

ISSN 0972- 1800



BIONOTES

VOLUME 23, NOS. 2 & 3

QUARTERLY

APRIL--SEPTEMBER, 2021



Date of Publication: 4th October, 2021

BIONOTES

A Quarterly Newsletter for Research Notes and News
On Any Aspect Related with Life Forms

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From Volume 21

Published by the Entomological Society of India (ESI), New Delhi (Nodal Officer: V.V.
Ramamurthy, ESI, New Delhi)

And

Butterfly Research Centre, Bhimtal
Executive Editor: Peter Smetacek
Assistant Editor: Shristee Panthee
Butterfly Research Trust, Bhimtal

Cover Photo of founder of BIONOTES *Late* Dr. R.K. Varshney

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EXTENSION OF THE KNOWN FLOWERING PERIOD OF *RHODODENDRON ARBOREUM* TO JUNE IN NAINITAL DISTRICT, UTTARAKHAND, INDIA

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Introduction

The community of flora and fauna that make up a forest ecosystem is directly affected by climate. Changes in the typical annual cycle of a plant reflect the changing climate and other factors. Budding, flowering, fruiting, leaf shedding and seed dispersal are regulated by the seasons. Changes in the timing of these phenomena affect not only the plant but the fauna dependent upon that plant for food.

The changes in temperature and moisture regimes affect the phenology of flora, which has a direct effect on the fauna of a forest. One such species is *Rhododendron arboreum* Smith, a medium sized tree that occurs in the Himalaya from 1200 m to 3350 m (Osmaston, 1927; Polunin & Stainton, 1984). It is the state tree of Uttarakhand. The conspicuous red, pink or white flowers are borne between January and May (Osmaston, 1927).

Although Osmaston (1927) noted that the tree flowers in June, studies in the outer ranges of the Himalaya show that flowering ends by late May (Gaira *et al.*, 2014; Mittal *et al.*, 2016). It therefore appears that the tree flowers in June at the upper limit of its distribution in the main Himalayan range in June, where Osmaston (1927) noted the pale flowered varieties occur. In the western Himalaya, field observations in Nainital district, Uttarakhand (2009– 2011) showed *R. arboreum* to have a peak flowering period from February to March (Gaira *et al.*, 2014). *Rhododendron* was reported to start flowering in the first week of February, flowering peaked in the first week of April and was completed by May (Mittal *et al.*, 2016).

Singh (2014) cryptically stated that *R. arboreum* flowered “first early June”, although the data he was interpreting ended on 31 May. Dr. N. Singh, the author, was contacted regarding this statement and he clarified (*pers. comm.*) that he meant “before early June”, the typographical error being caused by the fact that the Hindi word *pahle* translates into *first* or *before* in English.

Methodology

Maheshkhan Reserve Forest (29°24'16"N 79°33'50"E) was visited during 2020 and 2021 from time to time for various studies. It is located at an altitude of 1800 – 2200 m. The forest is composed of *Quercus leucotrichophora*, *Pinus roxburghii*, *Myrica esculenta*, *Lyonia ovalifolia*, *Viburnum cotinifolium*, *Viburnum mulaha*, *Rhododendron arboreum*, etc. and has rain fed streams. A motor road runs across the south facing hillside and is the main access to the forest, with game paths running above and below the road.

In 2021, the climatic conditions were unpredictable as there was no winter rain in January and February followed by heavy, unseasonal rain in the months of May and June.

Observations

The present observations were carried out while walking along a 3 km stretch of the motor road in Maheshkhan Reserve Forest from the entrance gate towards the Forest Rest House. On 17.vi.2021, 7 trees of *Rhododendron arboreum* were observed, each

with 2- 6 flowers. The flowers were normal, with some buds, some in full bloom and some with wilted petals on the same flower-head (Figures 1-6).

Discussion

Supplementary observations of the flowering of *R. arboreum* in Nainital district during 2021 are noted below, to show that flowering was on the whole normal during early 2021, until the unusual rains in May and June appear to have affected the process. All four locations where observations were carried out are situated on the southern face of the Gagar range, which is the outermost range of the Himalayan mountain system in Nainital district. The highest point is Cheena Peak (2600 m) above Nainital.

The first flowering observation was made on 21.i.2021 with 12 flowers blooming on a tree at the Forest Rest House, Bhowali Range (29°23'17.2"N 79°30' 40.1"E; 1800 m), Bhowali. In Manora range near Takula (29°21'27.0"N 79°27'25.1"E; 1700 m), one tree was observed with 15 flowers and the second tree with 2 flowers on 29.i.2021. In Nainital, at Tanki bend on the southern slope of Cheena Peak (Naina range) (29°24'03.3"N 79°26'59.6"E; 2330 m), one tree had 2 flowers and another tree had 5 flowers on 1.iii.2021. Further observations were interrupted by the lockdown.

On 17.vi.2021, along the same range, *Rhododendron arboreum* flowers were observed blooming at Maheshkhan as mentioned above. A total of 7 trees were observed which had 2- 6 flowers each and out of them one was a short 1.5 m tall bush. The flowering trees had a girth from 10 cm and 1.5 m height to mature trees with a girth of 2 m and an estimated height of 6 m. The current

observations thus extend the known flowering time of *Rhododendron arboreum* in the outer ranges of the western Himalaya from the end of May (Singh, 2014) to the third week of June. It is not a regular phenomenon but one clearly brought about by the unusual weather pattern in the area during the first half of the year.

Acknowledgement

I am grateful to Mr. S. Chaturvedi, Head, Uttarakhand Forest Research Institute Haldwani for making this work possible; to Mr. N. Pant, Ranger, Uttarakhand Forest Research Institute for support and Ms. Kamla of the same organisation for field support.

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Figures 1-6 showing *Rhododendron arboreum* flowers in Maheshkhan Reserve Forest on 17.vi.2021