

## BSI contribution to floral documentation and conservation

This correspondence is prompted by an article by Rawat<sup>1</sup> and advocating in support of national flora as a priority activity for the Botanical Survey of India (BSI). The herbaria harbour material that will be the basis for the state/national flora, whereas flora is a publication on floral wealth that includes nomenclature (correct names, synonyms), identification keys and descriptions of a given region. Thus, these are two different activities but associated with each other; one pertains to material which is acquired over the years through exploration activity and the other is the documented information to be used for the identification and projected floral wealth in a defined area. With online herbaria, the material of the BSI and other institutions harbour can be shared, thereby helping taxonomists involved in flora writing. In other words, the online facility expedites flora completion removing/reducing conventional constraints. Hence a choice sought for/suggested by Rawat is not rational. Rawat suggests that only a synoptic online herbarium of 50,000–60,000 sheets be prepared initially so as to serve users interest in identification. But identification is to be done based on flora and not by matching specimens. Specimen matching serves as a secondary prop for confirmation of identity. Moreover, the suggested sorting out of specimens is difficult in well-established herbaria and complete digitization is ideal to build virtual replicas to the existing herbaria for future use. Further, Rawat has regretted that BSI could not bring out a national flora, while the nation has achieved glory through *Chandrayaan*, a more prestigious and technically challenging mission to the moon. The correlation seems remote and inappropriate. BSI's reduced pace to produce national flora after the year 2000 is due to various reasons. A national flora is built by synthesis of regional/state/district floras. It is essential to mention that this synthesis is to be done by experts. A lasting national flora is realizable only when substantial areas are well covered for exploration and good documentation absorbing monographic works is done for majority of the states. With limited trained manpower, BSI has been besieged to keep a balance in exploration surveys and in generating district/state/national floras. There are

many difficult, isolated and remote areas, rich in floral wealth in Northeast India and western Himalayas that warrant more exhaustive explorations. Also, the explorers occasionally come across disturbed areas not congenial to exploration. Every year BSI conducts at least 60–70 field and herbarium consultation tours, with a period spanning between two and six weeks. However, this is still not sufficient in the light of diversity and area to be covered. Manpower is an acknowledged constraint to expedite and intensify it any further. The follow-up to exploration are the efforts essential for identification and documentation that take considerable time, which is often little appreciated. If this is not attended to on time, it results in backlog.

Production of national flora is certainly a principal goal of the BSI, but not the sole objective. It can generate flora at the national context with the existing data, but might have limitations both in coverage of explored area and percentage of documented regions. Limitations also appear in achieving greater clarity with regard to keying out of component genera and species as material basis for several taxa is based on a single or few collections.

In the last decade, floristic account of eight states (Arunachal Pradesh, Bihar, Jammu and Kashmir, Kerala, Madhya Pradesh, Maharashtra, Manipur and Mizoram) and four district floras (Buldhana, Hazaribagh, Palamau and Visakapatnam) were published<sup>2</sup>. The floras of protected areas such as Desert National Park, Gulf of Mannar, Indravati Tiger Reserve, Pin Valley National Park and Sanjay Gandhi National Park were also published. BSI accorded priority to lower groups and publications on algae (1), fungi (2), lichens (1), bryophytes (1) and pteridophytes (1) were brought out. Further, revisionary studies of several genera, including *Diospyros*, *Eria*, *Hedyotis*, *Juncus*, *Rhododendron*, *Rhynchospora*, *Ruellia*, *Scleria*, *Strobilanthus*, *Zeuxine* and also Euphorbiaceae of India<sup>3</sup> have been completed, and some even published<sup>2</sup>. These are no mean achievements. BSI's participation/collaboration with other institutions in both documentation and conservation is significant. The energy reserves of the limited manpower are in fact getting dissipated in administration

and maintenance of institutional set-ups spread across the country and also in services and other engagements as obligations for being a government department.

Rawat has also contended that on a national scale different figures were quoted for angiosperms, attributing it to lack of checklists. A checklist is a mere list of names and its publication in the national context serves as a guiding/reference document for those concerned with the flora of the country. A large number of names of plants found in Hooker's *The Flora of British India*<sup>4</sup> or in regional floras that followed in its wake stand changed with changed concepts and also with the application of ICBN (International Code of Botanical Nomenclature). As a result, on the one hand, what was considered as a species complex or variable species has now been split into more species and on the other, more than one species considered distinct earlier have been lumped together. As for the monocots, while Hooker's flora<sup>4</sup> projects 424 genera and 2521 species, a checklist prepared by BSI<sup>2</sup> contains 674 genera and 4081 species. The disagreements are essentially due to added collections and better understanding of taxa concerned, and not that what was given in earlier works is erroneous or the figures we carried till then had no meaning. BSI has brought out the first volume of checklists for dicots<sup>5</sup>. The same might happen to it once it is fully published. The quality of a checklist is proportional to the number of worked-out families/floras. Besides, there is a great degree of divergence in the figures which the experts suggest for some lower groups. Rawat also contends that it is an embarrassment (too unkind a word) to plant taxonomists that there is no information on threatened species and mentions that BSI has lost its priority for completion of the subsequent volumes. The survey, inventorying and documentation of plant resources so far have led to the identification of about 10% of both flowering and non-flowering plant species as rare and threatened. BSI came up with valuable datasets on 622 species in three volumes<sup>2</sup> (*Red Data Book of Indian Plants*). Another publication from the BSI<sup>6</sup> came up with a new list of 1215 species of threatened flowering plants drawn from the *IUCN Red Data Book*.

This is additional information and not a challenge to BSI's existing reports. As explorations continue we acquire more knowledge with regard to habitats/species which are threatened. Moreover, this may result in enlisting or delisting of threatened species depending upon their threatened status.

Many governments, including India, have acknowledged the existence of a 'taxonomic impediment' to the sound management of biodiversity after the ratification of the Convention on Biological Diversity. The Global Taxonomic Initiative has come into existence with a purpose to remove/reduce this taxonomic impediment, the knowledge gaps in our taxonomic data, including genetic data, the dearth of trained taxonomists and the impact these deficiencies has on our biological diversity. In order to enhance capacity building in taxonomy, a long-term project on 'Capacity Building in Taxonomy: All India Coordinated Project and Related Programmes' was for-

mulated. Specialist groups were drawn from universities, BSI and Zoological Survey of India to take up taxonomic work on viruses, bacteria and archaea, algae, fungi, lichens, bryophytes, pteridophytes, gymnosperms, palms, grasses, bamboos, orchids, helminthes and nematodes, microlepidoptera and molluscs. This programme proposed centres for research and training in biosystematics. The programme prioritized these areas after a careful study. In total, 40 centres were created, 14 of them for microbes, five for plant groups, 19 for animal groups and two for research in biosystematics. The efforts which are being carried out on sustained basis will contribute significantly to boost the documentation of our floral wealth in the coming years.

1. Rawat, D. S., *Curr. Sci.*, 2009, **97**, 1706–1707.
2. Catalogue of scientific publications, Botanical Survey of India, Kolkata, 2007.

3. Balakrishnan, N. P. and Chakravorthy, T., *The Family Euphorbiaceae in India – Synopsis of its Profile, Taxonomy and Bibliography*, Bishen Singh and Mahendrapal Singh, Dehra Dun, 2007.
4. Hooker, J. D., *The Flora of British India*, L. Reeve & Co., London, 1872–1897, vols 1–7.
5. Karthikeyan, S., Sanjappa, M. and Moorthy, S., *Flowering Plants of India (Acanthaceae–Avicenniaceae)*, 2009, vol. 1, pp. 1–144.
6. *Red List of Threatened Vascular Plant Species in India*, Botanical Survey of India (ENVIS), Kolkata, 2003.

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## *Urophyssa rockii* Ulbr., a rare and endangered plant needs urgent conservation

The genus *Urophyssa* (Ranunculaceae) consists of two species, *Urophyssa rockii* Ulbr. and *Urophyssa henryi* (Oliv.) Ulbr. The former, a perennial and summer dry-type herb, with robust rhizomes and sparsely puberulous three-foliolate palmately compound leaves, grows only along the middle and upper reaches of the Fujiang river in China. Its leaf blade is ovate to broadly ovate, lateral leaflets sessile or having 1–2 mm petiolule, unequally two-parted; central leaflet petiolulate, broadly rhombic to flabellate-rhombic, margin sparsely obtusely toothed; puberulous petioles about 10.3–24 cm long<sup>1</sup>; inflorescences with 7–12 cm capes, usually one-flowered, 1–2 bracts; navicular petals with spur ca. 2 mm; glabrous stamens 8–10 mm; lanceolate staminodes as long as petals; five pistils; follicles ca. 4 mm, transversely veined, sparsely puberulous; seeds ellipsoid, ca. 1.5 mm; flowering from January to April and fruiting during April<sup>2</sup>.

In 1925, J. F. Rock, an American plant collector, found this species for the first

time. Since then it has not been seen until Li Chunyu found it again in 2005 near the Fujiang river. Unfortunately, there are only about 400 individuals surviving in the cracks of rocks<sup>1,3</sup> (Figure 1 a) and their habitats will be completely

submerged when the Wudu Reservoir project is finished in 2011.

The species has spurs on the back of its petal base (Figure 1 b), which is important to reveal the phylogenetic relationship among the family of Isopyreae



**Figure 1.** a, *Urophyssa rockii* Ulbr. in the cracks of rocks; b, Flower with spurs on the back of petal base; c, Fruit.