

Timing of phenological events and fruit ripening in *Ficus palmata* forssk. In the Mid Himalayan Region

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ABSTRACT

Ficus palmata Forssk. is commonly growing wild in the Himalayan region of the family *Moraceae*. A study was undertaken at the Kumaun Himalaya region to evaluate the regeneration, phenology, maturity indices, and nutrition status of *F. palmata*. The density of *F. palmata* across the sites ranged between 22 and 122 ind/ha. Seedlings were completely absent in all the study sites. However, saplings were present in low numbers. The seeds were minute, and germination was high ranging between 84.68 ± 2.42 and $95.33 \pm 1.64\%$ while the seed moisture content was between 36.33 ± 0.88 and $42.33 \pm 0.88\%$ across all the sites. Flowering and fruiting occurred twice a year from March-May to October-December. Only the seeds produced during summer season (April-May) were viable. It is facing high anthropogenic pressure and poor regeneration. There is an urgent need for conservation and large-scale plantation programs. Assessment of the exact time of fruit/seed maturation using physical indicators can help collect viable seeds for regeneration and multiplication of the species. The study could highlight that this species is facing severe regeneration problems. Fruit/seed maturation can disturb its synchronization with the monsoon rains when maximum germination occurs. Study developed baseline data on phenological events for future referencing on the impact of climate change on this species.

1. INTRODUCTION

The genus *Ficus* universally known as fig, belongs to the family *Moraceae* [1] and is one of the largest plant genera, with more than 750 species distributed worldwide [2-4]. In India, 115 species of *Ficus* are distributed throughout the country, and the maximum diversity of the species lies in the North-East region [5]. *Ficus* species have a diversity of habitations; few are hemi epiphytes, large woody climbers, and trees and shrubs. Most of the *Ficus* species are good fodder sources. A large number of vertebrates depend for food on *Ficus* species [6].

Ficus palmata Forssk. is a multiuse tree that belongs to *Moraceae* family, found growing wild in the Himalayan region, native of North-Western India and Rajasthan regions, Garhwal and Kumaun region, Uttarakhand, Nepal up to 1550 m above the sea level. *F. palmata* occasionally occurs in the forest but grows well around the villages, fields, and wastelands. *F. palmata* is a deciduous tree with minor unisexual flowers and deep violet to black fruit inside which numerous, round, and very small seeds are found. The whole fruit and the seeds can be eaten either in the immature stage by cooking as a vegetable

or after maturing as fruit. It is one of the top edible wild fruits with medicinal and nutritional properties [7,8].

Several studies show the importance of *F. palmata* in treating several diseases [9] but very few on its regeneration status, phenological events, fruit/seed maturity, and germination. Shifting in the timing of fruit seed maturation time can severely impact the regeneration of this species. There appear to be no baseline data to compare the changes in the timing of phenological events of this important species coupled with regeneration information.

Ficus species are wild edible species, and the dependency for food on different species of *Ficus* is very high. In the Himalayan mountains, regeneration of the fodder/edible fruit species is a significant problem. Regeneration of the species, survival, and growth of seedlings depend upon human disturbance, trampling by cattle, and cattle browsing [10]. The successful regeneration of forest species is characterized by a sufficient population of saplings, seedlings, and adults [11].

We studied the regeneration status of fruit/seed-related traits, the timing of fruit/seed maturation, and germination, which is critically needed to develop baseline data to fully comprehend the impact of climate change on this struggling species. (1) In view of the importance of this species-poor regeneration and scanty information on seed/fruit maturity indices, the present study was planned to document the most suitable

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