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Chrysanthemum leucanthemum: A review

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Abstract

Chrysanthemum leucanthemum also called as oxeye daisy. Introduced from Europe in the early 1800's primarily as a grass seed contaminant, and subsequently spread as an ornamental, Oxeye daisy has become a serious invader of pastures and natural areas throughout North America. It is a perennial herb that reproduces both by seed and shallow rhizomes. Single plants quickly become patches that continually increase in size. Plants flower June August and its seed germinates throughout the growing season.

Keywords: *Chrysanthemum leucanthemum* and pharmacological

Introduction

Traditional medicines are wide spread throughout the world. Only 1% of angiospermic plants have been scientifically evaluated for their medicinal value [1]. Plants have a great potential for producing new drugs of great benefit to mankind [2, 3]. The prevailing threat on existing plant wealth compels us for an immediate scientific evaluation of the medicinal properties of these plants and globally there has been an increased interest to identify compounds that are pharmacologically potent that have low or no side effects for use in therapeutic purpose. *Chrysanthemum* distinctive flower head with yellow disc and white ray flowers and its spatula shaped, lobed rosette leaves help identify this Montana Category I noxious weed. First recorded from Lewis and Clark County in 1890, it spread to 24 counties by 2007. Oxeye daisy is a prolific seed producer and seeds can survive in the soil for up to 39 years [4].

In North America, it was reported to be naturalized in Québec and in the north eastern USA by the 18th century. Nowadays, it is common in the north eastern and north western states of the USA and in the south eastern and south western provinces of Canada [5]. The traditional medicinal methods, specially the use of medicinal plants, still play a vital role to cover the basic health needs in developing countries [6]. Moreover, the use of herbal remedies has risen in the developed countries in the last decades. In this connection, plants continue to be a rich source of therapeutic agents having antitumor activity in animals as well as in plants (crown gall tumours'). The active principles of many drugs are found in plants or are produced as secondary metabolites. The remarkable contribution of plants to the drug industry has been possible, because of the large number of phytochemical and biological studies all over the world.

This plant is a glabrous to sparsely pubescent shallow rooted perennial herb with conspicuous terminal flower heads and roots arise from a short creeping rootstock with a curved main stem with many adventitious roots. Underground stems contain water soluble red pigments in the xylem and pith tissues. Either short rhizomes or stout root crowns may give rise to stems. Seedlings bear cotyledons that open above the soil surface; the hypocotyl does not continue to elongate above the ground. Stems are erect, simple or slightly branching with usually 1-2 per plant, but may form thick clusters. The stems arise from stout rootstocks and are decumbent at their base, usually 30-90 cm in height, reaching a maximum height of 2 m. Leaves are sparsely pubescent and three-nerved. Basal leaves are stalked, spatulate (spatula shaped) to obovate (egg shaped with the narrower end at the base), and irregularly dentate (sharp teeth) to regularly crenulate (rounded teeth) (10-25 cm long and 3-7 cm wide). Stem leaves are smaller, alternate, mostly sessile, obovate to narrowly lanceolate (lance head-shaped) becoming ligulate (strap like) apically with coarse teeth and the base usually deeply lobed or fringed with slender segments.

Flower heads (capitula) are erect, usually solitary on long terminal peduncles and are 2.5-7.5 cm in diameter, with 1-15 inflorescences per plant.

The flower heads are mainly heterogamous with female ray florets and hermaphrodite disk florets. White ray florets number 15 to 30 per head and are 0.5–2.4 cm long, ligulate, the apex rounded or with 3 small teeth; the 400 to 500

yellow disk florets are 4 mm long and tubular forming a dense, slightly domed centre. The numerous involucre bracts are green, edged with brown, and surround the base of each head.

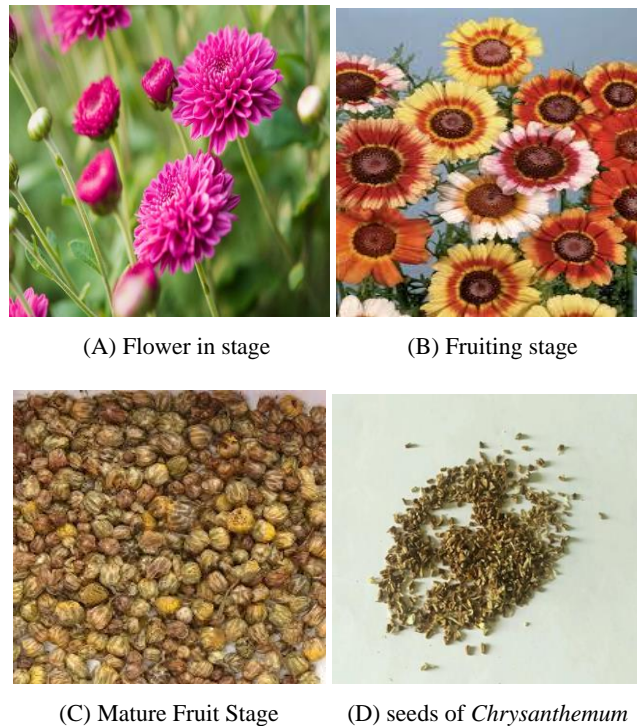


Fig 1: Different stages of *Chrysanthemum*

Chemical constituents

Search for the concerned active compounds has led to the isolation of several pyrethroids, sesquiterpenoids,

flavonoids, coumarins, triterpenoids, steroids, phenolics, purines, lipids, aliphatic compounds and monoterpenoids from different plant parts of *Chrysanthemum* [7-13].

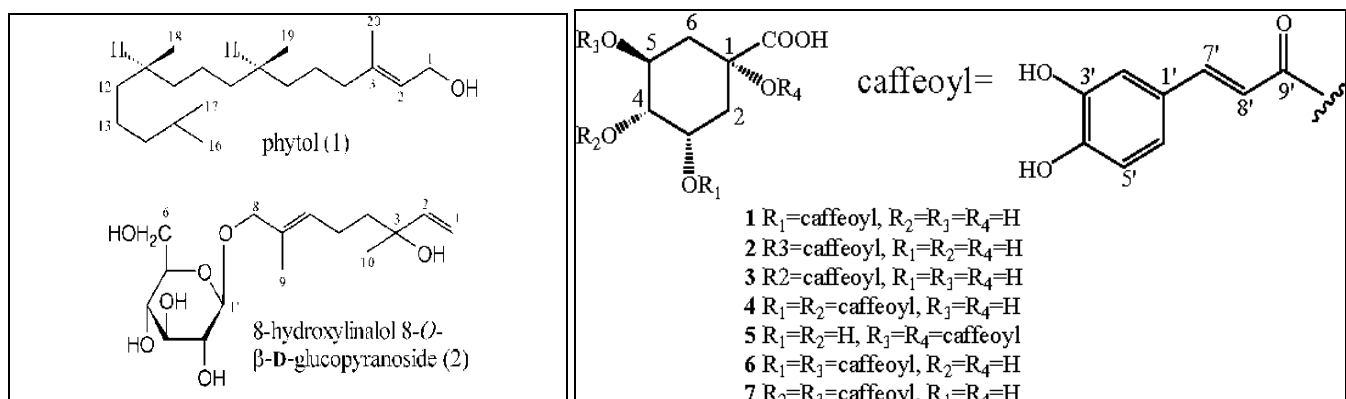


Fig 2: Chemical structure of *Chrysanthemum*

Biological activities reported for the different species of *Chrysanthemum* plants are molluscicidal, cytotoxicity, antibacterial, inhibitory, pharmacological, toxicity, insecticidal, etc. The various biological activities reported from different extracts of *Chrysanthemum* plants are summarized [14-16].

Pharmacological activity

Anti bacterial activity

The essential oil of *Chrysanthemum leucanthemum* exhibited strong activity against *Salmonella typhi* and *Proteus mirabilis*. The activity was investigated by agar dilution method [17]. Also, the essential oil of *Chrysanthemum leucanthemum* exhibited the activity

against six Gram +ve bacteria and 8 Gram -ve bacteria. The activity was investigated by broth dilution method [18].

Antimutagenic activity

Methanol extract from the flower head of *Chrysanthemum leucanthemum* showed a suppressive effect on umu gene expression of the SOS response in *Salmonella typhimurium* against the mutagen 2-(2-furyl)-3-(5-nitro-2-furyl) acrylamide. The four compounds, acacetin, apigenin, luteolin and quercetin suppressed 60.2, 75.7, 90.0 and 66.6% of SOS inducing activity at a concentration of 0.70 mmol/ml. These compounds were also active against other mutagens [19].

Antifungal activity

The activity of *Chrysanthemum leucanthemum* was evaluated against 12 fungal species. In agar diffusion plate assay, the growth of *Alternaria* sp., *Aspergillus flavus* and *Pythium ultimum* was highly reduced (> 80%) at the third day²⁰. Activity was also shown by essential oil from *Chrysanthemum leucanthemum* against four fungi at concentration of 150 ppm^[21].

Toxicity Carpenter *et al.*^[22] made an exhaustive study of the toxicity of pyrethrins and allethrin to rats, rabbits and dogs with inhalation studies, oral and skin exposure. They reported the oral LD50 of Pyrethrum oleoresin at 820 mg/kg on male and female Sherman strain white rats, whereas the LD50 of the purified 20% pyrethrins extract was 1870 mg/kg. Although the procedures used in the two tests varied a little, the comparison is still valid enough to show greater toxicity of the unpurified oleoresin.

Conclusion

The above study showed that *Chrysanthemum* can be used for antifungal, anti mutagenic and anti bacterial activities etc. Need to do more research on *chrysanthemum* for knowing pharmacological activity. So, we came to conclusion that *chrysanthemum* will act as above pharmacological activity.

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