

A Note on the Wing Petiole of Sal Seed from Tarai East Forest Division, Haldwani, Uttarakhand

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Abstract: *Sal (Shorea robusta)* is a dominant tree species in India's tropical moist and dry deciduous forests. It plays a crucial role in forest ecosystems and biodiversity conservation. This study focuses on the morphological variations in *Sal* seeds, particularly the rare occurrence of six-winged seeds in the Tarai East Forest Division of Uttarakhand. Field observations across six forest ranges revealed distinct wing patterns, with larger wings measuring between 5.6–7.2 cm and smaller ones between 3.1–4.5 cm. The study found that the occurrence of six-winged *Sal* seeds varied with temperature, being higher in areas with mean temperatures of 34–39°C. This variation may contribute to improved seed dispersal and natural regeneration, highlighting an adaptive trait of *Sal* in response to environmental conditions.

Keywords: *Sal* tree, seed morphology, forest ecology, seed dispersal, natural regeneration

1. Introduction

Sal (Shorea robusta Gaertn. f.) is one of the dominant tree species in the tropical moist as well as dry deciduous forests in India¹. The *Sal* forests' natural range spans 20° to 32° N and 75° to 95° E on a global scale. *Sal* forests are typically found between 300 and 1200 meters above sea level and are typically linked with such of tree species e. g. *Mallotus philippensis*, *Terminalia alata*, *Adina cordifolia*, *Syzygium cumini* etc. *Shorea robusta*, a member of *dipterocarpaceae*, is a large, deciduous tree with diameter at breast height (DBH) varying from 1.5 - 2 m and attains an average height ranging from 18 - 32 m. Its bole is neat, straight, and cylindrical, with a spherical crown and epicormic branches frequently present. The mature *Sal* seed typically has a brown color with a calyx; the literature that is currently available mentions three or five *Sal* seeds with wings. Around the *sal* fruit are expanded calyx segments that resemble five uneven wings that are between five and seven and a half centimeters long². According to Kumar et al. (2016), *sal* seeds have five unevenly sized and shaped wings and measure between 10 and 15 mm in length and diameter. A full-sized *sal* fruit measures roughly 1.3–1.5 cm in length and 1 cm in diameter. Five uneven wings, each measuring approximately 5 - 7.5 cm in length, extend the calyx segments surrounding the fruit³. *Sal* seeds were also reported to have five wings by Chitale and Behera (2012)⁴. *Sal* fruits that are fully grown have 23% wings, 30% pods, and 47% kernels. The dried wings are easily detached and

extremely fragile⁵. Appanah & Turnbull (1998) report that *Sal* has three calyxes with thicker bases that eventually enlarges into wings. *Sal* seeds are viviparous, meaning they germinate while still on the tree, and they start to fall to the forest floor as soon as they reach maturity in May or June⁶. The Viability of seeds is generally 6 - 10 days under ambient conditions^{7, 8, 9, 10}. With this significant of above mentioned issues, a field based survey or observation was carried out and documented the different wing petal of *Sal* seed of Tarai East Forest division.

2. Study Area & Methodology

Tarai East Forest Division is a part of the vast Tarai Arc Landscape (TAL) and comprises an area of 82, 429.0 ha of Tarai and Bhabar tracts between the Gola and Sharada rivers. In the Tarai East Forest Division, the *Sal* Forest is covering a total of 28% area of the division (Fig.1). It also connects the Nandhaur Wildlife Sanctuary with the Pilibhit Tiger Reserve through the Kilpura - Khatima - Surai corridor of tropical dry deciduous of central India. The area is home to very important wildlife species like elephants, tigers, crocodiles etc. Increasing population and dependency on forests, encroachment, overgrazing, poaching etc. are some of the challenges that threaten wildlife and its habitat. The division has covered a total of 9 ranges namely Kilpura, Khatima, Surai, Gaula, Ransali, Dauli, Barakoli, Kisanpur and Jaulasal these ranges are highly covered with *Sal* Forests.

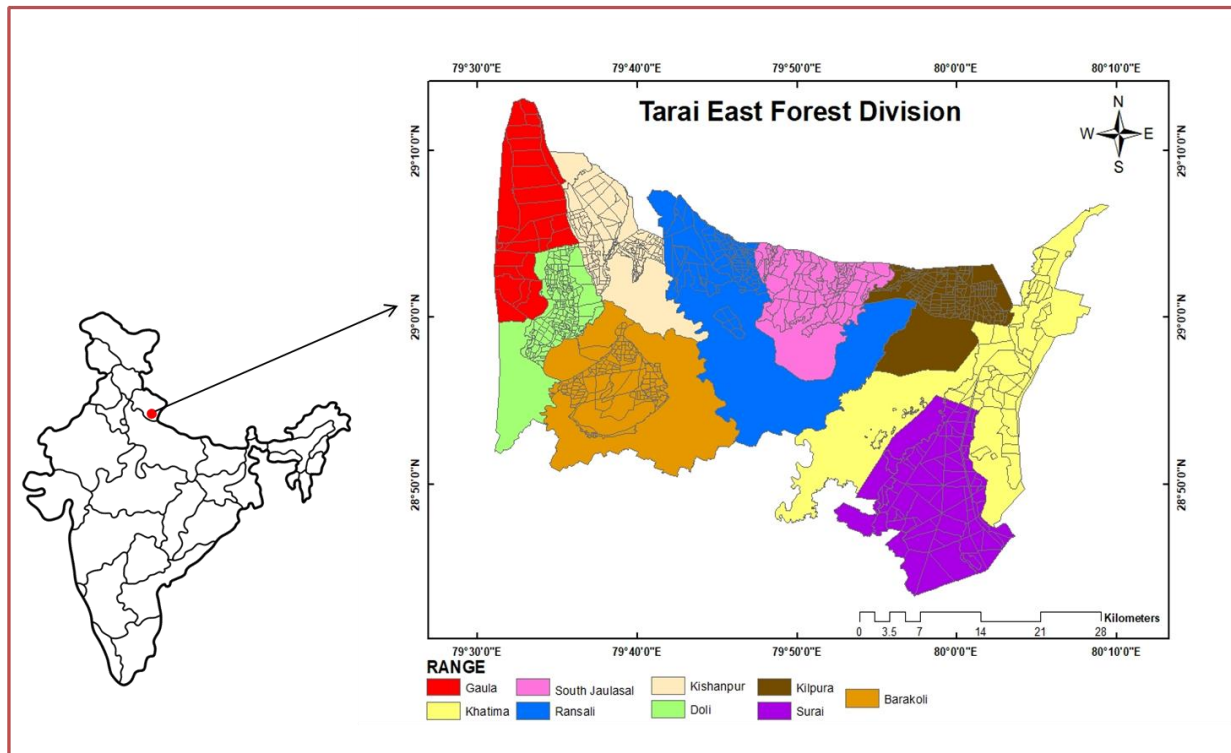


Figure 1: Study Map of Tarai Forest Division, Haldwani, Uttarakhand

3. Result & Discussion

During extensive field studies carried out during the year 2023 - 24 in six different (ANR site) forest ranges of Tarai Forest Division viz. Surai, Kishanpur, Khatima, Jaulasali, Dauli and Barakoli range respectively, interesting observations on different winged Sal seeds were noticed (Fig.2). The wing petal arrangement pattern was alternating in all the seeds i. e. one big wing and one small wing, few of equal was observed (Fig.2), whereas in five winged seeds, two types of wings were noticed. Upon measuring the length of six winged Sal seeds was maximum observed, the length of the bigger wings ranged between 5.6–7.2 cm and the smaller wings ranged between 3.1–4.5 cm. Also, the width of larger wings was measured to be around 1.0–1.3 cm and in smaller wings it ranged between 0.4–0.6 cm. Several workers have reported five rather unequal wings in the

matured Sal seed ^{2, 11, 12, 13}. However, the current report of six winged Sal seed is significant as such a morphological variant was not reported earlier in this division.

The morphological variance in Sal on the six winged seed in Tarai East Forest Division of Uttarakhand was observed in different ratios in different forest ranges. The ranges' varying average temperatures may be the cause of the ratio discrepancies. With mean temperatures between 34 and 39°C in May and June, the Barakoli, Surai, and Kishanpur ranges showed the highest proportion of six - winged sal seed, whereas Jaulasali and Khatima showed the lowest percentage with mean temperatures between 30 and 25°C over the same period. Based on the observations, it can be inferred that this anomaly may be the cause of adaptation in Sal to increase the seeds' dispersal area and it could be helpful for regeneration of Sal seed in Natural forest.



Figure 2: Observed Various wing petal of Sal (*Shorea robusta*) in Tarai East Forest Division, Haldwani

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