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V. RAVINDRA*
S. SHIVASHANKAR

Division of Plant Physiology and Biochemistry,
Indian Institute of Horticultural Research,
Hessaraghatta,
Bangalore 560 089, India
**For correspondence.*
e-mail: vattem@iihr.res.in

Crinum woodrowii Baker (Amaryllidaceae), hitherto assumed to be extinct, rediscovered after a century from Mahabaleshwar, India

The genus *Crinum* L. is represented in India by 12 species, 3 varieties and 1 form[1] of which 3 species and 1 form, viz. *Crinum brachynema* Herb., *C. eleonorae* Blatt. & McC. f. *eleonorae*, *C. eleonorae* f. *purpurea* Blatt. & McC. and *C. woodrowii* Baker are endemic to Mahabaleshwar and adjoining areas[2–7] in Maharashtra. The first one was recently recollected from the Kates Point, Mahabaleshwar after a lapse of 94 years[8] and the remaining three were assumed to be possibly extinct[6,7]. During floristic exploration of the above-mentioned area between 2001 and 2004, we collected and identified *C. woodrowii* Baker after a lapse of hundred years. G. M. Woodrow first collected this species from Mahabaleshwar. Several bulbs of this were sent to Kew (England) supposing them to be *C. brachynema* Herb., but when they flowered at Kew the plant proved to be a new species and was described by Baker[9] as *C. woodrowii*. It has been so far represented only by a single sheet in Calcutta Herbarium (CAL) collected by Woodrow[7] in 1899; after that report it was not collected again from the type locality or elsewhere[7,10–12].

In the present finding, a total of about 150 individuals were seen growing on hill slopes of Kates Point, Mahabaleshwar. Hence we strongly recommend and assign the status of this species as 'critically endangered'. Considering its narrow range of distribution, it is recommended for inclusion in *Red Data Book of Indian Plants*.

A detailed description, ecological observations, photograph (Figure 1 *a–e*) and distribution map (Figure 2) of the species are provided for its easy identification.

Crinum woodrowii Baker in *Bot. Mag.* 124: t. 7597. 1898; T. Cooke, Fl. Pres. Bombay 2: 750. 1907 [3: 257. 1967 (Repr.)].

Type: Holotype: Bot. Mag. 124: t. 7597. 1898.

Tall herbs; bulbs 8.6–16.2 cm in dia., globose–spheroidal, outer tunics brown, membranous. Leaves contemporary with the flowers, sometimes appear after flowering, many (8–17), 45.5–80 cm × 4.5–14 cm, ensiform, flat, bright green, slightly glaucous beneath, glabrous, apex acute, white waxy, scabrous along margin; leaf sheaths forming a pseudostem. Scapes one, rarely two, arising from bulb outside the tuft of leaves, stout, compressed, 53.5–82.5 cm × 1–3 cm, green at base and apex, purple in middle, faintly channelled. Flowers 10–20 in umbel, fragrant; pedicels 1–3 cm long, green with purple tinge. Spathe valves (involucral bracts) two, opposite, 8.7–10 cm × 2.7–3.9 cm, deltoid, obtuse or acute at apex, margin inflexed, often green, purple tinged, nervate, coriaceous. Bracteoles many, 3–8 cm long, filiform, pale yellow or green. Perianth hypocrateriform (salver-shaped); tube 4–8 cm long, terete, curved, green with purple tinge in flowers, purple in buds; segments spreading equally, white, lanceolate, acute at apex, longer than perianth tube, 8.6–10 cm × 1–1.8 cm, purple tinged on dorsal median line, shining. Stamens 6; filaments 6–7.2 cm long, filiform, white in lower half and at tip, red in upper half, shorter than perianth lobes; anther lobes versatile, linear, crescent, 1.2–1.5 cm long, yellow, grey when wet. Ovary oblong, 8–10 mm × 3–4 mm, three-celled, with numerous ovules in axile placentation; ovules sessile; style terete, filiform overtopping the stamens, 15–15.6 cm long, white in lower half, red in upper half; stigma lobed. Fruits irregular in shape, 3–7 cm across, trilocular, finally bursting, peduncle *c.* 3 cm long. Seeds *c.* 3, large, rounded, testa thick, albumen copious.

Fls. & Frts.: May–July.

Distribution: India, Maharashtra State, Satara District, Mahabaleshwar, Kates Point.

Ecology: Growing at an elevation of *c.* 1275 m (latitude 17°56′. 270″N and lon-

Figure 1 ***a–e*****.** *Crinum woodrowii* Baker. ***a***, Habit; ***b***, Bulb with lateral scape; ***c***, flower; ***d*** and ***e***, *Polytela* sp. caterpillar feeding on flower and fruit respectively. Photos by S.A.P.

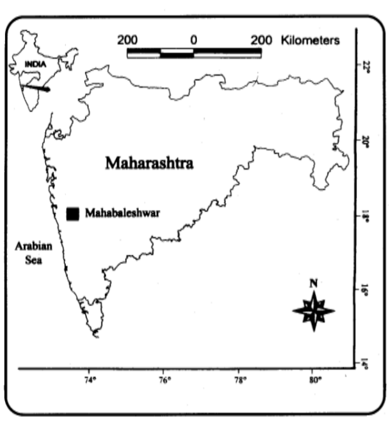

Figure 2. Distribution of *Crinum woodrowii* Baker.

gitude 73°41′. 488″E) on hill slopes of semi evergreen forest outskirts in association with *Ceropegia panchganiensis*, *Crinum brachynema*, *Cuculigo orchioides*, *Euphorbia panchganiensis*, *Hitchenia caulina*, *Nilgirianthus reticulatus*, *Pinda concanensis* and *Scilla hyacinthina*. The moth caterpillars of *Polytela* sp. were observed to feed on the scapes, flowers and fruits of this species (Figure 1 *d* and *e*).

Specimens examined: India, Maharashtra, Bombay (Presidency), May 1899, *G. M. Woodrow s.n.* (CAL); Satara District, Mahabaleshwar, Kates Point, 9 June 2001, *Punekar, Kavade* and *Datar* 178344 (BSI, K); same locality, 12 June 2004, *Punekar* and *Kavade* 187843 (BSI).

C. woodrowii Baker belongs to the section Platyaster, and is nearly allied to the Socotran *C. balfourii* Baker and Bornean *C. northianum* Baker and of the Indian species to *C. amoenum* Roxb. and *C. pratense* Herb[9].

We suggest that for the conservation of this critically endangered and endemic taxon, total protection should be given to the micro habitat. *Ex situ* conservation and domestication of the species in greenhouses and gardens to control pests like *Polytela* sp. that are endangering the plant, besides its reintroduction in the wild in similar habitats are the need of the hour.

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SACHIN A. PUNEKAR[1,*]
SHRINATH P. KAVADE[2]
MANDAR N. DATAR[1]
P. LAKSHMINARASIMHAN[3]
P. S. N. RAO[1]

[1]*Botanical Survey of India, Western Circle, 7, Koregaon Road, Pune 411 001, India*
[2]*Department of Botany, Sir Parashurambhau College, Pune 411 030, India*
[3]*Indian Liaison Officer, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, UK*
**For correspondence.*
e-mail: punekarsachin@hotmail.com

Inheritance of floral traits in spontaneous mutant in rice (*Oryza sativa* L.)

Mutations are the building blocks of genetic variation. Spontaneous mutations occur regularly in all crop plants. However, most of these are not noticed because of the minor changes involved. By contrast, mutations with major morphological alterations can be easily selected. Thus, floral abnormality as a cause of spikelet sterility or fertility has great significance on floral mutations of rice plants. Rice (*Oryza sativa* L.), a self-pollinated, monocot model plant, consists of florets with two glumes, two lodicules, six stamens and one pistil. Naturally, the floral biology shows that one floret provides one caryopsis. However, a range of floral mutants such as pistil hyperplasia (55.6%), represented by an increase in the number of pistils and also stamen hyperplasia (3.7%), represented by an increase in the number of stamens have been reported. Stamen hypoplasia (7%), represented by a decrease in the number of stamens has also been reported in cultivar Kinmaze[1]. These kinds of floral malformities are due to either environmental stresses or genetic factors, which are considered as major causes for sterility in rice[1,2]. The fertile sept-pistillate mutant[3] was also observed in rice cultivar, TDC 72. This sept-pistillate mutant gave a goodness-of-fit of segregation ratio to the expected Mendelian monogenic action of 3 : 1 ($\chi^2 = 1.78$). Multiple-pistillate mutants in rice were reported; these mutants are male fertile and the trait has been transferred to the cytoplasmic male sterile (CMS) background to breed elite CMS lines[4]. The extra glumes (*eg 2*) mutants are characterized by the presence of extra palea, and lemma was noticed in the cultivar IR 36. Not all the spikelets in a panicle of the mutant have extra glumes[5].

Rice accessions of *indica* (IR 36, IR 64 and IR 72), *japonica* (Taichung 65, Akihikari and Palawan) and *javanica* (PRR 5, PRR 10 and PRR 16) sub-species were transplanted in a hybridization block in the kharif (wet) season of 2000-01 in the experimental area of Paddy Breeding Station, Tamil Nadu Agricultural University, Coimbatore. Many spontaneous mutants were identified in one *javanica* accession PRR 16. These mutants were more vigorous and dissimilar from mother plants of PRR 16 in most of the traits, viz. floral abnormality, purple pigmentation in leaf sheath, leaf blade (Figure 1 *a*), stigma (Figure 1 *f* and *g*), bi-pistillate and tri-pistillate, apiculus and the presence of extra palea and lemma (*eg 2*; Figure 1 *b*). The mutant plants were evaluated in both wet and dry seasons of 2001–02. Selfing of panicle was carried out in all seasons to confirm seed setting, which showed that there was seed set in the mutant plants in all seasons. The evaluation confirmed that the occurrence of mutation was heritable. Spikelets were collected during all seasons at heading time and studied under a stereomicroscope to investigate the morphological changes in the floral parts. These mutant panicles had both bi-pistillate and tri-pistillate florets. Bi-pistillate florets appeared predominantly and produced double kernel seeds (Figure 1 *c*). The frequency of appearance of tripistillate florets was low and produced the triple kernel seeds (Figure 1 *d*). Few multi-pistillate florets were also found in a panicle and became sterile due to immature sexual organogenesis. Floral abnormality was studied across four seasons, which confirmed the stability of mutant traits.