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First Report of Sap Sucking insect pests on *Dalbergia latifolia* (Roxb.) from Non natural Growing Region of India

Insect pests infesting Dalbergia latifolia were documented within plantations located in non-native regions of India. Although D. latifolia has been introduced to various regions in India, there is a lack of comprehensive research on insect pest record. To evaluate the prevalence of insect pests in newly established growth areas of D. latifolia, systematic observations were conducted in Uttarakhand. Many insect pests infesting D. latifolia were recorded so far, though infestation of four insect pests, namely Ricania speculum, Leptocorisa acuta, Leptocentrus taurus, and Dorsicha stebbingi, on Dalbergia latifolia were exhibited for the first time. The research also uncovered the nature of the damage inflicted by these insect pests and their seasonal occurrence patterns. This periodic data on insect pest infestations can prove invaluable for the sustainable management of insect pests and the preservation of D. latifolia in the region.

Key words: *Dalbergia latifolia*, Rosewood, Defoliators, New records, Sap suckers.

Infestation of four sap sucking insect pests, namely Ricania speculum, Leptocorisa acuta, Leptocentrus taurus and Dorsicha stebbingi, on Dalbergia latifolia were exhibited for the first time in Uttarakhand.

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Introduction

Indian rosewood, *Dalbergia latifolia* (Roxb.) a native species of India, Nepal, and Indonesia, exhibits a broad geographical presence like Kenya, Malaysia, Myanmar, Nigeria, the Philippines, Sri Lanka, Tanzania, Vietnam, of Southeast Asia (Sujatha *et al*., 2008 and Orwa *et al*., 2009). *D. latifolia* is natively predominantly scattered population distributed in the low-elevation deciduous tropical monsoon forests of central and southern part of peninsular Indian in the mixed forests thriving at altitude ranging from 900 to 1350 meters above sea level (Sasidharan *et al*., 2020).

Dalbergia latifolia is one of the quality timbers yielding species known for its grain quality, strength, natural dark colour worldwide, which is used for making panel, decorative articles, furniture, musical instruments and other multiple products. The species is also having multiple medicinal properties, as its bark is used for source of tannin in medicine industry (Anon., 2018; Damaiyani and Prabowo, 2019; Chaterjee *et al*., 2020). The demand for this species increased resulting in its over exploitation in India (Orwa *et al*., 2009; Treanor, 2015). Due to poor regeneration, slow growth and long rotation period *D. latifolia* categorized as threatened species under IUCN red data list. With the aim to increase its population in other part of the country introduction trails of *D. latifolia* was established in Uttarakhand during 2003 to 2010 by state forest department and subsequently in the year 2019 by the ICFRE, but insect pest infestation study was not undertaken in this region. Though, it has been recorded that more than forty insect pests pose threat to *D. latifolia* and quality, growth and productivity of this species are adversely affected by frequent outbreaks of insect pests. There are some sucking insect pests *viz*. *Karria lacca* Kerr, *Lecanium hesperidum* Linn, *Gragara sordid* Fun., *Oxyrachis mangiferana* Dis., *Oxyrachis trandus* Fun. were previously recorded from *D. latifolia*. Apart from these other insect pest *viz. Achaea janata* Linnaeus, *Anomala dalbergiae* Arrow (leaf feeding beetle), *Anisodes obrinaria* Guenee, *Anoba polyspila* Walker, *Argyroploce aprobola* Meyrick

(Eucosmidae), *Aulacophora fovecollis* Lucans beetle, *Bocchoris onychinalis* Guenee, *Charaxes polyxena* Moore, *Clanis titan titan* Rothschild & Jordan (Sphingidae), *Cosmotriche laeta* Walker (Lasiocampidae), *Dasychira dalbergiae* Moore (Lymantriidae), *Ectropis bhurmitra* Walker (Geometridae), *Ericeia inangulata* Guenee, *Hamodes aurantiaca* Guenee, *Hapsifera rugosella* Stainton (Tineidae), *Labdia molybdaula* Meyrick (Cosmopterygidae), *Lamprosema imphealis* Walker, *Maruca testulalis* Geyer, *Metachrostis trigona* Hampson, *Midea rectalis* Walker, *Mocis undata* Fabricius, *Nephopteryx* sp. (Pyralidae), *Neptis viraja* Moore (Nymphalidae); *Opogona xanthocrita* Meyrick (Lyonetiidae), *Plecoptera quaesita* Guenee, *Plecoptera reflexa* Guenee, *Rhesala imparata* Walker (Noctuidae), *Spataloides costalis* Moore (Notodontidae), *Striglina scitaria* Walker (Thyrididae) (lepidopteran defoliators), and *Tapena thwaitesi* Moore (Hesperiidae) (Beeson, 1941; Mathur and Singh, 1959, Chatopadhyay, 2021) were also recorded from different part of the country. Hence, the study was undertaken in this study to find out the insect pests fauna associated with *D. latifolia* seasonal occurrence and their nature of damage in Uttarakhand, India.

Material and Methods

The present study was done on the plantation established in the year 2010 by the state forest department, Uttarakhand at Forest Research Centre Lalkuan, Silva Sal unit Haldwani, lies (Fig. 1) at lat 29°03'50.5"N to long 79°30'55.3" E and the nursery established at New Forest campus, Forest Research Institute, Dehradun lies at lat 30°20' 31.56" N and long 77°59' 50.28" E in the state of Uttarakhand, India. The investigation was done over nursery at New Forest Campus and eleven year old plantation at Lalkuan site of *D. latifolia* round the year from 2021-2023. Weekly field visit was done for record and collection of insect pests and observe their nature of damage and seasonality. Sap sucking insect pest associated *D. latifolia* were observed, collected and their nature of damage was recorded in the field. Seasonality of the insect pest infestation was recorded on monthly basis. Collected insect pests were brought to the laboratory for correct identification and adult stages were preserved for further record. Field photo of insect pest and their nature of damage were captured using digital DSLR camera and some of the pictures were captured under steriozoom microscope Leica M205 fitted with MC190 camera.

Results

The result presented in Table 1 revealed that *D. latifolia* was found to be infested with four insect pests of Hemiptera order and their nature of damage was also recorded.

***Ricania speculum* Walker:** The adult has dark brown wings with central wavy horizontal bands and irregular transparent patches of different sizes. The precostal area of the forewings showed dense transverse veinlets and the costal margin was distinctly convex near the base (Fig. 2C and D). Infestation of this bug was recorded from New Forest Campus and FRC Lalkuan under plantation. Both the nymph and adult were found feeding on the tender parts of the plants.

***Leptocorisa acuta* Thunberg:** The bug was greenish yellow to yellow-brown in colour (Fig. 2E and F). Head was longer than wide, rostrum relatively shorter; the scutellum (triangular shaped plate) was found on the thorax, posterior to the pronotum. The fourth antennal

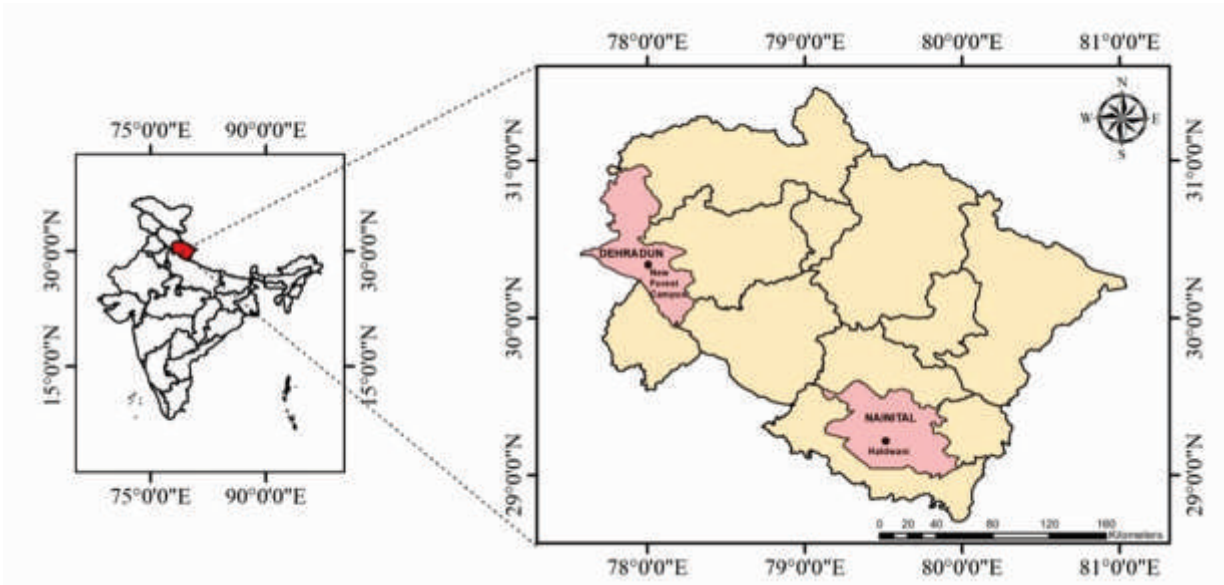

Fig. 1: Insect pest survey and study area of *D. latifolia.*

segment was curved. Infestation of this bug was recorded from FRC Lalkuan under plantation. Both nymph and adults were found to be feeding on leaves and tender shoots of the plant. Nymph feed gregariously on the tender shoots, resulted in wilting and drying of tender shoots.

***Leptocentrus taurus* Fabrichus**: The insect commonly known as tree hopper, triangular shaped body measured 4-7 mm long, yellow eyes, winged with three pairs of legs, two curved horns like projections on the thorax (Fig. 2A). Infestation of this hopper was recorded from aerial apical parts of *D. latifolia* from FRC Lalkuan plantation. Both nymph and adult suck the plant sap from tender parts of the plant. The hopper fed on apical portions of the shoot apices, making them rough and woody in appearance, brown in colour that gradually dried and apical leaves shed off.

***Drosicha stebbingi* Green:** Commonly known as mango mealy bug of about 1.0-1.5 cm long, oval white body (Fig. 2B). Infestation of this bug was recorded from FRC Lalkuan under plantation only. The nymph and adult the stages were observed to be infesting on tender parts of the plant. The late instar nymph and adult female was flat, oval and waxy white. They remained stationary and adhered to the total length on shoots. Infested shoot part was covered by the sooty mould.

The seasonal incidence (Table 2) of *R. speculum* was recorded during hot months of May to July, while the infestation of *L. acuta* was recorded during April to August. The infestation of *L. taurus* was recorded during March to October, while infestation of *D. stebbingi* was recorded to be during premonsoon to monsoon period from February to August.

Discussion

Global climatic changes can influence the expansion of insect pests' ecological niches and host ranges, contributing to a dynamic evolutionary process. Notable studies by Bernays and Chapman (1994); Janz *et al*. (2006); Van *et al*. (2004) emphasize the potential impact of climate change on the behavior and distribution of herbivorous insects. Herbivorous insects seeking to expand their range often necessitate behavioral adaptations for success, as indicated by research such as that by Henniges-Janssen *et al*. (2011). Unfortunately, there is often a lack of systematic evaluation regarding the geographical and host range extensions of insect pests in forestry. This knowledge gap poses challenges in predicting and effectively managing potential pest outbreaks. In the case of *Dalbergia latifolia*, frequent insect pest outbreaks negatively impact the quality, growth, and productivity of this tree species.

Leptocentrus taurus was found to be feed on apical part of *D. latifolia* first time, though this insect pest was recorded on *Dalbergia sissu*, *Zizyphus jujuba* and on *Solanum melongena*, Parthenium hysterophorusin Tamilnadu, India from India (Thangavelu, 1980; McKamey, 2017; Biswas *et al*., 1994; Kumar, 2017). Authors have recorded that female of this insect lay egg in the tender shoots and both nymph and adult feed gregariously on tender shoot. The insect species was found everywhere in the province and found very common.

Leptocentrus taurus was observed feeding on the apical part of *Dalbergia latifolia* for the first time. Although this insect pest had previously been documented on *Dalbergia sissoo, Zizyphus jujuba, Solanum melongena,* and *Parthenium hysterophorus* in Tamil Nadu, India (Thangavelu, 1980; McKamey, 2017; Biswas *et al*., 1994; Kumar, 2017), our findings revealed a novel occurrence on *D. latifolia*. Our research indicates that the female of this insect lays eggs in tender shoots, and both nymphs and adults exhibit gregarious feeding behaviour on these shoots. The insect species was observed ubiquitously in the province and appeared to be very common.

Kumar (2017) also noted that both adults and nymphs were found to extract sap from tender parts, especially during the period from March to June. In

Table 1 : Sap sucking insect pests infesting *D. latifolia* in Uttarakhand and their nature of damage.

S. No.	Species	Order	Family	Nature of damage
1.	*Ricania speculum* Walker	Hemiptera	Ricanidae	Sap sucker
2.	*Leptocorisa acuta* Thunberg	Hemiptera	Alydidae	Sap sucker
3.	*Leptocentrus taurus* Fabrichus	Hemiptera	Membracidae	Sap sucker
4.	*Drosicha stebbingi* Green	Hemiptera	Margarodidae	Sap sucker

Table 2 : Seasonal incidence of Insect pest infesting to *D. latifolia*

S. No.	Insect species	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.
1	*Ricania speculum* Walker				P	P	P	P			
2	*Leptocorisa acuta* Thunberg				P	P	P	P	P		
3	*Leptocentrus taurus* Fabrichus			P	P	P	P	P	P	P	P
4	*Drosicha stebbingi* Green		P	P	P	P	P	P	P		

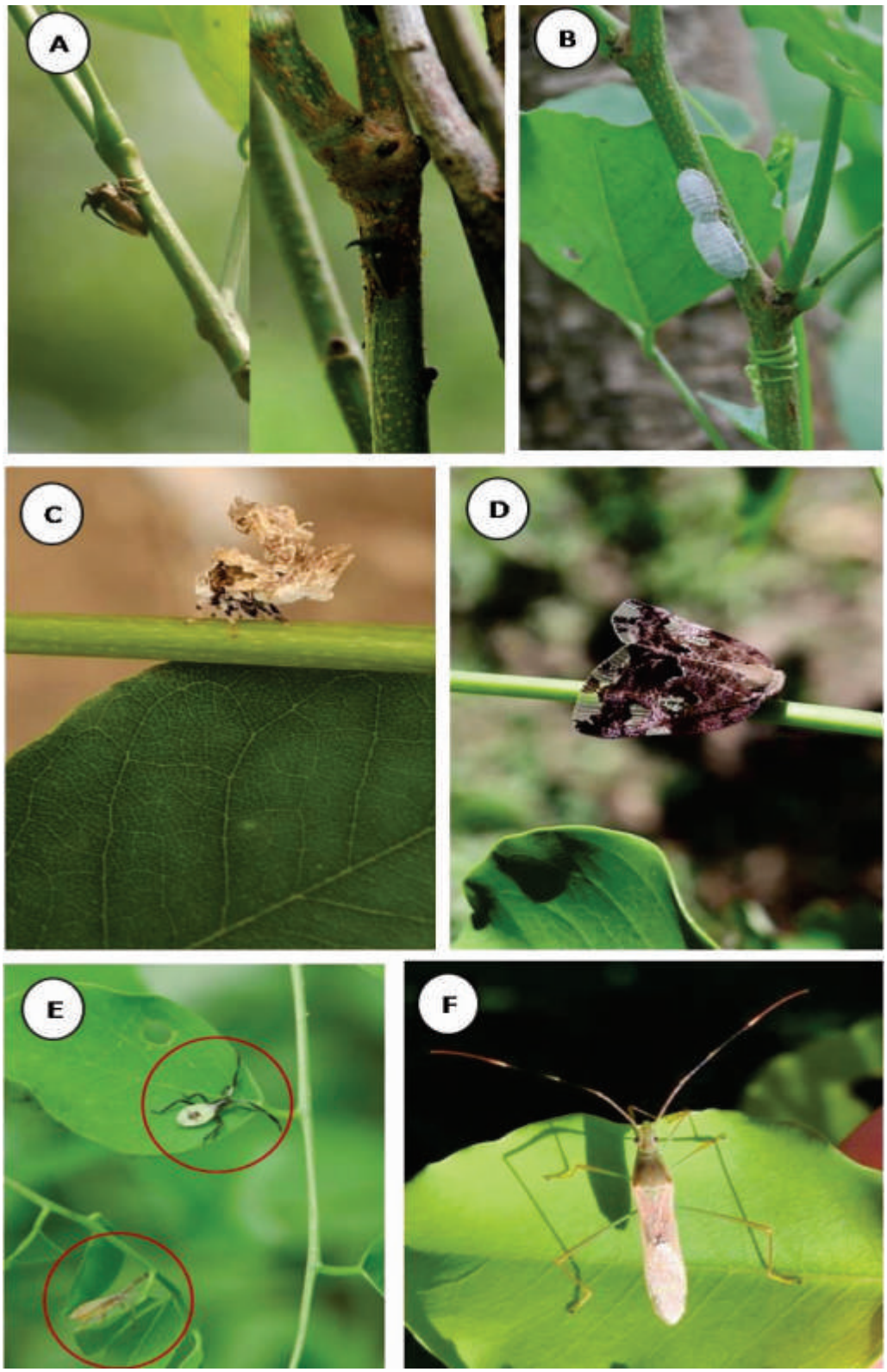

Fig. 2 (A-F) : Sap sucking insects feeding on *Dalbergia latifolia*. **A.** *Leptocentrus taurus*; **B.** *Drosicha stebbingi*; **C&D**. Nymph & Adult of *Ricania speculum*; **E&F.** Nymphs & Adult of *Leptocorisa acuta*.

Jharkhand, approximately 91% of *D. sissoo* plants were infested during this time. *Drosicha stebbingi*, in both nymph and adult stages, extracts plant sap from the stem. This species is a significant polyphagous sap-sucking pest affecting forestry, horticulture, and agriculture species. Its documented infestations include *Shorea robusta, Mangifera indica, Carica papaya, Zizyphus jujuba, Prunus persica, Prunus domestica, Artocarpus heterophyllus, Bauhinia variegata, Helianthus annuus, Rosa indica, Althaea rosea, Citrus sp., Nerium odorum, Eugenia jambolana, Eriobotrya japonica, Vitis vinifera, Jasminum sambac, Aloizzia lebbek, Hibiscus sp., Pyrus malus, Juglans regia, Pyrus communis, Litsaea polyantha, Butea frondosa, Holarrhena antidysenterica,* and *Mallotus philippinensis* (Dutt, 1925; Latif, 1949; Beeson, 1941). The rice ear bug, *Leptocorisa acuta*, poses a significant threat to rice crops in India. Both nymphs and adult bugs have been observed feeding on young tender plant parts in various locations. Our observations at the FRI nursery and Lalkuan indicate instances of both nymphs and adults feeding on the young tender parts of plants. *L. acuta* has also been documented infesting *Dalbergia sissoo*, causing considerable damage by extracting sap from tender shoots and leaves in nurseries and young plantations in Jharkhand (Chattopadhyay, 2021). Additionally, it has been reported on *Calotropis procera* in Madhya Pradesh (Chandra *et al*., 2011) and on nutmeg trees by Abraham and Mony, 1977.

This study identifies *Ricania speculum* as a new insect pest of *Dalbergia latifolia* in India. This hopper, commonly known as the black plant hopper, is distributed mainly in Asia, Australia, and tropical Africa (Mazza *et al*., 2014; Rossi and Lucchi, 2015). It has been recorded in various locations, including Genoa and La Spezia, China, Indonesia, Japan, Korea, Philippines, Taiwan, and Vietnam (Bourgoin, 2016). R. speculum is a broadly polyphagous pest; its females lay eggs in the woody twigs of many host plants, and the nymphs subsequently feed on the sap of the plant as they develop (Mazza *et al*., 2014; Rossi and Lucchi, 2015; Rossi *et al*., 2015)

भारत के गैर-प्राकृतिक रूप से उगने वाले क्षेत्र से *डालबर्गिया लैटिफोलिया* (रॉक्सब) पर रस चूसने वाले कीटों की पहली रिपोर्ट

अरविंद कुमार और नेहा राजवार

सारांश

भारत के गैर-देशी क्षेत्रों में स्थित बागानों में *डालबर्गिया लैटिफोलिया* को संक्रमित करने वाले कीटों का दस्तावेजीकरण किया गया। हालाँकि *डी. लैटिफोलिया* को भारत के विभिन्न क्षेत्रों में लाया गया है, फिर भी कीट रिकॉर्ड पर व्यापक शोध का अभाव है। *डी. लैटिफोलिया* के नए विकसित क्षेत्रों में कीटों की व्यापकता का मूल्यांकन करने के लिए, उत्तराखंड में व्यवस्थित अवलोकन किए गए। अब तक *डी. लैटिफोलिया* को संक्रमित करने वाले कई कीटों का रिकॉर्ड किया गया है, हालाँकि *डालबर्गिया लैटिफोलिया* पर चार कीटों, अर्थात् *रिकेनिया स्पेकुलम, लेप्टोकोरिसा एक्यूटा, लेप्टोसेन्ट्रस टॉरस* और *डोर्सिचा स्टेबिंगी* का संक्रमण पहली बार प्रदर्शित किया गया। इस शोध में इन कीटों द्वारा पहुँचाए गए नुकसान की प्रकृति और उनके मौसमी उपस्थिति पैटर्न का भी पता चला। कीटों के आक्रमण पर यह आवधिक डेटा कीटों के स्थायी प्रबंधन और क्षेत्र में *डी. लैटिफोलिया* के संरक्षण के लिए अमूल्य साबित हो सकता है।

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