

A Review Article On “*Matricaria Chamomilla* (German Chamomile).”

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Abstract: *German chamomile (M. chamomilla) is recognized as a star herb due to its medicinal and aromatic properties. This plant is found across a wide range of climatic and soil conditions. Both the flower heads and blue essential oils of German chamomile possess several pharmacological properties of an anti-inflammatory, antimicrobial, antiseptic, antispasmodic and sedative, etc., nature, which makes it a highly sought after herb for use in many pharma and aroma industries. Chamomile tea, prepared from its flower heads, is also a well-known herbal tea for mind and body relaxation. Though it is a high-demand herb, farmers have not adopted this plant for large scale cultivation as a crop, which could improve their livelihood, due to the high cost in flower heads harvesting, loss in over mature and immature flower heads picking during harvesting, unavailability of varieties and Agro technologies for machine harvesting, a lack of efficient process development of oil extraction and in the lack of improved stable varieties. There are many studies that have reported on the phytochemistry and pharmacological uses of chamomile, which further explore its importance in the medicine industry. Several studies are also present in the literature on its cultivation practices and plant ecology. However, studies on breeding behavior, genetic improvement, varietal development and mechanical harvesting are scarce in German chamomile. Hence, keeping in mind various aspects of farmers' and researchers' interest, earlier reports on taxonomy, floral biology, processing of oil extraction, active constituents, uses, agronomy, breeding challenges and opportunities in German chamomile are summarized in this review.*

Keywords: Chamomile; pharmacological uses; genetic improvement; agronomy; essential oils

I. INTRODUCTION

Chamomile is a widely recognized herb in Western culture. Its medicinal usage dates back to antiquity where such notables as Hippocrates, Galen, and Asclepius made written reference to it. A common ingredient today in herbal teas because of its calming, carminative, and spasmolytic properties, it is also a popular ingredient in topical health and beauty products for its soothing and anti-inflammatory effects on skin. Chamomile has a sweet, grassy, and lightly fruity aroma. Its flowers are daisy-like, with yellow centers (approximately 1-1.5 cm in diameter) and white petals (between 12-20 in number). It is from the plant's fresh and dried flower heads that infusions, liquid extracts, and essential oils are made. Two species of chamomile are generally used in traditional herbalism, *Matricaria chamomilla* (*Chamomilla re-cutita*; German chamomile; Hungarian chamomile) and *Chamaemelum nobile* (Roman chamomile). Both annual herbs belong to the Asteraceae/Compositae family and are similar in physical appearance, chemical properties, and general applications. German chamomile, however, is the more familiar and more commonly used of the two.

German chamomile (*M. chamomilla*) is an annual medicinal and aromatic herb which is found in south east Europe and in adjoining Asian countries. It has a wide adaptability over range of soil type, cold and soil alkalinity. German chamomile has been considered as a medicinal treasure due to its extensive therapeutic use. Hence, making it the fascinating herb of the earth. It has been used as a medicinal plant since the classical period, and the Egyptians considered this herb a sacred gift by the God 'Sun' [1]. Due to having several aromatic and pharmacological properties, it is popularly known as a “star” herb [2].

German chamomile flower heads have been used as such in herbal tea or in various forms of preparation from the extracts. The flower heads, and their extracts of German chamomile, are used in several herbal remedies, herbal tea, cosmetics, food flavors, dye and pest repellent [3,4]. The essential oil of German chamomile is of high pharmaceutical

value and contains flavones, polysaccharides and lipophilic active ingredients, corresponding to German chamomile activity. The primary use of essential oils is in the food industry, aromatherapy industries and perfumery; due properties of anti-inflammatory, antiulcerogenic, antimicrobial, antiseptic, antispasmodic, sedative, immunomodulatory and wound healing [5], its oil is also vital in the pharmaceutical industry.

Despite its great economic value and large demand, this herb is not popular among farmers at a commercial level, due to a lack of available varieties, a lack of appropriate agrotechnologies, the high cost of harvesting and challenges of losing active constituents in the process of oil extraction. In assessing the quality of German chamomile and its extracts, lipophilic active ingredients are of enormous importance. In addition to $(-)\alpha$ -bisabolol and chamazulene, polyynes such as spiroethers are also important. Spiroethers have anti-inflammatory and spasmolytic properties but are easily decomposed, especially at slightly elevated temperatures. Hence, the extraction process of bio-active constituents is crucial. The German chamomile has some varieties of both a diploid ($2n = 18$) and tetraploid ($2n = 36$) genetic load. The diploid varieties were reported to be shorter in growth and height than the tetraploid varieties [6]. The plant lacks synchronous flowering, which causes difficulties in mechanical harvesting and leads to a high cost of labor for flower heads picking. So, this crop requires extensive research and development in the areas of agrotechnology developments, genetic improvement, varietal development and in the processing of oil extraction for its large scale cultivation and industrial applications, which necessitates an assessment of the important parameters for extraction of active constituents.

Thus, the present review was undertaken to understand and summarize earlier reports on its taxonomy, floral biology, processing of oil extraction, active constituents, uses, agronomy, breeding challenges and opportunities to the benefit of researchers, farmers and industrialists.

II. PLANT PROFILE



Botanical name : *Matricaria recutita*

Biological Source : Dried flower-heads of *Matricaria chamomilla* L. belonging to family Asteraceae.

Parts used: Flowering tops.

Shape : Hemisphere

Colour : Greenish-yellow to yellowish-brown

Odour: Pleasant, aromatic, apple-like

Taste : Aromatic but slightly bitter

Size : 6 mm in diameter

Used for: Irritability, restlessness, insomnia, indigestion, dyspepsia, gas, fevers, colds, flu, externally for burns, rashes.

Active Constituents:

German chamomile flowers contain 0.24- to 2.0-percent volatile oil that is blue in color. The two key constituents, (-)-alpha-bisabolol and chamazulene, account for 50-65 percent of total volatile oil content. Other components of the oil include (-)-alpha-bisabolol oxide A and B, (-)-alpha-bisabolone oxide A, spiroethers (cis- and trans- en-yn-dicycloether), sesquiterpenes (antheotulid), cadinene, farnesene, furfural, spathulenol, and proazulene (matricarin and matricin). Chamazulene is formed from matricin during steam distillation of the oil. Yield varies depending on the origin and age of the flowers. European Pharmacopoeia recommends chamomile contain no less than 4 mL/kg of blue essential oil.¹ Chamomile also contains up to eight-percent flavone glycosides (apigenin 7-glycoside and its 6'-acetylated derivative) and flavonols (luteolin glucosides, quercetin glycosides, and isohamnetin); up to 10-percent mucilage poly-saccharides; up to 0.3-percent choline; and approximately 0.1-percent coumarins (umbelliferone and its methyl ether, herniarin). The tannin level in chamomile is less than one percent.

Clinical Indications:

Although chamomile is a well-known and widely used herb in Western culture, few well designed, randomized, double-blind, placebo-controlled studies are available to fully assess its therapeutic benefit.

Sleep Enhancement

In an open case study to examine the cardiac effects of two cups of chamomile tea on patients under going cardiac catheterization, the authors observed that 10 of 12 patients in the study achieved deep sleep with in 10 minutes of drinking the tea.[7] The patients had a small but significant increase in mean brachial artery pressure. No other significant hemodynamic changes were observed.

Diarrhea

In a prospective, randomized, multicenter, double-blind, parallel group trial, 79 children (ages six months to five years) with acute, noncomplicated diarrhea received either a commercial preparation of apple pectin and chamomile extract or placebo for three days, in addition to a typical rehydration and re-alimentation diet. At the end of three days, significantly more children in the pectin/chamomile group (85%) experienced diarrhea alleviation compared to the placebo group (58%) ($p < 0.05$). The children on the pectin/chamomile combination experienced a significant 5.2-hour shorter duration of symptoms compared to the placebo group.[8]

Colic

A double-blind study observed the efficacy of an herbal decoction consisting of German chamomile, vervain, licorice, fennel, and balm mint on 68 healthy infants with colic. For seven days the infants (ages 2-8 weeks) received 150 mL of the herbal preparation or placebo with each colic episode, but no more than three times daily. After seven days, 57 percent of the infants receiving the herbal preparation experienced colic relief compared to 26 percent in the placebo group.[9]

Wound Healing

A double-blind trial examined the therapeutic efficacy of a topical chamomile extract on 14 patients with weeping dermabrasions from tattoo applications. Those using chamomile noted a statistically significant decrease in the weeping wound area and increased drying compared to the placebo group.[10]

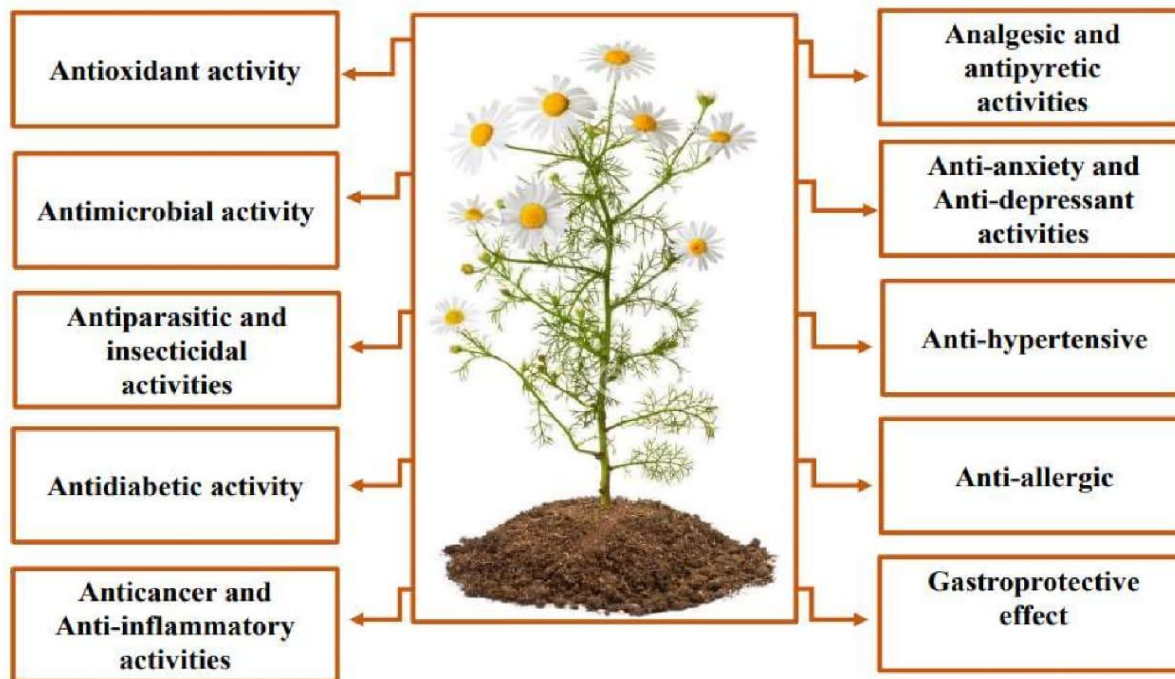
In a double-blind, randomized, placebo controlled study, 48 women receiving radiation therapy for breast cancer were treated topically with either chamomile cream or placebo (almond oil) to protect the radiation treated area. While there were no significant differences between the two groups in objective scores of skin irritation, the patients preferred the chamomile containing cream to the placebo for its rapid absorption and stinklessness.[11]

Eczema

In an open, bilateral comparative trial, 161 patients with eczema on their hands, forearms, and lower legs initially treated with 0.1-percent diflucortolone valerate received one of four treatments: chamomile cream (Kamillosan), 0.25-

percent hydrocortisone, 0.75-percent fluocortin butyl ester (a glucocorticoid), or 5.0-percent buprenorphine (a nonsteroidal anti-inflammatory). After 3-4 weeks, the chamomile cream was found to be as effective as hydrocortisone and demonstrated superior activity to buprenorphine and fluocortin butyl ester.[12]

III. PHARMACOLOGICAL ACTIVITY



Side Effects and Toxicity:

Chamomile use has a high level of safety, as confirmed by numerous animal models.[12,29-31] One particular toxicity study using rabbit models determined the acute oral LD₅₀ and acute dermal LD₅₀ to be greater than 5 g/kg body weight.[13] The U. S. Food and Drug Administration (FDA) has classified the oil and extract of both German and Roman chamomile as substances Generally Regarded As Safe (GRAS).[14]

A few reports indicate that individuals allergic to the Asteraceae/Compositae family (ragweed, chrysanthemum, marigold, daisy, etc.), can experience cross-over hypersensitivity reactions to chamomile. One report involved an eight-year-old boy with a history of atopy who ingested a chamomile tea infusion that precipitated an anaphylactic reaction.[15] In another report, a 20-year-old woman with confirmed sensitivity to chamomile experienced acute rhinitis from merely using chamomile-scented toilet paper.[16]

Dosage:

Adults, oral administration for traditional uses are generally as follows: (1) dried flower heads: 2-8 g as an infusion three times daily; (2) liquid extract/tincture: 1-6 mL up to three times daily of 1:1 potency; 7-15 mL up to three times daily of 1:5 potency.

Warnings and Contraindication:

Individuals with known hypersensitivity to members of Asteraceae/Compositae family (ragweed, chrysanthemum, marigold, daisy, etc.), should avoid use of chamomile-containing products to reduce the likelihood of an allergic reaction.

IV. CONCLUSION

From this review we conclude that German chamomile is a star herb which is extensively used in many homemade remedies, herbal drinks, condiments, and in the food and aroma industry, as has been the case since the classical period.

Continuous research on its active constituents and pharmacological properties explored its importance in many medicinal formulations.

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