

## Review on *Chrysanthemum morifolium* plant and its pharmacological activities

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### Abstract

*Chrysanthemum morifolium* is an ornamental flower. Flower of *Chrysanthemum morifolium* is widely used as a folk medicine in treatment of many diseases. However, its active compounds remain largely unknown. The *Chrysanthemum* is a well-known traditional Chinese medicinal herb which has been used as a drug for thousands of years. From the detailed literature survey it is determined that the dried flowers of *Chrysanthemum* contain organic groups such as alkanes, flavonoids, terpenoids, unsaturated fatty acids and polysaccharides which belongs to Secondary constituents in Phytochemicals classification. Pharmacological activities are antibacterial, antifungal, anti-inflammatory. Used in the treatment of hypertension, coronary heart diseases and angina, neuroprotection, anticancer, anti microbial, anti mutagenic, nematicidal activity, anti-HIV, anti-carcinogenic and anti-aging activities that are considered beneficial to human health.

**Keywords:** *Chrysanthemum Morifolium*, chemical constituents, pharmacological activities.

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### 1. Introduction

Flower of *Chrysanthemum morifolium* is widely used in China and Japan as a folk medicine in treatment of many diseases. [4] This flower has been traditionally consumed as an edible and medicinal cognate for about 2000 years. Tea made from Flos *Chrysanthemi* is believed to be capable of reducing a fever and improving eyesight in China. Meanwhile, it is effective in dispersing cold and eliminating heat. Shannon White is a White Decorative with a light yellow center. Shannon White is a white light yellow center decorative that flowers very early in the season. Shannon's white flowers are long lasting and its plant habit is mound [8]. The mums or chrysanthus are flowering plants of the genus *Chrysanthemum* in the family Asteraceae.

They are native to Asia and northeastern Europe. Most species originate from East Asia and the center of diversity is in China. Countless horticultural varieties and cultivars exist. In China, they have been around since 500 BC. In 1630, more than 500 varieties were already mentioned

there [13]. In Europe, especially in Holland, they have been known since the mid-17<sup>th</sup> century, but their general dissemination took place only in the 19th century. *Chrysanthemum* was first appreciated in China as a medicinal plant. And mainly the chrysanthemum is the national flower of the Japan.

### 2. Description of the plant

#### 2.1 Plant Type:

*Chrysanthemum morifolium* (family: Asteraceae) is an important medicinal herb of the Asteraceae family consisting of 8 major varieties (Hangju, Boju, Gongju, Chuju, Qiju, Huaiju, Jiju, and Hang Ju). The plant is 30–90 centimeters (12–35 in) high and wide, which grows as a perennial herbaceous or slightly woody plant on the ground. The stems stand upright. The leaves are broad ovate in outline and wedge-shaped in the petiole, the length of the leaves is more than 6 inches [12]. The lower leaves are plumed, further up the stems they are increasingly entire. Deciduous leaves

appear in the spring. They are alternate, lobed pinnatifid and toothed. They exhale a strong smell when they are wrinkled. The plant's texture is thick and leathery. Properties: Sweet, slightly bitter.

## 2.2 Taxonomical classification:

Kingdom: Plante  
 Category: Mum  
 Type: Herbeceous perennials  
 Crop: Garden Mum  
 Botanical Name: *Chrysanthemum morifolium*  
 Color: White  
 Family: Asteraceae  
 Genus: Chrysanthemum  
 Species: *C. Morifolium* white

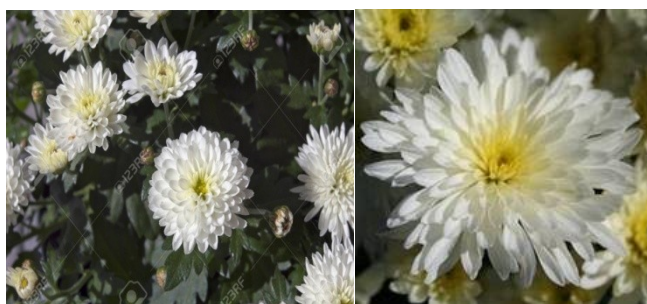


Figure 1: *Chrysanthemum morifolium*

## 2.3 Common Names:

The common name of the *C. morifolium* is the Florist's daisy and hardy garden mum. *Chrysanthemum morifolium*, commonly called *JU HUA* in Mandarin and *Flos Chrysanthemi* in Latin. *Chrysanthemum morifolium* is commonly known as *Hardy garden mum*, *Florist's mum*, in Hindi: *Sewanti* and in Manipuri: *Chandramukhi*.

## 2.4 Synonyms:

*Anthemis graniflora* flower, *Chrysanthemum* flower, *Dendranthema grandiflorum* flower, *Dendranthema morifolium* flower, *Matricaria morifolia* flower, *Tanacetum morifolium* flower. [9]

## 3. Chemical constituents

The bioactive compounds of *C. morifolium* consist of flavonoids, terpenoids, chlorogenic acids, vitamins, and amino acids.

### 3.1 Terpenoids:

C.M contains 36 detected compounds included 10 hydrocarbons, 10 terpenoids, 4 aromatics, 4 alcohols, 3 ketones, 3 esters, 1 aldehyde and 1 ether. Camphor, n-hexane, ethyl acetate, 1,3,5-cycloheptatriene, ethyl benzene, o-xylene, eucalyptol, nonane, alpha-Pinene, and pentadecane were the most common components, and camphor, n-hexane, o-

xylene, and eucalyptol were present at particularly high levels.[6]

Sesquiterpenes chlorochrymorin and chrysandiol were isolated from *C.morifolium*. Chlorochrymorin is the first natural sesquiterpene lactone with a 1-methyl-6- isopropyl-4- ethylperhydroindene skeleton containing a chlorine atom, whereas chrysandiol is a sesquiterpene diol with a germacrane skeleton containing a cyclodecane ring. [5]

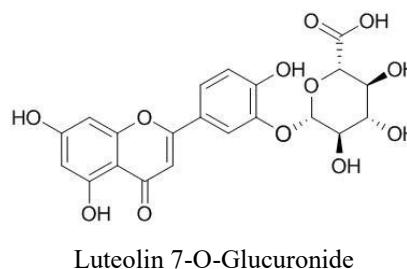
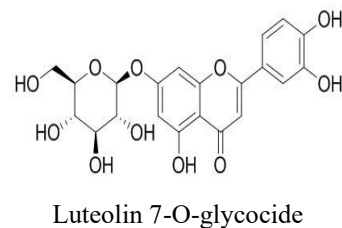
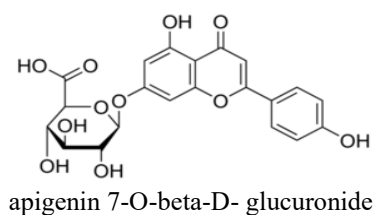
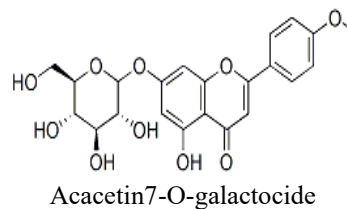
Chrysartemins A and B and chlorochrymorin have been isolated as rooting promoters from *Chrysanthemum morifolium* Ram. [11]

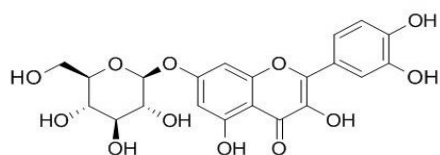
### 3.2 Flavonoids: [10]

Luteolin, quercetin, acacetin 7-O-beta-D-(3"-acetyl)-glucopyranoside, luteolin 7-O-beta-D-(6"-acetyl)-glucopyranoside, hesperetin 7-O-beta-D-glucopyranoside, acacetin 7-O-beta-D-glucopyranoside, diosmetin 7-O-beta-D-glucopyranoside, apigenin 7-O-beta-D-glucopyranoside, hesperidin, linarin and luteolin 7-O-beta-D-glucopyranoside.

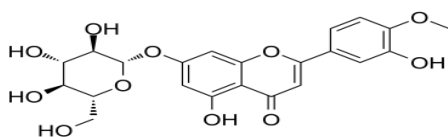
### 3.3 Vitamins: [15]

The vitamins like vitamin A, vitamin B1, vitamin E. The petals contain about protein, fat, carbohydrate, ash. And also contain amino acids and chlorogenic acids.

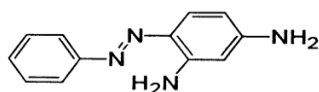




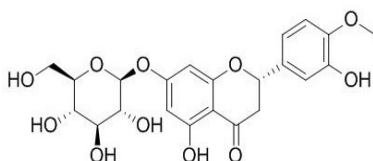
Acacetin-7-O-beta-D-glucopyranoside



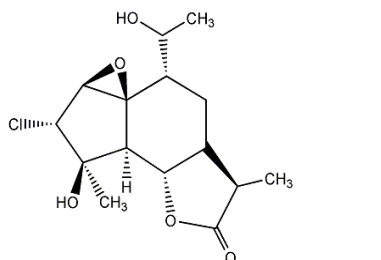
Diosmetin-7-O-beta-D-glucopyranoside



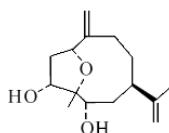
Chrysandion



Hesperitin-7-O-beta-D-glucopyranoside



Chlorochrymorin



Chryсандiol

#### 4. Other uses: [12]

- The chrysanthemum Plants have been grown indoors in pots in order to help remove toxins from the atmosphere. It is especially good at removing chemical vapours, especially formaldehyde, benzene and ammonia.
- The chrysanthemum flowers are used in the food industry for color ingredients and used in the pharmaceuticals for dyes.

- A tangy aromatic tea is made from the flowers or flower petals for a sweeter tea only the petals are used.
- The flower heads or petals are parboiled and served as a salad with tofu and seasoned with vinegar or soya sauce.
- They can also be prepared as tempura, pickled, dried or added to soups.
- Besides, the flower often combines with Sophora Japonica (Huai Hua Mi) to replace tea for lowering high blood pressure and with sugar to clear heat and remove toxicity.
- Its water extract or decoction of flower has certain antibacterial effect on *Staphylococcus aureus*, a variety of pathogenic bacteria, and skin fungus.
- The flower has inhibitory effect on influenza virus PR3 and leptospira. Its preparations can dilate coronary arteries, increase coronary blood flow, and improve myocardial oxygen consumption. Its preparations can also lower blood pressure, reduce blood clotting time, cool down, and diminish inflammation.
- Leaves – cooked Used as fritters, they are aromatic some varieties have been selected for their low bitterness.
- An aromatic tea is made from the leaves.
- The leaf juice is smeared onto wounds.

#### 4.1 Medicinal uses:

Pharmacological activities improve vision, soothe sore eyes, relieve headaches, counter infections etc. They are antibacterial, antifungal, anti-inflammatory, carminative, depurative, diaphoretic, febrifuge, refrigerant and sedative, thus increasing the flow of blood to the heart. Used in the treatment of hypertension, coronary heart diseases and angina, neuroprotection, anticancer, hepatoprotective activity, anti microbial, anti mutagenic, nematocidal activity, and insomnia. Demonstrate a variety of biological characteristics, such as radical-scavenging and, anti-virus, anti-HIV, anti-carcinogenic and antiaging activities that are considered beneficial to human health [11]. The *chrysanthemum morifolium* flower exhibited anti allergic activity, *Chrysanthemum* species have also been proposed as a potential ingredient for herbal cosmetics for their tyrosinase inhibitory activity which has been associated with antioxidant activation, whitening, and moisturizing effects [6]. The *chrysanthemum morifolium* flower used in the conjunctivitis and dizziness.

#### 5. Pharmacological activities

##### 5.1 Anti Microbial Activity:

Bacteria (*Salmonella Typhi*-MTCC-733, *Staphylococcus Aureus*- MTCC-7443, *Pseudomonas Aeruginosa*-MTCC-7296, *Mycobacterium Tuberculosis*-MTCC-300) and Fungus (*Microsporium Canis*-MTCC-2820, *Epidermophyton Floccosum*-MTCC-613, *Trichophyton*

*Rubrum* -MTCC-296 and *Aspergillus Candidus* -MTCC-1989) were selected for the study. The extract of root, stem, leaf and flower of plant were prepared in methanol and aqueous solutions. Study by agar disk diffusion method. [19]

### 5.2 Antibacterial Activity:

*C.morifolium* has a strong antibacterial action against *Staphylococcus aureus*, *Escheria coli* and *Shigella flexneri*. The bactericidal activity was tested against *S. aureus* and *E. coli* using an agar-dilution method and growth-inhibition test on Mueller–Hinton agar plates. [6]

### 5.3 Anti Oxidant Activity: [7]

The flavonoids in the extracts of *Chrysanthemum morifolium* protected the brain, liver, and kidney against lead-induced oxidative damage in mice. Moreover, the extracts provided significant protection against cerebral ischemia and reperfusion injury in rats through their antioxidant effect. An antioxidant activity of these three flower colours (pink, yellow and white) *Chrysanthemum morifolium* were examined through DPPH antioxidant assay. The sample showed significant antioxidant activity. The phytochemical analysis supports antioxidant properties of these flower colours. So, for comparing among pink, white, yellow flower, white flower of chrysanthemum was found good for potential phytochemical and antioxidant properties than pink and yellow flower.

### 5.4 Nematicidal Activity:

In the *chrysanthemum morifolium* flowering plant is the useful part of the plant is against the nematicidal activity to the *Bursaphelenchus xylophilus*. [18]

### 5.5 Anti Mutagenic Activity:

A methanol extract from the lower heads of *Chrysanthemum morifolium* showed a suppressive on umu gene expression of the SOS response in *Salmonella typhimurium* against the mutagen 2-(2-furyl)-3-(5-nitro-2-furyl) acrylamide (furylfuramide). In addition to the antimutagenic activities of these compounds against furylfuramide, Trp-P-1 and activated Trp-P-1 were also assayed by the Ames test using *S. typhimurium* TA100. [15]

### 5.6 Anti Inflammatory Activity:

An example of Asteraceae reported to inhibit COX is *Cichorium intybus* L., or chicory. In Asia, *Chrysanthemum sinense* Sab (*Chrysanthemum morifolium* Ramat) and *Bidens bipinnata* L. are used as anti-inflammatory on account of their likely ability to inhibit COX. [1]

### 5.7 Cardiovascular system:

*C.morifolium* increased the coronary flow and myocardial oxygen consumption of the isolated heart of rabbits. The medication also markedly improved chest discomfort, palpitation, tachypnoea, dizziness, headache and numbness of the extremities. *C.morifolium* was shown to be

effective in the treatment of hypertension with arteriosclerosis. [3]

### 5.8 Respiratory tract infection:

The volatile oil had definite therapeutic and prophylactic value. The aggregate effective rate achieved in patients with upper respiratory tract infection, tonsillitis, acute bronchitis and acute viral hepatitis.

### 5.9 Anticancer Activity:

*C. morifolium* showed relatively potent inhibition of cell viability against cell lines than *A. spathulifolius*, *C. drummondii* and *R. laciniata*. Except inhibition of HeLa cell viability by *A. spathulifolius*, *A. spathulifolius* and *C. drummondii*.

### 5.10 Antiobesity Activity:

LU supplements exert protective effects against obesity and its comorbidities via interplay between the liver and adipose tissue in diet-induced obese mice. [17]

### 5.11 Anti HIV Activity:

Antiviral compounds from natural products, a crude extract of the *C. morifolium* was found to inhibit HIV-1 integrase. Isolated a new flavonoid glucuronide, apigenin 7-*O*- $\beta$ -*D*-(4''-caffeoil) glucuronide (**1**), together with six known flavonoids, apigenin 7-*O*- $\beta$ -*D*-glucuronide (**2**), quercetin (**3**), quercitrin (**4**), astragalin (**5**), apigenin (**6**) and luteolin (**7**). Among isolated, compound **1** showed strong inhibitory activity against HIV-1 integrase. The isolation of **1**, the structure of which was determined by analyses of spectroscopic method and the HIV-1 integrase inhibitory and anti-HIV activity of compound **1**. [2]

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