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MORPHO-PHYSIOLOGICAL STUDY OF LAC INSECT HOST PLANTS KUSUM (SCHLEICHERA OLEOSA) ICAR-Indian Institute of Natural Resins and Gums, Ranchi, Jharkhand India 1 Principal Scientist; 2 S...

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**ABSTRACT**

Schleichera oleosa is one of the major lac host species in India. Growth performances and morphological parameters were assessed during 2017 - 2018 at Ranchi located in the humid subtropical part of India. A total of 94 kusum (*Schleichera oleosa*) plants in Ranchi region were studied for their morpho-physiological characteristics viz., root collar diameter, main stem diameter and main branch diameter, petiole number/branch, leaflet number/petiole and Leaflet area. Stem thickness grouped as low (> 50 cm), medium (51- 75 cm), large (76-100 cm) and very large range (< 101 cm) of main stem collar diameter. Observation illustrated that maximum trees (40) lie in low range (up to 50 cm) followed by medium (24), large (22) and very large range (8). The mean root collar diameter, main stem diameter and main branch number was observed maximum in very large range of main stem collar diameter. Mean of petiole number/branch was observed higher in large and very large range (3.4) whereas mean leaflet number/petiole was observed higher in medium and large range and it ranged from 5.8-6.8. Mean leaflet area was found higher in large range (500.6) followed by low (488.9), medium (481.5) and very large range (468.1). Observations revealed a significant amount of variation for root collar diameter, main stem diameter, main branch diameter, petiole number/branch, leaflet number/petiole and leaflet area.

The trees have shown measurable growth responses, which were sufficient for a conclusive remark. Such variation among different populations may be due to different intensities of natural selection acting upon the traits in their natural habitat.

Key words: Afforestation; genetic variation; morpho-physiology.

INTRODUCTION

Schleichera oleosa (Lour) Merr, is commonly known as *Kusum*, an important lac host tree known for its multipurpose use of a people in form of food, feed, fuel, timber, pharmaceutical and raw materials of industries. Besides the extraction of several edible as well as non edible oils from the *Kusum* (Kundu and Schmidt, 2011), the main use of *Kusum* as the host tree of lac insect (*Kerria lacca* Kerr.) for production of natural, biodegradable and commercially important lac resin that serves as a livelihood security to millions of farmers in states like Jharkhand, Chhattisgarh, Orissa, Andhra Pradesh and West Bengal (Saha *et al.*, 2010).

The Ideotype of *kusum* plant may consist of several morphological and physiological traits which contribute to enhanced seed quality and yield. *Schleichera oleosa* vary greatly in their morpho-physiological characteristics. The size and shape of different plant parts are used for differentiating provenances (Galan, 1989). However, no systematic attempt for collecting and conserving *kusum* germplasm has been made in India. Only a few provenances are available, which are collected from different locations and perpetuated through seed and other vegetative methods of propagation. There is no literature until now which indicates that different provenances of *Kusum* differ in their morphological characteristics and growth performances.

The aim of the study was thus to determine source variation in *Schleichera oleosa* provenances from different locations in Jharkhand state of India and to identify the best sources for seed collection intending to lac cultivation and further use in future afforestation and genetic improvement schemes.

MATERIALS AND METHODS

A field experiment was conducted during 2017-18 in planted plants of *kusum* (*Schleichera oleosa*) at the Agricultural Research Farm of ICAR-Indian Institute of Natural Resins and Gums, Namkum, Ranchi and natural niche of Namkum, Ranchi, Jharkhand. In the study, kusum tree was categorized on the basis of main stem diameter in four group viz., Group I: small (up to 50 cm), Group II: medium (51-75 cm), Group III : large (76-100 cm) and Group IV: very large (< 101 cm). Altogether, 94 plants representative in terms of size and vigor were selected for the

study, and their morpho-physiological characteristics viz., root collar diameter, main stem diameter and main branch diameter, petiole number/branch, leaflet number/petiole and leaflet area were recorded (Figure 1). From each selected plant, 10 leaves were randomly collected to record their morpho-physiological characteristics. On leaves, leaflet length and leaflet width were recorded. The collected morphological data were analyzed statistically using the SPSS 13.0 software package, using Tukey's Multiple Range Test, to determine differences among *kusum* plants.

RESULTS AND DISCUSSION

Data as shown in Figure 1 illustrated that maximum tree (40) lie in low range (up to 50 cm) followed by medium (24), large (22) and very large range (8). The mean root collar diameter, main stem diameter and main branch number was observed maximum in very large range (<101 cm) of main stem collar diameter. Mean of petiole number/branch was observed higher in large and very large range (3.4) but the differences among them was non-significant whereas mean leaflet number/petiole was observed higher in medium and large range and it ranged from 5.8-6.8. Mean leaflet area was observed higher in large range (500.6) followed by low (488.9), medium (481.5) and very large range (468.1). The leaf size (length and width) showed some variation among provenances, confirming that leaf size in *Schleichera oleosa* may be used for provenance identification, as in litchi (Singh *et al.*, 1999) and guggal (Sinha *et al.*, 2012). The differences among root collar diameter, main stem diameter and main branch diameter, leaflet number/petiole and Leaflet area were observed to be significant. A higher number of branches per plant generally reflect a potential to survive under adverse conditions. The plants having more stem collar diameter have more branches per plant than the other tree, which could be interpreted as a sign of higher adaptability to the stress condition. This is corroborated with the findings of Mertia *et al.* (2010). The variation in branching type might be due to differences in adaptive features for survival under extremely fragile habitat. Vigor in stem girth is an important morphological character of any plant for long-term establishment. In this study, higher stem girth thus may have a better ability to withstand the extreme weather. Observations revealed a significant

amount of variation for their morpho-physiological characteristics. The plants have shown measurable growth responses, such variation among different populations may be due to different intensities of natural selection acting upon the traits in their natural habitat. Results of this study are important for the conservation of the genetic variation of the species and for future improvement schemes.

CONCLUSION

In this study, morpho-physiological characteristics viz., root collar diameter, main stem diameter and main branch diameter, petiole number/branch, leaflet number/petiole and leaflet area were found widely variable among themselves. A considerable amount of genetic variability also exists in this species with respect to growth performance, which offers scope for selection and breeding.

Although, it is needed wider study in different soil and weather conditions. However, these sources can safely be used for large-scale afforestation programmes in the region for enhancing lac production and productivity.

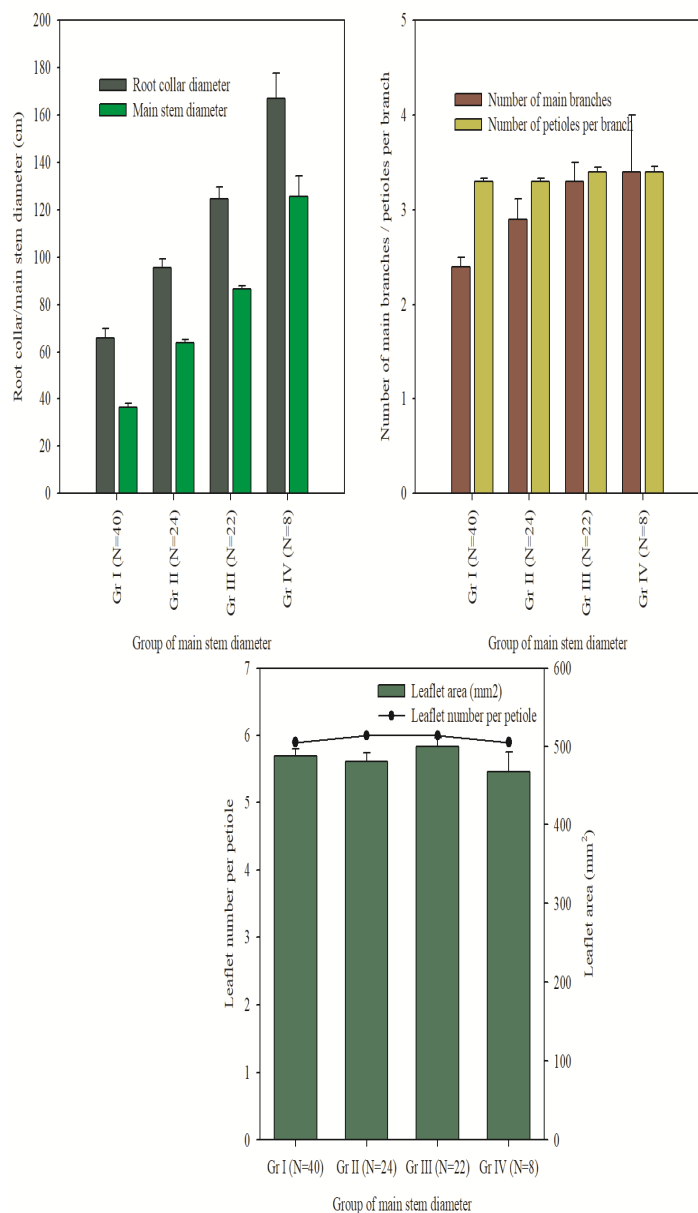


Figure 1: Morpho-physiological study of the kusum plants

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