***Sisyrinchium rosulatum* E.P.Bicknell (Iridaceae): new record of a naturalized species in Bhutan**

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Abstract

Sisyrinchium rosulatum E.P.Bicknell (Iridaceae, Iridoideae, Sisyrinchieae), a native of South America, is recorded and described here as a newly naturalized species for the flora of Bhutan.

Key words: *Sisyrinchium rosulatum*, Bhutan, Naturalization, New record

INTRODUCTION

Sisyrinchium L. (Iridaceae, Iridoideae, Sisyrinchieae) is the most diverse genus in the tribe consisting of approximately 200 species (Henderson 1976; Rudall *et al.* 1986), and is mostly distributed in the new world (Henderson 1976; Cholewa & Henderson 1984; Nicolella & Ardenghi 2013). The taxonomy of *Sisyrinchium* is complex (Chauveau *et al.* 2011) and hence, taking detailed field notes, remaining extra-cautious while preserving specimens, and by using large samples to evaluate multiple characters help in identification of species and filling the taxonomic gaps (Henderson 1976) are important. It prefers wet to dry grasslands, rocky and sandy soils, roadsides, grazed and burnt fields (Bicknell 1899). In July of 2017 an unfamiliar species of *Sisyrinchium* was collected from Trongsa District of central Bhutan. After perusal of relevant literatures (Bicknell 1899; Goldbatt *et al.* 1990; Yamaguchi & Hirai 1987; Henderson 1976; Chauveau *et al.* 2011; Shin *et al.* 2016) it was identified as *Sisyrinchium rosulatum* E.P.Bicknell. It is native to the southern part of North America and some part of South America (Bicknell 1899; Goldbatt & Manning 2008; Nicolella & Ardenghi 2013) and is reported as an invasive species in Korea (Shin *et al.* 2016), and also exotic to 22 countries (PlantNET 2013). For the *Flora of Bhutan* Noltie (1994) recorded a total of 13 species representing five genera (*Iris*, *Gladiolus*, *Crocasmia*, *Eleutherine*, *Belamcanda*). Now, with the addition of *Sisyrinchium rosulatum*, the numbers for genus and species increased to six and 14, respectively in this family for the flora of Bhutan.

Taxonomic treatment:

Sisyrinchium rosulatum E.P.Bicknell in Bull. Torr. Bot. Cl. 26: 228. 1899. *Sisyrinchium brownie* Small in Contrib. New York Bot. Gard. 327: 330. 1931. *Sisyrinchium exile* E.P. Bicknell in Bull. Torr. Bot. Cl. 28: 573 – 574. 1901.

TYPE: MNHN-P-P00672523 (P).

PLATE - I. *Sisyrinchium rosulatum* E.P. Bicknell: **A.** Habit; **B.** Part of the inflorescence showing mode of flower bearing; **C.** Top view of flower; **D.** Fruits. [Photos by Phub Gyeltshen at Bumthang, Bhutan on 12 June 2015]

SPECIMENS EXAMINED: BHUTAN. Bumthang, 27.592167° N 90.728673° E, 2622 m elevation, June 25, 2015, *Phub Gyeltshen H106* (**THIM; Figure 1**); Thimphu, 27.51283° N 89.644973° E, 2457m elevation, July 15, 2017, *Phub Gyeltshen H201* (**THIM**).

Rosette annual herb, 3 – 35 cm tall, glabrous, tufted, growing in small clumps. **Stem** glabrous, branches 1 – 3 – 4 or un-branched, simple with 1 – 3 (– 4) nodes; internodes 15 – 80 x 0.6 – 2 mm, shorter than its proximal leaves, stem colour similar to leaves, first node with 1 or 2 branches, usually middle internodes longer than the extreme ones. **Leaves** 2 – 8, grass-like, 1.2 – 25 x 0.1 – 0.6 cm, claspings, erect, alternate, sessile, linear-lanceolate, entire, narrowly acuminate, both sides glabrous, bases not persistent in fibrous tufts, colour and texture similar to stem. **Inflorescence** borne singly, spathes green, umbels 1 – 6 flowered, each umbel remain subtended by two opposite bracts, outer ones 1.5 – 4.5 cm long, larger, enclosing the inner one and connated at the summit, glabrous; pedicels 1.6 – 2.7 cm long, spreading, incurved laterally; **perianth** urceolate, flaring open at distal, campanulate basally, pale-violet with purple stripes or yellow with rosy purple bases, outer tepals 9 – 11 x 3 – 5 mm, inner tepals 8 – 10 x 2.5 – 4 mm, oblong, slightly obovate, entire, acute; **filaments**

fused basally; **Ovary** green, ca. 2 x 1.2 mm. **Capsules** tawny with brownish sutures, ± globose, 2–4 mm in diam., pubescent or glabrous; **seeds** 0.5 – 1 mm, ± globose, occasionally with slight depression at one side, black.

FLOWERING AND FRUITING: March – October

DISTRIBUTION: Native of the southernmost part of the North America along the coast of Gulf of Mexico/ Atlantic Ocean covering many US states [Texas, Louisiana, Mississippi, Alabama, Georgia, N & S Carolina, Florida and Virginia. North and South America]; widely naturalized in many countries like Australia, New Caledonia, New Zealand, Fiji, Easter Island, Java, New Guinea, China, Georgia, Hawaii, Africa, Tibet, France, Spain, Japan, Korea, Italy, Italy, Puerto Rico, Virgin Islands and India [Shinners, 1962; Parent 1977, 1980; Goldblatt & Henrich 1991; Wagner *et al.*, 1999; Sunil & Pradeep, 2011; Wang *et al.*, 2012; Cardiel, 2011; Verloove & Gullón 2012; Nicolella & Ardenghi 2013; <http://plantnet.rbgsyd.nsw.gov.au/cgi-in/NSWfl.pl?page=nswfl&lvl=sp&name=Sisyrinchium~rosulatum>] and now in Bhutan (Thimphu and Bumthang).

ECOLOGY: *Sisyrinchium rosulatum* in Bhutan grows along the roadsides and grasslands of elevation up to 3000 m in association *Rumex nepalensis* Spreng., *Plantago depressa* Willd., *Oxalis corniculata* L., *Trifolium repens* L., *Prunella vulgaris* L., *Hypoxis aurea* Lour., *Juncus inflexus* L., *Anaphalis nepalensis* (Spreng.) Hand.-Mazz., *Senecio raphanifolius* Wall. ex DC., *Potentilla lineata* Trevir., *etc.*

Note: The plant shows nyctinasty and dimorphic behavior, where partial closing of tepals at night and cloudy days was noted. The populations of species reported here is very rare and highly fragmented and it was noted from four districts of the country during the present study, but it might be present in other districts having similar habitats. Populations of newly naturalized species is expanding over the years and invasion of such alien species in the natural habitats can threaten the population of native species. Close monitoring on its invasion and population trend in the natural habitat is necessary to avoid threatening of endangered and native species.

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