ISSN 2518–2021 (Print) 2415–4474 (Electronic)

Fundamental and Applied Agriculture

Journal home page: https://www.f2ffoundation.org/faa/index.php/home

Vol. 10(1), pp. 311 – 316: 2025, https://doi.org/10.5455/faa.248640

ENTOMOLOGY | ORIGINAL ARTICLE

Knowledge and Perceptions of Litchi Growers on Newly Recorded Transboundary Litchi Stink Bug (*Tessaratoma javanica* Thunberg) in Northern Bangladesh

Md Tahmiduzzaman[1,2], Jaher Ahmed[2], Ashraful Hasan Moyem[1,2], M Bishal Rahman[1,2], Mohon Nandi[2], Umme Honey Shuily Khan[2], Md Fuad Mondal[1]✉

[1] Laboratory of Tropical Entomology, Department of Entomology, Sylhet Agricultural University, Sylhet 3100, Bangladesh

[2] Department of Entomology, Sylhet Agricultural University, Sylhet 3100, Bangladesh

ARTICLE INFO

Article history

Received: 30 Nov 2024

Accepted: 23 Jan 2025

Published online: 31 Mar 2025

Keywords

Invasive pest, Farmers, Pest management, Infestation time, Plant parts

Correspondence

Md Fuad Mondal

✉: mondalmf.entom@sau.ac.bd

ABSTRACT

Litchi stink bug (*Tessaratoma javanica* Thunberg) has recently emerged as a significant pest of litchi in north-eastern part of Bangladesh. However, there has been limited study on its spread and management particularly by farmers in the northern region which is a primary litchi-producing area. This study was conducted through a cross-sectional survey during 2020-2021. A total of 125 growers were randomly selected from five upazilas in the major litchi-producing districts of northern Bangladesh. Results showed that majority of growers identified the litchi fruit borer (*Conopomorpha sinensis*), litchi mite (*Eriophyes litchii* Keifer), litchi lopper (*Perixera illepidaria* Guenée), and litchi stink bug (*T. javanica* Thunberg) as the major pests affecting litchi in the surveyed areas. Litchi stink bug infestation have occurred in all surveyed upazilas since 2016, and 46.4% of growers first observed the pest in 2017. Around 53% of the growers reported infestation in young green fruits, and 23.6% of the growers confirmed damage on litchi inflorescences. About 50.4% of growers mentioned that *T. javanica* infestation was peak in the month of March. The management practices used by the growers, mainly consisted of chemical controls with full reliance on organophosphate and neonicotinoid insecticides to combat the pest. Additionally, about 5% of growers in two upazilas also stated that they used traditional methods like handpicking and smoke. These findings highlight the importance of developing integrated pest management (IPM) strategies, to promote sustainable and environmentally friendly pest management that could prevent possible yield losses of litchi production.

1. Introduction

Litchi (*Litchi chinensis* Sonn.) is an important fruit crop in Bangladesh and it makes significant contributions to the country's agriculture and economy (Akter et al. 2016). Although litchi cultivation is practiced across the country, the northern region of Bangladesh accounts for the majority of litchi production and diverse litchi varieties. Some popular cultivated varieties here are Bombai, China-3, Mojafforpuri, Madaji, Kathali, Bedana, and Kadmi (Tahmiduzzaman et al. 2024). The area of litchi cultivation in Bangladesh was about 21,759 acres during the 2022–2023 growing season which has an annual production of 104,708 million metric tons (BBS 2023). This success is due to favorable climate conditions, fertile soil, and the hard work of local farmers (Taher et al. 2021). However, litchi growers are currently faced with numerous challenges such as infestation by various insect pests (Huang, 2005). The litchi stink bug, a transboundary hemipteran pest, has recently emerged as a major threat, leading to considerable yield and economic losses in litchi orchards (Menzel 2002; Papademetriou and Dent 2002; Lu 2006; Hassan et al. 2014).

The litchi stink bug (*Tessaratoma javanica* Thunberg) (Hemiptera: Tessaratomidae) is a major pest in South Asia and Asia-pacific regions (Mondal et al. 2021; Hassan et al. 2014; Menzel 2002; Papademetriou and Dent 2002; Lu 2006). This bug is large, approximately 25-31 mm long and 15-16 mm wide, with ochraceous to pale olive-brown body color and white powder on the underside (Sunil and Chandrashekar 2013; Hassan et al. 2014). This pest is highly mobile and found nearly year-round, with a life cycle consisting of three primary stages: egg, nymph and adult stages, with an average life span of 115 days. The litchi stink bug female lays about 26 eggs in two clusters on the

Cite This Article

Tahmiduzzaman M, Ahmed J, Moyem AH, Rahman MB, Nandi M, Khan UHS, Mondal F. 2025. Knowledge and Perceptions of Litchi Growers on Newly Recorded Transboundary Litchi Stink Bug (*Tessaratoma javanica* Thunberg) in Northern Bangladesh. *Fundamental and Applied Agriculture*, 10(1): 311–316. https://doi.org/10.5455/faa.248640

underside or top side of the leaf. Nymphs live for five instars before becoming adults after they hatch (Mondal et al. 2021; Li et al. 2014).

Both nymph and adult stages cause substantial damage to host plants by removing cell sap from leaves and tender twigs, which leads to wilting and eventual plant death (Waite and Hwang 2002; Boopathi et al. 2013). At the reproductive stage, *T. javanica* creates damage to litchi inflorescences and fruit clusters by sap sucking those results in dropping of immature fruit (Choudhary et al. 2015; Parveen et al. 2015). In 2016, this pest was first recorded in the northeastern part of Bangladesh, causing significant decreases in litchi production (Mondal et al. 2021). It has spread very quickly across the country with potential for widespread damage to litchi crops, particularly in the northern region, the principal litchi grown area. However, the knowledge on spread, infestation pattern and management practice of the litchi stink bug in northern Bangladesh is quite poor. Thus, the objectives of this study were to determine the current distribution and management practices of the litchi stink bug in the northern region of Bangladesh.

2. Materials and Methods

2.1. Selection of survey areas

A cross-sectional survey was conducted in five upazilas (sub-districts) from five major litchi-producing northern districts of Bangladesh: Birol upazila (25.6335° N, 88.5505° E) of Dinajpur district, Rajshahi Sadar upazila (24.3747° N, 88.6041° E) of Rajshahi district, Gurudaspur upazila (24.3683° N, 89.2332° E) of Natore district, Ishwardi upazila (24.1292° N, 89.0657° E) of Pabna district, and Mujibnagar upazila (23.6468° N, 88.5928° E) of Meherpur district (Figure 1).

2.2. Preparation of questionnaire and color photographs of insect pests of litchi

Initially, a pre-survey was conducted in Gurudaspur upazila of Natore district to assess the infestation of insect pests in litchi, particularly *T. javanica*, in the northern parts of Bangladesh. Based on the pre-survey findings, relevant literature (Mondal et al. 2021; Kumar et al. 2014; Chen and Huang 2000) and insights from agricultural officials of the Department of Agricultural Extension (DAE) in the respective upazilas, a semi-structured questionnaire was developed, featuring both open- and closed-ended questions.

The questionnaire comprised 30 questions divided into three sections. The first section aimed to collect socio-economic characteristics of the litchi growers (i.e., gender, age, education, experience, etc.). The second section included information about the commonly grown litchi varieties and intercrops by the growers in the various study areas. The third section focused on questions regarding the infestation of litchi by insect pests, especially *T. javanica*, and their management practices. Additionally, based on the pre-survey and previous literature (Mondal et al. 2021; Kumar et al. 2011; Menzel 2002; Lu 2006; Schulte et al. 2006), printed and laminated color photographs of litchi insect pests and their damage symptoms were prepared for the growers' clear understanding.

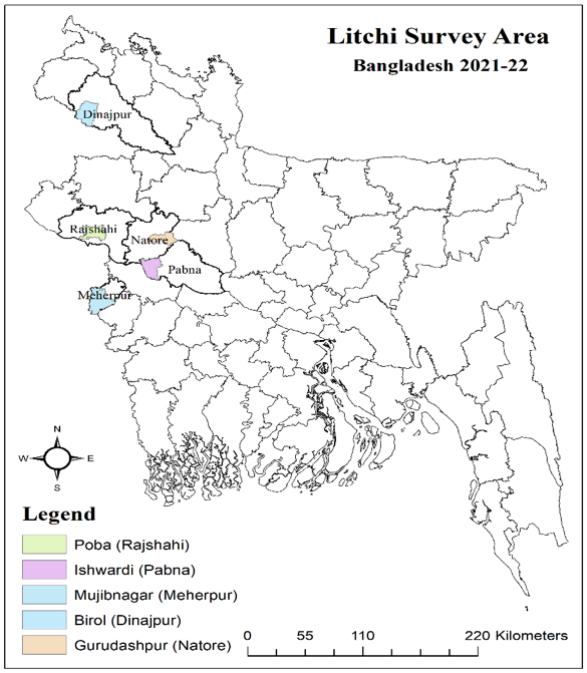

Figure 1. Surveyed upazilas (Sub-district) for newly introduced transboundary litchi stink bug (*Tessaratoma javanica* Thunberg) infestation across the northern parts of Bangladesh

2.3. Data collection and analysis

Data were obtained from face-to-face interviews with litchi growers, which were undertaken with the pre-designed questionnaire from March 2021 to April 2022. A total of 125 growers from the five upazilas, with 25 growers selected randomly from each upazila, were consulted with the Agriculture Extension Officers (AEOs) from the respective districts to minimize bias in the collected data. The inclusion criteria for respondents were: (i) active involvement in litchi cultivation during the recent production season, (ii) ownership or management of at least 10 litchi trees and (iii) a minimum of three consecutive years of experience in litchi farming. The exclusion criteria included: (i) individuals not engaged in litchi cultivation activities and (ii) growers experience is less than 1 year. Before data collection, we provided each enumerator with an in-depth introduction of the questionnaire, as well as a detailed explanation of the study's objectives.

This preparatory phase ensured that the enumerators were well-equipped with the necessary knowledge and skills to effectively conduct the survey within the five selected districts of Bangladesh. During data collection in each upazila, one Sub-Assistant Agricultural Officer (SAAO) from the Department of Agricultural Extension, Ministry of Agriculture, and the local lead grower from the respective study areas were present. The collected data from all surveyed areas were summarized using descriptive statistics (frequencies and percentages), analyzed using SPSS (version 25).

3. Results

The socio-demographic status of litchi growers from the five northern districts was recorded to gain insight into their personal and professional lives (Table 1). All litchi growers surveyed were male, with the majority (41.6%) belonging to the middle age group (36–50 years). Nearly thirty percent (29.6%) of the litchi growers had completed their higher secondary education, while a small fraction (5.6%) were illiterate. Results indicated that half of the growers (50.4%) cultivated litchi on approximately 0.01–0.25 ha of land, while only 8% had more than 1 ha dedicated to litchi cultivation. The maximum number of growers (40.0%) reported having more than 15 years of experience in litchi cultivation (Table 1).

Table 1. Socio-demographic status of litchi growers in the five surveyed areas of Bangladesh (n = 125)

Variables	Range of variable	Percentage (%)
Age(year)	18-35	28.0
	36-50	41.6
	>50	30.4
Gender	Male	100
	Female	0.0
Education level	Illiterate	5.6
	Only Signature	7.2
	Primary	21.6
	Secondary	20.0
	Higher Secondary	29.6
	Graduation	16.0
Land use for litchi cultivation (ha)	0.01-0.25	50.4
	0.26-0.50	25.6
	0.51-0.75	9.6
	0.76-1.0	6.4
	> 1.0	8.0
Experience in litchi cultivation (years)	<5	6.4
	5-10	31.2
	11-15	22.4
	> 15	40.0

When asked about litchi pests in their orchards, the majority of growers identified the litchi fruit borer (*Conopomorpha sinensis*), litchi mite (*Eriophyes litchii* Keifer), litchi lopper (*Perixera illepidaria* Guenée), and litchi stink bug (*T. javanica* Thunberg) as the major pests affecting litchi in the surveyed areas. Other pests, including litchi lopper, mealybug, leaf roller, red weevil, and bark-eating caterpillar, were also observed in the litchi orchards (Table 2).

The survey results revealed that the litchi stink bug (*T. javanica* Thunberg) was present in all surveyed upazilas across the five districts. However, the percentage of growers observing this pest varied among the upazilas (Table 2). In Gurudaspur upazila, all growers reported observing this pest, while the percentage of growers in Mujibnagar upazila who observed it was comparatively lower (56%) (Table 2). Litchi growers noted the infestation of this pest in their orchards starting in 2016, with nearly half of the respondents (46.4%) first noticing it in 2017. The lowest percentage of growers (1.03%) reported first noticing this pest in 2021 (Figure 2).

Approximately 32.8% of the growers reported a medium level of infestation by the litchi stink bug, while 21.6% recognized a very high level of infestation (Figure 3). According to 52.8% of growers, young fruits of litchi plants were primarily affected by this pest, followed by

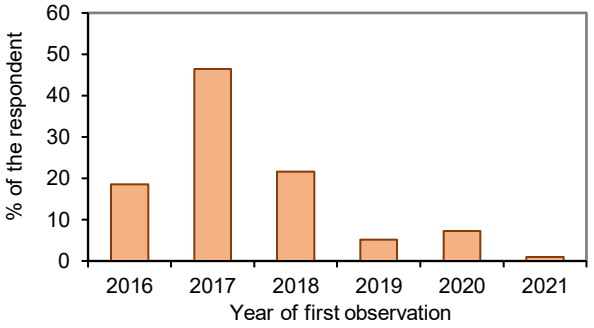

Figure 2. Litchi growers' first observation on litchi stink bug prevalence in northern part of Bangladesh observed from 2016 to 2021 (n =106)

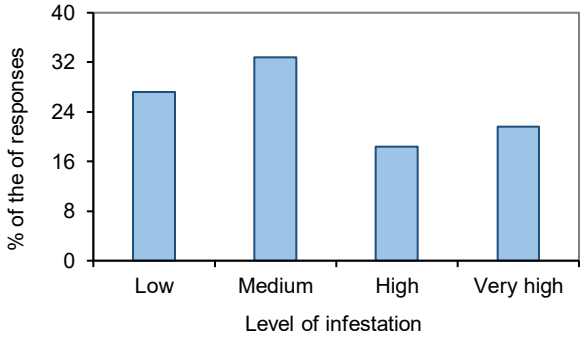

Figure 3. Growers' responses on the level of infestation of litchi stink bug in the northern part of Bangladesh (n=106)

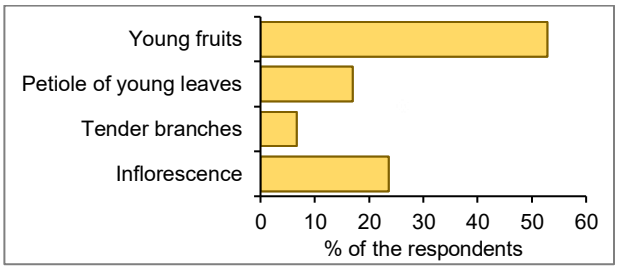

Figure 4. Litchi growers observations on the litchi stink bug infestations in various parts of the litchi plant (n=106) in the northern regions of Bangladesh

inflorescences (23.60%), petioles of young leaves (16.90%), and tender branches (6.60%) (Figure 4). More than half of the growers (50.50%) observed the highest infestation of *T. javanica* occurring in March, while nearly 30.50% noted the peak infestation in April (Figure 5). The symptoms of litchi stink bug infestation observed by the growers included burnt or blotch lesions on leaves and browning of green fruits, leading to a decline in fruit quality. More than half of the growers in Gurudaspur (56%), Birol (60%), and Pabna (68%) reported noticing burnt or blotch lesions on litchi leaves caused by this alien pest species. Additionally, around 84% of respondents in Gurudaspur and 96% in Pabna recognized brownish lesions on green

Table 2. Major litchi pests according to the interviewed litchi growers of five surveyed areas of Bangladesh (n=125)

Pest	Scientific name	Family	Order	% respondents in different study areas				
				Gurudashpur	Birol	Mujibnagar	Ishwardi	Poba
Litchi fruit borer	*Conopomorpha sinensis*	Gracillariidae	Lepidoptera	100	100	96	100	100
Litchi mite	*Eriophyes litchii* Keifer	Eriophyidae	Acari	84	88	76	96	92
Litchi lopper	*Perixera illepidaria* Guenée	Geometridae	Lepidoptera	60	56	84	84	56
Mealy bug	*Ferrisia virgata*	Pseudococcidae	Hemiptera	56	56	32	96	80
Litchi leafroller	*Statherotis discana*	Tortricidae	Lepidoptera	16	44	16	16	8
Red weevil	*Apoderus blandus*	Curculionidae	Coleeoptera	4	56	4	4	12
Bark eating caterpillar	*Indarbela quadrinotata*	Metarbelidae	Lepidoptera	12	24	12	4	-
Litchi stink bug	*Tessaratoma javanica* (Thurnberg)	Tessaratomidae	Hemiptera	100	80	56	92	96

Table 3. Symptoms on leaves and fruits by litchi stink bug by the farmers of surveyed upazila" with "by the farmers of the five surveyed areas in Bangladesh (n =125)

Symptoms	Variables	% of respondents in different study areas				
		Gurudashpur	Birol	Mujibnagar	Ishwardi	Poba
Burnt or blotch lesions on leaves	Yes	56	60	36	28	68
	No	36	28	32	32	24
	No idea	8	12	32	40	8
Green fruit turns into brown	Yes	84	60	48	68	96
	No	16	24	24	20	4
	No idea	0	16	28	12	0
Deteriorate fruit quality	Yes	100	80	48	88	92
	No	0	0	4	4	8
	No idea	0	20	48	8	0

Table 4. Management techniques against litchi stink bug by the farmers of surveyed upazila (n = 125)

Variable	% of respondents in different study areas				
	Gurudashpur	Birol	Mujibnagar	Ishwardi	Poba
Didn't apply pesticide	0	0	0	0	0
Apply pesticide	100	100	100	100	100
Others (Handpicking, Smoke repellant)	0	5	0	0	5

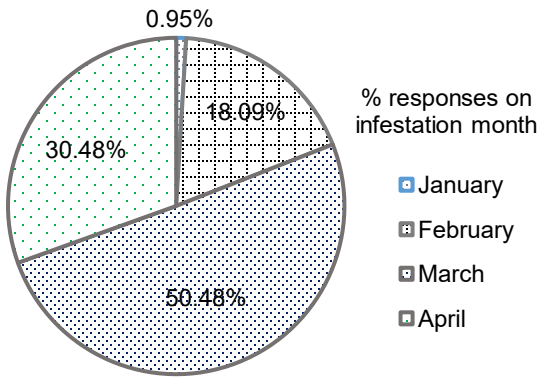

Figure 5. Litchi grower's knowledge on peak duration of litchi stink bug occurrence in northern parts of Bangladesh (n=106)

fruits (Table 3). Over 80% of respondents in Pabna, Ishwardi, and Birol, as well as all respondents in Gurudaspur, indicated that the litchi stink bug causes deterioration of fruit quality (Table 3).

Despite the severe infestation of the stink bug, all litchi growers in the surveyed upazilas used chemical insecticides from the organophosphate and neonicotinoid groups to control this transboundary pest. Besides, about 5% growers in two upazilas used traditional methods like handpicking and smoke as repellents. (Table 4).

4. Discussion

This study provides important information on the background of litchi growers and their farming practices in northern Bangladesh. Most of the respondents were male, middle-aged (36 -50 years), achieved secondary school education and have 15 years of experience. This indicates that experienced individuals with moderate education levels are main litchi producers in Bangladesh. In support of this observation, Lakshmi et al. (2023) concluded that most litchi growers in different Indian states share similar characteristics regarding experience and literacy.

The majority of litchi growers cultivated this fruit on a small scale (0.01-0.25 ha), suggesting that in the surveyed regions, litchi cultivation is mostly a small-scale enterprise, with only 8 % of growers cultivating more than 1 ha. Ibnat et al. (2022) indicated that in Bangladesh 80% of the growers allocate small areas (≤ 0.5 ha) in litchi cultivation, which supports the finding of this study. The major pests found to affect litchi crop in northern Bangladesh were identified as litchi fruit borer, litchi mite, litchi lopper, leaf roller, and bark-eating caterpillar. According to Ranjan and Kumar (2018) the litchi mite, litchi fruit borer and litchi leaf roller can cause significant damage of litchi trees that can lead to destructive effects on its leaves and its fruits. In particular, the litchi stink bug (*T. javanica* Thunberg) was confirmed to have an extensive negative impact on litchi cultivation in all surveyed areas, and the highest number of growers reporting its presence in 2017. Mondal et al. (2021) reported the first invasion of *T. javanica* in the northeastern region of Bangladesh in 2016. Similarly, Banjade et al. (2024) stated that litchi stink bug is a major pest of litchi native to tropical Asia. Kumar et al. (2022) also reported a significant rise in the incidence of litchi stink bug in Jharkhand and northeastern India in recent years.

The pest's migratory behavior and the presence of host plants were likely to have aided its movement from India to Sylhet, where the pest then established itself in the main litchi-growing regions in the northern part of Bangladesh. Ramiro et al. (2019) suggested that dispersal of sucking pest such as *Rhopalosiphum padi* and others occurs to surrounding countries as host plants distribution are similar and they provide a means of dispersal.

This pest primarily damages green fruits, inflorescences and young leaves petioles, causing significant damage for litchi farmers in the surveyed areas. Mondal et al. (2021) reported that the stink bug feeds on cell sap, flowers and fruits. Jaipal et al. (2013) also observed that *T. javanica* feeds on the xylem sap of litchi trees, causing more than 80% damage during the outbreak in Jharkhand, India. March and April were the peak months for *T. javanica* invasions. Hsu et al. (2025) reported that the winter diapause of litchi stink bug influences its seasonal movement and population dynamics, which contributes to the timing of peak infestations. Boopathi et al. (2013) suggested that environmental factors including humidity and temperature impact the prevalence of the pest, especially in summer.

The survey found that across all litchi growers in the infested upazilas, chemical insecticides (organophosphate and neonicotinoid group) were used for controlling this transboundary pest, despite the severe nature of the stink bug infestation. Choudhary et al. (2015) stated the necessity to establish effective insecticides to manage stink bug. Zeng et al. (2000) demonstrated the efficacy of a mixture of cypermethrin and chlorpyrifos in the management of adult *T. javanica.* According to Bing (2009), there is a need to improve understanding and implementation of particular preventive and control measures including insect parasitoids, biopesticides, and chemical pesticides.

Moreover, only 5% of the growers in two upazilas used traditional methods, including handpicking, and smoke as repellents. The relatively modest use of these non-chemical approaches suggests that some farmers are aware of alternative pest control. However, the limited adoption indicates that these methods are not yet well-known and IPM strategies should be promoted for sustainable management of this pest. Banjade et al. (2024) emphasized that for sustainable management of this pest, it's crucial to fully understand its identification, morphology, biology, and life history in order to develop effective and environmentally friendly control strategies.

5. Conclusion

The study was conducted to assess the distribution and management practices of the newly introduced litchi stink bug (*T. javanica* Thunberg) in northern Bangladesh, one of the major litchi growing region. The results show that most growers identified litchi fruit borer and litchi mite as the major pests of litchi trees. Additionallay, many growers reported the presence of litchi stink bug as new pest in their cultivation areas since 2017. As a sucking pest, *T. javanica* mainly damages young leaves, petioles, inflorescences and green fruits. Leaves and green fruits with blotch lesions eventually turn brown. According to growers, March is the peak month of the litchi stink bug infestation. Despite the severe infestation, all growers in the surveyed ares applied chemical insecticides in the organophosphate and neonicotinoid groups to control the pest. About 5% of growers in two upazilas also used traditional methods like handpicking and smoke repellents. But the widespread use of chemical insecticides underscores the importance of sustainable pest management practices. Further research is required to develop integrated pest management (IPM) strategies that include both chemical and non-chemical approaches to manage the threats posed by *T. javanica* in the major litchi growing region of Bangladesh.

Acknowledgment

The authors wish to thank all the AEO (Agricultural Extension Officer), SAAO (Sub Assistant Agricultural Officer) of the respected surveyed upazilas, Dr. Kamrul Hassan, Associate Professor, Department of Entomology, Tareq Ahmed, MS in Entomology and Mehedi Hasan, MS in Entomology for their emmense support throughout the research.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

References

Akter, R., Islam, M. S., & Jahan, H. 2016. Profitability of litchi production in Dinajpur district of Bangladesh. *Journal of the Bangladesh Agricultural University*, 13(2):283–289 DOI: https://doi.org/10.3329/jbau.v13i2.28800

Banjade D, Dahal, B, Khanal D, Shrestha A. 2024. A review on biology, and integrated management practices of litchi stink bug (*Tessaratoma papillosa* Drury Hemiptera: Tessaratomidae). *Tropical Agroecosystems*, 5(2):54-57.

BBS 2023. Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics, Statistics and Informatics Division (SID), Ministry of Planning, Government of Peoples Republic of Bangladesh, Dhaka.

Bing, C. 2009. Progress in control techniques of litchi stink bug, *Tessaratoma papillosa*. Guangdong Agricultural Sciences.

Boopathi, T., Pathak, K., Ramakrishna, Y.B., Verma, A.K. 2013. Effect of weather factors on the population dynamics of litchi stink bug, *Tessaritoma papillosa* (Drury). Pest Management in Horticultural Ecosystems, 17:69-74.

Chen HB, Huang, HB 2000. China litchi industry: development, achievements and problems. In I International Symposium on Litchi and Longan, 558, pp. 31-39.

Choudhary J, Lemtur M, Naaz N, Idris M 2015. Determination of bio-efficacy of insecticides against litchi stink bug, *Tessaratoma javanica* (Thunberg) (Hemiptera: Tessaratomidae): an emerging major pest of litchi, *Litchi chinensis* Sonn. The Bioscan, 10:217-220.

Hassan M E, Chandra K, Biswas H 2014. Report of litchi stink bug, *Tessaratoma javanica* (Hemiptera: Tessaratomidae) on mahua tree in Chhattisgarh. Records of the Zoological Survey of India, 114(2):263-268

He D P 2001. On the integrated management of litchi pests in Guangdong province. South China Fruits, 30:23-26.

Hsu M, Tsai Y, Wang L 2025. Dynamics of the Adult Litchi Stink Bugs, *Tessaratoma papillosa* (Drury) (Hemiptera: Tessaratomidae), on Four Urban Tree Species in Taipei City. Forests, 16(4):601. https://doi.org/10.3390/f16040601

Huang Y (2005) The preliminary analysis on the geographical division of litchi pest in China. J Central-South For Coll, 25(2):78–80.

Ibnat A, Ahmed M B, Jaman S, Amin M R 2022. Present scenario and problems of litchi cultivation in Meherpur District of Bangladesh. South Asian Journal of Agriculture, 8(1-2):20-28.

Jaipal S, Choudhary J, Chandra S, Prabhakar C, Moanaro M, Das B, Kumar S 2013. Litchi stink bug (*Tessaratoma javanica*) outbreak in Jharkhand, India, on litchi. Phytoparasitica, https://doi.org/10.1007/S12600-012-0265-X

Kumar A, Srivastava K, Patel R K, Nath V 2014. Management of litchi fruit borer and litchi mite using bio-rational approaches under subtropics of Bihar. The Ecoscan, 8(6):285-289.

Kumar V, Dubedi A K, Nath V 2014. Prevalence of some threatening pests and diseases of litchi (*Litchi chinensis* Sonn.) in Bihar state of India. Journal of Applied Horticulture, 16(3).

Kumar V, Kumar A, Nath V 2011. Emerging pests and diseases of litchi (*Litchi chinensis* Sonn.). Pest Management in Horticultural Ecosystems, 17(1):11-13.

Kumar V, Choudhary J S, Pande S 2022. Litchi stink bug in Bihar: Status, threats and management strategy. Indian Horticulture, 9-11.

Lakshmi R, Singh AK, Shelar R 2023. Knowledge and adoption of good management practices among litchi farmers in Muzaffarpur district of Bihar. Indian Journal of Extension Education, 59(4):130–134.

https://doi.org/10.48165/ijee.2023.59426

Li DS, Liao C, Zhang BX, Song ZW 2014. Biological control of insect pests in litchi orchards in China. Biological Control, 68:23-36.

Lu F 2006. Toxicity of neem seed extract to *Tessaratoma papillosa* (Drury) relative to its allozyme genotypes. Kun chong xue bao. Acta Entomol Sin, 49(2):241–246.

Menzel C 2002. The lychee crop in Asia and the Pacific. RAP publication, 16.

Mondal M, Ahmed J, Hassan K, Khan MAM 2021. First report of litchi stink bug (*Tessaratoma javanica* Thunberg) outbreak in Bangladesh. International Journal of Tropical Insect Science, 41(1):383-387.

Papademetriou M, Dent F 2002. Lychee production in the Asia-Pacific region. Regional Office for Asia and the Pacific. 2002. Food and Agriculture Organization. RAP publication, 4.

Parveen S, Choudhary JS, Thomas A, Ramamurthy VV 2015. Biology, morphology and DNA barcodes of *Tessaratoma javanica* (Thunberg) (Hemiptera: Tessaratomidae). Zootaxa, 3936(2):261-271.

Ranjan, R., & Kumar, V. 2018. Varietal reaction against the incidence of major pests of litchi (*Litchi chinensis* Sonnerat). Journal of Entomology and Zoology Studies, 6(5), 131–133.

Schulte MJ, Martin K, Sauerborn J 2006. Effects of azadirachtin injection in litchi trees (Litchi chinensis Sonn.) on the litchi stink bug (*Tessaratoma papillosa* Drury) in northern Thailand. Journal of Pest Science, 79(4):241-250.

Taher MA, Uddin MM, Islam KS, Rahman MA 2021. Efficacy of different approaches to control litchi fruit borer. Bangladesh Journal of Agricultural Research, 46(2):143-151.

Tahmiduzzaman M, Ahmed J, Khan UMH, Nandi M, Ahmed T, Mondal MF 2024. Dispersion of newly found litchi stink bug (*Tessaratoma javanica* Thunberg) in northern parts of Bangladesh. International conference on entomological research and development in last fifty years: challenges and way forward, p66.

Waite GK, Hwang JS 2002. Pests of litchi and longan. Tropical fruit pests and pollinators: biology, economic importance, natural enemies and control, 331-359.

Zeng XN, Deng D, Wang JM 2000. Chlorpyrifos and cypermethrin for the control of litchi stink bug (*Tessaratoma papillosa*). In I International Symposium on Litchi and Longan, 558:421-423.