ISSN 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com *Review Article*

BOTANY, TAXONOMY AND CYTOLOGY OF *CROCUS VERNI* – SERIES

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Abstract:
The genus crocus (Family- Iridaceae) contains ca 100 small, corm bearing, perennial species distributed Central south Europe north Africa, south Asia and west China. These species are highly valuated as ornamental plants of their colourful flowers, horticultural varieties and Industrial applications. Sub-genus Crocus series crocus verni series are closely related species; and are difficult to be separated taxonomically and have a complex cytology. Botany of c. varni series, taxonomy of their species are their infra-specific taxa are presented, and their distribution, ecology and phenology; full description and chromosome counts are proved with key of their identification.

Key words : *Crocus, Classification, Geographic area Cytology,, Chromosome, Crocus verni – series.*

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Please cite this article in press as ***Saxena R. B. Botany, Taxonomy and Cytology of Crocus Verni – Series,*** *Indo American J of Pharm Sci, 2015:2(4):757-763.*

INTRODUCTION:

The genus *crocus* (Family – Iridaceae or Iris) comparises some 85 – 100 species having an old world distribution, primarily in the Mediterranean – Europe and western Asia. The limits of the entire genus lie within the longitude 10^0 W to 80^0 E and latitude 30^0 N to 50^0 N. Phytographically, the majority of species occur within the Mediterian floristic region, extending eastward into the Ieano- Turanian region, both of these areas are characterized by cool to cold winters and autumn-winter-spring precipitation and warm summers with very little rainfall; the genus *crocus* is well adopted to such conditions, with the plants actively growing from autumn to rate spring and surviving the summer drought below ground by means of a compact corm. Many species have their above ground growth at the onset of autumn rains and flower almost immediately; some of these produce their leaves and flowers concurrently or nearly so, white other bloom without leaves and delay their leaf production until the onset of warmer weather, usually in spring [1].

Crocuses are some of the most vivrantly beautiful flowering plants, and are therefore widely popular among gardeners in the know. They mix well with creeping or dense greenery, and will push their may right up through even the densest vegetation and brust into colourful bloom. While new gardeners may feel intimidated by the process of planting and caring for *crocus* bulbs, the process is easier than it may appear with under-standing of the crocus growth cycle, it becomes possible to plant grow and cultivate there glorious additions to any garden or land scape.

Cultivation and harvesting of crocus was first dommented in the Mediterranean, notably on the Island of Crete. Fresces showing them are extent at the *Knossos* site of Crete [2] as well as comparably aged site on Santorini. An early spring bloomer, *crocus* bulbs,are technically corms. There are solid inside, if cuts than open, and then have papery outer covering which is called tunic. Each *crocus* usually makes many corms.

A 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. This variation is, however, difficult to deal with without information of breeding systems, hybridization potential and the production of hybrids. So far, it has 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 interbreeding. 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. On the other hand, when karyotypes are observably different, successfully interbreeding is less likely [3], 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 a series [4, 5]. These physiological characteristics, to-gether with cytological information and morphological features of the corm tunics, bracts, bracteoles, leaves, flowers and seed, have been discussed by the genus into ahierarchy of sub-genera, section and series of *crocus verni.*

BOTANY

Taxonomic characters are based mainly on the presence or absence of a prophyll (a basal spathe) and the aspect of the style and corm tunic. The taxonomic classification of *c. verni* series is as follows:

01.	**Domain**	**Eukaryota**
02.	**Kingdom**	**Plantae**
03.	**Sub-kingdom**	**Tracheobionta**
04.	**Super-division**	**Spermetophyta**
05.	**Division**	**Magnoliophyta**
06.	**Class**	**Liliopsida**
07.	**Sub – class**	**Liliidae**
08.	**Order**	**Liliales**
09.	**Family**	**Iridaceae (Iris- family)**
10.	**Genus**	***Crocus* L.**

(a) **Genus *crocus***: **Native** – woodland, scrub and meadowns from sea level to alpine Tundra in central and south – Europe. North Africa and middle east,of the Island of the Aegean and across central Asia to western China. **Herb** : small, perennial, cormous. **Corm** : oblateo, covered with tunic. **Leaves:** few, all basal, green, lineas, adaxially with pale, median-strip, base surrounded by membranous, sheath like leaves. **Aerial stem:** not developed. **Flowers:** emerging from ground, with peduncle and ovary sublerranean. **Perianth:** white, yellow or lilac to dark purple, tube long, slender. **Segments**: similar, equal or sub-equal. **Staments**: inserted in the throat of perianth tube. **Style**: slendar, distally with 3 to many branches. **Capsule**: small, ellipsoid or oblong – ellipsoid.

(b) **Sub- genus**: Anther with extrose dehiscence.

(c) **Section *crocus:*** Scope subtended by a membranous prophyll.

(d) **Series verni** : Corms with reticulated fibers, spring-flowering (apart from *crocus longiflorus*), flowers for the most or part without conspicuous outer striping of bracts absent. 2n = 8, 11, 12, 14, 16, 26, 27, 28.

CASE DISCRIPTION

Crocus angustifolius AGM [6]

Syninym (s): *C. susuanus* Ker-Gawl
C. susianus (Cloth of Gold)
C. ` cloth of Gold`

Scientific name: *Crocus angustifolius*

Common name: Cloth of Gold

Native: southern Ukraine and Armenia [7]. This is lovely *crocus* which is ideal for naturalizing in grass. *Crocus* are dwarf, deciduous perennials growing to convert 5 cm. on, tall and wide the narrow grass-like leaves with silver strip and goblet-shaped appear in late winter or early spring. **Flower** : bright yellow –orange, with the outer petals suffused with deep bronze, among the grey-green l**eaves**, sterile. Plant does not set by seed.[8] 2n = 12.

Phenology: Flowering: Late winter / early spring.

Crocus imperati Ten [8-10]

Botanical name : *Crocus imperati*

Common name : Early crocus (English), Imperati crocus.

Italian *crocus imperati* is a fascinating plant. Geographic division : north America. *Crocus* are dwarf, deciduous perennials growing grom a corm. Corm with glossay deep green leaves, height 10 cm. and fragrant purple flower, the outer tepals externally buff, striped with purple, throat yellow. The colours of this *crocus* dramatically change from bud to flower, the buds are buff-yellow, feathered with reddish-violet, but they open to reveal an interior of mineral – violet tinged rose; large, vasa-like flowers. Look to species *crocus* for a bit of daring and adventure. After all, these *crocuses* hail from homelands that include- Spain, Portugal, Morocco, Italy, Greece, Asia Minor and China. The flowers of species are miniature when compare to their Dutch cousins, but the species definitely bi-coloured species which are exotically feathered or dusted with a secondary hue. Flowers`s colour : purple and pale yellow in spring and winter. 2n = 26, 27.

Phenology: Flowering: February.

Crocus flavas Weston, non(L) hill [11-13]

Synonym (s) : *C. Curtis*
C. aurenus, C. moesiaeus

Native: Greece, former Yugoslavia, Bulgaria, Romania and north – west Turkey. Cultivated in UK – 400 years ago. A very hardy plant, *crocus flavus* grow well outdoors in well-drained sunny spot, on the rock gardens or thin grass, spreading gently to form a colony. **Corm**: tunics, membrande, splitting into vertical fibrous and lacking distance horizontal rings at the base, deep russet colour. They have the unusual characteristic of being elongated to form a tube through which the shoot emerges, and this persists for several seasons if not disturbed. **Leaves:** 4 – 8, usually 5 in number of each plu. 10 – 23 X 1-4 mm. size, erect, synanthous, green with distinct white's median strips, pubescent. **Flower** : usually 1 or 2, perianth segments, dark yellow or orange, 1-3.5 X 0.5 X 1.5 cm. in size. **Throat perianth**: yellow. **Style:** shorter than anther, yellow or pale orange, 2-5 mm. in size,. **Anther**: yellow, 8-12 mm. Bright –orange-yellow flowers emerge during later-part of February. **Seed**: large, recognizable rich russet red. 2n = 12.

Phenology: Flowering: February to April.

Crocus sativus (Excluded) [1, 3,5].

Crocus sieberi J. Gay [4, 14-16].

Synonym (s):

C. sibiricus, C. sibthorpianus, C. atticus, C. nivalis C. sublimis

Common name : Sieber`s crocus, Cretan crocus, Snow crocus.

Scientific name: *Crocus sieberi* J. Gay

The French botanist Jacques Gay described *crocus sieberi* in 1831, from plants growing on the island of Crete. It is named after Franz Sieber, the Czech naturalist who collected it, Gay was unware of the mainland from of this species. **Habitat**: rocky slopes and in grass; at **altitudes** of 1500 to 2700 m. **Occcurs:** throughout Greece and into southern Albania, Macedonia and southern Bulgaria and possibly western Turkey. The **corm** is surrounded by tunic (coat) made up of the expanded bases of the true leaves and the papery sheathing leaves, called cataphylls, which surrounded the aerial shoot. The

characteristics of the corm tunic are important for species identification. Corm: (short underground sween stem) and produced long, narrow leaves, usually with a pale strips down their centre. The leaves can develop at or after flowering and surrounded the flowers, which are held above the ground by the tube of the perianth (sepals and petals).

Crocus sieberi subsp. *sieberi* : It flowers as the snow melts and can be seen completely covering grazed areas in April. Flowers : 8 cm. tall, white with yellow throat (where the petals tube widens) and purple staining convery from a narrow strip down the centre of the segments, to an almost complete covering. Style : branched, deep orange or yellow. 2n = 11.

Phenology : Flowering : March – April.

Crocus sieberi subsp. *atticus* : It comes from the Attica region of Greece. It has a more coarsely netted corm tunic than the others and lilac-blue or violet flowers with yellow throat.

Crocus sieberi subsp. *sublimis* : Occurs from the Peloponnese to southern Albania, Macedonia and southern Bulgaria. It has pale lilac flowers with pale yellow throat. Some forms with deeper flower colour and zone of white between the two colours have benn called *Crocus sieberi* subsp. *sublimis* from a tricolour.

Crocus sieberi subsp. *nivalis* : has lilac-blue flowers with a yellow throat, and occurs in the southern Peloponnese.

Crocus tommasinianus[8,17, 18]

Crocus tommasinianus (woodland crocus, Tommasini`s crocus, early course) often referred as to `tommies`, were named after the botanist Muzio G. Spirito de Tommasini (1744 – 1879), who was Mayor of the city of Triest. They are native of Bulgaria, Hungary and former Yugoslavia. They are often referred to as early or snow crocuses, but these terms are shared with several other species, although *crocus tommasianus* is amongst the first to bloom. It grows in all soil types, produces lots of flowers and naturalizes (i.e. comes back year after year and multiplies) very easily. Also, it comes in various delightful shade of blue, mauve and purple. All in all, it's a terrific *crocus* to start your spring with. Perhaps the easiest *crocus* to grow, increasing abundanty where it can become to nuisance by invading choicer species. A number of colour forms have occupied in gardens or been collected in the wild. Name of clones include ` Albus ` (white tommies), ` Barr`s purple` (amethyst violet), ` Tommasinianus ` (lilac beauty), `` Pictus` ( lilac grey outside purple lips),` Roseus` ( pink with silvery-grey outside,` Ruby Giant` ( deep reddish purple), `White well purple` ( silver reddish purple)` Tomma sinius` ( cobalt lavender) and ` Oliver wyatt and Taplow Ruby` ( reddish purple). Rarely seen is 1 versitom` a hybrid with *Crocus versicolor*.

The corms are very small about 1`` or less, tunic parallel or slightly reticulate fibres. Foliage is thin grass like with white strip down the middle, 3 to 4, emergs when the flowers bloom but then remains until May typically. It has slender flowers about 2-4 cm. long, with white perianth tubes. Flowers range from mauve to purple to pink to white. They all have a white ` throat` often with silvery-white or cream exterior with yellow stamens and orangeish style, petals (6) pale silvery lilac to reddish purple, while the outer petals may be overlaid with silver and darker tips, style divided in the three orange-yellow branches, sees themselves freely, even in Crevices and cracks in paths and also multiply quickly below ground, but no-one open with sun but close upon overcast days and at night. 2n = 16.

Phenology : Flowering : upon February or beginning of March.

Crocus etruscus Parl [19-23]

Common name : Tuscan crocus

Crocus etruscus is an Italian endemic that is found in central-southern Tuscany. It has an extent of occurrence of 1,892 Km^2 and an area of occupancy of 120 Km^2. The species occurs in isolated sub-population nuclei but the populations are stable. However, the plant is potentially threatened by habit degradation, predation by wild boar, and small-scale wood plantation. *C. etruscus* is therefore assessed as a near threatened approaching Criterion $B_{1a} + B_{2a}$.

Native: woodlands of northern Italy. *Crocus* is dwarf, deciduous perennial growing to 8 cm. tall from a corm, with linear levels usually central strip, and goblet-shaped. **Flowers**: cup shaped, arranged solitary, lilac paler outside, finely veined with purple and with a yellow throat and prominent stigmas appear in early spring. **Fruits**: loculicidal capare. 2n = 8.

Phenology: Flowering: Early spring or March.

Crocus baytopiorum was discovered by Brian Mathew in 1973. Turkey is home to a remarkable numbers of *crocus* species and new ones are still being discovered. Asuman Bay top first collected *C. baytopiorum* on the Turkish mountains of Hona z dag, a mountain and national park near Denizli, and at other sites of south-west Turkey. The sky blue flowers, with delicate, slightly darker veining, together with the narrow leaves that are only 1.5 mm. wide, help to distinguish this species and make it easy to recognize. The flowers have perianth tube (sepals and petals) that can reach 9 cm. long, with perianth segments up to 3 cm. long. The style is divided into three yellow or orange branches, and seeds are elongated and red.

The original collection by Baytop was made in February, when the plants were flowering, but in the cultivation *c. Baytopiorum* can flower in January or earlier. Appearing so early in the year, the flowers can be damaged by wind and rain. Also the perianth tube can be fairly long and thin and a storage of sunny days can cause it to elongate further, with the results that the flower falls over. 2n = 28.

Phenology : Flowering : December – January.

Note : *C. bayotopiorum* resembles four European spring flowering *crocus* species, *C.vernus*, *C. tommasinianus*, *C. etruscus* and *c. kosaninii*, all in series *verni*. But despite their similar appearance recent molecular analysis of this genus concludes that *c. baytopiorum* should be placed in a series of its own, series *baytobi*, characterizes by the clear blue flowers, narrow leaves and the large papery, white bracts that surrounds the perianth tube.

Crocus kosaninii [27, 28]

(A) *C. kosaninii* : super new species is tolerant of cold and moisture and ideal for the garden. A rare endemic of *kosova* in former Yugoslavia where this was collected many years ago, with the held of Albanian shepherds and sharp stick. *C. kosaninii* is a newer species named in honor of the famous Yugoslavian botanist Nedejiko kosanin. The detail description of *c. kosaninii* was given by V. Pulevi (1976). Corm: tunic fibrous, netted at the top but parallel near base. Leaves : arranged opposite one another, linear arranged solitary, born cluster, lilac blue with some purple feathering out-side, sometimes with a dark basal blotch. Throat : yellow, spring. Fruit : loculicidal capsule. 2n = 14.

Phenology : Flowering : March.

(B) *Crocus kosaninii* April view [29, 30]: a new and even from selected in Neatherland for its late flowering habit. Origin: Asia. In addition it has good colour, well –formed flowers with nice overlapping petals and good demeanour. Petals are slightly lined/striped on the exterior, six petaled, cup shaped flower with grass like foliage that come in a myriad of colours, easily blooming and great rock gardens, forcing and for designs in the late winter or early spring lawns/zones 3-8, 3`` - 6``, bulb size 6/7 cm. unless other-wise roted. 2n = 14.

Phenology; Flowering: Very early spring (Winter).

Crocus longiflorus [26, 31, 32]

Synonym (s) :

C. longiflorus subsp. *melitensis* (Herb) K. Richt
C. odorus Biv, *C. odours* Vis
C. odorus var. *longiflorus* (Ref) Herb
C. odorus var. *melitensis* (Herb)
C. wilhelmii Fisch & C.A. Mey ex Mas

Common name: Crocus longiflorus.

C. longiflorus comes from south-west Italy, Sicily and Malta where it favours rocky lime stone areas. Despite its Mediterranean origins, it is very hardy and makes an excellent garden plant through strong autumnal winds and heavy rain can shorten the life of the flowers. It also grows well in a pot where its delicate colouring can perhaps be best appreciated a frame or Alpine house would offend some protection of the plant is required for `showing`. *C. longiflorus* means *crocus* odours, been longs to the group of bulbs and tuberous plant.

Distribution: south-west Italy, Malta, Sicily. **Wild habitat**: stoney places in dryish grassland, usually over limestone at up to 1900 m. **Corm**: tunic, fibrous, somewhat netted, strong honey sent. **Flowers:** long-flowereat lilac/purple. **Style**: orange-red, can be seen (covered in pollen following a visit from a very happy Bee!) With yellow anthers of equal length; note also the faint veining on the petals which in some clones, can be a pronounad dark purple. The flower colour is usually lilac through purple but white forms ~Albus` do exist. **Seeds:** set is readily set in cultivation and is good method for raising new corms. 2n = 28.

Phenology: Flowering: Autumn.

Crocus ilvensis sp. Nov [33]

A new species of *crocus* sect. *crocus* is described as an endomic of elba island (Tuscan Archipelago , Italy) : ilvensis Paruzzi carta sp.*nov.* The new species was wrongly reffered to *c. corsicus vanucchi*, *c. etruscus* Parl or *c. vernus* (Hill) subsp. *vernus* by previous authors. Its karyotype structure, asymmetry and chromosome dimensions show affinity with *c. etruscus* and no clear relations with other related Taxa. From the morphological point of view, *c. ilvensis* appears intermediate between *c. etruscus* and *c .vernus* subsp. *vernus* , showing however a peculiar combination of characteristic-states. The new species is completely allotropic with other *crocus* sect. *crocus* Taxa and its possible role in the origin of tetraploid races of *c. vernus* is discussed. 2n = 8.

Phenology : Flowering: March.

Crocus cymodocea nodosa (Ucria) is the most common seagrass in the Canary island. *C. cymodocea nodosa* forms scattered meadows mainly along the southern coast of the island. Plant provides with a robust creeping rhizomes, with only one strongly branched root, up to 28 cm. and shoot erect stem, bears 2 – 5 leaves at the each node. The inner-nodes are 1-6 cm. long, leaf-blade linner, 10 – 30 cm. long and 2-4 cm. wide. The plant grows in a vertical direction. When fertile shoots were observed than flowers were detacted. Fruiting began in April and fruits were observed attached to shoots until December. Throughout the year numlirons fruits were detected buried in the sediment. Seed

germination was observed from February to September. 2n = 14, 28.

Phenology: Flowering : March to July.

Crocus vernus Hill [38, 39]

Synonym (s):

C. grandiflorus Hegetschw, *C. multiflorus* Schur
C. nervifolius Rehb, *C. parviflorus* E.H.L. Krause
C. longiflorus Hegetschw. Non Ref.
C. reineggeri Opiz

Common name: Dutch crocus and spring crocus

Native: eastern Europe and western Russia. Dutch crocus is one of the hardiert, if not the hardert *crocus* species readily available to home gardeness. A true harbinger of spring it can be planted in bonders, rock gardens and even lawns. Height: o.25 to 0.5`. Spread: 0.25` to 0.5`. After flowering, the foliage must be left intact until it withers which may cause Pawn-mower anxiety in some garderness. Often said as ` mixed crocus`, cultivars of this species and typically white, lilac or purple and white striped.

Corm of Dutch crocus short, ideal to naturalise in grass. Leaves: basal are grass like, with silver mid rib. Flowers: bear s single, tubular light violet flowers, with bright yellow stems, upto 2.5`` long. When naturdising in grass, leave the grass uncut for six weeks after flowering to encourage self-seeding. *C. vernus* can tolerate poor to mode rate spoil as long as it is well drained. 2n = 8.

Phenology: Flowering: early spring or April.

Standard cyclopedia of Horticulture [40, 41]

Crocus vernus : Corm : 1`` or less diameter. Leaves : 2 – 4, as high as the fil of the ¼ in board, glancous beneath, but green above, with reflexed edges, and a central white band : upper spathe 1-lvd, about aslong as perianth tube : Perianth-segms. 1-1.5`` long, lilac white or purple striped, throat pubescent, never yellow. Anthers: lemon-yellow, exceeding the filament> Style: branches orange- yellow.

Phenology : Flowering : early spring

Crocus vernus (L) subsp. *Vernus*[42, 4]
C. albiflorus Kit subsp. *heuffclianus* (Herb) Hegi
C. heuffelianus Herb
C. vittatus Schloss & Vuk, non Ref
C. discolor G. Reuss
C. exiguns Schur
C, heuffelii Korn
C. scrpusiensis (Rahmann & Wonk 1) Bonbas
C. napolitanus Mord. Laun & Loisel
C. albiflorus Kit subsp. *neopolitanus* (Ker Gawl) Hegi
C. purpureus Weston
C. banatious Heuff. Non J. Gay
C. candidus Schloss & Vuk
C. uniflous Schur
C. veluchenis Schoot, non Herb
C. blbiogorenin Zapal > 1.

Native : Italy east words ; naturalized in Britain – It has been known in Britain since the Middle Ages where it has thrived in churchyards and old monostic grounds doing wonderfull in grass, wide spread in mountains of central and eastern Europe, in medows upto 1500 m c.v. subsp *c. albiflorus* inc., *c. sicalus* (syn. *C. caeruleus, c. montenegrinus*). Similar to subsp. *vernus* but flowers 5-7 cm. tall. Mountains of western and central Europe near melting snow, upto 2500 m. subsp. *vernus* is easy to grow and is the parent of the large flowered. Corm: tunic fibrous with some reticulation. Leaves: 4-6 mm. wide , fully or partically developed at flowering times. Flowers: 8-12 cm. tall, lilac, purple or white with varying strips outside and on the tube. Style: 3 branched-oranged and expanded at the tips. Original ` spring crocus`. 2n = 16 + 2B (B- chromosome in *vernus* subsp. *vernus*).

Phenology: Flowering: February – March.

Crocus vernus (L0 Hill subsp. *albiflorus* (Kit, ex Schult) Asch and Graebn [38, 44, 45, 46].

Synonym (s):

C. pygmaeus Lojac
C. albiflorus Kit subsp. *albiflorus*
C. appendiculatus A. Kem ex Maw
C. coeruleus Weston
C. vilmae Fiala

Origin: Europe, Asia. **Distribution** : Albania, Austria, Mountain region of France, the Apennine Peninsula, central Europe, the Czech republic and the Western Balkan Peninsula . **Plant height**: 0.12 m. **Corm**: tunic fine fibres can be slight nested. **Leaves:** deciduous plant, simple, opposite arranged, linear with entire margins, green, central white strips. **Flowers**: cup shaped, white, occasionally purple, with yellow/ orange stigmas appear in spring, arranged solitary. **Fruit**: loculicidal capsules. 2n = 8. **Phenology**: Flowering: Spring. **Note:** A mountain plant with a wide spread distribution from the Pyrenees in the south through the Alps to Czechoslovakia. Generally smaller flowered than *crocus vernus vernus*, it occupies a different habit where the two sub-species do occur in close localities often seen flowering as the snow melts in spring or summer.

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 review article.

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