026, Published: 10-07-2026
Volume 8, Issue 3, 2026, Page No. 55-59

Incidence of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee and insecticide usage pattern in major brinjal growing districts of Andhra Pradesh

N Spurthi*, **Rajasri Mandali, A Rajesh, M Pradeep**
Department of Entomology, S.V. Agricultural College, Acharya N.G. Ranga Agricultural University (ANGRAU), Tirupati, Andhra Pradesh, India
Corresponding Author: N Spurthi
DOI: https://doi.org/10.66856/ijaps.2026.8.3.8150

Abstract
A roving survey was conducted during *rabi* 2025–26 in major brinjal-growing areas of Chittoor and Guntur districts of Andhra Pradesh to assess the incidence of brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) and document insecticide usage patterns. Data were collected from 30 farmers using a structured questionnaire. Pest incidence ranged from 20.66 to 26.99 per cent, with the highest incidence recorded at Narakoduru (26.99%) and the lowest at Ekarlapalle (20.66%). Farmers predominantly used isocycloseram 9.2% w/w DC, emamectin benzoate 5% SG and thiamethoxam 25% WG for pest management. The average number of insecticide applications varied from 21.66 to 32.40 sprays per crop season, with spray intervals of 5.46–7.20 days. Most farmers relied on pesticide dealers for insecticide recommendations and adopted symptom based pesticide applications rather than economic threshold level based decisions. The study indicates excessive dependence on chemical insecticides and limited adoption of integrated pest management practices, highlighting the need for farmer awareness on judicious pesticide use and sustainable management of *L. orbonalis*.

Keywords: Brinjal, insecticide usage, integrated pest management, *Leucinodes orbonalis*, pesticide survey

Introduction
Brinjal (*Solanum melongena* L.) is one of the most important vegetable crops cultivated in tropical and subtropical regions of the world owing to its high nutritional value, wide adaptability and year round market demand. India is the second largest producer of brinjal after China and contributes substantially to global production. In Andhra Pradesh, brinjal is cultivated extensively as a commercial vegetable crop, providing a dependable source of income to small and marginal farmers. However, productivity is constrained by several insect pests, among which the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee is the most destructive.

Leucinodes orbonalis infests the crop throughout the growing season. The larvae initially bore into tender shoots, causing wilting and drying of the growing points, and subsequently damage flower buds and fruits, rendering them unmarketable. Depending on crop stage, season and management practices, the pest may cause yield losses ranging from 30 to 90 per cent, resulting in considerable economic losses to farmers (Chatterjee and Roy, 2004; Srinivasan, 2009) [1, 13]. The concealed feeding habit of the larvae makes effective control difficult and often encourages indiscriminate use of insecticides.

Management of *L. orbonalis* in farmers' fields largely depends on repeated applications of chemical insecticides. Frequent calendar-based spraying, often without considering economic threshold levels, has resulted in excessive pesticide use, increased production costs, insecticide resistance, pesticide residues in marketable fruits and adverse effects on beneficial organisms and the environment (Kodandaram *et al.*, 2015; Kranthi, 2015) [4, 5]. Despite the availability of integrated pest management (IPM) strategies, their adoption by vegetable growers remains limited because of inadequate awareness, dependence on pesticide dealers for technical advice and the need to maintain the good quality of fruits.

Understanding farmers' pesticide use practices is essential for developing sustainable pest management strategies and promoting the judicious use of insecticides. Although several studies have documented pesticide use in vegetable ecosystems, information on the incidence of *L. orbonalis* and prevailing insecticide usage patterns among brinjal growers in Andhra Pradesh is limited. Such information is useful for identifying gaps in existing pest management practices and designing location-specific IPM interventions.

Therefore, the present investigation was undertaken to assess the incidence of brinjal shoot and fruit borer (*L. orbonalis*) and to document the insecticide usage pattern and farmers' pest management practices in major brinjal-growing areas of Andhra Pradesh.

Materials and Methods
Survey area
A roving survey was conducted during the *rabi* 2025–26 in the major brinjal-growing Chittoor and Guntur districts of Andhra Pradesh (Fig. 1), to assess the incidence of brinjal shoot and fruit borer (*L. orbonalis* Guenee) and document the insecticide usage pattern adopted by farmers. Three major brinjal-growing villages were selected from each district *viz.*, Chandam, Ekarlapalle and Kathimanipalle in Chittoor district, and Narakoduru, Kasukarru and Kothapalem in Guntur district (Table 1).

Table 1: Major Brinjal growing villages of Chittor and Guntur districts of Andhra Pradesh surveyed for the incidence of Brinjal shoot and fruit borer during Rabi 2025-26.

Villages	District	Latitude(°N)	Longitude(°E)
Chandam	Chittoor	12.73072	78.37933
Ekarlapalle	Chittoor	12.73518	78.38852
Kathimanipalle	Chittoor	12.74851	78.37836
Narakoduru	Guntur	16.22868	80.50832
Kasukarru	Guntur	16.06407	80.52852
Kothapalem	Guntur	15.88970	80.45076

Chittoor District

Guntur District

Fig 1: Survey and collection of brinjal shoot and fruit borer from different brinjal growing villages of Andhra Pradesh state

Assessment of pest incidence

In each village, five farmers' fields were selected randomly, and ten brinjal plants were observed at random from each field for recording the incidence of *L. orbonalis*. The percentage incidence of the pest was estimated based on the proportion of infested shoots and fruits and expressed as mean per cent incidence for each village.

Survey on insecticide usage pattern

A total of 30 brinjal growers (15 from each district) were interviewed using a structured questionnaire. Information was collected on the insecticides used against *L. orbonalis*, spray interval, number of insecticide applications during the crop season, source of pesticide recommendations, adherence to recommended dosage, use of personal protective measures, waiting period, decision-making criteria for pesticide application and pest management practices.

Statistical analysis

The data collected from field observations and farmer interviews were compiled and analysed using descriptive statistics. Mean values and standard errors (Mean ± SE) were calculated to compare pest incidence and insecticide usage patterns among the surveyed villages and districts.

Results and Discussion

Incidence of brinjal shoot and fruit borer

The incidence of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenée, varied significantly among the surveyed villages during *rabi* 2025–26 (Table 2). Mean infestation ranged from 20.66 to 26.99 per cent. Among the six villages surveyed, the highest incidence was recorded in Narakoduru (26.99 ± 0.62%), followed by Kothapalem (26.39 ± 0.63%) and Kasukarru (25.33 ± 0.62%) of Guntur district. Comparatively lower infestation was observed in Chandam (22.26 ± 0.98%), Kathimanipalle (21.99 ± 0.81%) and Ekarlapalle (20.66 ± 0.66%) of Chittoor district.

The relatively higher infestation observed in Guntur district may be attributed to intensive brinjal cultivation, continuous availability of host plants, favourable climatic conditions and repeated cultivation of susceptible hybrids. Continuous cropping provides uninterrupted food resources for *L. orbonalis*, facilitating rapid population build-up throughout the cropping season. Differences in varietal preference, pesticide use patterns, cropping intensity and local weather conditions may also have contributed to the variation in pest incidence among locations.

These findings agree with recent studies demonstrating that the abundance of *L. orbonalis* is strongly influenced by agro-climatic conditions, host availability and crop management practices. Recent reviews have highlighted that continuous cultivation of brinjal and indiscriminate insecticide use often sustain higher pest populations while simultaneously exerting selection pressure for insecticide resistance. Consequently, pest incidence differs considerably among production ecosystems depending on local agronomic practices.

The present results also corroborate earlier reports of Chatterjee and Roy (2004) and Srinivasan (2009) [1, 13], who reported considerable regional variation in infestation levels owing to differences in environmental conditions and management practices. Such variation underscores the importance of developing location-specific pest management strategies rather than relying on uniform insecticide schedules.

Insecticide usage pattern and spray frequency

The survey revealed an extensive dependence on chemical insecticides for managing *L. orbonalis* (Table 2). Farmers predominantly used isocycloseram 9.2% w/w DC, emamectin benzoate 5% SG, chlorantraniliprole 18.5% SC, spinosad 45 SC, thiamethoxam 25% WG, dimethoate 30% EC and profenofos + cypermethrin formulations. The predominance of newer insecticide molecules indicates a gradual shift from conventional broad-spectrum insecticides towards comparatively selective chemistries for shoot and fruit borer management in brinjal.

Table 2: Pesticide usage pattern and spray interval in Chittoor and Guntur district of Andhra Pradesh

District	Village name	Village mean	Frequently used insecticides	Spray interval (Days)* Mean ± SE	Total no. of sprays
Chittoor	Chandam	22.26± 0.98	Isocycloseram 9.2%w/w DC, Emamectin benzoate 5% SG, Thiamethoxam 25% WG, Chlorantriniliprole 18.5% SC, Dimethoate 30%EC, Diafenthiuron 50% WP, Profenophos 40%+ Cypermethrin 4% EC, Neem oil	7.2 ± 0.45	21.66 ± 0.22
	Ekarlapalle	20.66 ± 0.66			
	Kathimanipalle	21.99 ± 0.81			
Guntur	Narakoduru	26.99 ± 0.62	Isocycloseram 9.2%w/w DC, Emamectin benzoate 5% SG, Dimethoate 30% EC, Thiamethoxam 25% WG, Chlorantriniliprole 18.5% SC, Spinosad 45 SC, Acetamiprid 20% SP.	5.46 ± 0.24	32.40 ± 0.46
	Kasukarru	25.33 ± 0.62			
	Kothapalem	26.39 ± 0.63			

*Mean is of 15 brinjal growing farmers from each district.

Marked differences were observed between the two districts with respect to spray frequency. Farmers in Guntur district applied an average of 32.40 insecticide sprays during a single crop season at an interval of 5.46 days, whereas farmers in Chittoor district applied 21.66 sprays with an average interval of 7.20 days. The shorter spray interval and greater number of applications in Guntur reflect a higher dependence on chemical control, possibly due to comparatively greater pest pressure and the market demand for blemish-free fruits.

A similar trend has recently been reported by Siddhartha *et al.* (2024) [12] among brinjal growers in Tamil Nadu, where chlorantraniliprole, spinetoram and emamectin benzoate were the predominant insecticides, and the number of insecticide applications ranged from 9.9 to 24.7 sprays per crop season. The authors also reported that pesticide dealers remained the principal source of insecticide recommendations, resulting in frequent prophylactic pesticide applications.

Comparable observations were also reported from a multi-state survey conducted in Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra and Telangana, where farmers used as many as eighteen insecticide formulations, with chlorantraniliprole and emamectin benzoate being the most frequently applied molecules. Spray frequency ranged from 10.8 to 22.2 applications per crop season, demonstrating the widespread dependence on insecticides for *L. orbonalis* management (Gaddanakeri *et al.*, 2023) [2]

Although newer insecticides are highly effective against concealed-feeding larvae, repeated application of molecules having similar modes of action may accelerate resistance development. Frequent insecticide applications also increase production costs, pesticide residues in harvested fruits, environmental contamination and adverse effects on natural enemies. Recent reviews have therefore emphasized the need for insecticide rotation based on mode of action, resistance management strategies and integration of biological and cultural practices with need-based insecticide applications.(Jat and Shrivastava., 2022) [3].Repeated use of insecticides with similar modes of action may accelerate resistance development in *L. orbonalis*, as evidenced by field populations exhibiting reduced susceptibility to indoxacarb, spinosad and thiodicarb (Pasayat and Tripathy, 2026) [9]

Recent investigations by Kumar and Senthil (2022) [6] have further demonstrated that biorational IPM modules integrating sanitation, pheromone-based monitoring, biological control and selective insecticides can substantially reduce pest infestation while minimizing insecticide use and improving economic returns.

Knowledge level of farmers on pesticide usage and protective gear

The survey revealed considerable variation in farmers' knowledge regarding pesticide use and safe handling practices (Table 3). A majority of respondents (63.33%) relied on pesticide dealers for technical advice, whereas only 1.66% sought recommendations from the Department of Agriculture and other extension personnel. The dominance of private pesticide dealers as the primary information source indicates limited interaction between farmers and public extension agencies.

Table 3: Knowledge level of Brinjal farmers on pesticide usage pattern for the management of brinjal shoot and fruit borer from different districts of Andhra Pradesh

Sl. No.	Pesticide usage pattern	% Brinjal farmers Respondents*						Mean (%)
		Chandam	Ekarlapalle	Kathimanipalle	Narakoduru	Kasukarru	Kothapalem	
1) Source of information on pesticide usage								
a)	Pesticide dealers	60	80	60	60	40	80	63.33
b)	Fellow farmers	20	10	30	10	30	10	18.33
c)	Company persons	20	10	10	20	20	10	15.00
d)	Government Department officials	00	00	00	00	10	00	1.66
2) Attention towards label information								
a)	Reading label before use	20	40	00	20	40	20	23.33
b)	No attention towards labels	80	60	100	80	60	80	76.66
3) Dosage used								
a)	Recommended dose	40	40	20	40	20	60	36.66
b)	Above recommended dose	60	60	80	60	80	40	63.33
4) Safety measures followed during spraying								
a)	No safety measures	80	60	80	60	80	60	70.00
b)	Use of mask only	20	20	10	30	0	20	16.66
c)	Use of hand gloves only	0	20	00	10	10	20	10.00
5) Type of sprayer used								
a)	Hand sprayer	20	0	20	40	20	20	23.33
b)	Power sprayer	80	100	80	60	80	80	76.66
6) Waiting period								
a)	Following waiting period	40	40	40	20	20	40	33.33
b)	Not following waiting period	60	60	60	80	80	60	66.66
7) Decision of spraying								
a)	Without observing any insect (Prophylactic)	20	00	00	20	00	00	6.66
b)	After initial symptoms	60	80	80	60	80	60	70.00
c)	Above Economic Threshold Level	20	20	20	20	20	40	23.33
8) Control Measures followed								
a)	Only insecticides	100	100	100	80	100	100	96.66
b)	Cultural methods	00	00	00	20	00	00	3.33
c)	Integrated Pest Management	00	00	00	00	00	00	0.00

*Mean of 30 brinjal growing farmers in Andhra Pradesh

The findings closely resemble those reported in a recent survey from Tamil Nadu, where nearly 65% of brinjal growers depended on pesticide dealers for insecticide recommendations, while awareness regarding pesticide labels, recommended dosages and safe handling practices remained inadequate (Siddhartha *et al.*, 2024) [12]

Knowledge regarding safe pesticide use was unsatisfactory. A considerable proportion of farmers ignored pesticide label instructions, exceeded recommended dosages and rarely used personal protective equipment such as masks and hand gloves. Furthermore, most respondents failed to observe the recommended waiting period before harvest, increasing the likelihood of pesticide residues in marketable fruits. Similar deficiencies in pesticide stewardship have been documented in recent studies, emphasizing the need for capacity building on safe pesticide handling and residue management. Similar findings were also reported by Ranjith Kumar (2014) [10].

Most respondents-initiated insecticide application only after observing pest damage rather than following economic threshold levels. Moreover, almost all farmers depended exclusively on chemical insecticides, with negligible adoption of cultural or integrated pest management practices. Such pesticide-intensive production systems are likely to accelerate insecticide resistance, suppress natural enemy populations and reduce the long-term sustainability of brinjal cultivation. Recent reviews by Sharma *et al.* (2024) [11] advocate a holistic IPM approach involving field sanitation, timely removal of infested shoots and fruits, pheromone-based monitoring and mass trapping, conservation and augmentation of natural enemies, deployment of resistant cultivars, and judicious use of selective insecticides. Such integrated strategies reduce dependence on chemical pesticides, delay resistance development, conserve beneficial arthropods and provide sustainable management of *L. orbonalis*. (Thomas *et al.*, 2025) [14]

Overall, the present investigation demonstrates that brinjal production in Andhra Pradesh continues to rely heavily on chemical insecticides for managing *L. orbonalis*. Although modern insecticides remain effective, sustainable management will require strengthening extension services, improving farmer awareness on economic threshold-based decision making, promoting insecticide rotation and increasing adoption of integrated pest management strategies. These interventions will help reduce unnecessary pesticide applications, delay resistance development and enhance environmental and food safety.

References

1. Chatterjee ML, Roy S. Bioefficacy of some insecticides against brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenée. Pest Management and Economic Zoology,2004:12(2):145–149.
2. Gaddanakeri S, Pradeep SS, Deshmukh SS, Shivanna BK, Chinniah C, Nandihalli BS, et al. Insecticide usage pattern and knowledge level of farmers on insecticides handling to manage *Leucinodes orbonalis* Guenée in brinjal across different localities. International Journal of Environment and Climate Change,2023:13(8):777–784.
3. Jat HK, Shrivastava VK. Management of the brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenée), through newer insecticides in brinjal. International Journal of Plant and Soil Science,2022:34(24):996–1004.
4. Kodandaram MH, Rai AB, Halder J. Pest Management in Vegetable Crops. ICAR–Indian Institute of Vegetable Research, Varanasi, 2015, 372.
5. Kranthi KR. Pesticide use and sustainable crop protection in Indian agriculture. Indian Journal of Agricultural Sciences,2015:85(1):1–12.
6. Kumar MS. Biorational based IPM module for the management of shoot and fruit borer, *Leucinodes orbonalis* in brinjal. International Journal of Plant and Soil Science,2022:34(22):877–881.
7. Nagaraju D, Venkateshalu R, Shashank PR. Farmers' knowledge and pesticide use pattern in vegetable ecosystems of South India. Journal of Entomology and Zoology Studies,2017:5(6):1417–1422.
8. Nayak US, Rath LK, Baral K. Evaluation of IPM modules for the management of *Leucinodes orbonalis* in brinjal. Indian Journal of Plant Protection,2014:42(4):357–362.
9. Pasayat B, Tripathy MK. Insecticide application trends and resistance development in *Leucinodes orbonalis* Guenée in brinjal shoot and fruit borer. Indian Journal of Entomology,2026:88(2):459–463.
10. Ranjith Kumar K. Survey on Incidence of Brinjal Shoot and Fruit Borer and Pesticide Usage Pattern in Andhra Pradesh. M.Sc. (Ag.) Thesis. Professor Jayashankar Telangana State Agricultural University, Hyderabad, 2014.
11. Sharma S, Mohapatra A, Kathayat K. Comprehensive review on the bio-ecology and integrated management strategies for brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenée). Journal of Advances in Biology & Biotechnology,2024:27(7):692–708.
12. Siddhartha K, Ragumoorthi KN, Krishnamoorthy SV, Saraswathi T, Balasubramani V, Vinothkumar B. Patterns of insecticide use and farmers' knowledge level in managing *Leucinodes orbonalis* Guenée in Tamil Nadu. Indian Journal of Entomology,2024:86(4):1094–1099.
13. Srinivasan R. Integrated Pest Management for Eggplant Fruit and Shoot Borer (*Leucinodes orbonalis*). AVRDC–The World Vegetable Center, Technical Bulletin No. 54. Shanhua, Taiwan, 2009, 65.
14. Thomas G, Thakur V, Sharma S, Azizi S. Strategic implementation of conventional and advanced approaches to combat brinjal shoot and fruit borer. Discover Applied Sciences,2025:7:232.