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Endemic medicinal plant *Kelussia odoratissma* in Iran; A review

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ABSTRACT

Background & Aim: *Kelussia odoratissma* Mozaff. is a valuable edible species exclusive to the central Zagros highlands. Although this plant was recently discovered, it has deep roots in the culture of the people of Central Zagros from the past to the present, an important part of the income of the local inhabitants is provided through it. Due to the compounds, properties and important therapeutic effects of *K. odoratissma*, investigation, processing and economic aspects of this medicinal plant can bring it to the attention of the World Health Organization.

Experimental: In this review, the authors searched the main related keywords of medicinal plants in main biological data centers e.g. Science Direct, Pubmed and Google Scholar. Then, the authors classified articles and only discussed the valid full papers in different categories.

Results: The most important compound in mountain celery essential oil is butylidene dihydrophthalide and butylidene phthalide. Phthalides are mainly found in plant seeds. Also, its important fatty acids are petroselinic acid, linoleic acid and palmitic acid. Medicinal forms and products of mountain celery plant in Iran are currently found in the form of dried powder and packaging, essential oil, extract or even fresh.

Recommended applications/industries: This plant is suitable for adding to yogurt, buttermilk, salad or flavore cheese and oil, so it can be used in culinary (including stews, soups) and industrial applications. The essential oils and extract of mountain celery have flavoring and antimicrobial properties which can be used to increase the shelf life of dairy products and preventing spoilage.

1. Introduction

According to the global perspectives of biodiversity, strengthening the role of local communities and the level of stakeholder interaction is essential in the possible actions in implementing strategic plans for biodiversity. Based on this, public participation and the role of social issues is the most effective way of protection. In recent years, recognition of the value of traditional knowledge and sustainable customary exploitation has increased and is widely respected, both in global policy - making forums and scientific communities (Singh *et al.*, 2002). Keeping native species of each region is very important in order to preserve biodiversity (Bruner *et al.*, 2001; Mabberley *et al.*, 2006). Central Zagros is one of the important center of biodiversity in Iran and Southwest Asia.

In this region, medicinal and edible species cover a significant part. One of the most important species is mountain celery with the scientific name *Kelussia odoratissima* Mozaff., whose existence has not been reported in other regions of the world (Endemic

medicinal plant of Iran) (Naderi Shahab *et al.*, 2013). Mountain celery is a perennial plant belonging to the Umbelliferae or (Apiaceae) family, whose height reaches 120 to 200 cm at maturity. The leaves have claw-shaped cuts and umbrella-shaped flowers. The seed of the plant is yellowish brown shaped plate (Naderi Shahab *et al.*, 2013). At present, the natural habitats of this species are limited to areas in Isfahan, Chaharmahal-Bakhtiari, Kohgiluyeh-Boyerahmad and Lorestan provinces, which It grows in Isfahan province in the mountains of Shahan, Fardan, and also in the area Pashtkoh, Mogoi, Tara, Klose, Kahgan Sofli and Alia and Sebestan Valley area, which are considered as the most important habitats of this species in the country. *K. odoratissma* is a valuable edible species exclusive to the central Zagros highlands, which has recently been introduced to botanical knowledge.

Although this plant was recently discovered, it has deep roots in the culture of the people of Central Zagros and from the past to the present, an important part of the income of the local inhabitants is provided through it (Zyaei *et al.*, 2015) and it is one of the plant species that, in addition to fodder uses, has non-fodder uses such as medicinal, edible, industrial, etc., which is one of the rare pasture species in the world and native to Iran. *K. odoratissma* has diverse and valuable uses. For this reason, it has been named as green gold in the Kahkilouye-Boyerahmad region (Jahantab, 2009). The use of medicinal plants has caused the production of medicinal plants in developing countries to increase day by day, and on the other hand, the global approach of people in the last few decades to use drugs that are of natural origin, has caused the increasing development of medicinal plants, processing and The new formulations of herbal medicines and their trade have become global, so that the import of medicinal plants in different countries such as China, Japan, Germany, Switzerland and Canada is increasing day by day and especially China is the main supplier of medicinal plants due to its diverse climate and plant cover, and European and American countries, of course, some Asian countries are considered major producers of herbal medicines, but herbal raw materials and therapeutic products derived from them contribute It includes an important part of the pharmaceutical market, and therefore it seems necessary to achieve their internationally recognized quality strategies.

The World Health Assembly in a number of its resolutions emphasizes the need to supply and control the quality of medicinal plant products by using new techniques and the use of suitable drugs, but Iran has a good potential for entering the market due to its climatic diversity and plant diversity. It has the trade of medicinal plants and herbal medicines, which, in addition to treating diseases, creates employment, self-sufficiency and economic development in the country (Asadabadi, 2010). There is no information about the position of *K. odoratissma* in the world based on the information of the World Health Organization, but today, considering the economic and therapeutic importance of medicinal and industrial plants and the development of the herbal treatment attitude in the world, the introduction of medicinal plants in order to use and optimally manage these God-given resources is necessary. Due to the compounds, properties and important therapeutic effects of *Kelussia odoratissma*, agroecological investigation, processing and economic aspects of this medicinal plant can bring it to the attention of the World Health Organization. Therefore, due to the importance of the issue, this plant is investigated.

2. Materials and Methods

In this review, the authors searched the main related keywords of medicinal plants in main biological data centers e.g. Science Direct, Pubmed and Google Scholar. Then, the authors classified articles and only discussed the valid full papers in different categories. The authors have addressed the subject of the medicinal plant *K. odoratissma* using the results obtained from researches related to this plant and referring to the reputable websites and scientific publications as well as the books to evaluate and compare data using related theories and ideas.

3. Results and discussion

3.1. Botanical features, morphology and reproduction of K. odoratissma

Umbelliferae family or (Apiaceae) with nearly 438 genera and 3500 species is one of the largest plant families in the world, mostly distributed in the northern hemisphere of the world (Mozaffarian, 2007). This family has 131 genera and 365 species in Iran, among which 118 species are unique to Iran (Mozaffarian, 2007). Mountain celery (Figure 1) is a rare pasture species in the world and native to Iran with the

scientific name *K. odoratissma* Mountain celery is a perennial plant and belongs to the Umbelliferae family (Mozaffarian, 2020).

Figure 1. Mountain celery (*Kelussia odoratissma*)

Celery reaches a height of 120 cm and sometimes up to 200 cm. This plant has a cylindrical (round) stem, wide leaves with petioles 35 to 55 cm long, terminal parts 7 to 10 cm long, rectangular-oval, saw-toothed teeth with an oblique or continuous base, pointed tip, close together and more or less overlapping, with reticulated veins, hairless. Umbels 8-12 rays, radii 2-5.4 cm long, glabrous, umbels about 9-flowered, leaves and bracts present, minutely pubescent. Yellow petals, hairless, regular. Fruits are oval-round, 10 to 12 mm long and 7 to 8 mm wide. Its leaves look like parsley leaves and have deep cuts and are composed of several leaflets. It has a straight and spindle-shaped root, the upper part of which has a large tuber, this tuber is the place to store the nutrients needed by the plant to start the plant's vegetative growth again in the next season. The seed (Figure 2) of this plant is relatively large, oval and plate-shaped, and its color also changes in the range of yellow, green and brown spectrums (Mozaffarian, 2020).

Figure 2. Seeds of *Kelussia odoratissma* Mozaff.

Propagation of this medicinal species is done using seeds. The seed needs a cold period to germinate. *K. odoratissma* seed has a type of dormancy that needs cold to break this dormancy, and if it is placed at a high temperature above 8 degrees Celsius, it will never turn green. But if it is cultivated from the beginning at a temperature between +1 and +4, it will germinate and continue to grow. In nature, such a need for cold will be fulfilled by winter cold. The advantage of this sleep is that because this plant must be cultivated in the fall, it does not germinate immediately after absorbing or reaching the seed, and germination is postponed until the next spring (Amu Aghaei and Valivand, 2013). Based on the results of the author's research project (comparison of rainfed and wet cultivation pilots of *K. odoratissma* in Kohgiluyeh-Boyer Ahmed provinces), the growth of mountain celery for one-year and two-year plants continues from early April to early June, but for perennial plants. It continues until the month of September, because the plant wants to produce seeds for its survival in nature.

3.2. Phytochemistry of K. odoratissma

K. odoratissma has two groups of essential oil and flavonoid compounds. Flavonoids in plant are important parts of the compounds, which have anti-inflammatory, antiviral, anti-diabetic and anti-cancer effects. The most important compound in celery essential oil is butylidene dihydrophthalide and butylidene phthalide. Phthalides are mainly found in plant seeds. Also, its important fatty acids are petroselinic acid, linoleic acid and palmitic acid (Ahmadi *et al.*, 2019). The root, leaf, stem and seeds of celery are among the parts used. This plant has various chemical compounds such as Ostohle, Coumarin, Furanocoumarin, Bergapten, Flavonoid, Apieine, essential oil, Limonene, Phthalide, β-Selinene, vitamins B, C and A, mannitol, inositol, glutamine, choline, asparagine, various minerals, especially phosphorus, silicon, etc. (Varouzi and Sadeghi, 2019).

Considering that the phthalides in this plant are volatile oil compounds, they probably have a good anti-inflammatory effect, and *K. odoratissma* has been introduced as a plant with anti-inflammatory properties in Iranian traditional medicine. Also, the presence of flavonoids and essential oil rich in phthalides has been proven in this plant (Asgari *et al.*, 2004).

The combination of butylidene phthalide and butylidene dihydrophthalide had the highest proportion of essential oil in the aerial parts of the celery plant at 26.80 minutes with 4.91% and 27.73 minutes with 82.10% respectively. These phthalides make up about 87% of the plant's essential oil (Asgari *et al.*, 2004).

Investigations show that the whole extract of mountain celery (*Kelussia odoratissima* Mozaff.) contains substances such as 4, 3 and 7-trihydroxyflavonol and caffeic acid, which can be a suitable antioxidant effect in celery (Salimi *et al.*, 2010). Phytochemical studies conducted on Kalos showed that the total amount of phenolic compounds extracted from Kalos plant was reported to be 1.033 mg/g of dry weight of the plant, and 0.595 mg of these compounds are related to flavonoids (Ahmadi *et al.*, 2007). In order to check the active ingredients of mountain celery to find out its medicinal properties, firstly, from the three studied ecotypes, including Kohrang, Bazfat and Doab Samsami ecotypes, (SCBD, 2020) after examining the obtained spectra and referring to reference books, the main chemical compounds of the essential oil were identified. The number of 24, 21 and 24 compounds representing 90.4, 95.6 and 93.6% of the total essential oil compounds of Kohrang, Bazoft and Doab Samsami samples were identified, respectively.

The comparison of the main essential oil compounds in the studied ecotypes showed that the main compounds in the essential oil of this plant include cis-ligustilide (Z-ligustilide), 3-trans-butylidene phthalide, trans-ligustilide (E-ligustilide), Kesan, spatholnol, 2-octen-1-ol acetate, globolol, butyl phthalide, beta-selinene and pentylbenzene, which constituted about 88.6% of the essential oil compounds of the studied ecotypes. Two compounds, cis-ligostelide and butylidene phthalide, respectively, in the three investigated ecotypes with 39.5% and 19.1%, make up a total of 58.7% of the essential compounds of the celery plant. Derivatives of phthalides present in the plant make up 86.6% of the compounds of the celery plant. The slight changes in the chemical composition of this plant in different habitats can be considered to some extent due to the effect of various ecological, geographical, climatic, soil and altitude factors on the composition of the essential oil of different ecotypes of this species. (Shakerian *et al.*, 2012) stated that celery seeds contain 25% oil and its most important fatty acids are 71.35% oleic acid, 19.14% linoleic acid, 6.65% palmitic acid, and 1.9% stearic acid and linolenic acid is 0.95%.

It should be mentioned that in addition to the medicinal effects, the essential oil in the seeds and roots of the plant attracts insects and facilitates pollination, repels some animals and plant pests, and protects against damage caused by increased heat (Payam Sabz, 2006; Soltani, 2005; Asgary *et al.*, 2004).

3.3. Traditional and industrial uses of K. odoratissma

Studies that refer to the processing and creation of added value from medicinal plants are divided into two categories: A: studies that refer to the processing of medicinal plants in the pharmaceutical industry and its economic value. B: studies that refer to the processing of medicinal plants in other industries or raw consumption, which include various products and by-products that can be extracted from medicinal plants (Jalili and Jamzad, 1999). Considering the antimicrobial properties and non-toxicity of *K. odoratissma* (Zareatkar *et al.*, 2023), for local consumption, the aerial parts (leaves and stems in the form of dry powder or essential oil and extract) are used in dairy products to enhance sensory properties, shelf life and control of acidity, especially in yogurt and buttermilk and to preparation of pickles and stews (Shahrani, 2006; Zareatkar *et al.*, 2023). On the one hand, considering that it is a suitable plant for adding to yogurt, buttermilk and salad or for flavoring cheese and oil, it is suitable for cooking all kinds of food, including stews, soups and soups with wonderful aroma and taste

To store and process the product of *K. odoratissma* ., it is first hand-picked and then dried because of the tender parts of mountain celery. Aerial parts are sold in the market in May and have great economic value and considered as a source of income. Therefore, the dry product can be packed and marketed. This plant has also fodder value and since it is used in dry form by livestock (mostly sheep), it is able to provide winter fodder (Irvani and Jabral Ansar, 2005).

Essential oils are one of the most important secondary compounds in plants, which are of great importance in the food industry due to their cooling aroma, flavoring properties, and the therapeutic properties of some essential oils such as strengthening the stomach. It has been proven to reduce bloating, relieve pain, antioxidant, increase the body's immunity level, relax the nerves, etc. In this regard, considering

the local use of the aerial parts (leaves and stems) of the exclusive Bakhtiari celery plant in dairy products, especially yogurt and buttermilk, a research results on addition of Bakhtiari celery essential oil in yogurt at concentrations of 20, 40 and 60 ppm showed that celery essential oil has an effect on the physical and chemical properties of yogurt and controls the increase of acidity, but it reduces the water holding capacity. It also increases the sensory properties and has the greatest effect on the taste and aroma and increases the shelf life of yogurt specially at concentration of 40 ppm (Shahrani, 2006).

3.4. Pharmaceutical importance of K. odoratissma

In traditional medicine, properties such as anti-inflammatory, anti-pain, treatment of rheumatism, blood purification are attributed to the aerial parts of the mountain celery plant, and to its seeds and root in boiled form, they are said to have properties to treat colds and severe coughs (Roghani *et al.*, 2007). In the conducted studies and reviews, the analgesic and anti-inflammatory effects (Soltani, 2009) and the anti-anxiety and sleep-inducing effect of the essence and extract of mountain celery have been proven (Saeidi, 2019). Also, in other researches, anti-allergic, vascular protective, anti-thrombosis and digestive tract protective, anti-diabetic, lipid anti-peroxidase and anti-cancer effects have been determined (Behagh, 2003). Considering its application and consumption in traditional medicine (Soltani *et al.*, 2005; Roghani *et al.*, 2007; Saeidi, 2019; Behagh, 2003) and its pharmacological properties (Salimi *et al.*, 2010; Soltani, 2008; Sabziparvar, 2010; Omidbeigi, 2000) medicinal forms and products of mountain celery plant can be found in Iran in the form of dried powder and packaging, essential oil, extract, or even fresh organ.

3.5. Post-Harvest Physiology of K. odoratissma

Post-harvest physiology is one of the important branches of plant physiology and horticulture, which studies the metabolic and chemical changes in plant tissues and organs, as well as the factors and ways of controlling the quality reduction of products after harvesting and during storage until consumption. Hand-picking and drying the mountain celery plant, then storing and processing the product (extraction of extract or essential oil) for use in the food industry, as well as the use of secondary metabolites in medicinal compounds, including physiological cases after harvesting the mountain celery plant, are considered in the storage and processing of the product. The growth of medicinal plants, the quality and quantity of their effective substances are under the direct influence of two basic factors, environment and genetics.

Climatic and environmental changes may have effects on all living organisms, including plants, and interactions between climate and medicinal plants. Medicinal plants are rich reservoirs of secondary metabolites, i.e. reservoirs of the basic active ingredients of many drugs. Secondary metabolites are not common in all plants and their production is significantly influenced by environmental and climate factors. Environmental and climate factors, with their effect on the vegetative and reproductive growth of plants, naturally cause changes in product efficiency, dry weight of the plant, the total amount of the effective substance and the constituent elements of the effective substance. Considering that the value of medicinal plants depends on the above factors, by choosing and controlling the climate and environmental factors, the maximum amount of product and the maximum amount of secondary metabolites can be achieved (Ebadi Esfahani and Moradi, 2014).

Considering that the mountain celery plant grows in areas between -15 and 20 degrees Celsius (Irvani and Jabral Ansar, 2005) and in sunny hours of 2935 to 2981 hours (Jabral Ansar and Bahreininezad, 2015) and the humidity required for the *Kelussia odoratissma* plant Mozaff can be supplied in snow-bearing areas with an annual rainfall of about 400 mm, which is often in the form of snow (SCBD, 2020). It also needs shallow to very deep soils with medium to heavy texture that have a high water holding capacity and are free of salinity and alkalinity (Irvani and Jabral Ansar, 2005), and these soils have high and good organic carbon, which these soils have high and good organic carbon, which is probably caused by the dead leaves and remaining vegetative organs of mountain celery and other related species (Ghasemi Nafchi, 2015). Therefore, for the proper growth, better quality and quantity of the effective ingredients of this medicinal plant, it is necessary to consider the environmental factors in the above conditions for this plant to plant the plant in agricultural conditions or in habitats.

Economical production of mountain celery due to its good aroma and essential oil (the amount of essential oil of mountain celery is 4.8%) and its use in food and health industries (leaves of the mountain plant for

fragrance or flavoring and fermented milk products, especially yogurt and buttermilk) (Shahrani, 2006).

Also, due to the use of the stem, leaves and other vegetative organs of the celery plant in the preparation of pickles and stews, it has great economic importance. Therefore, the production of this plant in farms and habitats, due to the use of this plant in transformation industries (food, health and medicine), can bring employment, economic prosperity and economic development in villages. At the beginning of the growing season, this plant is in the form of a bud due to the compression of the basal leaves, and it is heavily harvested by the local people and sold at a high price in the market (Kafi and Mahdavi Damghani, 2016). Fresh parts of mountain celery, which are sold in the month of May, have great economic value and are considered as a source of income. It can also be packaged and marketed as a dry product. This plant has fodder value and because it is used by livestock (mostly sheep) in dry form, it is able to provide winter fodder. Also, mountain celery habitats have beautiful landscapes that can play an important role in the development of ecotourism (Irvani and Jabral Ansar, 2005). Of course, mountain celery is very important in terms of biodiversity and genetics, and preventing its extinction will preserve the biodiversity of other related species.

Since this plant is a type of late-yielding plant and it takes 3-5 years from cultivation to its exploitation, it is necessary to give credit or financial assistance to the farmers who cultivate this crop in the first years. Because this species of *K. odoratissma* is endemic and unique to our country, it is possible to plan and act in a targeted manner for marketing, creating export markets, introducing the complete product, essential oil, active ingredients, secondary compounds and its processed export with very significant profitability. The last word is that the provision of economic and technical incentives by the government, entrusting protection matters to the people and encouraging and accompanying them, promoting the customary system of the village of mountain celery among other rural communities, will be an important factor in preserving and reviving the habitats of this endangered species (Jebli and Jafari, 2023).

3.6. Geographycal distribution of K. odoratissma

The natural habitats of *K. odoratissma* Mozaff. can be seen on shallow to very deep soils with medium to heavy texture that have a high water holding capacity and are free of salinity and alkalinity (Jabral Ansar and Bahreininezad, 2015). Mountain celery generally likes silty clay soils (medium to heavy texture) with acidity between 7.6 and 7.7, which lack salinity (EC) and alkalinity. Also, the soil of the habitats is rich in nutrients such as potassium, calcium and phosphorus and some micronutrients. Soil organic carbon also has a high and good amount, which is probably caused by the dead leaves and remaining vegetative organs of mountain celery and other related species. Non-saltiness of soils is also one of the characteristics of high areas where solutes are washed away by precipitation (Ghasemi Nafchi, 2015).

The climate of all habitats for *K. odoratissma* plant is semi-humid, moderately cold with cool and dry summers, and the maximum amount of precipitation is related to the second half of autumn and winter, and it is mostly in the form of snow, and with increasing altitude, the amount of precipitation increases and the amount of temperature decreases (Ghasemi Nafchi, 2015). This plant grows in the heights and snow-covered areas of the central Zagros region, with a minimum altitude of 2500 meters above sea level and an annual rainfall of about 400 mm, which is mostly snow (SCBD, 2020). The frost period in mountain celery habitats is at least 130 days a year, and the minimum air temperature is -15 ºC, the maximum air temperature rarely exceeds 20 ºC during the vegetative growth of the plant. The growth of this plant is limited to the northern directions of slopes and heights, which have both snow and lower temperature. However, in high areas and areas with permanent snow, natural habitats of mountain celery can be seen in the directions of different slopes (Irvani and Jabral Ansar, 2005). The number of hours of sunshine in a region is one of the parameters that has an effect on weather indicators and water and soil processes and plant growth, including potential evaporation and transpiration (Sabziparvar *et al.*, 2008) and (Sadeghi, 2007). The change trend of solar hours during the *K. odoratissma* habitat did not show any noticeable change. The most sunny hours with 2981 and the lowest with 2935 hours per year have been observed in the northernmost and southernmost point of this plant's habitat, respectively. Therefore, this plant grows in 2935 to 2981 hours of sunshine (Jabral Ansar and Bahreininezad, 2015).

The moisture required for the plant *K. odoratissma* can be provided in snowy areas with annual rainfall of

about 400 mm, which is often in the form of snow (SCBD, 2020). Also, Jahantab *et al*. (2011) pointed out the importance of precipitation and showed that in the mountain celery habitat in the Kohgiluyeh and Boyer Ahmad regions, the annual precipitation is about 865 mm and more in the form of snow. Of course, in another study, the highest and lowest amount of rainfall occurred in the winter and summer seasons, respectively, in the habitat of this plant. 52% of the annual precipitation was in winter.

After winter, the spring and autumn seasons respectively accounted for the highest amount of annual precipitation in the mountain celery habitat. The distribution of rains started from the end of October and continued until the middle of May. The amount of rainfall was low in October, which reached its maximum amount in March and its minimum amount in September. Therefore, it can be stated that for the plant *K. odoratissma* , the wettest month was March and the driest month was Shahrivar (Jabral Ansar and Bahreininezad, 2015).

Cultivation and establishment of mountain celery *K. odoratissma* outside the habitat areas was studied (Jebli and Jafari, 2023). At first, the germination capacity of the seeds was investigated (Oroojalian *et al*., 2010). Germination of celery seeds was done in two ways in November in field conditions and in South Alborz research station (latitude 35 degrees north, longitude 50 degrees east and altitude 1300 meters above sea level). In the first method, the seeds were planted in two rows in the distance between the two rows of hand-planted spruce trees in heaps at a distance of 1.5 cm from the soil surface. In the second method in the field, the seeds were planted in heaps on the southern stacks of plots with dimensions of 2 x 3 square meters with three repetitions. The cultivated seeds were not irrigated and used only the humidity of the place and spring rains for growth. In the first year, the highest germination percentage of celery seeds between the firs was 90%, and in the following years, the plants were established and grew well.

The germination of the seeds in the field was 65% in the first year, which decreased in the following years and reached one third of the first year, and finally, in the fourth year, vegetative growth and germination was not observed again. The seeds were planted in Sirachal station (latitude 35 degrees north, longitude 51 degrees east and altitude 2345 meters above sea level) in two ways. In the first method, in November, a flat and non-sloping area was selected in the shade of trees and about 100 seeds were poured into the created furrows in a length of one meter. Then the seeds were covered with soil to a depth of 1.5 cm. In the second method, the seeds were planted in the natural resources fields on the northern slope of Sirachal up to 2000 meters in the form of heaps in the shade of plants that were sometimes *Astragalus microcephalus*, also near the boulders. In both methods, irrigation was not done and only natural rainfall was used. 85% germination was observed in Sirachal station in the place without shadow slope and flat area.

In the upstream slopes, the amount of greening was about 10% in the first year. Therefore, replanting of seeds was done at Sirachal station in the upstream slopes. Due to the increase in rainfall in 2017, the germination of *K. odoratissma* seeds was higher than in 2016, but in the following years, with the decrease of precipitation and especially snow, the germination of seeds reached the lowest value in the sloping area of Sirachal (Jabali and Jafari). In general, this plant grows in altitudes and areas with annual rainfall of about 400 mm (SCBD, 2020). The growth of the plant rarely exceeds 20 degrees Celsius. The growth of this plant is limited to the northern directions of slopes and heights. *K. odoratissma* grows on shallow to very deep soils with medium to heavy texture that have high water holding capacity and are free of salinity and alkalinity (Irvani and Jabral Ansar, 2005). The beginning of the growth of the mountain celery species from early to mid-March (along with the increase in temperature), vegetative growth from mid-March to early June, flowering stage from early June to early July, seeding stage from early to late July and finally the seed fall stage It continues from the beginning to the middle of August, and the distribution pattern of the celery species is random with a tendency to a slight to dense mound (Jahantab *et al*., 2012).

4. Conclusion

The global approach of people in the last few decades to use medicines with natural origin has caused the increasing development of medicinal plants, processing and new formulations of herbal medicines and their trade in the world, so that some Asian countries are considered major producers of herbal medicines. However, herbal raw materials and the therapeutic products obtained from them include an important

share of the pharmaceutical market, and therefore it seems necessary and necessary to achieve their internationally recognized quality strategies. In a number of its resolutions, the World Health Assembly emphasizes the need to supply and control the quality of medicinal plant products by using new techniques and using appropriate drugs. Iran has a good potential for entering the trade market due to its climatic diversity and plant diversity. It has medicinal plants and herbal medicines, including mountain celery *(Kelussia odoratissma* Mozaff) which is a rare pasture species in the world and native to Iran specially areas with a semi-humid climate with cool and dry summers, such as Isfahan, Chaharmahal-Bakhtiari, Kohgiluyeh-Boyerahmad and Lorestan provinces. According to the perspective, in the possible actions in the implementation of strategic plans for the cultivation of this medicinal plant, it is necessary to strengthen the role of local communities and the level of interaction of agricultural users. Based on this, popular participation and the role of social issues is the only known way to cultivate it. In recent years, recognition of the value of traditional knowledge and its sustainable utilization has increased and gained widespread respects in both global policy-making and scientific communities. Therefore, in addition to treating diseases, it creates employment, self-sufficiency and economic development in the country for the rural users.

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