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RESEARCH PAPER

New Record of the Lac Insect (*Kerria spp.*) Infestation on Ornamental Plant Snow Bush (*Euphorbia leucocephala*) from Lucknow City

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ABSTRACT

Euphorbia leucocephala, commonly known as Snow Bush, is a widely cultivated ornamental shrub valued for its delicate white bracts and aesthetic appeal in tropical and subtropical landscapes. However, its ornamental significance is increasingly threatened by infestation from lac insects (*Kerria spp.*), which are traditionally recognized for producing natural resin used in commercial industries. When colonizing ornamental plants, these sap-sucking insects extract vital nutrients, leading to physiological stress, reduced vigor, and aesthetic deterioration. Symptoms of infestation include chlorosis, stunted growth, leaf yellowing, premature defoliation, and accumulation of honeydew, which promotes sooty mold development on leaves and stems. This not only diminishes the plant's photosynthetic capacity but also lowers its ornamental value. Infestations are favoured by warm, dry conditions and can spread rapidly through nursery stock or adjacent infested hosts. Management strategies emphasize early detection, pruning of infested branches, and application of horticultural oils or systemic insecticides within an Integrated Pest Management (IPM) framework.

HIGHLIGHTS

- A new record of lac insect infestation on ornamental plant.
- Lac insect showing adaptability as per available host plant.
- Finding suggest lac insect plasticity for survival.

Keywords: Lac insect, ornamental shrub, milky sap, infestation, Pest Management, plasticity

Ornamental shrubs contribute substantially to urban landscapes, private gardens, and public green spaces by providing aesthetic value, microclimate benefits, and habitat for urban biodiversity. *Euphorbia leucocephala* (Snow Bush) is commonly planted for its profuse white bracts and compact habit. The horticultural value depends on visual quality, even low-intensity pest damage can result in substantial economic and aesthetic loss. Sap-feeding insects, including aphids, mealybugs, and scale insects, are frequent pests on ornamentals; among these, lac insect's (genus *Kerria*) are notable in tropical subtropical regions for their resin production and for sometimes colonizing non-traditional hosts (Borah and Garkoti, 2020; Bashir *et al.* 2022). Nutritious sap inside the plant's make susceptibility to infestation by lac insects, particularly those of the *Kerria* genus. These tiny scale insects are well-known for producing natural resin lac which has been harvested historically for varnishes, dyes, and various commercial products. However, lac insects' role shifts dramatically when present on ornamental plants. As sap-sucking pests, they embed themselves into the plant's tissue,

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siphoning vital nutrients, reducing energy reserves, and impairing growth.

Compounding the situation, lac insects secrete honeydew a sticky, sugary exudate that fosters the growth of sooty mold on leaves and stems. This secondary problem diminishes photosynthesis, further weakens the plant, and obscures its characteristic white bracts. The blemished foliage and denser canopies of soot-covered leaves can significantly diminish the garden value of Snow Bush, turning an ornamental gem into a disfigured, coated silhouette (Sharma, 2017).

Understanding the dynamics of lac insect infestation on *Euphorbia leucocephala* requires appreciating both ecological interplay and horticultural context. These insects often colonize via wind, nearby infested hosts, or inadvertent transfer through nursery material. Once settled, their populations can escalate swiftly during warm, dry periods, when natural predators like lady beetles or parasitic wasps may be less active or abundant. Moreover, the milky latex typical of *Euphorbia* species can complicate detection, as initial infestations may remain subtle until populations swell.

TAXONOMY

Lac insects (Hemiptera: Kerriidae; commonly *Kerria lacca* in India) are obligate phloem feeders. They have a life cycle that includes a mobile "crawler" first instar that locates feeding sites on branches and then becomes sedentary while forming resinous encrustations (lac) (Gullan and Kondo, 2007; Rajgopal *et al.* 2021). Lac is an animal-derived natural resin used historically for shellac and dye, and lac culture is of commercial and socio-economic importance in South and Southeast Asia. India remains a major producer of lac (Sharma,2018; Thombare *et al.* 2022). These insects display sexual dimorphism with distinct life cycles: males undergo complete metamorphosis and remain mobile, while females experience incomplete metamorphosis, are immobile, and produce the majority of lac resin (Mishra *et al* 2016; Mohanasundaram *et al.* 2019). Typically, lac insects are bivoltine, yielding two generations annually one from July to December and another from January to June (Ramani and Sharma, 2016). Adult females are the primary source of economically valuable lac (Chen *et al.* 2008).

Although commercial lac production focuses on traditional hosts (e.g., *Butea monosperma*, *Schleichera oleosa*, *Ziziphus mauritiana*), the genus *Kerria* is polyphagous with hundreds of recorded host species worldwide. Non-host and ornamental plants can be colonized accidentally or when lac insect populations are dense and dispersal conditions favour spread. Such incidental infestations may not support high lac yields but can nonetheless cause plant stress and reduce ornamental quality (Sharma, 2017).

MATERIALS AND METHODS

A survey from January to December 2024 was carried out at Isabella Thoburn College, Lucknow, Uttar Pradesh, to assess lac insect infestation on Snow Bush (*Euphorbia leucocephala*). Out of 17 plants examined, three were found infested with lac insects. Infested twigs of Snow Bush were collected from the college campus (26.871°N, 80.943°E) and preserved in 70 % ethyl alcohol for further analysis. Adult stages of the insects were extracted from lac cells by immersing them in chilled 70% ethanol. The preserved specimens were processed to prepare permanent slides (Varshney, 1976 and Sirisena *et al.* 2013). For anatomical studies, samples were treated with 10% potassium hydroxide and later stained with carmine alum. Dehydration was carried out through graded concentrations of ethanol, after which the specimens were mounted in Canada balsam for taxonomic identification. Observations and illustrations were made under a compound microscope, and photographs were captured using an iQOO Z9 camera attached to the microscope.

RESULTS AND DISCUSSION

A field survey was conducted in Lucknow city at Isabella Thoburn College to assess the occurrence of lac insect infestation on the ornamental plant Snow Bush (*Euphorbia leucocephala*). A total of 17 plants were examined across the different areas of the college campus. Out of these, 3 snow bush plants (17.65%) were found to be infested by lac insects (*Kerria spp*.) while the remaining 14 plants were free from visible colonization (Table 1 and Graph 1). This indicates that the lac insect infestation on Snow Bush in the study area is rare and sporadic rather than widespread.

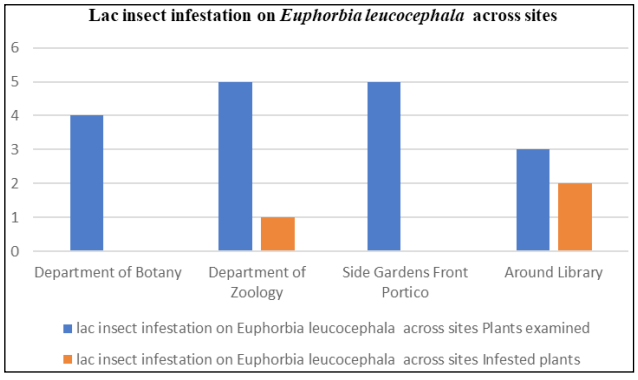
Infested plants exhibited characteristic symptoms, including encrustation of twigs with lac secretions, chlorotic patches on leaves, reduced vigor, and localized drying of branches. Honeydew deposition was also observed on heavily colonized twigs, which subsequently facilitated the growth of sooty mold on leaf surfaces. Honeydew accumulation fosters sooty mold fungi, which blacken foliage and reduce photosynthesis, further degrading plant appearance and health. Documented physiological effects on hosts include declines in chlorophyll content and altered carbohydrate allocation (Shruti Sinha *et al.* 2024). In contrast, the remaining 14 plants (82.35%) showed no signs of infestation, indicating a rare and scattered occurrence of lac insects on *Euphorbia leucocephala* in the study area (Table 1).

Table 1: Lac insect infestation on *Euphorbia leucocephala* across sites college campus

Site type	Plants examined	Infested plants	Incidence (%)
Department of Botany	4	00	0.00
Department of Zoology	5	01	20.00
Side Gardens of Front Portico	5	00	0.00
Around Library	3	02	66.67
Overall Total	**17**	**03**	**17.65**

The low incidence of infestation suggests that *Euphorbia leucocephala* is not a common host for lac insects in Lucknow. However, the presence of even a few cases highlights the ability of *Kerria spp.* to colonize non-traditional ornamental hosts under favourable ecological conditions. Similar low incidence of lac insect occurrence on non-traditional hosts has been noted in other parts of India, where *Kerria lacca* primarily prefers commercial hosts such as *Schleichera oleosa, Butea monosperma,* and *Ziziphus mauritiana* (Ramani and Sharma, 2010; Ghosh *et al.* 2017). The detection of infestation on an ornamental shrub like *Euphorbia leucocephala* thus highlights its capacity to serve as an occasional or accidental host.

Lac insect infestation on Snow Bush (*Euphorbia leucocephala*) negatively affects plant growth, primarily through resource diversion and physical damage caused by feeding and resin secretion. Plants show reductions in leaf biomass by 22–37% at moderate infestation levels and even greater declines at high densities, leading to stunted or less vigorous growth. Characteristic symptoms include twig encrustation, chlorotic leaf patches, diminished vigor, branch drying, honeydew deposition, and sooty mold development (Fig. 1A and 1B). In the infested Snow Bush, total plant and leaf biomass are significantly reduced, especially at early infestation stages. Loss of chlorophyll content is common, making photosynthesis less efficient and further limiting growth and health. The negative impact is density dependent: moderate infestations cause mild reductions, while heavy infestations result in dramatic biomass loss. Encrusted twigs from lac resin impair nutrient and water transport, aggravating stress and causing branch dieback. Chlorotic (yellow) leaf patches and localized drying reflect impaired photosynthesis and premature leaf senescence (Fig. 1B). Honeydew excreted by insects facilitates sooty molds, further interfering with plant metabolism and visual quality. Infestation of lac insects on *Euphorbia leucocephala* poses a unique challenge. Infested plants exhibited localized twig encrustations formed by lac insect secretions. The encrustations were reddish-brown to dark brown in colour, firmly attached to young branches. Affected twigs showed chlorosis and leaf yellowing (Figure 1B), with reduced vigor compared to uninfected counterparts. Honeydew secretion was observed beneath infested twigs, and in two plants, sooty mold growth was noted on leaf surfaces, reducing their ornamental appeal. While the overall plant health of moderately infested individuals was not severely compromised, aesthetic quality was markedly reduced due to blackened leaves and twig discoloration (Fig. 1A,1B). In severe infestations, affected *Euphorbia leucocephala* may display stunted shoots, foliar chlorosis, and premature leaf drop, compromising both health and visual appeal. After some time, the snow shrub plants dried and fell (Fig. 2A).



Graph 1: Lac insect infestation on *Euphorbia leucocephala* across sites college campus

Fig. 1: Summer generation of Lac insect (*Kerria* spp.) infestation on ornamental plant Snow Bush (*Euphorbia leucocephala*), **1A and 1B** Lac encrustation on snow bush plant (Red arrow) and yellow leaf (Yellow arrow)

Lac insects (*Kerria lacca*) are known to infest over 400 plant species, but fresh documentation of their expansion to ornamental *Euphorbia leucocephala* is rare. The present field study revealed a rare occurrence of lac insect infestation (*Kerria spp.*) on *Euphorbia leucocephala* (Snow Bush) in the surveyed area. The findings indicate that lac insects do not generally prefer *Euphorbia leucocephala* as a host in this region, but under favourable ecological conditions, they are capable of sporadic establishment (Fig. 2B).

The low infestation rate in this study (17.65%) aligns with regional surveys in Maharashtra and other Indian states, which have shown occasional, scattered infestations of lac insects on various ornamentals, but the most common hosts remain *Butea monosperma*, *Schleichera oleosa*, and *Ziziphus mauritiana* ((Ramani and Sharma, 2010; Singh *et al.* 2021; Bhatnagar *et al.* 2022). The occasional colonization of *Euphorbia leucocephala* suggests a host plasticity that allows lac insects to utilize alternative plants when ecological conditions support their survival. Such sporadic infestations on ornamentals have been reported in other parts of India, though with variable intensity depending on host availability and climatic conditions.

The moderate lac insect infestations (levels I–II) led to a reduction of 22–37% in leaf biomass, while higher infestation levels (III–IV) caused as much as 62–69% biomass loss during the early stages on host plants. Comparable impacts, including reduced growth, weakened branching, and partial dieback, were noted in *Euphorbia leucocephala* under severe infestation (Shruti Sinha *et al.* 2024). Ramani and Sharma (2010) and Ramani *et al.* (2008) documented new host records of *Kerria lacca* on ornamental plants, including *Calliandra surinamensis* and *Euphorbia pulcherrima*, highlighting the capacity of lac insects to expand onto non-traditional, ornamental plants under favourable conditions (Aditya *et al.* 2023).

A three-year survey (2014–2017) was conducted across five agro-climatic zones of Punjab to study lac insect distribution and host plant association. Infestation was most severe in the Western and Western Plain zones, moderate in the Central zone, and lowest in the Sub-mountainous regions. Major host plants recorded were *Ziziphus mauritiana*, *Ficus religiosa*, *Acacia nilotica*, and *Albizia* spp., with *Z. mauritiana* showing the highest infestation levels. *Litchi chinensis* was affected only at Ludhiana in the Central zone. The study confirmed that the wild

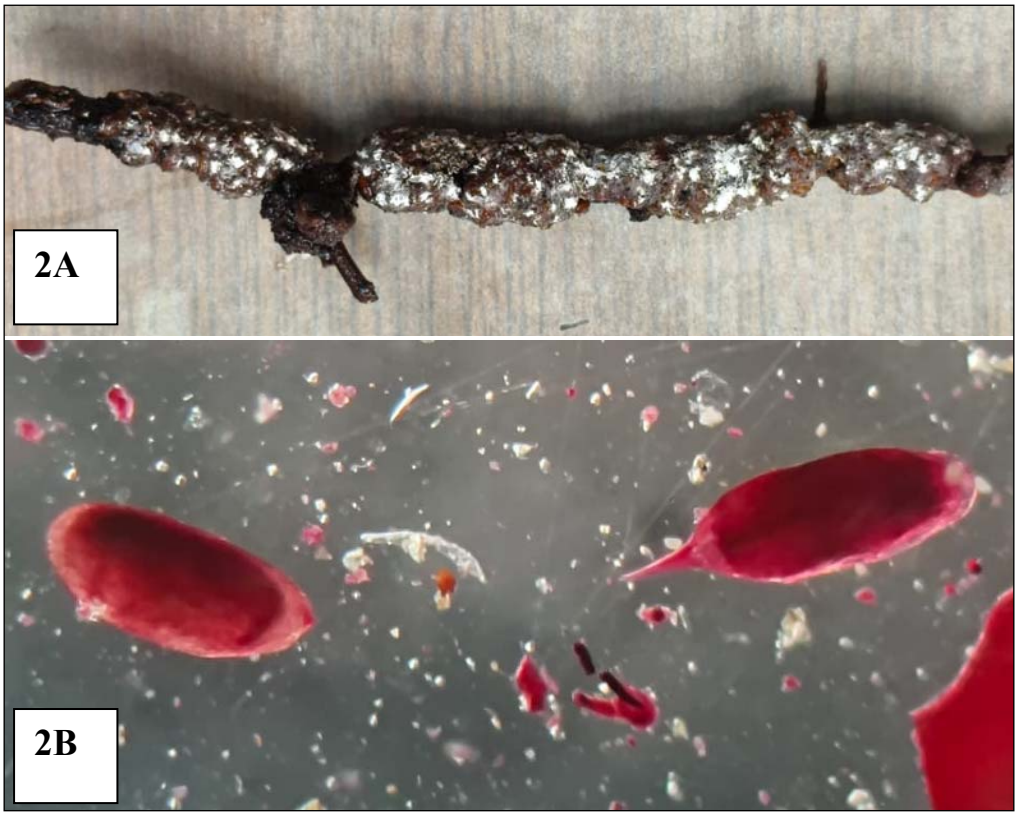


Fig. 2: (2A) A Stick lac showing Lac encrustation on twig of ornamental plant Snow Bush (*Euphorbia leucocephala*), **(2B)** Showing Early and mid-adult stage of lac insect life-cycle

Indian ber tree serves as the dominant host for lac insects across Punjab's agro-climatic zones (Sangha *et al.* 2019). The study, conducted at Agricultural College, Bapatla, Andhra Pradesh, from January to June 2023, evaluated *Flemingia semialata* as a host plant for lac insect rearing under coastal conditions. Results revealed higher settlement density, sex ratio, and crop maturity density on the lower stem portions compared to middle and upper parts, where initial mortality was greatest. The mean fecundity of females was 389.60, with an average brood lac yield of 0.76 kg and scraped lac yield of 0.35 kg. Female size averaged 1.85 mm, with a brood-to-scraped lac ratio of 2.17, confirming *F. semialata* as a promising host (Bhagyapriya *et al.* 2025).

The impact of infestation was strongly density-dependent. At moderate levels, reductions in biomass and leaf chlorophyll were evident, but plant vitality was not severely compromised. At higher infestation levels, however, stunted growth, increased branch dieback, and more pronounced chlorosis are expected, as earlier demonstrated in host-parasite interactions of lac insects (Shruti Sinha *et al.* 2024). This density-driven decline highlights the potential risk of aesthetic and physiological damage even when overall plant mortality remains low. The symptoms recorded in infested plants were consistent with earlier reports on lac insect infestations across non-traditional hosts. Twig encrustation by resinous secretions, chlorosis, reduced plant vigor, and localized drying of branches are typical indicators of stress caused by lac colonization (Ramani and Sharma, 2010; Ghosh *et al.* 2017). Plant stress responses and anatomical changes due to lac infestation, such as increased phenolics and antioxidants, have also been reported as part of host defence mechanisms, propagating effects like chlorosis, decreased vigor, honeydew, and sooty mold as found on snow plants (Shyam *et al.* 2024). The deposition of honeydew and subsequent proliferation of sooty mold were also observed, which not only reduced photosynthetic efficiency but also compromised the ornamental value of the plants. Such secondary effects are significant in ornamental species, where visual appearance is of high importance.

Interestingly, the three infested *Euphorbia leucocephala* plants displayed visible twig encrustations ranging from reddish-brown to dark brown, consistent with lac resin deposition. These deposits likely obstruct nutrient and water movement, thereby intensifying branch stress and leaf senescence. The presence of sooty mold in two cases further diminished leaf quality and ornamental appeal, suggesting that even minor infestations can substantially affect landscape aesthetics. Although branch mortality was not observed in the current sample, reports from other ornamental species indicate that severe infestations can result in dieback and long-term decline (Borah and Garkoti 2020). Given Lucknow's climate suitability for lac insects, the new infestation could have implications for ornamental plant management, the ecological expansion of commercially important insects, and the integration or threat to urban landscape diversity (Meena *et al.* 2020). Lac insects have strong host specificity, preferring certain woody plants for brood initiation and sustainable populations; non-traditional hosts like *E. leucocephala* see occasional, often accidental infestation under favourable conditions (Shruti Sinha *et al.* 2024). The field evidence from Lucknow confirms that *Euphorbia leucocephala* is a marginal or occasional host for lac insect, but sporadic colonization can locally compromise vigor and appearance (Rao *et al.* 2025). The results highlight the adaptability of *Kerria spp*. and the need for monitoring, especially where ornamental value is a priority.

The increasing urban use of ornamental shrubs such as Snow Bush elevates the importance of understanding pest dynamics outside traditional agroecosystems. Lac insects, while commercially valuable on host trees, can become aesthetic pests when they colonize ornamentals. Overall, the findings demonstrate that while *Euphorbia leucocephala* is not a preferred host; its occasional infestation by lac insects cannot be overlooked. In ornamental landscapes, where plant health and visual quality are crucial, even low levels of infestation may lead to economic and aesthetic losses. Continuous monitoring and ecological assessment are therefore recommended to understand the conditions that facilitate such host shifts.

CONCLUSION

Lac insect infestation on *Euphorbia leucocephala* diminishes its ornamental value through sap extraction, honeydew deposition, and sooty mold development. Early detection, by examining branch tips, leaf undersides, and bract axils for resin-coated clusters, is crucial for management. Mechanical approaches such as pruning or brushing can reduce infestation levels, while horticultural oils and insecticidal soaps offer eco-friendly alternatives. In severe cases, systemic insecticides or biological control agents may be used under integrated pest management (IPM). With the growing significance of ornamental horticulture, particularly in India, the unintentional colonization of *Euphorbia leucocephala* by lac insects requires prompt attention for sustainable landscape management.

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