

# What drives flowering, fruiting in Sikkim's rhododendrons?

Temperature and day length play an important role

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Neems are in bloom and mango trees fruiting in many parts of India now, but what determines such seasonal changes? At least, in the Sikkim Himalaya temperature, day length and genetic relatedness between species determine when rhododendrons put out their first buds, flowers and fruits, finds a new study.

Interest in tree phenology – the timing of biological events such as flowering and fruiting – has increased after climate change has been shown to alter it, especially of plants in high-altitudes. But what abiotic factors play a role in such changes, and do closely-related tree species respond similarly to them? To find out, researchers at the Ashoka Trust for Research in Ecology and Environment including Shweta Basnett studied rhododendron trees in sub-alpine and alpine forests between 3,400-4,230 metres above sea level in Sikkim's Kyongnosla Alpine Sanctuary.

Between 2013 and 2015, the team monitored budding, flowering, fruiting (arrival of first fruits, immature green fruits and mature brown fruits) and fruit dehiscence (splitting open of fruit to release seeds) and the duration of phenology in 320 trees of 10 rhododendron species for every 15 days. Si-



**In full bloom:** Rhododendron aeruginosum trees flowering in an alpine region in Sikkim ■ SHWETA BASNETT

multaneously, they collected data on temperature. Results from these, combined with data on day length in this region, reveal that the onset of budding, flowering and initial fruiting were mainly associated with a longer day length (around 13 hours) and higher temperature.

## Relatedness matters

The team also collected DNA from leaves of each species to see how genetically closely-related the 10 rhododendrons species are, to analyse if this plays a role in their phenological patterns. Relatedness did indeed influence early phenology events: closely-related species put out their first buds, flowers and fruits together.

But when resources (sunshine as reflected by day length, and temperature) decreased as winter neared,

all rhododendrons experienced later phenology events – the arrival of immature green fruits, mature brown fruits and finally, fruit dehiscence – regardless of whether they were closely related or not, says Basnett. Similarly, relatedness did not play a role in phenology of rhododendrons with increasing altitude. Harsher environments at higher elevations – including lower temperatures, heavy snowfall and barren and rockier lands higher up – could be trumping over the species' common evolutionary history here, write the authors in their study published in *Ecosphere*.

"Different factors play a role in rhododendron phenology and the study contributes to baseline information about the species in India and the world," added Basnett.