

# Identification of the Medicinal Plants from Morphological, Anatomical, and Cytogenetic Perspectives

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## DESCRIPTION

A valuable source of isoquinoline alkaloids, which have a range of pharmacological qualities including anti-viral and anti-bacterial activities, is the medicinal plant *Chelidonium majus* L. The identification and verification of raw materials are made more difficult by *C. majus*'s significant intraspecific bio-morphological diversity. Five populations of *C. majus* subsp. *majus* from various places were introduced into cultivation for the first time, and their agro morphological, micro anatomical, and molecular cytogenetic characteristics were assessed. High yields of seeds (18.6–19.9 kg/ha) and raw materials (0.84–1.08 t/ha) were generated. The total alkaloid concentrations were between 0.30–0.38%. However, there were noticeable variations in plant shape and characteristics that affected yield. Micro-diagnostic features, such as tissue topography, stomatal types, laticifers, the structure of the mesophyll in the leaf, and hairs, sepals, and petals, were discovered through the micro anatomical analysis of the leaves and flowers of double-flowered and normal-flowered plants. These features are crucial for identifying *C. majus* raw materials all chromosomes in karyotypes for the first time were evaluated identified and validate the relative genotype stability of the examined plants by the investigation of chromosomal shape, DAPI-banding patterns, FISH mapping of 45S and 5S rDNA, as well as chromosome behavior in meiosis.

Synthetic therapy is thought to be an efficient substitute for herbal treatment. Many potent cures are made from the basic components found in wild and imported medicinal plants. Currently, herbal active components make up approximately 40% of medications, and demand for medicinal plants is rising.

*Chelidonium majus* often known as greater celandine, is an important medicinal plant that is found across Europe, Asia, and has also been imported to North America. Due to its widespread usage in both formal phytotherapy and traditional medicine, *C. majus* is a plant of significant interest. This species produces a wide

variety of secondary metabolites, which give them their medicinal qualities.

One to two percent of the plant and two to four percent of the roots contain isoquinoline alkaloids, the most prevalent of which are chelidonine, berberine, sanguinarine, coptisine, chelerythrine, and protopine. In addition, *C. majus* includes flavonoids, saponins, minerals, vitamins (including vitamin A and C), sterols, acids, and their derivatives. Anti-bacterial, anti-inflammatory, anti-viral, anti-fungal, anti-protozoal and radioprotective, hepatoprotective, natriuretic and antidiuretic, as well as anti-alzheimer actions are among the pharmacological qualities attributed to *C. majus*. Since it has been shown that many alkaloids from *C. majus*, including chelidonine, sanguinarine, berberine, chelerythrine, and coptisine, have anti-cancer properties, there has been a substantial rise in celandine as a naturally obtained raw pharmaceutical drugs. Strong cytotoxicity was demonstrated against human colon cancer by the coptisine alkaloid and the methanol extract of *C. majus* in particular.

The semi-synthetic medication NSC-631570 known as Ukrain, which was demonstrated to exhibit specific toxicity towards malignant cells and touted as a possible anti-cancer therapy, is also made from *C. majus*. Recently, the *de novo* transcriptome sequencing of leaf and root tissues utilizing Illumina technology has been used to explore the molecular pathways of alkaloid production in *C. majus*.

Furthermore, the currently available karyological information on *Chelidonium* is based on straightforward monochrome staining of chromosomes, and for *C. majus*, only the basic information regarding the number of chromosomes and their sizes. However, the majority of vegetative parameters and the micro-morphology of the epidermis of the leaves and flowers did not substantially differ between the plants of the analyzed populations. Furthermore, no significant chromosomal rearrangements nor chromosome aneuploidy were seen in their karyotypes.

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