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VERBENA INCOMPTA: INSIGHTS INTO ITS FIRST RECORDED PRESENCE IN THE DOON VALLEY'S RIVERINE HABITATS

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ABSTRACT

The Doon Valley is well known for its diverse biodiversity, shaped by its distinctive geography and climate, which supports numerous rivers and streams, creating moist habitats throughout the region. In 2023, *Verbena incompta*, a species native to the New World, was reported in India for the first time. This paper documents the first recorded occurrence of *Verbena incompta* in the Uttarakhand Valley, specifically in riverine habitats, and includes photographs, a taxonomic key, and a detailed description of the species.

Keywords **:** Asan River, Aquatic, Ganga basin, Riparian, Hydrophytes, Vegetation, Wetlands

Introduction

A valley refers to a low-lying area between two mountain ranges, formed through tectonic plate movements. Valleys are rich in biodiversity and function as natural drainage systems, channelling water from sources originating in the hills. The Doon Valley, located in Dehradun, Uttarakhand, spans 75 km in length (east to west) and 22-25 km in width (north to south), covering an area of over 2,000 square kilometres. It is home to two major perennial rivers of India: the Yamuna in the west and the Ganga in the east, along with their tributaries and sub-tributaries, creating a watershed that fosters moist habitats along their course.

The genus Verbena, which serves as the type genus for the family Verbenaceae, consists of 150 accepted species with a cosmopolitan distribution (POWO, 2024). While the genus is believed to have originated predominantly in the Americas (Perry, 1933), it is now found in various countries across both the New and Old Worlds, typically as an introduced weedy species. *Verbena incompta*, a South American species, was first described by Michael (1995). This species is often confused with *Verbena bonariensis* (see Table 1), as they share overlapping characteristics such as semi-amplexicaul leaf bases, spikelet inflorescences, and schizocarpic fruits. Rajendran and Daniel (2002) revised the Indian Verbenaceae and documented three species of Verbena from the wild: 1. *V. bonariensis*, 2. *V. officinalis*, and 3. *V. rigida*, along with nine cultivated species. Recently, *Verbena incompta* was reported as a new addition to the flora of India by Pandey (2023) in Uttar Pradesh, followed by Singh *et al*. (2024) reporting the species from Srinagar, Uttarakhand.

The present study was conducted to survey the plant diversity along the Asan River. During this survey, the authors encountered several individuals of the Verbena genus growing in the riparian zone and within the flood line of the river. Upon closer examination, these individuals exhibited unique characteristics that did not match any of the *Verbena* species listed in the local floras. After reviewing recent literature (Michael, 2008; Nesom, 2010; Verloove, 2011; Marley, 2022; Pandey, 2023), the plant was identified as *Verbena incompta*. A few specimens were collected, processed using standard methods (Rao and Sharma, 1990), and deposited in the Herbarium of the Wildlife Institute of India, Dehradun, Uttarakhand. A detailed description of the plant is provided below.

Key to species

1. Leaves simple, opposite decussate, sessile; Leaf base clasping, Semi amplexicaul & sub-auriculate. **(*V. brasiliensis*)**

2. Corolla tube twice the length of calyx well exserted from calyx; Calyx hairs glandular; Floral bracts shorter than calyx. (***V. bonariensis)***
3. Corolla tube slightly longer than the calyx hardly exserted from calyx; Calyx hairs eglandular. Floral bracts longer than calyx (***V. incompta***)

Botanical Description

Verbena incompta P.W. Michael in Telopea 6: 181.1995; Anjula Pandey *et al.* in Indian Journal of Plant Genetic Resources 36 (1) 56-61.2022. [Plate I]

Erect annual or biannual herbs branching from the base 0.5-5m tall. **Stem** four angled completely covered with stiff hispid hairs. **Leaves** sessile simple opposite decussate base sub amplexicaul with sometime sub-auriculate, lamina lanceolate, 15-16 cm long and 25-30mm wide in centre scabrous on both surfaces with irregularly serrate margines which are entire near the base, somewhat undulating. Generally, leaves of young shoot near the base of plant larger than others parts. **Inflorescence** spikelet arranged in cymbose of 3 to 5, cylindrical to sub cylindrical and terminal. **Flowers** bisexual, many opening in a circle immediately below the apex of the spike, sometimes slightly exceeding the apex, floral bract 4-4.5 mm ovate or lance ovate, longer than calyx. **Calyx** 5 persistent with hispid hairs toothed at apex, e-glandular. **Corolla** 5, salver shaped with hairs present on outside and at the mouth, purple-pink to violet coloured 4-6 mm long and 2.5-3.5 mm wide slightly curved and slightly exceeding the calyx. **Stamens** 4, didynamous epipetalous lower two shorter 1.5-1.7 mm long arranged below the upper ones, upper two positioned above the middle of corolla tube slight longer than the lower stamens 2-2.5 mm long, anther lobes dithecous and basifixed. **Fruit** is a Schizocarp with dry style still attached in young fruit, splitting into 4 mericarps about 1.7 mm long with ribbed outside.

Habitat

Verbena incompta is adapted to a variety of habitats mostly including dry river beds, ditches, road verges, streams, waterways and open places. Generally, prefers moist habitats and can grow in different soil type and climatic conditions.

Global Distribution

It is widely distributed in sub-tropical biome as it is found from South America, Australia, New Zealand, Northen Spain, Czech Republic, Portugal, Spain**,** India (Uttar-Pradesh, Uttarakhand)

Specimen examined

Tuntowala, Mehuwala Mafi, Dehradun, Uttarakhand, 248007
Latitude/Longitude: 30°17'24.27"N, 77°57'50.99"E
Elevation: 604 m.
Date: 09 September 2024.

Discussion

This study marks the first report of *Verbena incompta* from the Doon Valley, specifically within riverine habitats. By documenting this new occurrence, we aim to emphasize the emergence of this species in the region and to foster further research into its spread and ecological impact. *Verbena incompta* has shown significant potential as a weed and has been classified as a noxious species in several temperate and subtropical biomes worldwide (GISD, 2007; Verloove, 2011). In India, Pandey (2023) also highlighted its invasive nature. The species prefers wet and moist habitats, commonly found in agricultural areas, which raises concerns about its potential to spread rapidly. Continuous monitoring of its populations is essential. Additionally, Date *et al*. (2021) isolated a compound called verbascoside from the shoot of *Verbena incompta*, an allelochemical with strong growth-inhibiting properties. This compound poses a threat to native flora due to its allelopathic effects and can also be used as a biopesticide. Therefore, the presence of *Verbena incompta* requires careful study to assess its ecological implications and control measures.

Table 1: A comparative analysis of *Verbena incompta* with other closely related species, *Verbena bonariensis*

	Verbena bonariensis L.	***Verbena incompta* P.W. Michael**
Habit	Erect slender branched herb, up to 0.5 m to 2 m tall.	Erect vigorous branched herb up to 0.5 m to 5 m tall
Ornamental use	Used as ornamental plant, corolla attractive and bright coloured	Lack ornamental value, corolla inconspicuous as compared to *V. bonariensis.*
Corolla tube	Corolla tube hairy outside and around the mouth .4.25-5.5mm width & twice the length of calyx, 5.5–7 mm long. well, exserted from calyx tube.	Corolla tube hairy outside and around the mouth. 2.75–3.75 mm wide, slight longer than calyx, 2.75–3.25 mm long. hardly exserted from calyx tube.
Floral Bracts	Shorter than calyx	Longer than calyx
Stamens	Upper stamens inserted beneath the corolla tube	Upper stamens inserted above the middle of corolla tube.
Nut lets	1.5 to 2.1 mm long.	1.2 to 1.7 mm in long.
Hairs	Glandular hairs on leaves and calyx.	Eglandular hairs on leaves and calyx.

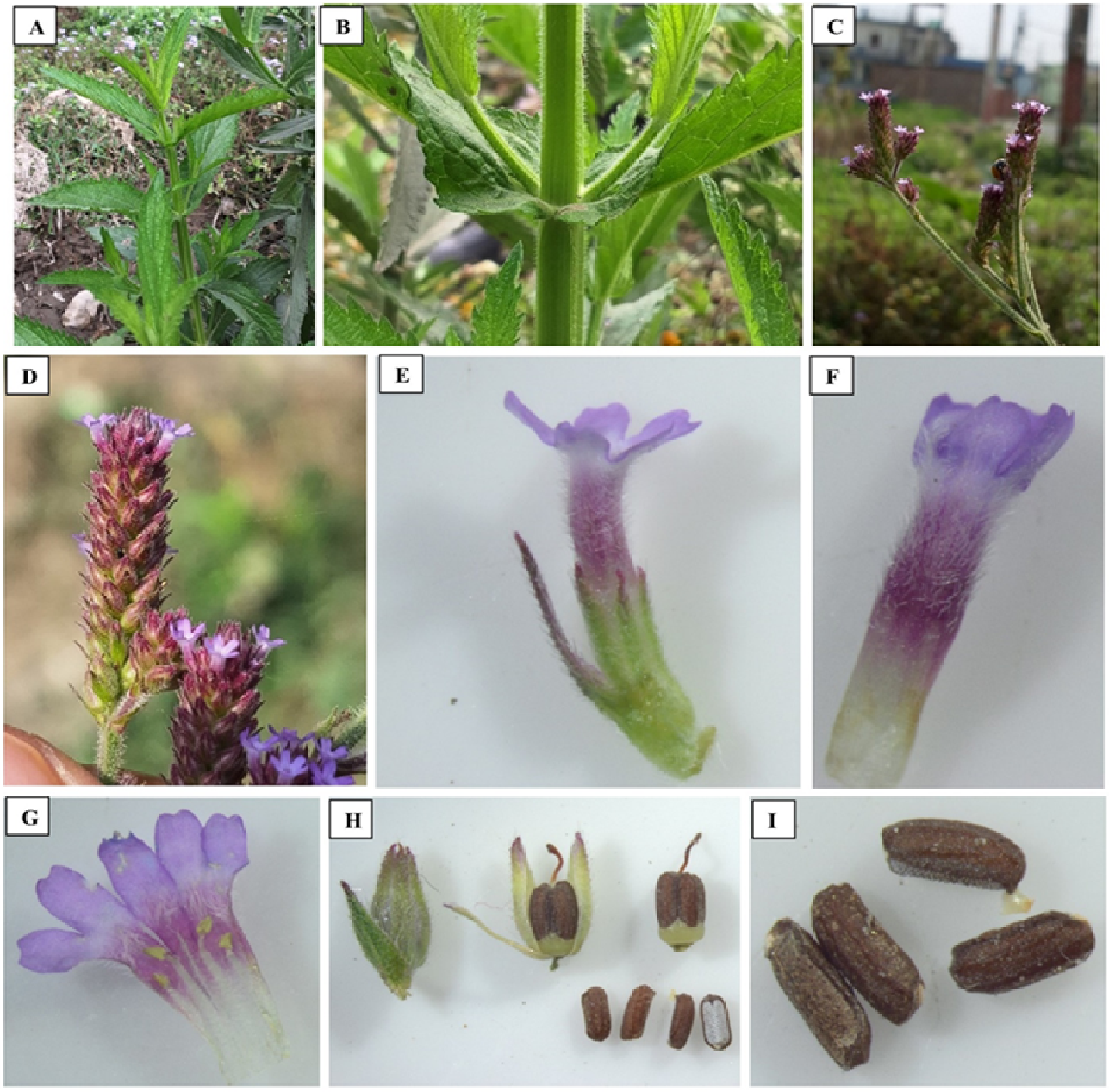

Plate I: ***Verbena incompta*** **P.W. Michael; A.** Plant habit**; B.** Semi-amplexicaul leaf base**; C & D.** Inflorescence**; E.** Single flower with bract**; F.** Corolla tube**; G.** Stamens**; H.** Schizocarp with persistent calyx and dry style still attached**; I.** Mericarps

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