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MORPHOLOGICAL AND CHEMICAL STUDY WITH GEOGRAPHICAL DISTRIBUTION OF SILYMARIN SP. (ASTERACEAE) IN IRAQ

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Abstract

The cultivation of desert plants is widespread in Iraq, especially medicinal plants, some of which are characterized by high temperatures and water stress due to the drought prevailing in these areas. One example of these plants is the milk thistle, known in Iraq as the milk thistle, and in this research paper we will talk about it in detail.

In this paper, we will talk in general about the classification of the silymarin sp. plant. Many and varied plants fall under this genus, one of which is Silybum marianum, known as the milk thistle. This plant is considered one of the medicinal herbs that can be used as a medicine to treat some diseases, and it has been used in Iraq as an example of that. Moreover, it aims to study the morphological and chemical as well as the geographical location and places of spread of this plant all in addition to updating the existing evidence on milk thistle extract, which has proven its success in treating various diseases through laboratory, biological and clinical studies, it was found that the silymarin plant contains some active compounds such as flavonolignan and flavonoid taxifolin. Silymarin helps stimulate liver activity and is anti-cancer. It will be clear to us future studies in improving the properties of silymarin plant through genetic breeding.

Keywords: Silybum marianum, Silymarin, Asteraceae, flavonolignans, morphological properties, Clean the liver of toxins, and Geographical Distribution.

Taxonomy Concept

It is a science aims to describe and name living organisms and classify them with a specific system that explains their evolutionary relations with each other, and we find that the word Taxonomy is a term taken from the Greek language, as Taxo means arrangement and nemos means law, so the meaning becomes the law of arrangement.

Definition of Classification

Plants share a number of basic traits with each other, so they are placed in one group, they are actually said to represent one species. Then, closely related species are

combined into a larger group known as the genus, and then the converging genes are placed in another broader group called the family, and this organization continues ascending to the highest taxonomic ranks. We find this gradation that it reflects the natural relations between all plants on the basis of similarity based on genetic links between them and this is what is known as the gradation of ranks, i.e. placing the groups in an ascending sequence in which each group is wider than the group below it.

The first to use the dual label in history (although he did not apply it completely) and this label shows that the plant consists of two parts, the first of which is known as the genus and the second is known by the species. By comparing him with the scientist Linnaeus, he has used this label for more than 100 years, but Linnaeus He was given credit for inventing it, as he used it in a fixed system and without exception, and as proof of Bauhin's adherence to his idea, he published a book in 1632 that included the names of six thousand species of plants, and this book remained prevalent for nearly or more than a hundred years over other books. Bauhin was later known as the genus Bauhinia.(i)

The purpose and importance of plant classification

The main objective of plant classification is to place plants into groups within a particular system and this is done based on genetic similarities and genes in order to facilitate the task of studying them.(ii)

Scientific name: Silybum marianum (L.) Gareth

Family name: Asteraceae (Compositae)

English name: Milk thistle

Arabic name: Kharfeesh, Kharfeesh beauty

It can be said, in general, the genus Silybum (S.), includes two very important species of S. marianum, one of which is characterized by diverse leaves and the other contains completely green leaves, namely (S. eburneum Coss. & Dureu).(iii)

The types differ among themselves in terms of their flavonol content. Examples of these types are: S. marianum (L.) Gaertn purple and S. marianum var. Biflora with white flowers.(iv)

Morphological description of Silybum marianum (L.):

An annual herbaceous spiny plant that grows in the winter, with a height of 30-120 cm and may reach more than a meter from the surface of the earth, and this is determined by the fertility of the soil in which it is located, covered with large-sized cotton leaves with a leathery texture, and we note that its veins are prominent and its

edges are serrated, twisted and strong, showing sharp thorns on its edges. It is supported by a very thick, wingless stem, grooved, solid, grooved, branching from above (Fig. 1). The leaves are alternate, lobed, their edges are serrated and prickly, green and yellow along the edges. The lower leaves are sessile, and the upper leaves surround the base of the stem (Fig. 2). The head of the inflorescence is 1-2.5 cm in diameter, surrounded by several rows of pink and white masses, has a yellowish curved spiny end, the flowers are tubular red. Purple and white, the fruits are poor, with bristles on the top that help the wind to spread. When examining the content of milk thistle, we find that it contains many strong organic components and fatty acids such as linoleic acid (it has a great effect in maintaining the health of the liver, and it is preferable to use the buds in it boiled as Asparagus as well as the leaves are cooked like spinach).

Figure 1. S. marianum. Stem.

Figure 2. S. marianum. lower leaves

It is clearly one of the most popular alternative remedies currently in use, so we will take a comprehensive look at the health benefits of this plant. The plant has medicinal value, and its seeds are considered fodder for poultry. This study showed that marianum is a medicinal herb that is grown as an annual and rarely used every two years [v] with a height of 2.0 m. The stem height is 40-200 cm, may be slightly bare and sometimes smooth, many tribes in Asteraceae family are classification according to their trichomes feature. [vi] The upper part erect and branched.[vii] The leaves are large and variegated and appear shiny , Its edges have thorns and the leaf blades are white and distinctive (length 50-60 cm and width 20-30 cm).[viii] The diameter of the flower head is about 5 cm. The fruits are single-seeded, hard, ash-shaped (Fig. 3), seed is about 6-8 mm long, shiny, brown.[ix]

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Flowering time: March-July

Figure 3. Silybi mariani **(**according to [x])

Figure 1. S. marianum. Seeds **(**according to [xi])

Habitat and Geographical Distribution:

The common name of the milk thistle plant, Silybum marianum (L.) Gaertn. (syn. Carduus marianus L.[xii] Is an important plant of the family Asteraceae [xiii]

The original home of this herb is the Mediterranean basin. And it needs warm and dry soil to grow[xiv] and many countries are characterized by these specifications, such as the countries of Europe, North Africa, Central and Western Asia, South Australia, and South and North America.[xv] In Iraq the genus Silybum marianum (L.) grows in Kurdistan Region widely and naturally, and grow less in middle and south of Iraq, this is due to the drought prevalent in most areas of Iraq due to the lack of rain for several consecutive years.[xvi] Our research depended on sample of this plant collected from Baghdad. In Baghdad the Asteraceae family are grown wildly and cultivated as un ornamental plants. There is much competition between cultivated plants, and milk thistle is considered a fiercely competitive plant. And it can grow in light soil that suffers from drought (because of its strong root;[xvii] and settles in its growth on long and dense spots, competition between plant species is for water and nutrients and they are able to eliminate each other through shading. [xviii] , [xix] The results of some studies revealed that the species of marianum seeds that grow in Iraq are an important source of natural antioxidants, and this confirms that silymarin is a powerful antioxidant herbal medicine that can protect biological systems from oxidative stress. Silybum is grown in Iraq, and the culture of using it as a medicine to treat many diseases has spread. Some use it as a drink, and it is called the prawns or “Akool.” The heart of the stalks of the milkshakes is eaten raw and tastes delicious, and there are some locals who cook it with meat or chicken, onions, garlic and green coriander. Others clean the artichokes from the thorns and work from the pulp of the stem and some soft leaves. Salad with lemon, olive oil and salt. Add to the artichoke salad,

according to taste, green thyme leaves. And the Bedouin people use its leaves by placing them on wounds, where they heal completely. The leaves are also used as a drug to treat fever. (xx)

Figure 4. S. marianum (according to (xxi))

Chemical composition of milk thistle herb:

Milk thistle contains many medicinally effective chemical compounds, such as:

Bioflavonoids, known as silymarin, represent 1-4% of the weight of the herb and the main therapeutic active substance in the plant.

Silymarin consists of 4 components: silibinin, silsidianin, scicristin, and poly acetylene, in addition to medically important bile compounds, and silibinin is the most effective of them and is responsible for the benefits of silymarin.(xxii)

THE FRUITS	Silybin
	Silychristin
	Silydianin
	3-Deoxyderivatives of silychristin and silydianin (silymonin)
	Neosilyhermin A
	Neosilyhermin B
	2,3-Dehydrosilybin
	Taxifolin
	Quercetin
	Dihydrokaempferol
	Kaempferol
	Apigenin
	Naringin
	Eriodyctiol
	Chrysoeriol
	5,7-Dihydroxy chromone
	Dehydroconiferyl alcohol
	Silyhermin
	20–30% fixed oil (–60% linoleic acid; –30% oleic acid; –9% plamatic acid
	0.038% tocopherol
	0.63% sterols (cholesterol, campesterol, stigmasterol and sitosterol)
	25–30% protein, some mucilage
	Flavonoids (apigenin and its 7-O-glucoside, 7-O-glucuronide; 4,7-diglucoside, kaempferol and its 7-glucoside and 3-sulphate)
THE HERB	Luteolin and its 7-glucoside
	Sitosterol and its glucoside
	Triterpene acetate
	Fumaric acid
	Polyacetylenes

Figure 3: the main constituents of Milk Thistle (xxiii)

COMPOSITION OF MILK THISTLE EXTRACT

It is extracted from the seeds of the milk thistle plant Aquin (lipophilic) known as silymarin. According to this study, it was found that silymarin includes in the composition of its structure a number of elements, including flavonolignan compounds (flavonolignan isomers).(xxiv) Structurally, flavonolignans have wide structural diversity as a result of the C-C or C-O binding of the C6C3 subunit to the flavonoid nucleus at different positions, providing dioxane, furan, cyclohexane, or simple chains on both sides. As an explanation, these compounds contain many chiral centers and thus usually occur as stereoisomers in nature.(xxv)

One of the most important results of this study is that, among the isomers, silane is a major component and is a very active compound with a ratio of 60-70%, followed by silicristin (20%), siladianine (10%), and isosilibin (5) %.(xxvi) In addition, The chemical composition of the milk thistle plant includes some other flavonoid compounds (such as quercetin, dihydroimpferol, kaempferol, apigenin, naringin, eriodictyol, chrysoariol), and proteins (25-30%), and the sugars were (arabinose, rhamnose, xylose, glucose), tocopherols, sterols (cholesterol, campesterol, stigmasterol, sitosterol), and fats (15-30%) as triglycerides (60% linoleic, 30% oleic and 9% palmitic acid).(xxvii)

Milk thistle plant uses:

- **food uses**

The inside is eaten raw and tastes delicious, and some residents cook it with meat or chicken, onions, garlic and green coriander. Others clean the thistles from the thorns and make the pulp of the stem and some tender leaves, a salad with lemon, olive oil and salt. And added to the salad Krfeish to taste the leaves of green thyme. And the Bedouins use its leaves by placing them on the wounds where they are completely healed. The leaves are also used as a medicine to treat fever.(xxviii),(xxix)

- **Medicinal uses**

The milk thistle herb is grown for medicinal uses, where its seeds are used to obtain the active substance silymarin. It has many health uses, perhaps the most important of which is strengthening and cleansing the liver of toxins and strengthening the body. and we will explain it in detail below.

The history of the use of the milk thistle herb goes back more than 2000 years, as it was used in the past to treat depression, liver diseases, and liver damage as a result of alcoholism. Milk thistle is found in several types.

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The importance of milk thistle in medicinal use

Due to the unprecedented availability of chemical diversity, natural products from medicinal herbs (in their pure form or standardized extracts) have proven to be of unlimited therapeutic use as they contain different types of bioactive compounds.(xxx) the study showed that natural polyphenols It is one of the most important potential factors for the treatment of liver disease.(xxxi) For example, flavonolignans are among the most abundant compounds in silymarin extract (xxxii) and have long been used to protect the liver.(xxxiii) Also, through its many other health-promoting actions, the extract has an important role in pharmaceutical and medical applications.

Health benefits of milk thistle:

Some of the health benefits of milk thistle are its ability to detoxify the liver and treat some types of cancer, as well as the ability to treat fungal infections, treat excessive alcohol consumption, protect against the side effects of many medications, delay the onset of Alzheimer's disease, reduce heart disease and control symptoms of diabetes.

1. Detoxification of the body:

It is considered the most common use, because the plant is an important factor in removing toxins and has a strong effect on the liver, because the liver's function is to deal with toxins in the body and eliminate them safely and effectively, thanks to the organic components that stimulate liver functions, clean the lymphatic system and maintain the body. This is what was indicated by the results of the study (Mohammed, Al-Khashali, and Al-Shawi, 2012) that silymarin has an antioxidant property through a direct or indirect mechanism in terms of providing cellular protection for renal tissue against damage caused by DDT.(xxxiv)

Enhance liver function:

This benefit includes people who suffer from cirrhosis or liver disease and then negatively affects the functions of the body and slows down the processes of the whole body (the system of the organs in the body) and this plant is responsible for accelerating the healing process in the liver thanks to the damage caused by excessive drinking alcohol and smoking or behaviors harmful to the liver in general, it cleans the liver of toxins.(xxxv) The study showed that the liver is the main site of action of silymarin in mammals.(xxxvi) The study confirmed that silymarin is widely used to treat various liver disorders for its effective role in stimulating liver function and regeneration of its cells,{(xxxvii) ,(xxxviii),(xxxix),(xl)} and these diseases including (alcoholic

and non-alcoholic fatty liver disease, viral hepatitis, and liver injury). Liver as a result of drug addiction, mushroom poisoning,[xli] steatohepatitis,[xlii] as well as cirrhosis.[xliii]

2. Milk thistle protects against cancer:

Although research is still in its early stages, preliminary indications have shown that the plant has an effect on the growth of cancer cells and tumors in the skin, and it also helps prevent prostate and cervical cancer.

On the other hand, it was discovered that silymarin can inhibit the regulation of gene products involved in cancer cell proliferation On the other hand, it was discovered that silymarin can inhibit the regulation of gene products involved in cancer cell proliferation [epidermal growth factor receptor, cyclooxygenase, transforming growth factor, insulin-like growth factor receptor, angiogenesis].[xliv]

3. Antifungal:

The plant works to reduce the emergence of some fungal diseases, as it is extracted from the plant to treat mushroom poisoning.

4. Milk thistle controls diabetes.

This is thanks to the mixture of antioxidants and fatty acids that are linked to the regulation of insulin levels and maintain blood sugar levels, thus preventing diabetes.[xlv]

Milk thistle improves heart health:

This plant contains high concentrations of beneficial fatty acids such as omega-3, which are necessary to maintain heart health, especially acids that are able to balance cholesterol levels in the body, which by nature protects against atherosclerosis and reduces the risk of strokes and heart attacks.

5. Treatment of side effects of certain drugs:

Strong painkillers have an effect on pain and body. The liver is known to be the center of poison collection in the body. When taken over time, it leaves some impurities in the liver. This plant is useful in getting rid of these toxins and impurities from the liver resulting from taking palliative drugs.

- Warning: When using bat herb excessively or taking it extravagantly, it causes these symptoms (nausea, convulsion, diarrhoea and excess gases). Women with estrogen deficiency or endometriosis are also advised to avoid using this plant because it increases hormonal fluctuation levels.[xlvi]

- **Milk thistle side effects:**

Milk thistle extract has no harm or side effects when used in recommended doses, and given the multiple benefits of milk thistle we can ignore its side effects.

- It can be used safely for pregnant and lactating women.
- It acts as a mild analgesic in rare cases, especially for people who suffer from itchy skin caused by increased bile in the blood, a side effect that can stop within three days.
- Its use may result in a headache: joint pain, loss of appetite, and in some cases, stomach pain.

Discussion

- **Recommended doses:**

It is recommended to take 420 mg of silymarin daily, which is 80% found in the milk thistle herb.

When feeling better, which begins after 8-12 weeks, the patient can reduce doses up to 280 mg of silymarin per day.

12-15 grams of milk thistle can be used by grinding the seeds and eating them, or boiling them to get the plant tea.

You should not rely on taking milk thistle to treat liver damage without consulting a doctor, but you should rely entirely on medications.

The future vision for the use of milk thistle as a therapeutic drug

The study showed that in order to choose the appropriate genotypes and design the most suitable for breeding programs, we must first absorb the huge amount of genetic diversity and inherit the populations of medicinal species. Despite the wide therapeutic application and powerful medical potential of marianum, accurate genetic data is still not available.[xlvii] One of the most important results expected to occur is that choosing the optimal design of breeding programs can improve the required characteristics of milk thistle. In addition, S. marianum is drought tolerant [xlviii]however, diverse genotypes tolerate drought stress differently. The researchers emphasized that the prominent interest in breeding programs in the context of medicinal plants aims to increase the content of beneficial compounds and this is due to the development of the plant's therapeutic potential.[xlix] Wild populations originating from different regions constitute a gene pool that may improve milk thistle productivity.[l] Based on several recent studies, mutagenicity breeding is another useful and applicable method in plant improvement.[li], [lii]

CONCLUSION

Clinical research confirms that silymarin is an active ingredient in S. marianum, and has a positive effect on human health. To confirm this effect, compounds (flavonolignans and flavonoids) were isolated from silymarin in large quantities for biological studies. This has helped determine the liver's protective, anti-cancer and other activities. Milk thistle extracts are safe and well tolerated with minimal toxic or harmful effects.

Milk thistle, which is a great source of silymarin, is beginning to gain the attention of not only biomedical researchers but also geneticists and educators. Identification of the molecular pathways and genes responsible for silymarin production is important for crop improvement and thus enhancing its medicinal properties.

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