



CODEN (USA): IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**Available online at: <http://www.iajps.com>**Review Article****BOTANY, TAXONOMY AND CYTOLOGY OF *CROCUS*
ALEPPICI AND ITS ALLIES**

R.B. Saxena

Drug Standardization Research Section, Central Research Institute- Ayurveda, Aamkho, Gwalior – 474
009. (INDIA)E-mail. bigboss.raja28@gmail.com

Phone: + 91751 – 4076287 (R)

Mobile: + 91 9752926029

Abstract:

The genus crocus (family – iridaceae) contains ca. 150, small, corm bearing, perennial species having an old world distribution, primarily in Mediterranean- Europe, west Asia and west China. These species are highly valued as ornamental applications. Sub-genus crocus – crocus aleppici – series are closely related, and are difficult to be separated taxonomically and have a complex cytology. Botany of crocus aleppici – series, taxonomy of their species and their infra-specific taxa are presented, and their distribution, ecology and phenology; description and chromosome counts are provided with key to their identification.

Key words : Crocus, geographic area, Classification, Chromosome, Cytology, alpine – series.

Correspondance address :**Dr. R.B. Saxena,**

F/o Pukhraj Saxena, 22,

Juliatt square St. Edmnnds park, Lucan,

Dublin – 20. Ireland.

QR code



Please cite this article in press as Saxena R.B , **Botany, Taxonomy and Cytology of Crocus Aleppici and Its Allies**, Indo Am. J. Pharm. Sci, 2015;2(9).

INTRODUCTION

Crocus is a genus of the flowering plants in its Iridaceae or Iris family comprising approximately 150 taxa, 1 divided by Mathew² into two sub-genera (not supported by recent phylogenetic research [1, 3] and two sections sub-divided into 15 series. Later, one more series was added 4 and one series was moved to another section [1]. The species discovered since then have been integrated into this classification, distributed sea (Portugal and W. Morocco), Europe to W. China and Mongolia. The center diversity of the genus in Turkey with more than 70 taxa and Greece with 33 taxa. The study shows no support for a system of sections as currently defined,³ although despite the many inconsistencies between Mathew's classification and current hypothesis.

The species evolution is generally accompanied or followed by partial changes in the chromosome complement and there can be few genera where such a wide range of variation occurs. The variation is, however, difficult to deal with or without information of breeding systems, hybridization potential and the production of hybrids. So far, it has

BOTANY

The taxonomic classification of *crocus aleppici* – series is as follows :

01.	Division	Spermatophyta
02.	Sub-division	Angiospermae
03.	Infra-division	Radiatopses
04.	Class	Monocotyledonae
05.	Sub-class	Liliidae
06.	Order	Liliales
07.	Family	Iridaceae or Iris
08.	Sub-family	Crocoidae
09.	Tribus	Croceae
10.	Genus	<i>Crocus</i>

only been possible to make a comparative analysis of chromosome number and morphology, but these differences and similarities can be significant, and may well indicate barriers to successful inter-breeding. Although similar karyotypes do not reveal the presence of symmetrical structural changes, it may generally be assumed that if the phenotypes are also alike, there is a probability that there are no barriers to gene exchange. If karyotypes are observably different than inter-breeding is less likely [2, 5-8]. Such chromosome barriers are of obvious importance and can lead on the further divergence which may eventually give rise to acceptable species. The closely related species have been difficult to separate taxonomically and have also been found to be complex cytologically and have been treated as the series [9-11].

The corm tunics of studied genera contain calcium oxalate crystals, which have not previously been overlooked except in *crocus* [12]. The crystals on the surface of the observed *crocus* taxa are determined as styloids. In iridaceae, almost all taxa have styloids, with the exception of *sisyrinchium* and its close allies, which lack crystals altogether [13].

Genus *crocus*: **Herb:** small, perennial, cormous. **Corm** ; oblate, covered with tunics. **Leaves** : few, all basal, green, adoxially with pale, median strips, base surrounded by membranous, sheath like. **Aerial stem** : not developed. **Flowers:** emerging from ground, with peduncle and ovary sub-terrestrial. **Perianth** : white or lilac to dark purple . **Tube:** long, slender, segments similar, equal or sub-equal. **Stamens** : inserted in the throat of the perianth tube. **Style:** 1, slender, distally with 3 to many branches. **Capsule** : small, ellipsoid or oblong-ellipsoid. **Seed:** coats covered with dense mat of papillae [14]. **Section:** Nudiscapus – species without basal prophyll.

Series *aleppici* : It is also called yellow series *aleppici*. Tunics of the corms membranous, with split, parallel fibers, foliage produced at the same time as the flowers, fall or winter flowerings.

Crocus aleppicus Baker [15]

C. aleppicus is from the Aleppo region of Jordan. A plant with a restricted distribution in the wild it inhabits a semi-desert habitat where the dry season may be eight months without rain. *Aleppicus gaillardotii*, named after Charles Gaillardot (1811 – 1883), a French surgeon and botanist in Egypt at Syria (Lebanon).

Synonym: *Crocus gaillardotii* Maw

Scientific name: *Crocus aleppicus* Baker

Common name: *Crocus* Aleppo.

Life form: geophytes. **Habitat:** batha phrygana. **Native climate:** Mediterranean, hot, very dry summer, cool winter. **Wild habitat** : stony places, scrubland. **Distribution** : Syria, In Israel – Golan, Hermon, Gallilee, Mediterranean coast, Lebanon, Jordan, dandy hills and rocky places. **Altitude** : 1800 m. **Corm** : tunic with parallel fibres. **Stem** : 4-8 cm. high. **Leaves** : numerous, 1-1.5 mm. broad, all basal, rosette, very narrow, needle shaped with bright white center vein, smooth margins. **Inflorescence** : one to several, each on a short, subterranean pedicel. **Flowers** : hermaphrodite, large well-shaped flower, about 8 cm. high, white variable purple veining externally. **Corolla** : tube

as far as the onion, white. **Perianth** : may be purple on out-side. **Throat** : yellow, winter. **Stamens** : yellow and not back. **Fruits /Pods** : homogeneous seed fruit. $2n = 16$.

Phenology: Flowering: November – January.

Characteristics: (i) *crocus aleppicus* Baker = *c. gaillardotii* (Boiss and Blanche) Maw. (ii) In Jordan, bulbs and soft seeds eaten raw or bulbs roasted and (iii) *c. aleppicus* seeds will usually germination or may erratic.

Crocus boulosii Greuter [16-19]

Crocus boulosii Greuter collected by Boulos 1380 Libya

Scientific name: *Crocus boulosii*

Common name: *Crocus boulosii*, *Crocus boulosii* Greuter.

Habit: herb/forb. **Life cycle:** perennial. **Distribution:** Libya. **Native:** Libya. **Locality:** Cyrenacia, Marana in Mt. Achdar. **Native climate:** cold wet winter, warm dry summer. **Wild habitat:** open stony places over lime-stone, woodland edges in terra rose. **Altitude:** 500 m. **Corm:** membranous tunic ages to parallel fibres. **Leaves:** narrow, rather numerous appearing with the flowers, spring ephemeral. **Flowers:** 6-9 cm. tall, white suffused with purple at the base of segments, mid winter. $2n = ?$.

Phenology: Flowering: Late winter and early spring.

Characteristics: Not a very exciting species horticulturally (But its available in commerce and barely in cultivation, this is unlikely to be an issue). Smallish white flowers in mid winter and almost certain to need winter protection and a completely dry summer rest.

Note: No basal spathe, 2 bract. Flora of Libya.

Crocus veneris tappein ex Poech [20,21]

It is endemic and can be seen in Akamas and Pentadactylos.

Scientific name: *Crocus veneris*.

Common name : Aphrodite's crocus, Autumn crocus, Cyprus crocus, *Crocus veneris*, Species crocus, saffron, meadow saffron, Naked ladies.

Habit: herb/forb. **Life cycle:** perennial. **Distribution:** northern cyprus frequent, on northern slopes of kyrenia range, from kornospeat of eastern end of range. Not occurring on the main land. **Native**

climate: Mediterranean. **Wild habitat:** dry, stony or grassy places, scrub or thin woodland. **Height:** 10 cm. **Spread:** 10 cm. **Altitude:** 1000 m. **Corm:** tunic, membranous with parallel fibers. **Leaves :** 1 mm. wide, dark green, 3-4, 7.5 10 cm. long, equaling the flower in height, but occasionally with only the tips showing, narrow silvery median strips on the upper surface. **Flowers:** 1-2, fragrant, six white segments, often with a violet stripe or feathering on the out-side of the outer three, 8 cm. high, small to medium-size; rarely the purple is almost black. **Throat:** bright yellow. **Capsule:** small, ellipsoid or oblong-ellipsoid. **Seed:** white flushed bronze flowers with yellow. $2n = 16$.

Phenology: Flowering: November – January

Characteristics: (i) *Crocus veneris* a species endemic to the Mediterranean island of Cyprus where it is said to grow in stony or grassy places in scrub. It's flower in autumn and early winter and is little difference in cultivation where it make its cheery, star-shaped flowers from on wards. (ii) This is an undistinguished species requiring glass protection and dryish summer dormancy. (iii) Autopoly ploidy can be induced by treating cells with a drug, Colchicine. Colchicine is a alkaloid derivative from the autumn *crocus* (*C. veneris*). (iv) In habit microtubule polymerization, and thus inhibits the separation of chromosome during meiosis and (v) Autopolyploidy application: treating a plant with colchicines often produces autopolyploidy, resulting in plants with larger flowers and /or fruits.

Crocus sari [22 – 26]

Common name: Iris sari

Habit: herb/forb. **Life cycle :** geophytes. **Habitat:** batha phrygana. **Native climate:** Mediterranean, hot, very dry summer, cool winter. **Wild habitat :** stony places , scrubland. **Origin :** Iran. **Distribution:** ?. **corm:** ovoid,c. 10 – 20 (25) mm. diameter, depressed globose, tunics fibrous, the fibres finely reticulated, extended at the apex into a neck upto 2 cm. long. **Cataphylls :** 3-5, white membranous. **Leaves :** (5-) 7 – 17, synanthous or sub-synanthous but if absent at anthesis than developing immediately after flowering, grayish- green, 0.5 – 1.5 mm. wide, glabrous or scabrid to papillose on the margins of keel and blade. **Flowers:** fragrant, autumnal, 1-6, pale pinkish lilac to deep lilac – blue or purplish-blue, usually slightly veined darker. **Throat:** white or lilac, pubescent. **Prophyll :** present. **Bract and bractolate :** present, unequal, membranous, white tapering gradually to acute, flaccid tips. **Perianth**

tubes: 4-7 (-10) cm. long, white, lilac or purplish. **Segments:** (1-9), 2.5 – 5 cm. long, (5-8)- 16 cm. wide , elliptic, oblanceolate or obovate, acute or sub-acute, the inner often slightly smaller than the outer. **Filament:** 2-5 mm. long, white, glabrous or sparsely papillose-pubescent. **Anthers:** 9-20 mm. long, yellow. **Style:** divided into 3 red (occasionally yellow) branches, each branch 3 – 15 mm. long and half as long as the perianth segments, rather slender and tapering gradually to the expanded apex. **Capsule:** ellipsoid, 15 – 25 mm. long, 7 – 10 mm. wide, produced on a short pedicel at or just above the ground level at maturity. **Seed:** reddish-purple, irregularly sub-globose, 3-4 mm. diameter, with a small, pointed caruncle, raphe, usually a small ridge running the length of the seed but occasionally wind-like. **Testa :** covered with dense mat of papillae. $2n = 12$.

Phenology: Flowering: October – December.

Characteristics: *Crocus sari* is one of the close relations of *crocus sativus*. A new cytotype of this species was discovered from west of Iran (Reno Valley and Islamabad – e- Ghash). Karyotype of this cytotype with $2n = 12$ consists of one large pair of metacentric chromosome with a satellite in the long arm. One pair of large sub-metacentrics, two pairs of smaller sub-metacentrics and two smallest pairs, which are metacentric. This plant cytogenetically is very similar to *crocus pallasii* subsp. *turcicus* ($2n = 12$) and also *crocus pallasii* subsp. *haussknechtii* with 16 chromosome is considerable different from those two cytotypes. It seems that during evolution new cytotype with $2n = 12$ derived from *crocus pallasii* subsp. *haussknechtii* .

ACKNOWLEDGMENTS

The author extends his deep gratitude to Dr. B. Mathew, 90 Foley Road, Clay gate KT 10 ONB, UK. And Dr. M. Negbi, Department of Agricultural Botany, The Hebrew University of Jerusalem, Israel, for providing the literature and encouraging the article.

REFERENCES

- 01.Harpke, D. et.al. 2012. Phylogeny of *crocus* (Iridaceae) base of the chloroplast and two nuclear loci : incient hybridization and chromosome number evolution. Mole. Phylogent. Evol.
02. Mathew, B. 1982. The *crocus* : A Revision of the Genus *crocus* (Iridaceae), B.T. Batsford,London.
03. Petersan, G., Scberg, O., Thorsoe, S., Jogenserv, T. and Mathew, B. 2008. A phylogeny of

the Genus *crocus* (Iridaceae) based on sequerke data from five plastid region, Taxon. 57. 487 – 499.

04. Mathew, B., Petterson, G. and Seberg, O. 2009. A reassessment of *crocus* based on molecular analysis, The Plantsman, New series. 8. 50-57.

05. Saxena, R.B. 2010. Botany, Taxonomy and Cytology of *crocus sativus* – series, Ayu. 31. 374 – 381.

06. Brighton, C.A. 1977. Cytology of *crocus sativus* and its Allies (Iridaceae), Pl. Syst. Evol. Austria. 128. 137 – 157.

07. Saxena, R.B. 2014. Botany, Taxonomy and Cytology of *crocus vericolors* – series, The Experiment. 21. 1487 – 1494.

08. Saxena, R.B. 2015. Entirely gone out useful plant – *Artemisia cina.*, Indo-American Journal of Pharmaceutical Sciences. 2. 3. 648 – 663.

09. Gawler, K. 1771. Weston Publication, Bot. Univ. 2. 238.

10. Brickell, C. (Editor-in- chief). 2008. RHS A-Z Encyclopedia of Garden Plants UK.: Dorling Kindersley. 1136.

11. Haywood, C.A. 1983. Meiosis in some species and cultivars of *crocus* (Iridaceae), Pl. Syst. Evol. 143. 207 – 225.

12. Wolter, M. 1990. Calcium oxalate- kristalle in den knollen-hiillen vao *crocus* (Iridaceae) und ihre systematische Bedeurung, Bot. Jahrb. Syst. 112. 99 – 114.

13. Rudale, P. et. Al. 1986. An anatomical and chromosome investigation of *sisyrinabium* and allied genera, Bot. Gaz. 147.

14. Zhao yu-Tang. 1985. Iridaceae in : Pei Chien and Ting Chin-Tsun, eds. Fl- Reipabl Popularis Sin. 16. 120 – 198.

15. Baker. 1873. *Crocus aleppicus*, Gard. Chron. 69.

16. Greuter, W.R. 1968. *Crocus boulosii*, Candollea. 23. 45.

17. Ali, S.I., Jafri, S.M.H. and Godi, E.L. 1989. Flora of Libya, Al Faatch University, Tripoli. 23.

18. *Crocus boulosii* Greuter, Alpine Garden Society, UK.

19. Greuter, W.R. 1968. *Crocus boulosii*, Candollea, Organe du conservatoix et du Jordin Botsnique de la ville Geneve, Switzarland. 25. 320.

20. Tappein ex Poch. 1842. *Crocus veneris*, Enum. Pl. Cypr. 10.

21. Halliday, S. and Lushington, L. 1988. Flowers of northern Cyprus, Angus Hudson Ltd. London.

22. Goldbach, K.L. 1817. Monographiae Generis *croci* tantamen Mem. Soc. Imp. Net. Moscou. 5. 142 – 161.

23. Sanei, M. , Rahimyan, H., Agayev, Y.M. and Soheilvand, S. 2007. New cytotype of *crocus*

pallasii subsp. *hanssknechtii* from west of Iran, Acta Horticulture. 739. 107-112.

24. Kandemir, N. 2003. An autecological study of the endemic *Iris sari* Schoot ex Baker (Iridaceae), Herb J. systemetic Bot. 10. 2. 31-51.

25. Kandemir, N., Celik, A. and Sunuco, A. 2011. *Iris sari*, Bangladesh J. Bot. 40. 2. 177-184.

26. Agayev, Y.M., Soheilvand, S., Sanei, M. and Rahimyan, H. 2006. New cytotype of *crocus pallasii* subsp. *hausknechtii* from west of Iran, II International Symposium on saffron, Biology and Technology. 739. 107-111.