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BOTANY, TAXONOMY AND CYTOLOGY OF *COLCHICUM PUSILLUM*

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ABSTRACT
Colchicum is a genus of perennial flowering plants containing around 160 species which grow from bulb-like corms. It is native of west Asia, Europe, parts of the Mediterranean coast, down the East Africa coast to south Africa and western cape. In this genus the ovary of the flower is underground. As a consequence, the styles are extremely long in propotior, often more than 10 cm. The common names ` Autumn crocus`, `meadow saffron`, `naked lady` and `false autumn crocus`, may be applied to the whole genus or to may of its species. Colchicum pusillum is generally found at the height of 0-10 m asl. It is generally found in Greece and Cyprus. This species are highly valuated as ornamental and therapeutic use. The taxonomy of this genus ia rather confused and misnaming often occurs in the trade, so many of the so-called species in cultication are actually hybrids of unknown origin. Botany, taxonomy, infra-specific taxa, distribution, ecology, description, chromosome counts and phenology are provided with their identification of colchicum pusillum.

KEYWORDS: Colchicum, Geographic area, taxonomy, cytology, chromosome, therapeutic uses, colchicum pusillum.

INTRODUCTION
There are about seventy species in the genus and native Greece, Crete and Cypus. The plants under this genus are corm bearing herbs with short scape colchicum pusillum is an annual herb and found up to 100m asl. Colchicum pusillum should not be confused with the Cretan colchicum (Colchicum cretense) that climber often encounter in the Island`s mountain. Plant is quite small and grow in cluster.

Scientific Classification[1]

01. Domain	Eukaryota
02. Kingdom	Plantae
03. Sub-kingdom	Viridaeplantae
04. Phylum	Tracheophyta
05. Sub-phylum	Euphyllophytina
06. Infra-phylum	Radiatopses
07. Class	Magnoliopside
08. Sub-class	Liliidae
09. Super – order	Lilianae
10. Order	Liliales
11. Family	Colchicaceae
12. Sub- family	Colchicoideae
13. Tribe	Colchieeae
14. Genus	Colchicum
15. Species	Colchicum pusillum Sieber

Genus Colchicum[2,4]
Herb: small, perennial, bulb like corms. Foliage: looks natural and woody, starts growing in February and dies away by the end of the May; leaves few, all basal, not ever-green, free, 15-30 cm in length, 0.8-1.5 cm width. Flowers: funnel shaped, lilac, pink, white or light lavender, appear in late September, ovary under-ground, styles extremely long in proportion often more than 10 cm, hermaphrodite.

History[5]
Colchicum pusillum was described by Franz Wilhelm Sieber in 1822. One of the most common types of colchicum with particular beauty despite its small size in the colchicum pusillum Sieber. The colchicum pusillum sieber is found at low altitudes in autumn and winter months and should not be confused with the Cretan colchicum (Colchicum cretense) that climber often encounter in the Island`s mountains. The plant is quite small and grows in clusters. Its colour is white and pinkish and sometimes inside the flowers seen the anthers with the reddish-black colour. Typically each plant has 3-6 leaves rising few cm about the ground area that is full colchicum is Helepa of Kefalogianni above Tsalikaki, near Heraklion city.

Pusillum means barrowing from the Latin pusillus, a-um (aje) = very small, tiny, in reference of its short and narrow tepals. This species grow in dry phrygana on

Lehmfiachen and cultivated at altitudes 0 – 1400 m asl. The name is considered as validly published.

Names[6,7]

Synonyms: Colchicum zndrium Rech.f. & P.H.Davis
Colchicum hertolonii var. pusillum (Sieber) Nyman
Colchicum montanum var. pusillum (Sieber) Fiori
Colchicum timidum Heldr. Ex- Lakon
Colchicum hiemale Freyn
Botanical name: Colchicum usipluml
Colchicum eemhila
Binomical name: Colchicum pusillum Sieber
Common name: Naked ladies, False autumn crocus, Meadow saffron.
English name: Small autumn crocus.

Description[8,17,9]

Life cycle: perennial. Native: Greece, Crete and Cypus. Habit: erect. Growth: 5-15 cm. Underground: bulb. Growth habit: depending on site. Habitat: rocky and stony slopes, maquies, at low altitudes. Propogation: medium. Rate of growth: medium. Distribution: Greece – Kiklades, Kriti, Karpathos, Tilos, Chalki and Rodos; and Cyprus. Altitudes: 0-100 m asl. Corm: 0.9-1.7 cm, ovoid to sub-globoluse, membrane sleeves. Tunucs: only papery, dull dark-brown. Neck: 4 (-6) cm long, without visible stem(under-ground stem). Leaves: 3-7, hanging, narrow, almost upright-offset, smooth or clenched at the edge, green, deciduous, sometime ciliate on margins, 4-11 cm long and 1-4 mm wide, rarely developed at flowering (often only tips are visible). Flowers: 1-4 (-6), funnel shaped, showy, radical sysmmetry, rose with pale or white purple , 2-2.5 cm in diameter, in a tube whose lower part in the soil, Solitary or 2-4 per bulb. Teats: 3 x 0.6 (- 0.9) cm; 5 parallel ribs. Perianth: 6 free tepals, linear to elliptic, 10-20 mm long and 3-4 mm wide. Stamens: with white thread, yellow spot at base. Filament: 5-8 mm, white. Anthers: 0-5 mm width, often yellow, sometime brown 3 straight. Pollen: yellow. Style: white. Ovary: superior. Fruit: flessy capsule, 3 valves. Capsule: ovoid. Seeds: small, diameter does not exceed 3 mm, glabrous and particulary hard, brownish. 2n = 54.

Phenology: October – December.
Characteristics: (i) At the time, the fertilized ovary of fruit emerges from the ground and completes its maturation. (ii) It is small septicidal three-lobed, three called capsule vaguely reminiscent of walnut (hence the risk of intoxication of young children).

Chemical Composition[18]

The contraction of total alkaloids is variable from 0.3 - 1.2% about 20 alkali-type compall have been isolated from the drugs. Most of them occur only small quqntities. Almost of them are amides that are weakly or not basic. Some occur as glycoside (Colchicoside – 0.4%). Colchicine and colchicoside are structurally have common tropolone nucleus (ropolone alkaloids) demecolcine, autumnaline.

The metals in corm are found- Fe (Iron), Mn (Manganese), cu (Copper), Zn (Znic), Pb (Lead), Ni (Nical), Co (Cobalt), Cd (Cadmium), Cr (Cromium), Si (Sand), Slit (Sand collected by water), Clay (Lenacious earth, human body) and Organic matter.

Relationship Between Corm Components and Effects[19]

Corm colchicine concentration as well as corm Fe content increased with increasing soil, Fe, Mn, Zn, Co, Cu, Pb and Cd contents and that corm Fe content has positive effects on the production of Colchicine. However the corm Co, Mn and Zn as well as Ni and Cd were inhibators for the formation of corm colchicine.

Effects: (i) according for 31% of variation was mainly related to corm colchicine concentration and Fe content in positive side and Co, Zn and Mn content in the negative side effect. (ii) explain 27% of the variations was mainly related to corm Ni and Cd contents in the positive side, Mn had a negative loading (0.60) in the second factor. The corm colchicine concentration also had a negative loading (- 0.55) in second factor. (iii) 20% of variation was mainly related to the corm Pb content has a negative loading (-52) in third factor.

Pharmacological Activity[20]

The autumn crocus is very toxic: ingested, the corms kill by suffocation, like mushroom. The ingestion of all part of the plant causes swallowing difficulties, abdominal pains with diarrhea, muscle cramps, hypotension and respiratory difficulties. In case of serious intoxication, death occurs by respiratory arrest or cardiovascular collapse, several days after intoxication.

Bio-Synthetic Origin[20]

The bio-synthetic of these alkaloids are not obvious. But of course phenylalanine and tyrosine are incorporate.

Uses[20,30]

The autumn crocus, known to the Greeks for its toxicity, was used in the Byzantine empire since 15th century to treat gout. It appeared at the end of 18th century in the form of a `tincture` two pqrts of roots in four parts of rectified wine. Colchicine was crystallized by chemists by Laborde and Houd`e in 1884. The formula was established by Dewar in 1945.

Medical uses: The parts medically use are corm (Colchicum tuber), dry seeds (colchici seman), Hiranya-Tuttha (a dark brown dry extract of colchicum-pusillum Sieber) and fresh flowers.

The dry corm of colchicum pusillum is bitter, pungent, hot and kapha-vata suppressant, therefore it used in inflammation, swelling, joint pain, gout, sciatica,

osleoarthritis, rheumatoid arthritis, indigation and healing of wounds.

It is also acts as diuretic thus it is used in urinary tract related problems i.e. stones, dysuria, urinary tract infection. It is mild laxative and helps in relieving from constipation. The corm is used in leaver and spleen related ailments and also a good blood purifier, thus used in skin and blood related disorder like leprosy. It also acts as anti-depressant if take in proper dose.

Hiranya Tuttha (dry extract of colchicum pusillum) used in preparations prescribed by Medical practitioners Mainly for acute attacks of gout and rheumatism. Tinctures of meadow saffron are used in homeopathy for the Same complaints.

The seeds are acrid, bitter, anodyne, astringent, anti-inflammatory, analgesic, sedative, aphrodisiac, carminative, alterative, aperient, laxative, blood purifier and are also useful in the neuralgia, gout, leukaemia, puriris, liver disorders, enlarge of spleen, sexual debility, sciatica, lumbago and familial Mediterranean fever.

Flowers contain colchine and democoline which are used for the treatment of solid tumors and for certain forms of leukaemia, especially for chronic myelocytic leukaemia.

Therapeutic uses: The therapeutic uses of colchicum pusillum are similar to colchicum luteum – Baker, because the composition are found similar.

Alternative: The colchicum pusillum causes a gradual change in the body which asually because of improve nutritive absorption as well as the elimation of toxins from the body. 02. Aphordisic: these herb works as an aphridisc that increases the sexual desires of the person. 03. Rheumatic arthritis: colchicum pusillum is a poly-herbal formation used in Unani system of medicine for the treatment of rhemulation arthritis. 04. Treatment of dysuria, constipation, inflammation and atthritis: According to unani formulation contain (i) dried rhizome of Ginger (Zingiber officinale L.) – 3.5 gm (ii) dried corm of calchicum pusillum – 3.5 and (iii) dried exudate of Aloe (Aloe vera L.)- 7 gm used for treatment. 05. Rheumatic and other form of swelling: A paste of colchicum pusillum, sffron and egg paste can be applied for relieving. 06. Wounds: dried and powdered corms of the plant is very useful in healing the wounds, it should be sprinkled on the effected areas. It promotes cicutrisation. 07. `Tutthanjan`: A term applied to a collyrium made of copper sulphate and root of colchicum pusillum is used as a cleanser for the eyes. 08. Piles: When a cloth coated with cow Ghrita and past of corm is applied on the piles mass, it necosed and falls down in due time. 09. Extract: The extracted colchine is employed orally in tablet form for acute gout, enlarges prostate, gonorrhea, dropsy and familial Mediterranean fever. It is also used most of fingers wrist and abdomen the most painful location, in rheumatoid headache and rheumatic iritis, swollen joints, with or without effusion, muscular pain sub-acute and chronic sciatica. 10. Double chromosome number: Alkaloid colchicine extract from this plant and used to alter the genetic make up of the plants in an attempt to find –new, improve varieties. It works by doubling the chromosome number. 11. It is used to treat rheumatic complaints especially gout also prescribed for its cathartic and antiemetic effects and also in initial treatment for pericarditis. 12. Anti-phlogistic effects: Colchicum inhibits mitosis through the inhibition of motility, particular of the phageytosing lymphocytes. This is of the rapeutic uses for blocking the immigration and the autolysis of phagocytes in inflammatory process and there by producing and anti-phlogistic effect. 13. Cerminative: It reduces flatulence and help in expelling excessive gas from the intestine. 14. Laxative: This herb is known to stimulate the bousl movement in the body naturelly and solve the problem of constipation. 15. Anodyne: It is known its pain relieving properties. It is also a very beneficial pain relieving agent. 16. Derivative related of colchicine: (i) Thio-colchicoside (Colchcoside) – use muscle pain relaxant. It is not curare and it acts through a central effect on the spastic hypertony of the skeletal muscle.

Contra-Indication[21,22,29,31,32]

01 The bitter variety is not to be ingested under any circumstances as it may cause death. 02. Avoid the use of sweet variety in patients taking colchicine. 03. Caution is also warranted in patients on cyclosporine, gemfibrozil, macrolide antibiotics and st.John`s wort. 04. Care must be observed old and weak patients, as well as with those who suffer from heart, kidney or gastro-intestinal conditions. 05. The sweet variety is also contraindicated during pregnancy and breast feeding. 06. This plant is also toxic to animals, particular when they are fed on dry fodder. The alkaloid even pass in to milk and can accumulate to rich toxic level. 07. The toxic dose in humans is about 10 mg, while 40 gm would always to fatal (leads respiratory and cardiovascular disruption with in few days). 08. At therapeutic dose, colchicine is an extremely effective as anti-inflammatory agent and pain killer, as it prevents the migration of macrophages to the inflamed joint, associated with an acute attack of gout (caused by precipitation of urate crystals). 09. Long term use of colchicum pusillum can cause kidney and liver damage. 10. The regular use of colchicines can cause irritation to intestines. To countrate this, it is available to use the drug with Suchi (Atropa Belladonna L.) and Khurasani Ajvain (Hyoscyamus niger L.). 11. When taken in large dosed it may cause diarrohea, salivation, vomiting, abdominal cramps, convulsions and general paralysis, These symptoms appears several hours after and administration even if the dose is large and this is probably due to its conversion in the oxydicolchins. 12. Colchicine in large doses low body temperature, potentiates the action of central depressant drug, increase the effect of the chemoreceptortrigger some as vaso motor centre causing concentraction of blood vessels and rise blood pressure.

13. Muscular weakness and ascending paralysis may occur in toxic doses and death may take place due to failure of respiratory center.

Research Studies[21,33,43]

01. Colchicine extracts also being useful in the treatment of SLE which is an auto immune disorder affects many organs but more particulary the brain, skin, kidney and joints. 02. Cancer treatment: Colchicum pusillum, contains tropolone groups of alkaloids colchicines, colchicine shows anty-mitotic activity and used in cancer for the dispersal of tumors and for treatments of various neoplastic diseases. Cancer cells usually divide much faster then normal cells. Therefore compounds that stop cell division i.e. alkaloids such as colchicine, demecolcine are also being helpful in cancer treatment. 03. Anti-oxidant activity: The ethanolic extract from corms of colchicum pusillum was investigated phyto-chemically and found colchicum offered promising anti-oxidant activity. The highest activity was displayed by chloroform fraction 9.1%, while overall range was found 56-91%. 04. Anti-fungal and anti-bacterial activity: The methaloic extract of the corms of colchicum pusillum and its sub-sequent fraction in different systems were screened for anti-bacterial and anti-fungal activites. The crude extract and all the fraction demonstrated moderate to excellent anti-fungal activity against tasted pathogens in anti-fungal bio-assay. Excellent anti-fungal activity was shown against trichophyton longifusus, up to 75% and microsporum canis, up to 85% while the crude extract and sub-sequent fractions shows mild to moderate activities in an anti-bacterial bio-assay with maximum anti-bacterial activity 58% against bacillus subtilis. 05. Enzyme in-hibition activity: The crude methandic extract and various fraction of colchicum pusillum including chloroform, ethyl-acetate, n-butanol and aqueous were carried out against acetyl-cholinesterase butylglach0linesterase, lipoxygenase and urease enzymes, a significant enzyme in-hibition activity (80%) is shown by the crude methaloic extract against lipoxygenase, while low to significant activity (32%) was evident against butyrlcholine-sterase and acetyl cholinesterase (29-61%) and no activity against urease. 06. Inflammation in rheumatoid disorder: In modern medicine, anti-inflammatory dis-order and produce associated side effect. They have the tendency to develop tolerance and gradually the dosage is increased to marked levels. In this study the drug colchicum pusillum was selected due to the anti-inflammation, anti-rheumatic and analgestic activities clamed by unani physicion and philosaphers,\. The above observstion shows the drug seems to have anti-inflammatory and analgesic effects of the drug in rheumatoid arthritis as it reduce or minimizes the symptoms/sign of the aliments. The study also revealed the drug has no effect on blood pressure, pules, respiration and weight of patients. During study, gastric upset (2%) leading to loose motions were observed as side effect of the drug. The results are highly significant at $p< 0.001$ and $p< 0.012$, respectively. 07. Phyto-toxic assay: The medium was prepared by mixing various inorganic constituents in distilled water (100 ml) and pH was adjusted (5.5 - ^.5) by adding KOH solution. The medium was than auto-claved at 121^{o}C for 15 min. The samples (30.0 gm) dissolved in ethanol (15 ml) served as stock solution. Sterilized 9 flasks, three for each concentration, were inoculated with 1000, 100 and 10µl for stock solution to give the final concentration of 1000, 100 and 10 µg/ml, respectively. The solvent was allowed to evaporate over night under sterile conditions. The each flask, 20 ml of medium at a pH of 5.5 to 6.5 was added. The 10 plants of L.dequinoctialis Welv, each containing a rosette of three fronds was added to each flasks. One other flask was supplemented with solvent and reference plant growth inbitor (paraquat) that served as negative control. All flasks were plugged with cotton and kept in the growth cabinet for 7 days. The number of fronds per flask were counted and recorded on day seven. The seven % growth inhabitation = 100 –No found in test/No of found in central x 100. 08. Insecticides activity: The crude extact and various fraction of colchicum pusillum were screened against various insects like R. dominica 25% and analis 15%. The chloroform fraction show low activity against R. dominica 25% and analis 35%. In case of n-butanal fraction, showed 33% R. dominice and against analis 44.0%. The rest of fraction were displayed no activities against there.

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