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BOTANY, TAXONOMY AND CYTOLOGY OF AUTUMN CROCUS SERIES

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ABSTRACT

Crocus is a Chaldean name meaning 'saffron'. Alpine plants grow in alpine climate, which occurs at higher elevation and above the tree line. Alpine plants are not a single taxon, but many different plant species live in this environment i.e. perennial grass, sedges, mosses, lichen etc. These plants must adopt the harsh conditions i.e. low temperature, dryness, ultra-violet radiation and short growing seasons. Some species of alpine plants, known as '**Autumn crocus**', flower in late summer and autumn, often before their leaves appearing. These belong to sub-genus called '**Autumn crocus series**'. It contains fifteen specific group and twenty four sub-species. The sub-genus are closely related species; and are difficult to be separated taxonomically and have a complex cytology. Botany of autumn crocus series, taxonomy, ecology and phenology; full description and chromosome counts are provided with key their identification.

INTRODUCTION

The genus *crocus*(family - Iridaceae or Iris) comprises 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 10⁰ W to 80⁰ E and latitude 30⁰ N to 50⁰ N. Phytogeographically, the majority of species occur within the Mediterranean floristic region, extending eastward into the Irano - Turanin region : both of these areas are characterized by cool to cold winters with autumn - winter-spring precipitation and warm summers with very little rainfall; the genus *crocus* is well adapted to late spring and surviving the summer drought below ground by means of compact corm. Many species have 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, while others bloom without leaves and delay their leaf production until the onset of warmer weather, usually in spring.¹

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.² This variation is , however, difficult to deal with without information on breeding systems, hybridization potential and the production of hybrids. So far, it is 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.^{3 - 7} Although similar karyotypes do not reveal the presence of symmetrical 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, successful interbreeding is less likely.⁸ Such chromosome barriers are of obvious importance and can lead on to 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.^{9 - 14} These physiological characteristics, together with cytological information and morphological features of the corm tunics, bracteoles, leaves, flowers, and seed, have been discussed by the genus into hierarchy of sub-genera, section and series of *crocus autumn*.

BOTANY

The taxonomic classification of *crocus autumn* series is as follows,

- | | |
|--------------------|-------------------|
| 01. Domain | Eukaryota |
| 02. Kingdom | Plantae |
| 03. Sub-kingdom | Viridaeophyta. |
| 04. Phylum | Tracheophyta. |
| 05. Sub-phylum | Euphyllophytina. |
| 06. Infra - phylum | Radiatopses. |
| 07. Class | Spermatopsida. |
| 08. Sub - class | Liliidae. |
| 09. Super- order | Lilianaes. |
| 10. Order | Asparagals |
| 11. Family | Iridaceae (Iris). |
| 12. Sub - family | Crocoideae. |

13. Tribe Ixieae
14. Genus *crocus*

Genus *crocus* : **Herbs :** small perennial, cormous. **Corms :** oblate, covered with a tunic. **Leaves:** few, all basal, green, linear, adaxially with pale, median stripe, base surrounded by membranous, sheath like leaves. Aerial stem not developed. **Flowers :** emerging from ground, with perianth and ovary- subterranean. **Perianth :** white, yellow or lilac to dark purple, **Tube :** long, slender. **Segments :** similar, equal or sub-equal. **Stamen :** inserted in the throat of perianth tube. **Style :** 1, slender, distally with 3 to many branches. **Capsule :** small, ellipsoid or oblong-ellipsoid.^{4,15,16}

Alp plants: Alpine plants grow in the alpine climate, which occurs at higher elevation and above the tree line. Alpine plants grow together as a plant community in alpine tundra.⁸ Alpine plants are not a single taxon. Rather, many different plants species live in the alpine environment. These include perennial grass, sedges, forbs, cushion plants, mosses and lichen. Alpine plants must adopt to harsh conditions of the alpine environment, which include low temperature, dryness, ultra-violet radiation and a short growing season.⁹

Autumn crocus : Some species of alpine plants, known as 'autumn crocus', flower in late summer and autumn, often before their leaves appearing. They should not be confused with different genus of autumn- flowering plants, *Colchium*. Scientific name (s) of autumn crocus is *Colchium autumnale*. L. Other species used medicinally have included *colchicum speciosum* Steven and *Bulbocodium vernum* L. Ker. Gawl.

History : *Colchium*'s plant and its extracts have used for centuries in the treatment of gout, rheumatism, dropsy, Prostate enlargement and gonorrhea.¹⁷ Extracts have been used to treat cancer. The first Official Pharmacopeia of the United States (1820) colchicum preparation was included.¹⁸

Seed, bulbs and flowers are used to make medicine. To-day the plant is primary source of *colchicines* alkaloid, which is used therapeutically to treat gout and experimentally in cellular chromosomal studies. In addition to its FDA - approved use (gout), *colchina* has been used in the following conditions : neurologic disability caused by chronic progressive multiple sclerosis, familial Mediterranean fever, hepatic cirrhosis, primary biliary cirrhosis, and as adjunctive treatment of primary amyloidosis,¹⁹ Behcet disease,²⁰ pseudo-gut, skin manifestations of Scleroderma, psoriasis, palmoplantar pustulosis and dermatitis herpetiformis.²¹

Use of Autumn crocus: The plant and its extracts are used to treat gout and related inflammatory disorders. Autumn *crocus* may ameliorate hepatitis and cirrhosis, may have potential in chemotherapeutic regimens. However, no clinical trials are available to support the use of autumn *crocus* for any indication.

Autumn crocus dosing : All parts are highly toxic. It may produce severe gastric distress, shock and inhibit normal cell growth. *Colchicine* 1 to 2 mg. is typical oral dose for gout, corresponding to *crocus* seed 200 mg. *Colchicine* also has been studied for osteoarthritis of the knee, refractory constipation, and postpericardiotomy syndromes at similar doses. Its narrow therapeutic index requires medical supervision. However, autumn *crocus* has not been studied at these doses for verification,^{20,22-29} see try contraindications. It has not yet been identified.

Autumn crocus in Pregnancy/Lactation: Information regarding safety and efficacy pregnancy and lactation is contradictory. Avoid use.³⁰⁻³³

Autumn Crocus Interactions : Avoid use in patients taking *colchicines* caution is warranted in patients on cyclosporine, gemfibrozil. Macrolide antibiotics and St. John's wort.

Autumn crocus adverse reaction : GI disturbances (eg. Diarrhea, steatorrhea, reversible malabsorption, syndrome) are common following acute therapeutic case of *colchicines*.

Accidental poisoning : There have been reports of children becoming intoxicated by drinking milk from cows that have ingested the plant.³⁴ Human intoxication have occurred after corms were mistaken for onion wild garlic (*Allium ursinum*), Japanese domestica, *allium* and leak, while others have suffered over-dosages from seed or corm- derived natural medicinal. Autumn *crocus* plants consider differential diagnosis of *crocus* autumnal poisoning is an explained extended GL symptoms after ingestion of wild plants as used as species.³⁵⁻⁴¹ Toxicity has been observed with *colchicine* was accidentally take by nasal insufflations in place of methamphetamine.^{38, 40, 62}

Autumn *crocus* series have chromosome numbers (2n) = 06, 08, 10, 12, 16, 22, 23, 24, 26, 28, 30, 48 and the following species of *crocus* are included for descriptions :

***Crocus banaticus* J.Gay.**⁴³⁻⁴⁹

Hetero type Synonym (s)

- * *C.nudiflorus* Schult.
- * *C. iridiflorus* Heuff ex Rchb.
- * *C. hebertia* Korn

Botanical name : *Crocus banaticus*.

Common name : Byzantine, Iris-flowered *crocus*.

Habit: tufted. **Native :** Balkans, particular only to Serbia. Romania, Yugoslavia, South-Western Ukraine, Western European Russia and in meadows and deciduous woodland. It creates its own subgenus is the *crocus* sub-family known as *crociris*. **Corm :** 0.01 meters, occasionally some what eccentric, flat base ranging obliquely instead of horizontal, with a larger development of the corm mass on one side of the axis than the other. This is a constant feature in small seedling corms, the mass of which in their earliest stages are developed on one side of the axis of growth, corm consists of almost homogeneous mass of cellular tissue (woody fibre) and starch, perennial growing to 4 cms. **Leaves :** foliage green in autumn, 1 cm. wide, dark green with an indistinct central stripe, appearing after the flowers. **Flowers :** 10 - 13 cms. High, pale to deep lilac and unique in having very short inner perianth segments (giving a superficial resemblance to iris unguicularis), small inner tepals are surrounded by three larger tepals, unlike the more symmetrical *crocus* species found outside of the sub-family. A very distinctive plant, with a flower whose outer tepals can reflex (fold back) leading some early botanists to call the plant *crocus* ` **Iridiflorus**`. A straight forward garden plant in northern temperate gardens. It is not difficult to rise from seed. 2n = 26.

Phenology : Flowering : - September - November.

Crocus cancellatus **subsp. Cancellatus** Herb.^{10,13, 50-53.}

Synonym : *C. cilicus* Herb

Common name : Saffron

Crocus is a Chaldean name meaning `Saffron`. **Native** :Southern Turkey, Lebanon, Syria, Israel, Jordon, in open rocky slopes upto 2400 meters Wild Europe especially around the Mediterranean, North Africa and Western Asia. **Wild habit** : stony place, thin pine woods, over limestone. **Plant** : 5 cms. Tall, spread - 190 cms. **Corm**: tunic, coarsely reticulate. **Foliage** : 25 - 30 cms. Long and 12 mm. wide, green leaves, leaves appear after flower. **Flower** : colour in month(s) lilac to white, slim or globular in shape, autumn. **Anther** : yellow. **Style** : much divided exceeds the anther. **Seed**: pale to Mid-lilac-blue, 0.5 - 7.5 cms high blooms. $2n = 16$.

Phenology : Flowering :- September - December.

Characteristic : Subsp. *Cancellatus* : bracteole is not usually visible i.e. much shorter than bract, below the cataphyll (sheathing leaf) protects entire shoots as pushes its way up through the soil.

This is probably the earliest subsp. *C.cancelatus* to cultivate in gardens although `Garden` should be taken to include with protection in some situation. Where a warm, dryish summer rest can be guaranteed this plant can be grown in a well drained spot in the open. A plant sometimes seen in commerce as *crocus cancellatus* var. *cilicicus* in this subspecies.

Crocus cancellatus Herb var. *cilicicus* Maw^{4, 10, 16, 54 - 57}

Crocus cancellatus (Autumn flowering)

Crocus cancellatus var. *cilicicus* Boiss.

Native : South Turkey, Lebanon, West Syria, North Israyl and alpine a Boulgarmaden. Belong to the group of bulbous of tuberous plant. **Corm tunic** : fibrous, the fibrous conspicuously netted. **Growth** : approximately 0.05 m. height and spread 5.0 cms. **Leaves**: 4-7, 1-2 wide, simple, arranged opposite one another, linear with entire margins, absent flowering time, but rarely with tip visible, grey-green. **Flowers** : cup shaped, pale blue, usually veined darker, **Throat**: pale yellow, hairy or hairless, arranged solitary. **Spathe**: absent. **Bracts** : 2. **Perianth tube** : 3 - 8 cms., lobes: 3 - 4.2 cms. X 6 - 11 mm., oblanceolate or narrowly alliptic. **Anther** : Yellow. **Style**: divided into many slender orange branches, taller than anther. **Fruit** : loculicidal capsules. $2n = 10$.

Phenology : Flowering : September - November.

Characteristic : cultivates in garden although `Garden` should be taken to include with protection in some situation. Where the worm, dryish summer rest can be guaranted this plant can be grown in a well drained spot in the open.

Crocus cancellatus subsp. *Damascenes* (Herb) B. Mathew.^{13,50,58-60}

Synonym (s)

- * *C. cnacellatus* subsp. *damascenes* (Herb) Mouterde
- * *C. cancellatus* var. *damascenes* (Herb) Maw ex Boiss
- * *C. damascenes* (Herb)
- * *C. dianthus* K. Koch
- * *C. edulis* Boiss & Blanche

Native : Central Turkey, East to parts of Iran and Iraq and south through Syria, Lebanon Israel, Palestine and Jordon. **Wild habited** : dry, stony places, thin scrub, 50 - 2400 m. **Native climate** : dry Mediterranean (likely long, hot summers). **Plant** : 10 - 25 cm.tall. **Corm** : 0 - 9.3 x 0.8 - 2.5 cm. **Corm tunic** : reticulate and robust, coarsely needted fibres,

tunic with rings at base. **Leaves** : 2 - 10, hysteranthous or rarely with tips just visible, 2 - 3 mm. broad, greenish. **Bracteole** : present, not usually visible above cataphyll. **Perianth tube** : 5 - 9 cm. long; throat of perianth usually pale yellow, glabrous. **Scape** : 1.5 - 5 cm. long, 1 flowered; **Segments**: 2.4 - 4.8 x 0.7 - 1 cm. bluntly acuminate lilac blue or lilac white glabrous. **Anther** : 12 - 21 mm., yellow. **Pistil** : orange, rarely yellow, 1.6 - 3 cm. long. **Style** : divides into several slender branches, larger than stamero or sometimes equal. **Fruit** : capsule, cylendric, 15 - 26 mm. long above ground level. **Seed**: numerous, brownish, 3 mm. long. $2n = 8$

Phenology : Flowering: September - October.

Characteristic : Even coarser reticulate tunic with long `neck` of bristles and pale lilac flowers with very narrow segments. Likely to be of a interest only to specialist growers.

***Crocus cancellatus* subsp. *Lycius* B. Mathew^{57, 61}**

Native : Only known to be found in Antalya and Mugla in Turkey, upto 1400 m. **Distribution** : South Turkey. **Native climate** : Mediterranean. **Wild habitat** : rocky places limestone. **Plant**: 15 - 25 cm. tall. **Corm** : 1 - 3.5 x 0.9 - 3.0 cm., tunic coarsely reticulate - fibrous. **Root** : 7 - 12 cm. long. **Leaves** : 3 - 7, hysteranthous, 8 - 15 cm. x 1.5 - 3.5 mm. broad, greenish with distinct white medium strip. **Prophyll** : absent. **Bracteole** : exserted, visible, sub-equal to the bract. **Perianth tube** : 3.5 - 5.0 cm., yellow and glabrous. **Scape** : 5 - 8 cm. long. **Segments** : 2.8 - 3.5 x 0.5 - 1 cm., obtuse or rounded a very pale lilac or white and cosnally veined. **Stamens**: 3, filaments, 2 - 7 mm., pale yellow and glabrous. **Anthers** : 13 - 20 mm., yellow or creamy white. **Pistil** : orange and the ovary 1.7 - 2.5 x 0.4 - 0.5 cm. **Style** : divides into several slender orange branches, equal anthers. **Fruit Capsule** : 1.5 x 2.5 cm. length. **Seeds** : brownish and 3 mm. diameter. $2n = 16$.

Phenology : Flowering : Late autumn.

Characteristic : produces smaller white flowers with orange throats and striking orange styles. Corm tunic - compare with subsp. *Damascenes* which has much less finely netted tunics.

***Crocuscancellatus* subsp. *Mazziaricus* B. Mathew^{13, 52, 53, 57}**

Basionym : *C. mazziaricus* Herb

Synonym (s)

- * *C. mazziaricus* Herb
- * *C. cancellatus* var. *mazziaricus* (Herb)
- * *C. nudiflorus* Sm., nom. Illaq.
- * *C. schimperi* J. Gay ex Baker
- * *C. spruneri* Boiss & Helder

- 6 -

Native : Turkey, Balkan Peninsula, east Aegean island, Greek east Aegean island, Greece, former Jugoslavia, Astatic Turkey. Rare Plant, lovely form, first found in Volos province, Greece, on mountain pillion, growing on a stony slop at 1500 m. Some years ago this has flowers which are typical *mazziaricus*, except that they are of pure white, born early in the autumn with the lovely saffron scent of this species. **Wild habitat** : rocky places, thin woods and scrub, over lime stone. **Native climate** : Mediterranean. **Plant** : 0.05 m. tall. **Corm**: tunics, reticulate-fibrous, usually coarsel. **Leaves** : dicidious plant with simple leaves,

arrange opposite one another, linear with entire margins. **Flower** : cup shaped, arranged solitary, ground colour lilac or white marked with thin blue lines and shape much more bowl - shaped than the Parnassus clone. **Anther** : yellow colour. **Perianth** : segments, size - 3.8- 5.5 x 1.0 - 1.5 cm. **Style** : tall than anther. **Fruit** : loculicidal capsules. $2n = 12, 16$.

Phenology : Flowering : early autumn.

Characteristic : differs from previous subsp. Having a long `neck` of bristles on the corm tunic, subsp. *Cancallanatus* and subsp. *Damascenes* - both are visible as the two pointed shapes around the flora tube at very top of the image, below cataphyll (sheathing leaf) protects entire shoot as pushes its way up through the soil, both subsp. bracteoloe not usually visible (i.e. much shorter than bract). This distinction can be used to assist in identification.

***Crocus cancellatus* subsp. *pamphylicus* B. Mathew^{13,52,53}**

Synonym :

* *C. cancellatus* subsp. *pamphylicus* B. Mathew.

Other name :

* *C. cancellatus* subsp. *pamphylicus* B. Mathew

* *C. cancellatus* subsp. *pamphylicus*

Misspelling : *Crocus cancellatus* subsp. *pamphylicus*

Native : South Turkey. **Native climate** : Mediterranean, relatively high rainfall. **Wild habitat** : rocky places in scrub, up to 1500 m. **Corm tunic** : reticulate -fibrous, usually coarsel. **Flower** : pale. **Anther** : white. **Perianth** : segments, 2.3 - 5.5 x 0.5 - 1.8 cm., lilac - blue or lilac white. **Style** : shorter or equaling the anther. $2n = ?$

Phenology : Flowering : autumn.

Characteristic : distinct from the other subspecies by its white anthers. Subsp. *pamphylicus* has a relatively redistribution in the Western Taurus mountains.

***Crocus goulimy* Turrill^{62 - 69}**

Synonym :

* *C. goulimy* `Albus`.

Botanical name : *Crocus goulimy*.

Common name : crocus, `Mani white`, saffron.

Other name : fall crocus.

Native : South Greece. **Habit** : tufted. **Habitat** : old olive and fig groves, edge of cultivated field, by dry stone walls in terra rossa overlying lime-stone, 300 - 750 m. **Corm** : ovoid, 3 - 4 x 1 - 2 cm., tunics smooth and coriaceous, without reticulate fibres, wooly insight with long undulate hairs, splitting vertically at the base in narrow triangular teeth. **Spread** : 0.1 m. **Height** : 0.1 m., time of ultimate height - 2 - 5 years. **Cataphyll** : 3 - 5 membrarous, white or suffksed green. **Leaves** : (4-)6 - 12, presentat anthesis 10 - 15 x (0.5-) 1 - 2.5 mm. green glabrous. **Prophyll** : present. **Bract** : sheathing perianth tube, greenish, often veined and spotted, purplish - brown. Perianth segments more thsn 40 violet or white, often light bi-coloured with three inner segments often paler than the three outer, blooms with leaves, 7.5 - 10.5 cm. high. **Throat** : white, pubescent, this light colouration was primarily because of low concentration of total carotenoids. **Filaments** : 8 -10 mm., white, glabrous. **Anther** : 1.3 - 1.6 mm., yellow. **Style** : divided into 3 white to orange, 5 - 7 mm. long branches, each branch

expanded and sometimes shortly, lobed at apex. **Capsule** : broadly, ellipsoid, C. 1 x 0.6 - 0.7 cm. **Seed** : subglobose, C. 3 mm. diameter, deep reddish purple. $2n = 12$.

Phenology : Flowering: October - November.

Characteristic : *C.goulimyi* did not become wide spread in cultivation until relatively recently, perhaps within the last 30 years, and when stock began to be available there were complaints that it lacked cold hardiness. It is from southern Greece. At things turned out, at least in this garden it's probably the autumn-blooming crocus best adapted to our conditions.

***Crocus goulimyi* subsp. *leucanthus* B. Mathew.**⁶⁸⁻⁷⁷

Synonym :

* *C. goulimyi* var. *leucanthus* B. Mathew

Scientific name : *Crocus goulimyi* var. *leucanthus* B. Mathew

Botanical name : *Crocus goulimyi leucanthus* (B. Mathew) B. Mathew

Native : Greece (SE Peloponnese). **Distribution** : south Greece. **Wild habitat** : dry places over lime stone (especially old/ neglected olive and fig groves) . **Native climate** : Mediterranean. **Corm** : coriaceous tunic, 20 - 47 x 8 - 22 mm. **Leaves**: 5 - 7 upto 20 x 2 cm., margin somewhat undulate. **Perianth**: bright orange to brownish - red, segments more than 40 mm., outer segments 42 - 50 x 12 - 14 mm. **Flower**: pale yellow often look white in strong light. To-day we can see the subtle shading on the outer petals which make this one special, hermaphrodite. **Anther**: Yellow. **Style** : divided into 3 white to orange, 5 - 7 mm. long branches, each branch expanded and sometimes shortly lobed at apex. **Capsule**: broadly, ellipsoid. **Seed**: subglobose, 3 mm. diameter, deep reddish purple. $2n = 24$.

Phenology : Flowering : autumn.

***Crocus hadriaticus* Herb**^{78,79}

Synonym (s)

* *C. cartwrightianus* 'Albus' misapplied

* *C. hadriaticus* var. *chrysobeloni* Herb

* *C. peloponnesiacus*

* *C. nivalis*, partly to syn. *Peloponnesiacus* Orph and specimens orphanides

Native : S W Greece, Pindus, Peloponnese and nearby islands. **Habit** : tufted. **Height** : 10 cm. **Spread** : 0.1 m. **Time ultimate height**: 2 - 5 years. **Corm** : 10 - 15 mm. diameter, depressed globose, rather flattened at the base; tunics fibrous, the fibres very slender and finely reticulated, extended at the apex of the corm into a short neck. **Cataphyllus** : 3 - 4, white membranous. **Leaves** : 5 - 9, normally synanthous, sometimes equaling the flower at anthesis, but sometimes very short and occasionally absent, but then appearing immediately after the flowers, gray-green, 45 cm. long, 0.5 - 1.0 mm. wide, ciliate. **Flowers** : autumnal, fragrant, 1 - 3, white, often stained externally brownish, yellowish or violet at the base of thesegments, rarely flushed throughout pale lilac. **Throat**: yellow or rarely white, pubescent. **Prophyll** : present. **Bract and bracteole** : present, sub-equal or with the bracteole much narrower, white, membranous with long, tapering, rather flaccid tips. **Perianth tube** : 3 - 9 cm. long, white, yellow, brownish or violet.

Segments : equal or the inner slightly smaller, 2 - 4.5 cm. long, 0.7 - 2 cm. wide, elliptic-oblongate, obtuse. **Filament** : 3 - 11 cm. long, yellow or white, glabrous or sparsely and

minutely pubescent just at the base. **Anthers:** 7 - 15 mm. long. **Style :**divided into 3 slender branches, each branch 10 - 16 (-20)mm. long, slightly shorter than or exceeding the anthers, less than half the length of the perianth segments arising at a point above the throat of the flower. **Capsule:** ellipsoid, 1.2 - 2 cm. long, 0.6 - 0.8 cm. wide, raised on a pedicel to 4.5 cm. length (above ground level) at maturity. **Seed:** reddish-brown, subglobose, 2 - 3 mm. long, the rape narrow and poorly developed, caruncle pointed, less than 1 mm. long. **Testa:** covered with dense mat papillae. $2n = 16$.

Phenology : Flowering : September - November.

Characteristic : This plant can be confused with *C. cartwrightianus* white forms, a confusion that has been perpetuated in commerce. *C. hadriaticus* has a style which divides above the throat of the flower and is less than half as long as petals while *C. cartwrightianus* has long style branches which arise, divided in the throat of the flower.

***Crocus kotschyanus* subsp. *kotschyanus* Koch** ^{75, 80 - 82}

Synonym (s)

* *C.kotschyanus* Koch

* *C.zonatus* J.Gay ex Klatt

Common name : fall crocus (Misc), autumn crocus zonatus

Botanical name : *Crocus kotschyanus* subsp. *kotschyanus* Koch

Native: Cilia, Lebanon, Turkey, Asia, China. **Origin :** Horticultural. **Habit:** erect, clump-forming. **Growing reason :** Garberville, California, Colorado springs, Colorado corpus christi, Texas. **Habitats :** scrub and rocky places , 500 - 2600 m. **Height:** 3 - 15 cm. **Spread:** 0.04 to 0.8 m. **Maturity:** 2 - 5 years. **Growth habit:** stalked clump. **Corm:** growing 0.3 m. by 0.1 m. its hardy zone 5 and not frost, low stalked perennial clump. **Leaves:** come up in spring and fade by summer, grass like, generally with a large stripe running upto the middle, green fall beauties favorite for many years. **Flower:** fragrant, lilac goblet shaped, yellow in centres appearing in autumn before their leaves, hermaphrodite (both male and female organs present). **Petals:** white **Stigma:** elongant orange- yellow. $2n = 08, 10$.

Phenology: Flowering : September - November.

Characteristic: It can not grow in shade. Plant tends to tree seed, which can make it a bit weedy.

Crocus kotschyanus subsp. *cappadocicus* B. Mathew ^{46, 51,75-76,82-86}

Scientific name: *Crocus kotschyanus* subsp. *cappadocicus*

Common name: Kotschy`crocus

Other name: *Crocus kotschyanus* subsp. *cappadocicus* B. Mathew

Native: Turkey. **Distribution :** central south Turkey, North-west Syriac Lebanon. **Native climate :** alpine/ sub-alpine. **Wild habitat:** rocky slopes, mountain turf at high altitudes. **Growth height:** 10 cm. **Ultimate spread:** 0.0 - 0.1 m. **Time of ultimate height:** 2 - 5 years. **Corm:** thin membranous axious corm tunic, oriented on its side in soil. **Leaves:** deciduous plant with simple leaves, arranged opposite one another, linear with entire margins, green, develop in late winter. **Flower:** cup shaped, yellow and pale purple in autumn, arranged solitary. **Anther:** white. **Fruit:** loculicidal capsules. $2n = 10$.

Phenology : Flowering : September - October.

Characteristic: A very distinctive flower and almost unique in the corms being oriented ` on their side` in nature. Dark flowers than the type, strongly veined with a fine violet thread- like tracery. Throat being a misasic ring of yellow blotches.

***Crocus koschyanus* subsp. *hakkariensis* B. Mathew^{2, 87}**

Synonym:

* *C.koschyanus* subsp. *hakkariensis* B. Mathew

Scientific name : *Crocus koschyanus* subsp. *hakkariensis*

Other name: *Crocus koschyanus* subsp. *hakkariensis* B. Mathew

Native: Turkey. **Distribution :** SE Turkey. **Native climate :** cold winter, cool summer.

Wild habitat: stony place, above 1100 m. **Corm:** tunic membranous, on its edge in the soil.

Leaves: 3 - 4, upto approximate 3 to 4 mm. wide, arranged opposite one another, green.

Flower: cup shaped, approximately 10 cm. height, arranged solitary, hermaphrodite, wedge shaped petals. **Anther:** white. **Stigma:** elegant orange - yellow. **Fruit:** loculicidal capsule. 2n = 10.

Phenology: Flowering : autumn.

Characteristic: distinctive wedge shaped petals.

***Crocus kotschyanus* subsp. *suworowianus* K. Koch^{13, 48, 75, 88 - 92}**

Synonym (s):

* *C. Karsianus* Fomin

**C. Kotschyanus* subsp. *suworowianus* (K. Koch) B. Mathew

**C. vallicola* var. *lilacinus* Maw

**C. vallicola* var. *suworowianus* (K. Koch) Maw

**C. vallicola* var. *zoharbii* Maw

**C. zoharbii* Maw

Botanical name: *Crocus suworowianus* K.Koch

Native: turkey. **Distribution:** central north and north-east Turkey, adjacent parts of former Soviet-union. **Native climate:** cold winter, cool dryish summer. **Wild habitat:** short truff, open stony places, above 2100 m. **Corm:** tunic membranous, on its side in the soil. **Leaves:** 4 to 6, upto 4 mm wide, arranged opposite one another, green. **Flower:** cup shaped, 10 cm. height, arranged solitary, early season will ghostly white (a rare violet form is also known) or lilac veining, finely lived with palest lavender hairs-treks. **Throat:** bears a bright chrome yellow ring formed from two golden yellow marks present at the base of each petal, hermaphrodite. **Anther:** white. **Stigma:** elongant orange-yellow. **Fruit:** loculicidal capsule. 2n = 20.

Phenology: Flowering : autumn.

Characteristic: A robust species. Good out in the gradw where its flowering follows on from the superficially similar (but distinct) *Crocus vallicola*; the pair being the harbingess of autumn.

***Crocus laevigatus* Bory & Chaub^{48,66,93}**

Native: Greece, Crete, Cyclades. **Distribution:** Greece, Kriti. **Wild habitat:** tufted, scrabor woodland at low altitudes (but upto 1500 m. in crete). **Height:** 10 cm. Spread: 0.0 - 0.1 m.

Time of ultimate height: 2 - 5 years. **Corm:** tunic,smooth, rather shiny, hazal-nut like,

coriaceous splitting into long teeth at the base. **Leaves:** usually 3 to 4, 1 - 2.5 mm. wide, green in spring and winter, well developed at the flowering time. **Flowers:** 6 - 9 cm. high, fragrance, lilac or white externally silvery or buff with purple strips which sometimes merge. **Anther:** white, late autumn to late winter. **Stigma:** thread - like orange or yellow, branches which are divided several times. $2n = 26$.

Phenology: Flowering: November - February.

Characteristic: There may be fewer alpine that flower regularly in December in the N. hemisphere than in other month, but *Crocus lacvigatus* is one of the most reliable example. A most useful and attractive plant providing flowers over a long period i.e. February.

***Crocus ligusticus* Moriotti M.G.** ^{94 - 97}

Synonym:

* *C. medius* Balb

Native: encountered on woods and meadows in mountain environments altitudinal limits 600 - 1700 m. above sea level. The meaning of ligusticus is ligurian. **Distribution:** an endemic species of Liguria and the southern Maritime Alps in France and Italy. **Corm** (bulb -tuber): subsferico, slightly fattened at the poles, diameter 15 - 25 mm., wrapped in robes dissolved fiber-brown colour. **Leaves:** 3 - 4 reduced to only sheaths, upper leaves usually 2 (rarely 3 or 4), formation early spring and full developed April- May, 30 cm. long and 3-5 mm. wide, with longitudines white streck that runs through the whole blade. Crowberry: thin and non-cross. **Flower:** solitary, wrapped by a single funnel shaped spathe, membranous, white, tinged with green, perigonium colour light violet, purple fauce perigoriale very pale, with numerous thin longitudinal streaks of purplish colour darker, tube perigonile - 12- 30 cm. long, white, laciniae with outling ovate-lanceolate, the linear shooted and narrower the external (12 - 20 x 15 - 25 x 30 - 40 mm. versap 40 - 45). **Anther;** about twice as long filaments, yellow - orange pollen. **Stigma:** fringed, scarlet length- 1.5 times the stamena. **Fruit:** ovoid capsule, 8 - 12 mm, entered as ovary the level of terrain. **Seed:** numerous, reddish brown colour. $2n = 28, 30$.

Phenology: Flowering: September - October.

Characteristic: Flower completely odourless. It is slightly toxic, owing to content of some alkaloids. Perigonium making it very characteristic *c. ligusticus* is an autumn- flowering plant, the period extends from September through October.

***Crocus niveus* Bowles** ^{51, 98 - 100}

Botanical name: *Crocus niveus*

Common name: Crocus

Cultivar name: Cape Metapan

Native: Greece. **Native climate:** Mediterranean. **Wild habitat:** scrub, olive groves, over limestone. **Habit:** tufted. **Height:** 10 - 15 cm. **Spread:** 25 - 37.5 cm. **Corm:** tunic finely reticulate. **Leave:** 5 to 8, dark green, 2 mm. wide, with flower, 2.5 - 25 cm. long. **Flowers:** 10 - 15 cm. high, white occasionally pale lilac with prominent orange-yellow throat. **Stigma:** 7.5 - 10 cm. height, scarlet. **Style:** orange or red, much divided, autumn. **Seed:** white. $2n = 28$.

Phenology: Flowering : November - December.

Characteristic: Easily grown without protection but pot cultivation allows its handsome late-autumn flowers to be enjoyed undamaged by weather. Flowers have very long tubes, so are quite tall (up to 18 cm.), but tube is stout and the flowers are not easily spoilt by autumn rain.

***Crocus nudiflorus* Smith** ^{46, 51, 83, 101}

Synonym:

* *C. hybenuus* var. *pyrenaeus*

* *C. pyrenaicus*

It is also called naked flowering *crocus*. **Native:** south-west France, naturalized in the British Isles. **Distribution:** southern France, Spain. **Habit:** tufted. **Native climate:** warm summer (with rain from storms), cool moist winter. **Wild habitat:** moist meadows up to 2000 m. **Growth:** 0.25 m. high. **Corm:** stoloniferous with parallel fibre tunic. **Leaves:** deciduous, 3 to 4, simple, arranged opposite one another, 3 - 4 mm. wide, linear with entire margins, produced long after the flowers have finished. **Flower:** cup shaped, arranged solitary, 20 - 27 cm. tall, deep purple on long perianth tubes, without foliage in mid - September. **Style:** orange, multi-branched, autumn. **Fruit:** loculicidal capsules. $2n = 48$.

Phenology: Flowering : September.

Characteristic: It is easily established in moist situations where it will spread by means of stolons. It is said to be poisonous.

***Crocus ochroleucus* Boiss & Gaill** ^{46, 51, 82-83, 102}

Scientific name: *Crocus ochroleucus* Boiss & Gaill

Botanical name: *Crocus ochroleucus*

Common name: fall crocus

Other name: straw coloured crocus

Native: Syria, Israel, Lebanon, Asia Minor. **Distribution:** SW Syria, N Israel, Lebanon, Horticultural origin. **Habit:** erect. **Native climate:** warm dryish summer, cool moist winter. **Wild habitat:** stony places, occasionally in scrub, 300 - 1500 m. **Growth:** 10 cm. height. **Spread:** 0 - 0.1 m. **Time of ultimate height:** 2 - 5 years. **Corm:** tunic, parallel fibre with some reticulation at the apex. **Stems:** without stem. **Leaves:** all basal, deciduous, simple, arranged opposite one another, linear with entire margin, 3 - 6, deep green, narrow ensiform leaf with white central stripe along the leaf axis, produced with or shortly after the flowers. **Inflorescence:** solitary. **Flowers:** 10 - 19 cm. tall, cup shaped, arranged solitary, white or cream with yellow, rarely white with ring spots in the throat, hermaphrodite, 3 stamens and pollen.

Anther: yellow. **Style:** three fringed branches, apart from a yellow- coloured muzzel. **Fruit:** loculicidal capsule. **Seed:** numerous. $2n = 10$.

Phenology: Flowering: October - November.

Characteristic: *C. ochroleucus* - wide spread in the Levant/ Holy land where it frequents base, after over- grazed or arid scrubby areas usually on limestone.

***Crocus pulchellus* Herb** ^{66, 91, 103 - 108}

Botanical name: *Crocus pulchellus*

Common name: Mount Atos Crocus, Fall crocus, Balkan Autumn Crocus

The word pulchellus means beautiful and smell beautiful. Certainly but no where near the smallest autumn crocus. **Native:** Europe. West Russia. Distribution: Macedonia, Serbia, south Bulgaria, north Greece, Turkey. **Habit:** clump-forming. **Native climate:** Mediterranean. **Wild habitat:** damp turf and in thin woodland or scrub upto 1800 m. **Height:** 7.6 - 10.2 cm. Corm: tunic coriaceous splitting into rings at the base. **Stem:** 7.5 - 15.0 cm. tall have the same refined goblet-shaped flowers of their spring cousins. **Leaves:** 3-4, 5mm.wide, appearing long after the flower, green. **Foliage colour** (spring- green), (fall-green), (winter - green). **Flower:** 12 - 20 cm. tall, pale or deep blue with deeper coloured veins and orange-yellow throat. **Petals number:** single. **Anther:** white or pale cream, filament- hairy. **Style:** orange - yellow, fragrant. **Bloom colour:** pale yellow, bright-yellow, light-blue, violet/lavender. **Bloom time:** late fall, early winter. $2n = 12$.

Phenology: Flowering : October - November.

Characteristic: Cormlets means it can become a nuisance for those who like order and decorum; but grown in a bulb

Frame where wayward seedling can appear at an alarming rate. White forms are know and 'Zepyr' is large pale -

Grew flowered cultivar.

Crocus sativus Linn^{13, 109 - 111}

Synonym (s)

- * *C. sativus* var. *officinalis* Linn.
- * *C. officinalis* var. *sativus* Huds
- * *C. autumnalis* Smith
- * *C. sativus* var. *casbmiruanus* Royle
- * *C. orsini* Parl
- * *C. sativus* var. *crsinii*

Native: southern Europe - Greece to west Asia. **Habitats:** Lawn, cultivated Beds. **Corm:** 5 cm. in diameter, depressed globose, flattened at the base, tunica fibrous, the fibers very slender and finely reticulated, extended at the apex of the corm into neck upto 5 cm. long. **Cataphyll:** 3 - 5, white, membranous. **Leaves:** 5 to 11, normally synathous erect, green, 1.5 - 2.5 mm. wide, globous or ciliate. **Flowers:** autumnal, fragrant, 1 - 4 deep lilac- purple with darker veins and a darker violet stain in the throat. **Throat:** white or lilac, pubescent. Prophyll: present. **Bractand bracteole :** present , very unequal white, membranous with long-tapering rather flaccid tips. Perianth tube: 4-5 (-8)cm Long. Segments: subequal, 3.5 - 5 cm. long, 1 - 2 cm. wide, Oblanceolate or obovate, obtuse. Filaments : 7 - 10 mm. long, purplish, glabrous. Anther: 15 - 20 mm. long, yellow. Style: divided into three deep red clavate branches, each 25 - 32 mm. long, much exceeding the anthers and at least half the length of the perianth segments, arising at a point well below the base of the anthers in the throat of the flower. Capsule and seeds rarely produced (a triploid of low fertility). $2n = 24$.

Phenology: Flowering; October - November.

Characteristic: Plant is poisonous, perfectly safe in the normal usage but 5 - 10 gms. Of saffron has been known to cause death.

Crocus serotinus* Salisb**^{113 - 116}**Synonym: Late *crocus***Common name:** Late crocus.

Native: Northern Africa : Morocco, EW Europe: Portugal, Spain. **Distribution:** southern Europe to northern Africa and west Asia. **Habitat:** stony slopes in scrub and open pine woods. *C. serotinus* grows in various spots around Spain, Portugal and north Africa, upto altitude 650 - 700 m. Colours are variable and some of its varieties are known as very good garden *crocuses*. Small plant about 3 cm. high, with corm. **Leaves:** narrow about 3 mm. wide with pale central groove. Usually one flower, lilac to pink, hermaphrodite (have both male and female organs). $2n = ?$.

Crocus serotinus* subsp. *serotinus* Salisb**^{5, 116 - 119}**Synonym(s):*C. asturicus* Herb**C. autumnalis* Brot**C. clusianus* Herb**C. clusii* J.Gay**C. granatensis* Boiss former Maw**C. kudiflorus* Boiss . non Sm**C. salzanannianus* Herb**C. salzanannii* J.Gay**C. tingitanus* Herb**Binomical name:** *Crocus serotinus* Salisb

Common name: Faded saffron, settron fatuous, saffron crazy, wild saffron, saffron odourless, pierdemiendas.

Native: Portugal. **Distribution:** Iberian, Peninsula in Portugal and Castilla Y Leon, Spain. Wild habitat: open rocky / sandy places, pine woods, woodland garden dappled shade upto 3500 m. cultivated beds. **Native climate:** cool moist Winter warm dry summer. **Habit:** in rocky terrain and grasses land. **Plant height:** 6 - 12 cm. Range: southern Europe to northern Africa and western Asia. Corm: tunic coarsely netted fibres. **Leaves:** bravo with leaves usually partially developed with long green, 5 to 7. **Flowers:** 10 - 15 cm. tall, 1 - 3 short tube, cup shaped, hermaphrodite, pale lilac, blue-violet, sometimes with darker nerves out and after with throat pale yellow, 6 floral parts (tepals), bluish pink in the center, fragrant. **Tepals:** no more than 30 mm. long, tubule of the perianth short, 2 - 5 cm. **Stemens:** 3, long. **Style:** divided as a `brush`, poor hairs: as the name implies bloom in fall. $2n = 24$.

Phenology: Flowering: November - December.

Characteristic: Colouring - yellow dye obtained from stigmas yields a yellow dye. Saffron substitute in flavouring food and colouring it yellow, condiment.

Crocus serotinus* subsp. *clusii* (J. Gay) B. Mathew**^{48, 66, 75, 120 - 127}**Synonym(s):*C. autumnalis* Brot**C. clusii* J. Gay

- **C. clusii* f. *xanthostylus* Maire
- **C. clusii* var. *xanthastylus* (Maire) Maire
- **C. asturicus* aduct. Luist.non. Herb

Botanical name: *Crocus serotinus* subsp. *clusii* (J. Gay)

Common name: saffron, clusius's crocus.

Native: Portugal and Spain. **Distribution:** Portugal, NW Spain, SW Spain. **Native climate:** cool winter, warm drier summer. **Wild habitat:** open places, thin scrub or pine woods. **Height:** 10 - 12 cm. Spread: 5.0 cm. **Grows:** under full sun. **Corm:** tunic finally netted fibres, perennial. **Leaves:** green, usually 4 - 7 (not 3 - 4), often not present during the flowering period, simple, arranged- opposite one another, linear with entire margins, 7.5 - 10 cm long. **Flowers:** cup shaped, fragrant, lilac, with throat, arranged- solitary. **Style:** many branched, orange colour. **Fruit:** loculicidal capsules. $2n = 22, 23, 24$.

Phenology: Flowering: October - November.

Characteristic: *C. clusii* has leaves when bloom and it is the only Iberian crocus with reticulated tunics. It blooms a month after *C. serotinus* (August - September) in the southern part of Iberian Peninsula, line cadiz (late November).

Crocus serotinus subsp. *salzmannii* (J. Gay) B. Mathew ^{46, 128 - 130}

Synonym (s):

Basionym: *Crocus salzmannii* J. Gay

Homotypic: *Crocus salzmannii* J. Gay

Heterotypic:

- **C. crociris iridiflora* Schur
- **C. crociris speciosa* Schur
- **C. asturicus* Herb
- **C. byzantinus* Ker Gawl
- **C. granatensis* Boiss. Ex Maw
- **C. neapolitanus* Hoppe
- **C. nudiflorus* Boiss, nom. Illeg
- **C. salzmannianus* Herb
- **C. tinquitanus* Herb
- **C. hybernus* subsp. *asturicus* (Herb) Nyman
- **C. nudiflorus* subsp. *granatensis* (Boiss. Ex Maw) K. Richt
- **C. serotinus* subsp. *asturicus* (Herb) M. Lainz
- **C. clusii* var. *mauriti* (Maire & Sonnen) Maire
- **C. clusii* f. *mauriti* Maire & Sennean

Botanical name: *Crocus serotinus* subsp. *salzmannii*

Common name: Saffron edge, Azafran (Spanish, Castilian), (Credits).

Native: Spain and Morocco. **Distribution:** south - west Mediterranean region, Iberian, Peninsula and west Africa (Morocco). **Native climate:** cool moist winter warm, often very dry summer. **Wild habituated:** open places, grassy or rocky, in scrub and thin woodland. **Altitude range:** 100 - 1900 m. **Growth height:** 15 cm. Spread: 10 cm. **Corm:** membranous tunic splitting in to parallel fibres. **Leaves:** deciduous plant with simple leaves, arranged

opposite one another, linear with entire margins, fine, green medium, good growing season colour spring ephemeral. **Flower:** cup shaped, deep purple to lilac and white, arranged solitary, often darker ribbed on the outside covered by silver layer, tubule of tepalo: 4 - 11 cm. long, blooms in fall, no smell. **Style and Stigma:** usually orange, surpassing the anthers with 3 branches more or less divided into lobes. **Fruit:** loculicidal capsule. $2n = 22, 44$.

Phenology: Flowering: October - December.

Characteristic: flowers have no smell. Corms are sometimes stoloniferous. Bloom-time- Mid fall/ late fall/ early winter. Corm membranous tunic splitting into parallel fibres.

Crocus speciosus subsp. *speciosus* ^{47, 101, 108, 131 - 133.}

Synonym:

**C. speciosus* subsp. *speciosus* 'Albus'

Binomial name: *crocus speciosus* M. Bieb

Common name: Large autumn crocus, white biebersteins crocus.

Native: NC Turkey, northern Iran, the Crimea, southern Ukraine, the Caucasus and central Asia. **Habit:** erect, clump- forming. **Wild habitat:** woods or alpine meadows, clearing in forest on limestone or non calcareous formations, altitude 800 - 2500 m. **Height:** 10 cm. **Spread:** 15 cm. Time of ultimate height: 2-5 years. **Distribution:** Crimea(Ukarine) and Caucasus (Russia, Aremenia, Georgia, Azerbaijan, Turkey). **Crom depressed:** globose, 8 - 15 mm. in diameter, sometimes with cormlets at its base, tunics cocisceous with distinct basal rings at the base and a long brown neck of old cataphylls at the apex. **Cataphylls:** 3 - 4. Leaves: 3 - 5, hysteranthous emerging long after flowering globules or with a ciliate or scabrkal margin or present on the upper lamina, 4 - 8 (-10) mm. wide and upto 37 cm. long, without ridges in lateral channel. **Flowers:** 1 - 2, fragrant lilac- blue usually conspicieourly veined darker, usually with distinct secondary veining sometime silvery or whitish on the outside and with darker speckling. Throat: glabrous, whitish or fainting yellow, rarely yellow(Armenla). **Prophyll:** absent. **Bract and Bractole:** sub-equal membranous. **Perianth tube:** 5 20 cm. long, white or purplish toned in apart part. **Segments:** 3 - 7 cm. long innerdistinctly broader thin outer upto 2.2 cm.wide. **Filaments:** white or light yellow, glabrous or minurally papillase, 4 - 11 mm. long. **Anther:** yellow, 2.5 - 3 timer- long than filaments. **Style:** divided at the top of anther into many yellow to deep orange slender branches well overlapping anthers. Capsule carried just above ground leveal at maturiry. **Seed:** reddish - brown nearly globose upto 3 mm. in diameter. $2n = 14, 18$.

Phenology: Flowering : September - November.

Crocus speciosus subsp. *ilgazansis* B. Mathew ⁴

General description same of *C.speciosus* but with the following :

Native: Turkey. **Habit:** clearing in Ables forest, turf on stony hill-side on limestone formation, altitude 1600 - 1850 m. **Distribution:** north Turkey. **Native climate:** cold winter with snow, warm dries summer. **Corm:** tunic membranous, lacking distinct basal rings splitting into parallel fibres. **Flowers:** generally smaller, lilac blue, tube upto 5 - 8 cm., segments upto 3 - 5 cm. long. **Style:** divided into 6 - 8 branches hidden among anther. Seed: c 1.5 mm. diameter. $2n = 6, 8$.

Phenology: Flowering: September - October.

Characteristic: difference from *C. speciosus* subsp. *speciosus* - The principal difference is the very short and few branched style together with the shorter tube.

***Crocus speciosus* subsp. *xantholaimos* B. Mathew⁴**

General description same of *C. speciosus* but with the following:

Native: Turkey. **Habit:** Alpine turf (yala) and stony hill side on lime stone formation, altitude 1150 - 1500 m. **Distribution:** Turkey. **Native climate:** cold winter with snow, warm drier summer. **Wild habitat:** woodland clearing. **Corm:** tunic membranous splitting into basal rings. **Leaves:** narrow, 1 - 2.5 mm. wide. **Flowers:** lilac with darker veins.

Throat of perianth yellow, sparsely pubescent. **Style:** much branched but shorter than anthers. $2n = 10$.

Phenology: Flowering: September - October.

Characteristic: Often smaller but otherwise very similar to *C. speciosus* species, except tiny its yellow throated flower. Hybridises in cultivation with *C. pulchellus*, a range of intermediates being produced. *C. speciosus* is easily cultivated in sun or shade .

***Crocus speciosus* subsp. *archibaldiorion* Ruksans^{75, 134}**

General description same of *C. speciosus* but with the following character:

Habit: steep mountain slopes in turf or fages forest sides and among shrubs, limestone formation. **Altitude:** 650 - 2100 m. **Distribution:** NE Iran, S Azerbaijan. **Corm:** tunics without a prolonged neck. **Flowers:** whitish from the outside with minutely branched. Comparatively wide lilac strips from the bottom of the segments upto the tip, the perianth throat yellow. **Stigma:** branches short, ending at the level of or overlapping the anthers. Leaves develop soon after flowering. $2n = 12$.

Phenology: Flowering : October.

***Crocus speciosus* subsp. *Ibrakiwii* Ruksans^{15, 135}**

General description same of *C. speciosus* but with the following character :

Native: Turkey, Sabarya. **Habit:** in shade under coryus and among young planting in full sun, on burnus-rich grarelly. **Altitude:** 50 - 150 m. **Distribution:** known only from the type locality. **Corm:** tunics membranous, without basal rings. **Perianth tube:** 10 cm. long. **Perianth segments:** 30 - 35 mm. long, throat deep yellow. **Stigma:** many brnched with overlopping anthers. **Leaves:** 3 - 6 mm. wide. $2n = ?$.

Phenology: Flowering: October -November.

***Crocus speciosus* subsp. *bolensis* Ruksana^{75, 134 - 135}**

General description same of *C. speciosus* but with the following character:

Native: Turkey. **Height:** above Lake Abant. **Habit:** on open alpine turf (Yaila) and in clearing of **Pinus** and **Albants** forests. **Altitude:** 850 - 1700 m. **Distribution:** Turkey, Abant, Bolu and Goksckr Deg. **Stigma:** well branched but ends below the tips of anther. **Flowers:** are similar than in the type subspecies, generally ricely striped. From the subsp. *ngszcrists* well separable by the distinctly many branched stigma, from subsp. *kanthoimos* by the white throat. $2n = 8$.

Phenology: Flowering : October - November.

***Crocus speciosus* subsp. *elegans* Ruksana^{75, 134 - 135}**

General description is the same of subsp. *speciosus* but with the following character:

Native: Turkey, Konya orovince, south of Sugla Gola. Habit: on clearing and edges of Abies forest and rocky out crops. Altitude: 140 - 700 m. Distribution: turkey. Corm: tunics membranous, splitting longitudinal into strips, basal, rings indistinct. Long neck formed by old cataphylls present, but thin and very brittle, so careful digging is reached for observation. Anther: white. Leaves: upto 4 mm. wide. $2n = 10$.

Phenology: Flowering : Octoer - November.

***Crocus tournefortii* J. Gay**^{46, 56, 83, 101, 136 - 141}

Synonym(s):

Homotypic:

**C. turnefortianus* Herb. Nom. Super fl.

**C. boryi* subsp. *turnfortii* (J.Gay) greuter, Matthas & Risse.

Heterotypic:

**C. fontenayi* Nyman

**C. orphanidis* Hook f.

**C. parvulus* Herb. Ex Maw, des. Inval

**C. pholeqandrius* Orph

Native: south Greece, North Crete. **Native climate:** Mediterranean. **Distribution:** Europe, Greece, Kriti with Karpathds Kasos and Gaydhos, Turkey. **Habit:** tufted. Wild habitat: dryish, often stony places or scrub, rock crevices. Hardness: half hardy-unteated green house/mild winter. **Height:** upto 10 cm. Spread: 0 - 0.1 m. **Time of ultimate height:** 2 - 5 years. **Corm:** tunic papery, splitting at the base into many parallel fibres. **Leaves:** 5 - 10, 1 - 2.5 mm. wide, shorter them or equaltiry the flower, dark green. **Flower:** cup shaped, arranged solitary remaining open in dull weather and at night, usually lilac-blue, sometimes veined darker to deep yellow, hairless or hairy. **Spathe:** absent. **Bracts:** 2. **Perianth:** lobes, 1.5 - 3.6 cm. x 4 - 13 mm. **Stamens:** with creamy white anthers any yellow, hairy stalk. **Style:** divided into many branches, usually widly spreading and very conspicuous, yellow or orange branches, widly. **Fruit:** loculicidal capsule, 1 - 1.2 cm. $2n = 30$.

Phenology: Flowering: November - January.

Characteristic: This species is unusual because the flowers remain open at night and in bad weather. It is best grown under glass in less wild climates. The flowers after leaves have emerged.

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TABLE
Classification and Cytology of Autumn *crocus* series

<u>banat.</u>	<u>cance.</u>	<u>gouli.</u>	<u>hadri.</u>	<u>kotsch.</u>	<u>lari.</u>	<u>ligues.</u>	<u>nive.</u>	<u>nudi.</u>	<u>ochro.</u>	<u>pulch.</u>	<u>sati.</u>	<u>seroti.</u>	<u>speci.</u>	<u>tourn.</u>
(2n) = 26	16	12	16	08,10	26	28,30	28	48	10	12	24	22	06,10	30
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.	Subsp.
<u>cancellatus</u>	<u>goulmyi</u>			<u>kotschanus</u>							<u>scrobinus</u>	<u>specisus</u>		
(2n= 16)	(2n= 12)			(2n= 08, 10)							(2n= 24)	(2n= 14,18)		
<u>Cilicicus</u>	<u>leucanthus</u>			<u>cappadocicus</u>							<u>clusii</u>	<u>ilaazansis</u>		
(2n=10)	(2n= 24)			(2n= 10)							(2n=22,23,24)	(2n= 6,8)		
<u>damascenes</u>				<u>hakkariensis</u>							<u>salzannii</u>	<u>kantholamimes</u>		
(2n= 8)				(2n= 10)							(2n=22,24)	(2n=10)		
<u>lycius</u>				<u>suworowianus</u>							<u>archibaldiorion</u>			
(2n=16)				(2n= 20)							(2n=12)			
<u>mazziaricus</u>											<u>ibrakiwii</u>			
(2n=12,16)											(2n= ?)			
<u>pamphylicus</u>											<u>sukaricusis</u>			
(2n= ?)											(2n=?)			
											<u>bolonsis</u>			
											(2n=8)			
											<u>hellenicus</u>			
											(2n= ?)			
											<u>elegans</u>			
											(2n= 18)			

01. *Crocus banaticus* 02. *Crocus cancellatus* 03. *Crocus goulmyi* 04. *Crocus hadriaticus* 05. *Crocus kotschyanus* 06. *Crocus lorigatus* 07. *Crocus liquesticus* 08. *Crocus niveus* 09. *Crocus nadiiflorus* 10. *Crocus ochroleucus* 11. *Crocus pulchellus* 12. *Crocus sativus* 13. *Crocus serotinus* 14. *Crocus speciosus* 15. *Tournefortii*.

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