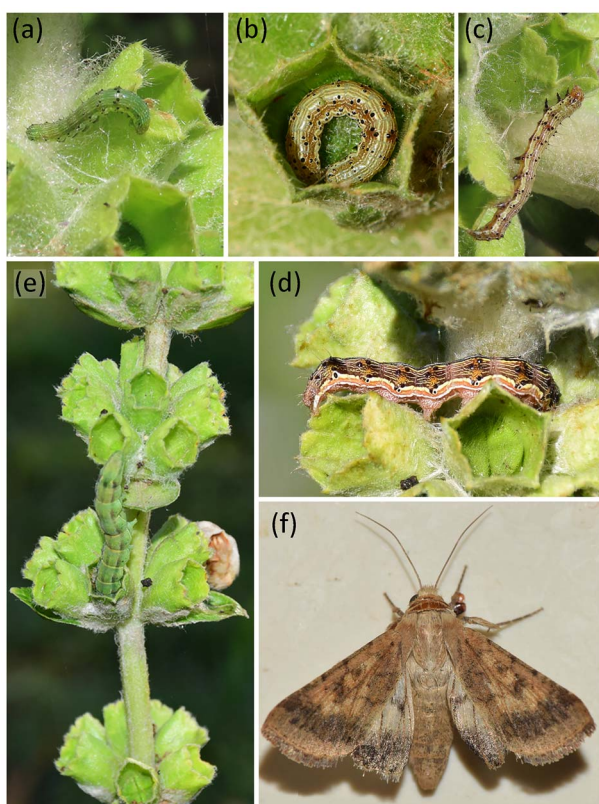


Dhanusha, Nepal. ³Ministry of Forests and Environment, Government of Nepal, Kathmandu, Nepal

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The moth *Helicoverpa armigera* is a leading cause of the decline of the Endangered golden Himalayan spike *Phlomooides superba*

The impacts of invasive invertebrates on plants are primarily studied on cultivated crops, with the effects on wild and threatened species mostly overlooked. The genus *Phlomooides* (Lamiaceae; common names include Jerusalem sage and Lampwick plant) comprises 174 species primarily occurring in Asia and some parts of Europe. The golden Himalayan spike *Phlomooides superba* (syn. *Eremostachys superba*) is an Endangered species (Srivastava et al., 2017, *Journal of Threatened Taxa*, 9, 10089–10095) endemic to the western Himalayan foothills of eastern Afghanistan, Pakistan and India, at altitudes of 450–800 m. There are concerns regarding its decline in natural habitats in several locations. The reasons are still poorly understood but low regeneration potential is one possible cause. In 2020, the species disappeared from its type locality in Mohand Pass, Dehradun, India.



Helicoverpa armigera infestation on *Phlomooides superba*: (a–d) 3rd–6th instar larval stage feeding on seed capsules, (e) final instar and emptied seed capsules, (f) female adult moth. Photos: Amber Srivastava.

In May 2023, we discovered that the major cause of the decline of *P. superba* appears to be infestation by an insect pest whose larvae feed on its seeds, leading to seed loss and thus affecting regeneration. In April 2024, we collected 20 larvae from three populations of *P. superba* in Jammu, India, and from plants growing in the garden of the Botanical Survey of India, Dehradun. We kept the larvae in transparent glass bottles for 25–32 days until pupation and emergence of the adult, which was then identified as the cotton bollworm *Helicoverpa armigera* (Lepidoptera: Noctuidae), a polyphagous, invasive moth globally recognized as a pest of c. 200 crops. From 1st to 3rd instar stage the larvae mainly feed on the tender leaves and then migrate to the seed capsules; we observed 90–95% seed loss in highly infested populations. Major infestations were found on *P. superba* near crop fields or human settlements. In ex situ conservation conditions, *P. superba* is growing well and regenerating at the Botanical Survey of India, Dehradun, where regular pesticide treatment controls the infestation, resulting in 95% seed survival and 84% seed germination.

The shift of crop pests to wild, threatened species needs to be monitored as many native and endemic species do not have natural defences against attacks by invasive pests. This discovery of the impact of *H. armigera* on a threatened wild plant species will be of help in development of a conservation protocol to address the ongoing decline of *P. superba*.

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New subpopulations of three threatened plant species endemic to the karstic areas of the Potiguar Basin, Brazil

The flora of the karstic areas discontinuously exposed in the Potiguar Basin in north-east Brazil is poorly studied. However, three annual herbaceous flowering plant species have recently been described as endemic to these areas: *Borreria apodiensis* (Souza et al., 2016, *Acta Botanica Brasiliica*, 30, 283–289), *Ipomoea apodiensis* (Wood et al., 2020, *PhytoKeys*, 143, 1–823) and *Pectis loiolae* (Rebouças et al., 2021, *Systematic Botany*, 46, 486–492), known from five, two and one locations, respectively. *Ipomoea apodiensis* is categorized as Endangered on the IUCN Red List, and recommendations have been made to categorize *B. apodiensis* and *P. loiolae* as Endangered and Data Deficient, respectively.

During February–July 2024, as part of project no. PIA10010-2022, we surveyed for new subpopulations of