

Ethnobotanical survey of *Silybum marianum* L. Gaertn in the Ouezzane region (northwestern Morocco): knowledge and use of the plant

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Abstract. *Silybum marianum* L. Gaertn is a spontaneous plant whose medicinal properties have been used for over two thousand years. This study aims to clarify the understanding and utilisation of *S. marianum* by the rural and urban populations of Ouezzane region in Morocco, in order to assess the level of recognition and exploitation of this plant. An ethnobotanical survey in this region involved a sample of 140 individuals. Survey results are analyzed using SPSS. The survey results have revealed a significantly limited level of appreciation for *S. marianum*. Through the use of chi-square statistical tests, we identified significant relationships between our variables and the knowledge about *S. marianum* and its use. Based on the findings of our study, *Silybum marianum* L. remains one of Morocco's most neglected and underutilized plants. This may be due to a lack of knowledge or adequate information about its applications, a lack of general interest or even socio-economic factors that limit its exploitation.

Keywords: Ethnobotanical, *Silybum marianum* L., Socio-economic, Therapeutic, SPSS software, Ouezzane, Morocco

1 introduction

Morocco, located at the crossroads of North Africa and Europe, is renowned for its exceptional biological diversity: The over 4200 species and subspecies that make up Morocco's flora are found in nearly all of the major botanical families, which are represented by 940 genera and 130 families [1]. This high number reflects the richness and diversity of Moroccan flora.

These plants play a central role in Moroccan culture, tradition and daily life [2], embodying a precious heritage handed down from generation to generation. Moroccan aromatic and medicinal plants represent a rich and varied natural heritage, with many traditional uses and health benefits [3].

Ouezzane is a town in northwest Morocco, near the western Rif, south of the Oued Loukkous. The town has a population of 300,637 and covers an area of 2,038.87 km² (of which 25 km² is urban and 2014 km² rural), rich in plant diversity [4]. Ouezzane is known for the abundance of the medicinal plant: *Silybum marianum* L. Gaertn are part of the Asteraceae family [5]; however, little research into their pharmacological or phytochemical characteristics has been carried out in Morocco.

Milk thistle, or *Silybum marianum* L., is a popular medicinal plant widely used for its therapeutic properties [6]. Its seeds contain a combination of bioactive compounds, including Silymarin [7], which is considered the main active ingredient responsible for its beneficial effects.

S. marianum is a plant commonly used in traditional medicine to cure conditions of the liver, kidneys, rheumatism, gastrointestinal tract, heart, and gallbladder, including cirrhosis, hepatitis, and jaundice. [8].

An ethnobotanical survey was carried out among the indigenous population of Ouezzane. The main objectives of this survey were to reveal the degree of knowledge and use of *S. marianum*, and to gather information on the plant's preparation and administration techniques, as well as on the parts used by the local population of the region.

2 Material and methods

2.1 Sampled sites

The Ouezzane province is bordered to the northeast by the province of Chafchaouen, to the northwest by the province of Larache, to the east by the province of Al

Houceima and to the southeast by the provinces of Kenitra and Sidi Kacem (Figure 1).

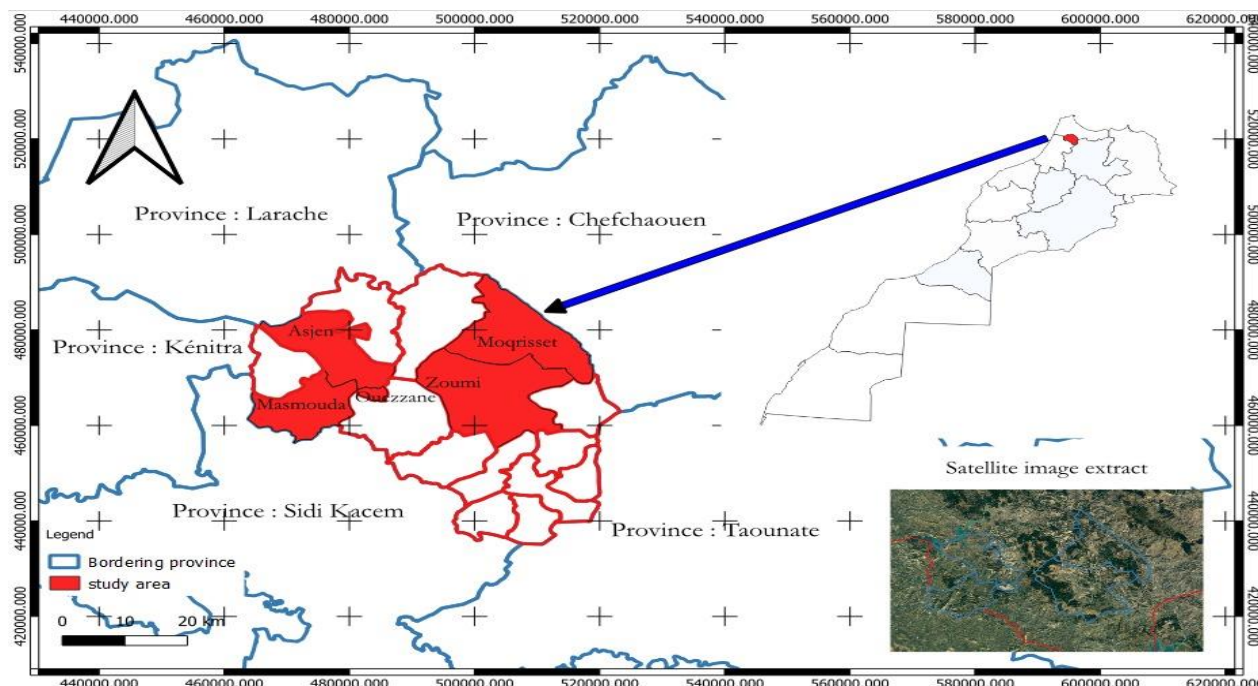


Figure 1. The study area's location map (QGIS)

The climate in the Ouezzane region is subhumid Mediterranean, dry in summer, with temperatures ranging from 26°C to 44°C, and cold to mild in winter, with temperatures ranging from 8°C to 1°C and rainfall ranging from 700mm to 900mm/year [4]. The ideal climatic conditions of Ouezzane region have a predominant influence on the evolution of plant cover and biodiversity.

2.2 Ethnobotanical survey

The ethnobotanical survey lasted three months, from March to May 2023. Semi-structured interviews were used to collect the data. This purpose required individual interviews with a total of 140 people.

Each interviewer was allocated a time span of between 10 and 30 minutes. Information was collected on the characteristics of *S. marianum* (knowledge, use of the plant, harvesting period, preparation method, administration method, side effects, etc.) and on the informant (age, gender, level of education and socio-economic status).

Respondents were encouraged to provide voluntary and anonymous answers to the survey, which was administered randomly.

2.3 Study population

The population studied was made up of people who lived in different rural and urban municipalities in the Ouezzane region (Ouezzane, Zoumi, Mokrisset, Masmouda, and Asjen, (Figure 1).

2.4 Data analysis

The data was statistically analyzed using Microsoft Office Excel 2016 and SPSS (System Package for Social Sciences, version 26). The chi-squared test and the Phi coefficient were the two statistical tests that were employed. For the analysis of categorical data, both are helpful statistical techniques. Two categorical variables can be related using the chi-squared test, and the strength of that link can be assessed using the phi test.

3 Results and Discussion

3.1 Socio-demographic profile

3.1.1 Gender:

According to Table 1, the gender distribution of the respondents was the following: men represented 59.3% and women represented 40.7%.

3.1.2 Education level

In the survey area, we targeted different education levels (Table 1). The majority of respondents were illiterate (45%), followed by those in primary (24.3%) and secondary school (20%), while those in university comprised only 10.7%.

3.1.3 Socio-economic level:

The survey data showed that 58.6% of respondents had a low socio-economic level, followed by those with a medium socio-economic level (37.9%). Those with a high socio-economic level represented a small percentage (3.6%) (Table 1).

3.1.4 Age:

The age group of over 60 years old accounted for the majority of participants (60.7%), with other groups following (table 1).

Table 1. The sociodemographic attributes of the interviewed informants.

	Group	Number	Percentage (%)
Gender	Men	83	59,3
	Women	57	40,7
Education level	Illiterate	63	45
	Primary	34	24,3
	Secondary	28	20,0
	University	15	10,7
Socio-economic level	Highest	58	58,6
	Medium	53	37,9
	Lowest	5	3,6
Age	>60	85	60,7
	[50-60]	20	14,3
	[30-50]	11	7,9
	[18-30]	19	13,6
	<18	5	3,6

3.2 knowledge of *S. marianum*

Survey results show high plant awareness: 73.6 % of participants know the plant.

3.2.1 Correlation and relationship between socio-demographic characteristics and knowledge of *Silybum marianum* (L.):

The chi-squared test was utilized to verify the correlation between variables and plant knowledge.

- a. Knowledge of *S. marianum* according to the age of the participants

The majority of those who were aware of the plant in the Ouezzane region survey area (66.01%) belonged to the 50–60 age group, with the >60 age group coming in second (14.56%). The age group of 50–30 years old came next (10.67%). The lowest percentage of people (80.73%) who are under 30 years old are aware of *S. marianum*. According to the study, elder people are far more knowledgeable about aromatic and therapeutic plants than younger ones. Earlier ethnobotanical research conducted in other Moroccan locales produced findings that were comparable to these. [9-11].

Pearson's chi-squared test carried out showed a significant p-value (p-value= 0.020 < 0, 05), indicating that there is a significant link between age and plant knowledge.

After checking the relationship between age and plant knowledge. The phi test revealed a phi value equal to 0.288, indicating a close relationship between the two variables.

We note that knowledge of the plant depends on age: people over 50 years know more about the plant than other age groups.

- b. Knowledge of *S. marianum* according to the gender of the participants

In our study, we found that women know more about plants than men do. The data show that women are more familiar with aromatic and medicinal plants than men. These results are consistent with other ethnobotanical studies at national level [12,13].

The results of our chi-square analysis showed no significant relationship between gender and about *S. marianum* knowledge (p-value = 0.715 > 0.05). This indicates that, in our study sample, gender does not appear to have a significant influence on the level of plant knowledge. This is an important finding, as it suggests that plant knowledge is not strongly correlated with gender.

- c. Knowledge of *S. marianum* according to the socio-economic level of the participants

The survey revealed that higher levels of plant knowledge are associated with lower socio-economic levels (46.4%). Our results are in agreement with the results of other ethnobotanical studies carried out, in

which the knowledge of medicinal plants is held by people from lower socio-economic backgrounds [14,15].

The chi-square test shows a p-value= 0.184 greater than 0.05. i.e. there is no important relationship between socio-economic status and knowledge of the plant.

- d. Knowledge of *S. marianum* according to the education level of the participants

The survey data show that 44.66% of people who know about the plant are illiterate, followed by those with a university education (31.06%). However, respondents with primary and secondary education rank last (12.62% and 11.65% respectively). The results obtained attest to the fact that knowledge of the plant and the development of the transmission of ancestral traditions across different types of users, even the most educated. Similar results have also been reported in other studies [16,17].

The results of chi-squared test showed a significant relationship between level of education and plant knowledge. (p-value=0.01 <0.05).

The phi test (Phi value=0.362) performed showed that there is a very strong significant relationship between our two variables. (Annex 1).

3.2 Use of the *S. marianum*

According to the ethnobotanical survey only 23.45% of the *S. marianum* plant is utilised.

The use of it is limited to 32.03% of those familiar with *S. marianum*.

3.2.1 Correlation and relationship between socio-demographic characteristics and use of *Silybum marianum* (L.):

The analysis was performed to ascertain the correlation between the Socio-demographic characteristics and the use of *Silybum marianum* (L.). The chi-squared statistical test was utilized, and the SPSS software was employed for the analysis.

The percentages presented in the results and discussion section are based on the subset of individuals acquainted with the plant, encompassing 103 respondents.

- a. Use of *Silybum marianum* according to the age of the participants

The use of medicinal plants in the study area (Ouezzane, Morocco) is rare among all age groups, with a slight dominance among older people (>60) with a percentage (19.41%).

For the youngest respondents, the use of medicinal plants (0%) does not represent a great therapeutic interest.

The chi-square test carried out showed that there was no significant relationship between age and the use of the *S. marianum* (p-value = 0.665 >0.05).

- b. Use of *S. marianum* according to the gender of the participants

The use of *S. marianum* in the Ouezzane region varies according to gender. Women use plants slightly more than men, since 72.72% of users are women and 27.27% are men.

There is a significant relationship between gender and plant use, the relationship was indicated by the chi-square statistical test carried out (p-value =0.014<0.05).

Gender and the usage of the *S. marianum* plant were shown to be significantly correlated, according to the Phi statistical test. (Phi = 0.462). (Annex 1)

- c. Use of *S. marianum* according to the education level

The percentage of use of *S. marianum* varies according to academic level. In the study area, the majority of *S. marianum* users are illiterate (51%), while 21.21% have primary education and 15.15% secondary education. Very few people with a university education use medicinal plants (12.12%).

The significant relationship was validated by the chi-squared test (p-value=0.018)

The phi test indicated a very strong significant relationship between our two variables (phi =0.314). (Annex 1).

- d. Use of *S. marianum* according to the socio-economic level of the participants

In the selected study area, most *S. marianum* users have a low socio-economic level (90.90%), followed by those with a medium level (9.10%), respondents with a high socio-economic level do not use *S. marianum*.

The chi-square test showed that there was a significant correlation between socio-economic status and use of *S. marianum* use (p-value=0.006), and this relationship was considered to be strong (phi-value=0.397).

3.2.2 Used part of *Silybum marianum* L.

The ethnobotanical survey carried out among the local populations in the areas studied indicated a high frequency of use of the aerial part for fodder, 49% on average.

A few mentions of consumption of the fresh stem were also reported in the survey (21%).

The use of *S. marianum* seeds, at 30% on average, was reported by some respondents as having certain therapeutic effects to treat digestive disorders. Various studies have reported the use of the seeds of the *S. marianum* plant and indicated that the seeds are the parts of the plant richest in active ingredients [18,19].

3.2.3 Methods of preparation of *S. marianum*

The people interviewed said that the seeds must be infused in boiling water to extract the enzymes, and then the preparation must be drunk to reap the benefits of the plant. Infusion of the plant's seeds has often been mentioned as a method of preparing *S. marianum* [20].

3.2.4 Toxicity of *S. marianum*

The majority of those who eat *S. marianum* raw or as an infusion acknowledge that it has no toxic effects on health, according to the survey conducted among the Ouezzane local community.

According to one study, silymarin, even at high doses, had no appreciable negative effects on animals. Another study of participants revealed very few side effects, limited mainly to mild gastrointestinal problems. [21]

4 Conclusion

S. marianum is traditionally used to protect and support liver health, detoxify the body, improve digestion, reduce inflammation, boost the immune system, and treat skin conditions. The purpose of this study is to promote the plant, which is very common in the Ouezzane region: this work has allowed us to make several conclusions about the traditional uses and cultural significance of the medicinal plant we studied.

The data showed that there are strong relationships between people's knowledge of the plant, how they use it, and their personal characteristics: people over the age of 50 and people from disadvantaged socioeconomic backgrounds are the most familiar with the *S. marianum* plant. While women, the less educated, and people from disadvantaged socioeconomic backgrounds use the plant more frequently than other categories.

According to the survey, the plant is used most often for fodder, but only a low percentage is used for its therapeutic effects.

The study also showed that the seeds of plants are commonly used parts to make remedies. These plant parts are mainly prepared as infusions, and administered orally. In addition, this medicinal plant is used in the treatment of digestive disorders. According to the population studied, no adverse effects linked to the use of *S. marianum* have been reported.

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Annex

Annex 1: Phi and Cramer's V interpretation

Phi an Cramer's V	Interpretation
>0.25	Very strong
>0.15	Strong
>0.10	Moderate
>0.05	Weak
>0	No or very weak

Source: [22]