

## IPHIGENIA STELLATA BLATTER (LILIACEAE)—ITS IDENTITY AND ECONOMIC IMPORTANCE

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## ABSTRACT

The genus *Iphigenia* with 6 species (two new but not described here) from Western India and their distinguishing characters and the variation in their yield of Colchicine, is presented briefly, while the correct identity and affinities of *Iphigenia stellata* Blatter are well established with detailed description and diagram, indicating briefly the field work and analysis carried out to discover this new potential plant source for Colchicine.

## INTRODUCTION

The genus *Iphigenia* Kunth, as recorded in the *Flora of British India* and various State Floras, is represented by two species in India, namely *I. indica* (Linn.) A. Gray and *I. pallida* Baker. The former is fairly distributed throughout the country and the latter along the peninsular India, but mostly Western ghats. Blatter (1928) discovered *I. stellata* from Panchgani in Satara district, Maharashtra. This has been so far found to be endemic to this area and also the adjoining ranges of Sahyadris in Ratnagiri and Kolhapur districts of Maharashtra. Recently Arekal et Swamy (1972) described another new species *I. mysorensis* from Ranganathittu, near Mysore.

Presently the genus as available in Western India is being studied critically and most of the above mentioned species have been collected besides two more interesting species which would be described as new elsewhere. Biosystematic studies of the genus with several populations are in progress and a few aspects of cytology, embryology, palynology and chemistry of some of these species are being studied.

Though colchicine is fairly widely distributed

in several species of Liliaceae (Wildman *et al.*, 1968), the only commercially viable source known at present is *Colchicum autumnale* Linn. (Hamerslag, 1950), the seeds of which contain 0.3-0.5% colchicine. During 1963, on request from the Chemical Institute, Medical Faculty of Palacky University, Olomouc, Czechoslovakia, the Western Circle, Botanical Survey of India supplied the seeds of *Iphigenia indica*. Their chemical findings (Kaul *et al.*, 1964) that seeds of *I. indica* contain as much as 0.51% colchicine made the genus *Iphigenia* as another potential source of colchicine, a rare drug very much in short supply throughout the world. Consequent to this, the National Chemical Laboratory, Poona, made a request for the supply of seeds of *I. indica* and *I. pallida* for their chemical study. Besides the seeds of the above two species, the authors after critical taxonomic analysis, supplied the seeds of *I. stellata* and other two new species of *Iphigenia* in complete pure form, for analysing their colchicine content. As compared to others, the seeds of *I. stellata* gave astonishing results as it was found to contain 1.5-2.0% colchicine—the highest percentage known so far in the plant-kingdom. The results of the species worked out are given in the table (Page 119) to present an up-to-date picture at a glance.

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TABLE SHOWING SALIENT FEATURES OF *IPHIGENIA* SP. WITH THEIR CORRESPONDING YIELD IN COLCHICINE

Sl. No.	Species	Inflorescence	Flowers	Fruits	Seeds (fresh)	No. of samples analysed	% yield
1.	<i>Iphigenia indica</i> (Linn.) A. Gray	1-3 flowered, short, corymbiform raceme	Dark brownish-purple	Generally oblong, columnar	Brown, with prominent band of white raphe	3	0.5-0.6
2.	<i>Iphigenia</i> sp. nov.	4-many flowered, long raceme	—do—	oblong	Brown, with reduced band of brown raphe	1	0.7
3.	<i>I. mysorensis</i> Arekal et Swamy	2-4 flowered, sometimes 7 flowered raceme	—do—	obovoid	Brown, with small white raphe	—	(under investigation)
4.	<i>I. pallida</i> Baker	3-4 flowered, sometimes 4-7 flowered, corymbiform raceme	White to pale pinkish	Generally ellipsoid	Brown with prominent wavy, crumpled ovate mass of raphe	2	0.5-0.6
5.	<i>I. stellata</i> Blatter	2-4 flowered, sometimes 6 flowered, short raceme	Bright pinkish	Obovate or subglobose	Brown with reduced thread-like raphe	7	1.2-1.9
6.	<i>Iphigenia</i> sp. nov.	1-2 flowered, corymbiform raceme	Pinkish violet to pure violet	Obovate	—do—	1	1.0 (further investigation is in progress)

A short note on "New sources of colchicine in *Iphigenia*" has also been published by the present authors jointly with Kapadia and Sukh Dev, co-workers from National Chemical Laboratory, Poona (*Phytochemistry*, 2: 1193-1194. 1972) and the invention was registered and patented (Patent no. 127743). This work has brought out some new thinking and approach on the problem of availability and production of colchicine from the genus *Iphigenia* and to the country, a very rich source of the drug in *I. stellata* and its allied species. This leads to the importance of further thorough chemical screening of other genera of Liliaceae in India not worked out properly, in order to enhance the knowledge on the availability of new plant sources rich in colchicine which at the moment has a consistent demand and a very high market value. Keeping in view of such programme, experimental cultivation of *I. stellata* has been initiated at 10 different representative centres to begin with,

having slightly varied climatic conditions along the Sahyadris in Maharashtra from Surgana in Nasik district in the north to Chandgad in Kolhapur district in the south to study their growth performance and yield in colchicine. Efforts are also being made to cultivate this species on a large scale by private enterprise and a few drug farms have already been established under the technical supervision of the authors and with the co-operation and under the care and ownership of the Forest Department, Maharashtra State at Panchgani, Gureghar Forest Nursery and plateau, to obtain a perennial source of raw material to produce colchicine on commercial basis, initially to cope up with the domestic requirements and save valuable foreign exchange and later to produce enough for export purposes.

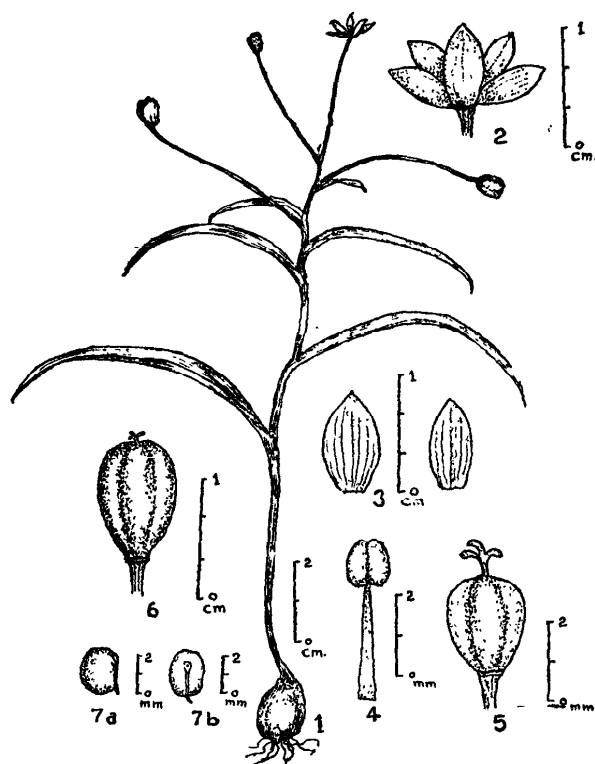
Botanically *I. stellata*, being just a small weed, growing and completing its life-cycle within a short period during mid-monsoon season, did not attract much at-

tention of the botanists earlier. Now, with its importance as a new source for colchicine, the authors have been carrying out detailed investigations on the various aspects of the genus. Many short trips to Panchgani and its surroundings were made and it was observed that the species is very common along plateau and gravelly slopes and abundant at some places. Within a radius of 8-10 km, quite a good number of populations were studied, material collected and grown at experimental plots. While comparing the characters with those of the original description, it has become evident that the length of pedicels (12-20 mm, stout), colour of flowers (pale mauve), size and shape of perianth segments (15 mm, oblong-oblancoate, oblong-obovate), as given by Blatter do not agree with actual specimens of *I. stellata* (which has 2.0-5.5 cm long pedicels, bright or dark pink flowers with perianth segments 6-10 mm long, broadly elliptic or elliptic-ovate in shape) but agree with *I. pallida*, a closely allied species. Presuming the possibility of the occurrence of *I. pallida* growing in mixed state with the scattered populations of *I. stellata*, a careful search was carried out which resulted in the occasional collection of *I. pallida* along with *I. stellata*. Thus, it is evident that Blatter had prepared the description of his new species *I. stellata* mixing a few characters of *I. pallida*, as mentioned earlier. Further, his comparison of *I. stellata* as a new species with *I. indica* (having dark brownish-purple flowers) rather with *I. pallida*, supports the authors' opinion that he did not distinguish *I. pallida* clearly, though in fact, it is more allied to and comparable with *I. stellata* than *I. indica*. It has therefore, become necessary now to emend the original description of *I. stellata*. However, in *I. pallida*, fruits are larger and ellipsoid, raphe on fresh seeds is well developed, broadly ovate in shape; whereas in *I. stellata*, fruits are smaller, obovoid or subglobose with raphe

on fresh seeds reduced to a thread-like appendage.

For the first time, illustrations are given in this paper for a better understanding of the species so as to enable other workers to locate it in other parts of the country, particularly along the peninsular India and the western ghats.

***Iphigenia stellata*** Blatter in J. Bombay nat. Hist. Soc. 32: 734. 1928 *emend* Ansari et Rolla (Figs. 1-7b).



*Iphigenia stellata* Blatter

Figs. 1-7b: 1. Whole Plant. 2. Flower. 3. Perianth segments. 4. Stamen. 5. Ovary. 6. Fruit. 7a. Lateral view of seed. 7b. Front view of seed.

Perennial herb, upto 15 cm high. *Corms* ovate or sub-globose varying in size, narrowing to a short neck. *Stem* rigid to flexuous. *Leaves* alternate, 4-6, similar to grass blades, sessile, 8-14 × 0.4-1.0 cm, the lower larger and upper smaller, linear or linear-lanceolate, tip acute. *Flowers* bright pink to pinkish mauve, creamy white in bud,

generally 2-4, sometimes 4-6 in a short terminal raceme. *Bracts* leafy, smaller. *Pedicels* 2.5-4.0 cm long, reaching 5.5 cm in fruits, thin, broadening at the top with papillae at the end of ridges only. *Perianth* segments 6, broadly elliptic or elliptic-ovate, acute or acuminate, 6-10 × 3-4 mm, spreading and ascending, 7-9 nerved. *Stamens* 3.5-4.0 mm long; anthers sub-globose, 1.25 × 1.0 mm, purple, pollen yellow; filaments 3 mm long, straight, light pinkish, tapering towards the apex. *Ovary* green, obovate, slightly shorter than the stamens, styles 3, 1.5 mm long, united near the base, each recurved above to end in stigma. *Capsules* 8-12 mm long, obovate or sub-globose, loculicidal, grooved between the carpels, styles and stigma persistent. *Seeds* 20-30 in number, sub-globose or ovoid, 2 × 1.5 mm in size, brownish-black on maturity with thread-like white raphe on fresh seeds, not conspicuous when dried (Plate 1).

Fls. Late June-July. Frt. July-mid Aug.

*Specimens examined*: SATARA DISTRICT: Panchgani plateau, A. S. Rao 77906, Ansari 104890; Gureghar, Ansari et Rolla 116546 (BSI); Panchgani, Rukmini 141, 313; Mahabaleshwar, Bole 1697, 1909, 1999 (BLAT).

*Field notes*: A very common herb, found on the plateau and open grazed grasslands. It grows well on gentle slopy areas with gravelly, poor but well-drained soil. About 250-300 cm rainfall with cool and misty atmosphere over an altitude of about  $\pm 1500$  m provides ideal condition for its healthy growth. Trial experiments have proved that the percentage of germination of the corms in rich clayey moisture-laden soil is poor and those which succeed in germination, yield weak plants. It also does not grow well in shady areas and among tall grasses. Cattle generally do not relish its grass blade-like leaves and bitter fruits. The fruits dehisce very slowly during mid-monsoon

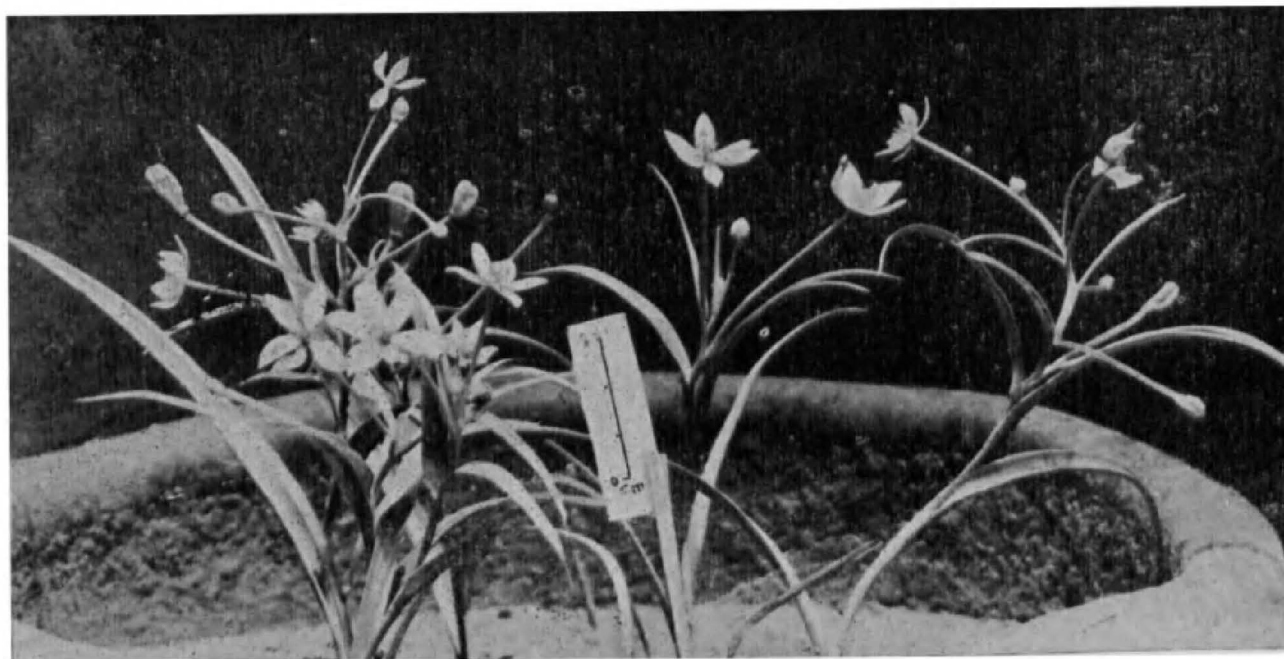


Plate I : *Iphigenia stellata* Blatter—Plants with flowers and fruits.

season and the wet seeds just fall in the vicinity of the plant. This is perhaps one of reasons for its very localised distribution.

It is observed that the plants particularly fruits, get attacked by some caterpillars at Dehra Dun and Yercaud. This needs proper

check up and control through insecticides etc. without affecting the colchicine content of the seeds.

extraction of colchicine and to Prof. P. V. Bole, Blatter Herbarium, Bombay for facilities for herbarium work.

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