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ORIGINAL ARTICLE

Study on Cammomile(*Matricaria chamomilla* L.)Usage and Farming

Sharrif moghaddasi Mohammad

Islamic Azad University/Saveh Branch, Iran

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ABSTRACT

Matricaria chamomilla has numerous, and ages-old, usages, particularly as herb tea, as a natural medicine, and for pharmaceutical extracts. It has anti inflammatory, antibacterial, anti-allergic, as a diuretic, sedative, carminative, and secretogog for bile and are used externally to treat skin wounds, mouth sores, and hemorrhoids and sedative properties. Chamomile, *Matricaria chamomilla* L. Asteraceae family, is a well-known and important medicinal plant in Iran that traditionally have been used for the treatment of various diseases, and it is cultivated all over the world. The medicinal and pharmacological effects of chamomile are mainly connected with its essential oil for its antispasmodic, antimicrobial and disinfective properties. Chamomile essential oil is widely used in food, cosmetics and pharmaceutical industries. The largest group of medically important compounds forming the essential oil are chamazulene, epi- α -bisabolol, α -bisabolol oxide, -carvacrol, p-cymene, (E)- β -ocimene, (Z)- β - ocimene, (E,E)-farnesol, and en-yn-dicycloethers. Flavonoids, coumarins, hydroxycinnamic acids, mucilages and some other primary metabolites also have pharmacological effects. It contains 0.75% of a volatile oil. *In vitro* chamomile has demonstrated moderate antimicrobial and antioxidant properties and significant ant platelet activity, as well as preliminary results against cancer. Essential oil of chamomile was shown to be a promising antiviral agent against herpes simplex virus type 2 (HSV-2) *in vitro*. Potential risks include interference with warfarin and infant botulism in very young children. Chamomile is also used cosmetically, primarily to make a rinse for blonde hair, and as a yellow dye for fabrics.

Key words: *Matricaria chamomilla*, anti inflammatory, antibacterial, anti-allergic, Chamomile, medicinal plant, essential oil.

Introduction

The chamomile is one of the most important and well-known drugs. It is used a lot in Europe, Middle East, North America, Australia, and African countries. It is cultivated mostly for its blue essence and in view of its ever-increasing usage in pharmaceutical, cosmetic and sanitary, perfumery industry, and production of nutritional flavors, the chamomile is of great significance. Therefore lots of researches have been done on agronomic and racial aspects of this plant in all over the world especially European countries and this plant is producing different productive products every year. Cultivation of this plant in large-scale has been started since 20

years ago in western Germany and at the present annual usage of the chamomile in the world(consists of German and Greek chamomile) is more than 4000 tons dried flower which are mostly prepared by Hungary, Russia, Argentina, Germany, Czechoslovakia, Finland, Egypt, and recently India. In our country-Iran- the chamomile has been grown up wildly and in some provinces it is cultivated in small scale [2].

History:

This important medicinal plant-the chamomile- has been cultivated from two chamomiles: Roman one *Chamamelum nobile* L. with ancient name

Corresponding Author

Sharrif moghaddasi Mohammad, Islamic Azad University/Saveh Branch, Iran
E-mail: Memo1340@yahoo.com

Antem. nobilis and German one *Matricaria recutita*. [10] Dried flowers of the chamomile were recognized as an effective medicinal plant in Rome, Greece, and ancient Egypt. Polonyus the historian named this plant *Chamaelon*. There are explanations of this plant in some inscriptions of Hippocrates, Dioscorid, Galen.

The name of this plant is derived from Greek word CHAMOS which means 'ground', and MELOS which means 'apple'. These words refer to slowness of growing and apple odor of fresh flowers of the chamomile.

Esclepiad used to use the brewed chamomile in 200 BC. Dioscorid had used three species at the same as diuretic, make regl, and bile which the chamomile was one of them. Galen had utilized the chamomile to cure the pains, crick, and fever especially bilious fevers. The chamomile became valuable regarding therapy during the mediaeval and even until present. For its significance, it is well-known as plant star.

Generalities of Botany:

Camomile is a small, standing and fragrant plant which its height is about 30 centimeter and it grows in prairies and sandy grounds. The color of its stem is flavovirens, its leaves are alternate small with narrow erratic and mat-covered cuts. The flowers of the camomile appear in form of collected in a head and at the end of the flowering stem in the summer. In each head the white and yellow flowers are located at around and center.

The chamomile or *Matricaria Chamomil* is a plant of chicory and *Radiae* subsidiary group. The height of this plant is variable between 30-70 centimeters, and its stem has some offshoots every which conduce to capitools which are 5 centimeters in diameter. The flowers consist of two uvular and tubular florets which can be seen at the end of the stem. The lateral uvular florets are white and their numbers are variable between 12-18 per flower. These florets are considered as female. The middle receptacle tubular florets are yellow and considered as male/female (bisexual) and after flourishing they are shaped into cylindrical. The chamomile ornament flower is a terminal capitool. At first the receptacle is like a hemisphere which has been elongated during efflorescence and shaped into a hollow cone. The diameter of the chamomile's flowers varies between 1/5 to 3 centimeters. One of the features of German chamomile, which distinctive it from other ones with the same flowers, is existence of a vacuumed in the flower. So that if the flowers are slit linear, a cavernous would be seen among them, while this cavernous is not seen in flowers with different genders such as *Tripleurospermum*, *Pyrethum* *Chrysanthemum*. Meanwhile, the chamomile's flowers

will be seen in cone shape after they grew and developed.

Development procedures of the chamomile:

- a) Efflorescence (while the tubular florets are closed).
- b) More than 13 and less than 34 tubular florets are developed.
- c) The flowers begin to senesce and more than 34 tubular florets are developed [3].

The stem of the chamomile is cone shaped and more or less planar. The leaves of this plant are aciform, flat, without fuzz and have narrow and long cuts. They are alternately put on the stem [6].

Achene fruit is about 1 to 1/5 millimeters, gray or bright yellow. Fruit consists of two parts: one part contains seed which will make 20%-25% of the fruit; the other part is the same as those dried tubular florets. Weight of 1000 seeds of the chamomile is 2% to 3% of gram [4,5].

The effectual substance of this plant is a kind of essence which is mostly made and saved beneath the tubular florets. The percentage of the existing essence in dried flowers of this plant are very variable, and regarding the variety, environment, and growth conditions it is between 5% and 1/5%.

The most important compositions in the chamomile's flowers:

The essence (including: farnesene, chamazulene, bisabolol, oxide of A & B). flavonoids (including apigenin, quercetin, patuletin and luteolin) and other materials.

The chamomile has varieties of diploid $2n=18$ and tetraploid $2n=36$. The varieties of diploid have shorter growth and less brushwood height than the varieties of tetraploid. Nowadays the kind of nurturing tetraploid has the most amounts of motive materials [3].

Different Species of Matrikaria and Their Dispersion:

1. *M. aurea*: this plant can be found in Roodbar, Khoramshahr, southern borders, Booshehr, Koonak (among Dezfool and Shooshtar) Ghasr-e-shirin 400 meter ridges.
2. *M. lasiocarp*: it grows wildly in Baloochestaan and Harirood valy. It is well-known as Pinfooli and piyunfooli which are folk names.
3. *M. chamomile*: the pervasion of it was mentioned
4. *M. praecox*: it grows in Tehran, Tabriz, among Qom and Araak, among Khoy and Tabriz, salty regions of Rezaa'eeye, and among Ahvaaz and Shooshtar.
5. *M. corgmbifera*: it grows in Kermaan, Alborz ridges, Araak and Oshtoraankoo, Rezaa'eeye and Tabriz.
6. *M. decipiens*: it can be find in Azarbajejan, Chaahaarmahaal o Bakhtiyaari, and kooshshari.

7. *M. microcaplaium*: it grows in farms between Kermaanshaah, Bisotoon, and Kordestan.
8. *M. melsnphglla*: it can be mostly find in Kordestaan
9. *M. oleades*: it grows in Sahand regions

The Extensiveness:

It has much extensiveness in Europe and has high consumption in Germany especially. In Iran it can be found in provinces of Khuzestan, Kohkiluye and Boyerahmad, and Tehran.

Chemical Compositions:

The camomile flowers contain oily essence of anthemine tanan, phytostronol and also a bitter substance named anthemique acid.

Chamazolen bisabolol from the group of volatile oil

Apigenin luteolin from the group of flavonoids

Uronic acid from the group of mucilage

Pharmaceutical Properties:

The camomile is called "physician of the plants".

This plant is useful in prevention from: Peptic ulcer, and Esnaa ashar, emphysema and tumult of bowel

Painful periods, Microbial plaques in teeth, and tumults of gingiva.

According to Iran traditional medicin, the camomile is warm and dry. It is supposed as bitter reinforcers. Galen (Greek physician) had used it to cure the fever and intermittent shivers.

- 1) One of the most important properties of the camomile is to cure the peptic ulcer and gastritis easily. Those who are chalenging with this desease and using different expensive pills such as lozac, zantac, etc can save these expenses by using the camomile and achieve their ease and peace.

In order to cure the peptic ulcer, make a cup of thick tea of camomile (4 teaspoons of camomile in a glass of boiled water or 4 tea bags of camomile in a glass of boiled water) and drink it as the breakfast and then lie supinely and sleep after 4 minutes. Of course you can have your breakfast after 15 minutes. Follow this procedure for two weeks untill the peptic ulcer is cured completely.

- 2) The camomile reinforces the nerves and sexual powers and desires.
- 3) The camomile is the brain tonic.
- 4) The camomile is uretic and brings about menstruation.
- 5) This plant enhances the milk secretion of mothers who foster children

- 6) It cures headache and migrain.
- 7) Using the camomile would crush and remove the bladder rock
- 8) In order to cure someone who urinates dribbly, a camomile tea is useful.
- 9) The camomile cures the shortage of secretions of the period.
- 10) In order to cure eye disease, pour the camomile in vinegar and fumigate it.
- 11) To alleviate the muscular pains, drink the camomile tea.
- 12) Chewing the camomile is effective to heal the wounds of mouth.
- 13) Eating 5g the camomile's stem accompanied with vinegar stimulates sexual powers. (the camomile's stem is warmer and dryer than it flower)
- 14) The camomile febrifiuges and alleviates pains.
- 15) The camomile reinforces the stomach
- 16) The camomile tea can alleviate the pain of a child who is teething.
- 17) If you want to have a peaceful and comfortable sleep, drink a cup of camomile tea 10 minutes before going to bed.
- 18) The camomile cures the anorexia.
- 19) The camomile helps the bowel swelling go down.
- 20) The camomile tea cures the anemia.
- 21) The camomile is used to remove the stomach and the bowel worm.
- 22) The camomile alleviates the menstrual period pains.
- 23) The camomile is an effective cure for Xanthochromia.
- 24) The camomile bath has reinforcing effect. To this end, pour little drops of the camomile in bathtub and lie in it for 15 minutes.
- 25) To alleviate pain, mingle little drops of the camomile essence with a spoon of almond oil and then rub it into painful positions. It will reduce the pain.
- 26) The camomile essence which is mixed with almond oil is an effective cure for skin deseases such as exema, hives, and itching.
- 27) To reduce earache and amblyacusia, drip one drop of the camomile oil into the ear.
- 28) As the camomile essence has emetic effect, it is used in dealing with food poisoning.
- 29) Rub the camomile oil to reduce the backache, the arthrosis, and the podagra (gout).
- 30) If you wash blonde hair with the camomile tea, they will be more clear and brighter.
- 31) Those women who have gone through the menopause would do better to drink the camomile tea, because it reduces the menopausal disorders.
- 32) The camomile is antiallergic.
- 33) Anti stomach/bowel spasms

- 34) Protection and prevention from the peptic ulcer due to drugs, alcohol, and stress.
- 35) Harnessing bacterium and fungus growth.
- 36) Mucous and topical anti-inflammatory
- 37) Reduction of period disorders and painful period.
- 38) Prevention from inflammation of the position of the baby 's caused by the urine.
- 39) As anti-inflammatory of gingiva and reducer of the formation of microbial plaques on the teeth.
- 40) In throat infections and gingivitis the camomile accelerates the recuperation. {reel(subsidiary)}
- 41) In respiratory infections it brings reduction of respiratory ducts inflammation. {incense and edible(subsidiary)}
- 42) In sinusitis it brings reduction the need to antibiotic by reduction of the inflammation and antibacterial effects, so the camomile accelerates the recuperation. {incense(subsidiary)}
- 43) By reduction of inflammation and recovering of damaged tissues the camomile accelerates the recuperation. {edible(subsidiary and equivalent)}
- 44) The camomile reduces the stomach flatulence in inflammatory and neural diseases of the bowel. {edible(subsidiary)}
- 45) The camomile shortens the period of diarrhoea regarding acute diarrhoea especially viral one, and cures the bowel viral fluorine and reduces the inflammation. {edible(subsidiary and equivalent)}
- 46) The camomile reduces the inflammation of the bowel extremity(end) and hemorrhoids. {enema, bathing, and compress(subsidiary)}
- 47) The camomile in an effective cure for the inflammation of the vagina. {bathing and enema(subsidiary)}
- 48) Using the camomile during the period disorders reduces the pains during the period. {edible and positional, due to abdomen skin(subsidiary)}
- 49) The camomile accelerates the recuperation and reduces the outbreak of wound malformation in chronic wounds especially the shin. {positional and compress (subsidiary)}

Using Inhibition Occasions:

The camomile and its products should not be rubbed around the eyes. Because of rare occasions of sensitivity, it is better to be used positionally and started with a morsel of it.

Drug Interactions:

The camomile increases the effect of anti-clotting drugs.

Using during Gestation:

Some other parts of the camomile has the

miscarriage or stillbirth effects; that is why using large amount of it is forbidden during first months of pregnancy.

Using during Lactation:

It is allowable just for normal and nonremedial quantities

The Method of Use:

The camomile essence: there is about 0,8%-1% essence in this plant which is made by the condensation or vapor of water. The color of this essence is bright blue but because of wearing out, it turns to yellowish brown. This essence has high odor and its flavour is odorous and keen. The camomile essence is used in perfumery and for flavoring the foods.

The camomile tea due to brewing: to make The camomile tea pour one teaspoon of dried camomile in a cup of boiled water and then brew it for 5 minutes.

The camomile oil with olive oil: mix some olive oil with the same amount of dried flower of the camomile and put it on a moderate fire to be brewed (it should not be boiled) and agitate it occasionally. Then pick it up from the fire and remain it in its normal situation for 24 hours. Next, infiltrate it with press and keep it in a closed glass.(smear it over the abdomen to cure meteorism and colic)

The camomile oil: in order to prepare the camomile oil mix some of the dried flower of the camomile with its quadruple measure of sesame oil and then add some water equal to double the camomile. Put it on the gaslight to be boiled and evaporated (its water) completely and just its oil remains. Be careful not to burn the oil.

Disadvantages:

It is not mentioned any disadvantages for it.

Ecological Needs:

The chamomile is from temperate regions and has average thermal needs. Budding begins in temperature of 6-7 centigrade, but the optimum temperature for budding is 20-25 centigrade. During the growth the average of 19-20 is suitable.

To produce the maximum essence and chamazulene in the plant, the temperature should be 25' centigrade in the day and 15' centigrade in the night.

Generally, the temperature is one of the ecological factors affecting physiological and biochemistry features of the plants. The results show that temperature rise would brings about decreasing

the amount of wet material, weight of one flower, and the numbers of the days from budding to complete opening of the flower. The amount of apigenin and the essence increases by rise in temperature. The chamomile is not sensitive to winter temperature during stage of Corn; but it can be damaged by spring temperature during the stage of stem thickening and cease its growth and decrease the formation of the flower.

This plant needs much light even during greening of the seed. The requirement of this plant for the light reaches to maximum during the formation of blossom bud. If the quantity of light is not enough, the amount of chamazulene will be decreased. The results of the researches show that there is positive correlation between illumination period and amount of the essence in the chamomile. Increasing illumination period from 14 hours to 18 hours brings about increasing, chamazulene the amount of essence, and bisabolol. However the surveys show that decreasing light during growth period brings about decreasing the number of flowers, the size of flowers, and the amount of essence and chamazulene.

This plant is tolerant of dried conditions, but it requires large amount of the water to bud. Irrigation increases the flower operation very much during tillering. Though the chamomile is a winter resistant plant, but cold effects are not necessary for efflorescence. Even if the chamomile is cultured in the spring, it would flower, but its flower operation will be less than autumn cultivation; while the amount of the essence and chamazulene is larger in spring cultivation.

The stored seeds would not be able to bud after two or three years. The seeds which are placed in soil and sleep mood will maintain their germination for 10 or 15 years. The seeds bud rather quickly (during 6 to 8 days). The early growth is slow and small oat is formed in first half of the germination. They begin to grow in the spring and produce lots of embranchments and then the flowers appear. The start of flowering depends on figure and ecological condition of germination place. The main flowering period is 10-16 days. The chamomile is the most precocious kind regarding flowering in salty soils. (From late April to May). The figures under cultivation produce more serotine flowers in early May.

The flowering takes place earlier in sandy and light soils, while it takes place 5-8 days later. If the flowers are broken, the plant will flower again (less amount). In view of amount of flowering, fruits ripen gradually. During ripping receptacle turns to cone shaped and flowers which have pedicel become compressed near the stem. Ripening of the fruit starts from the end of the receptacle, and the fruits defoliate after being ripped.

The chamomile is saltiness resisting, but cannot be supposed as a Halophyt plant; because it grows well in default of sodium salts. The chamomile store Halophyt in cells of its stem 10 milligrams per gram; that is why the chamomile would be in a suitable condition while other plants are wearing off because of shortage of water. It also should be mentioned that the salinity brings about reduction of flower operation.

The chamomile grows in every soil, but it grows best in sandy light soil accompanied with large amounts of calcareous compounds. Ideal PH of soil for the chamomile is 4/8-8. Though the researches show that it can be cultivated in alkaline soils with 9-9/2 PH [1,2].

Seeding:

The chamomile can be cultivated all at once (cultivation of monoculture). In natural provenances and saline pastures the chamomile is self propelled and flowers in very that place. The researchers of the Soviet, Czechoslovakia, and Germany studied the cultivation of the chamomile during 1950s. According to those researchers the German chamomile can be cultivated for 2-3 years due to seed spilling in a location, but weeds prevent it from growing. The same results were achieved from the experiments by Kerekes (1969) in Hungary. According to recent experiments in Hungary, the chamomile can be cultivated by using correct cropping techniques in an agricultural land for 4-5 or even more years.

Whenever a weedy plant is herbicide resistant, farm should be changed. There is another advantage of German chamomile cultivation; it means German chamomile will not appear as weedy plant of other plants, and spilled seeds will bring about continuity of German chamomile appearance.

Preparing an ideal condition for cultivation is a prerequisite to production of the desirable chamomile. Crop residue should be returned to soil by disc in one-year production. The chamomile production can be performed in two ways: direct and indirect. Direct cultivation is not recommended because of weed problem.

Harvest:

The German chamomile should be harvested when most of flowers have been grown. The flowers are harvested with 5cm of flower. Early or late harvest would bring about quality reduction of effective materials. The flowers have maximum amounts of essence when ray florets are in mood; afterwards, the amount of the essence decreases.

The development of the chamomile flowers includes 3 steps:

1. The outset of entesis (tubular flowers not flourished yet)
2. More than 30% and less than 75% of tubular flowers are flourished.
3. The flowers begin to senesce and more than 75% of tubular flowers are flourished.

In order to enjoy maximum operation of dried flower and the essence, we should harvest the flowers in second stage of development. The chamomile is harvested during months Ordibehesht and Mehr in which the flowers have maximum amount of the essence. Cloudy and cold days are not ideal time to harvest the flowers; in these conditions the amount of essence and chamazulene of the flowers would reduce.

It costs a lot to harvest the flower by a worker, and it is only possible in small scale harvests. An experienced worker is able to harvest 100-150 Kg flowers of a field in a 10-hours shift.

One of the conditions of economic production in large scale is to mechanize the harvest. Ebert-Schubert is one of the harvesters. Using this kind of harvester, the German chamomile would have very ideal quality and without weeds. The chamomile combine which is made of Argentina acts as the same as that harvester and has great capacity. In Hungary, doing reforms to combine of grains harvest, great capacity of the chamomile collection has been designed and system of classifier is devised in it. This machine is practical for large chamomile fields.

The flowers should be dried in order after the harvest. Any postponement brings on changes in the flowers color and reduction of their essence quantity. If it is not possible to put the flowers in drier quickly, they should be laid temporarily in shadow for some hours.

To reduce the costs of drying collected flowers, the chamomile should be cleaned by a bolting machine. Diameter of the sieve should be 7-12 cm, thus macro gangues in the field or in place of the driers would be separated. Drying of the chamomile can be done naturally too. According to most of reports the ideal temperature to dry the flowers is 35°-38° centigrade, and necessary time to do this is 36-72 hours. But artificial drying brings on more ability for conserving and increasing cosmetic medicines; because, the plants will not be jabbed and powdered through this. The ideal temperature to dry the flowers is 40°-60° centigrade by electric driers.

In order to produce the essence or other industrial usages the chamomile harvest can be done by harvester or movable machines which are used in fodder harvest. Slash height should be adjusted in a way that does not cut the stems in lengthy shape; because, green parts of the plant would impose an overload to dry and distil.

5% to 2 tons per hectare of the product is fresh flower, and 100-500 Kg dried product will be

produced from those flowers. In mechanized harvest 400-800 Kg per hectare flowering stem would be collected to produce the essence. Weather conditions' relative the plant would flower once or twice; that is why, the amount of the product is really variable, as it is usual in other plants. After main product harvest, the flower's shoots appear from underneath of the plant; this provides the third harvest possibility. The second harvest can not be done in severe weather [2,13].

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