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Ethnobotanical study of the plant of medicinal interest *Saccocalyx satureioides* Coss. & Durieu (Lamiaceae) in the region of Naâma (Algeria)

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Abstract. An ethnobotanical study was carried out in the Naâma region to gather information on the traditional therapeutic uses of a plant of medicinal interest, *Saccocalyx satureioides*, practiced by the local population. Using 40 questionnaires, ethnobotanical surveys were carried out in the province of Naâma between January and April 2015. The analysis of the data collected in the field made it possible to identify 17 diseases, including hypertension, diabetes, kidney problems, certain diseases of the digestive tract, in particular those of the colon and the stomach, treated with *S. satureioides*. The results show that different parts of the plant (leaves, flowers, fruits and roots) are used in the form of decoction, maceration; they are cooked and powdered in therapeutic preparations.

Key words: ethnobotany, medicinal plants, Naâma, *Saccocalyx satureioides*

1. Introduction

Today, the medicinal and aromatic plants' sector mainly concerns markets such as perfumery, cosmetics, aromatherapy and the food industry and it is constantly growing (Bouzabata 2015). Despite the development of the chemical drug industry, there are still populations that prefer medicinal plants in treatment of various diseases (Bouallala *et al*. 2014). Phytotherapy is the treatment or prevention of diseases by using plants and it is a part of alternative medicine or Natural Healing. Herbal medicine, based on natural remedies, is well accepted by the body and often associated with conventional treatments. Nowadays, it is experiencing a remarkable revival in the West, especially in treating chronic diseases (Zeghad 2009).

Around 35,000 plant species are used for medicinal purposes worldwide, constituting the broadest range of biodiversity used by humans (Elqaj *et al*. 2007). Medicinal plants have always been an essential source of medicines. Even today, most of the world's population, particularly in the developing countries, is treated only with traditional herbal remedies. Throughout the world, plants have always been used as medicines. These herbal drugs are considered to be low in toxicity and mild in comparison to pharmaceutical drugs. The pharmaceutical industries are increasingly interested in the ethnobotanical study of plants (Dibong *et al*. 2011). Indeed, statistics show that natural products and their derivatives represent more than 50% of the drugs used in the world; additionally the formulation of a quarter of medicinal prescriptions is based on substances extracted from plants or synthetic analogues derived from plants (Kumar *et al*. 2012).

In the Mediterranean region, the use of aromatic plants occupied a prominent place both in daily life and during rituals in Egyptian, Hebrew, Greek and Roman civilizations (Baudoux 2010; Bouzabata 2015). In Africa, medicinal plants are still a valuable resources for the majority of rural and urban populations and represent the main means with the help of which people heal themselves (Badiaga 2011).

Algeria, through the richness and the floristic diversity, constitutes a real phylogenetic reservoir, with about 4000 species and subspecies of vascular plants (Quézel & Santa 1962-1963; Dobignard & Chatelain

2010-2013). This great plant diversity has contributed to the development of scientific research in Algeria in several fields such as: ethnomedicine, traditional pharmacopoeia and the valorisation of natural substances (Nouara *et al*. 2016; Ourzeddine 2018). There are more than 600 species of medicinal and aromatic plants in Algeria (Mokkadem 1999; Chenouf 2009). Several research studies have been carried out on medicinal plants in Algeria (Chehma 1995; Beloued 1998; Baba Aissa 1999; Ould El Hadj *et al*. 2001; Benaradj *et al* 2012, 2017; Bouzabata 2015; Adouane 2016; Boucherit *et al*. 2017, 2018; Boucherit 2018; Ourzeddine 2018; Bendif *et al*. 2021; Boukezoula *et al*. 2022; Daoud *et al*. 2022).

The Naâma region is dominated by plant steppe formations: *Stipa tenacissima* L., *Lygeum spartum* L., *Artemisia herba alba* Asso., *Stipagrostis pungens* Desf. and *Hammada scoparia* (Pomel) Iljin. It has a considerable floristic richness including more than 400 species (Bouzenoune 1984; Benaradj 2009, 2017; Boucherit 2018; Benaradj *et al*. 2021). This floristic potential includes more than 200 species of various medicinal capacities, in this case in the search for biologically active substances.

This article aims at broadening the knowledge about the ethnobotanical characteristics of medically interesting plants, which are well known in traditional medicine at the regional level, namely *Saccocalyx satureioides*. The purpose of this survey was to protect and preserve traditional knowledge of the conventional pharmacopeia and increase the understanding of the flora heritage in Naâma region as well as to create a database that can support further scientific research in this field and provide valuable information on these plants for the use in pharmaceutical industry.

2. Materials and Methods

2.1. Location of survey sites

The province of Naâma is a part of the southern Oranian high plains and it is located between the Tell Atlas and the Saharan one in its western part. It borders to the north with the provinces of Tlemcen and Sidi Bel Abbes, to the east with El Bayadh, to the south with the province of Bechar and to the west with the west Algerian-Moroccan border (Fig. 1).

2.2. Biological material

The Naâma province is characterised by a diversity of steppe and Saharan plants (e.g. psammophytes). *S. satureioides* belongs to the Lamiaceae family. It's a drought and frost tolerant shrub. *S. satureioides* is a widespread and long-lived psammophyte. Its natural growth in the pre-desert zones is remarkable. The plant requires a slightly moist, sandy soil and a warm site during its slow growth. It also helps to fix the dunes

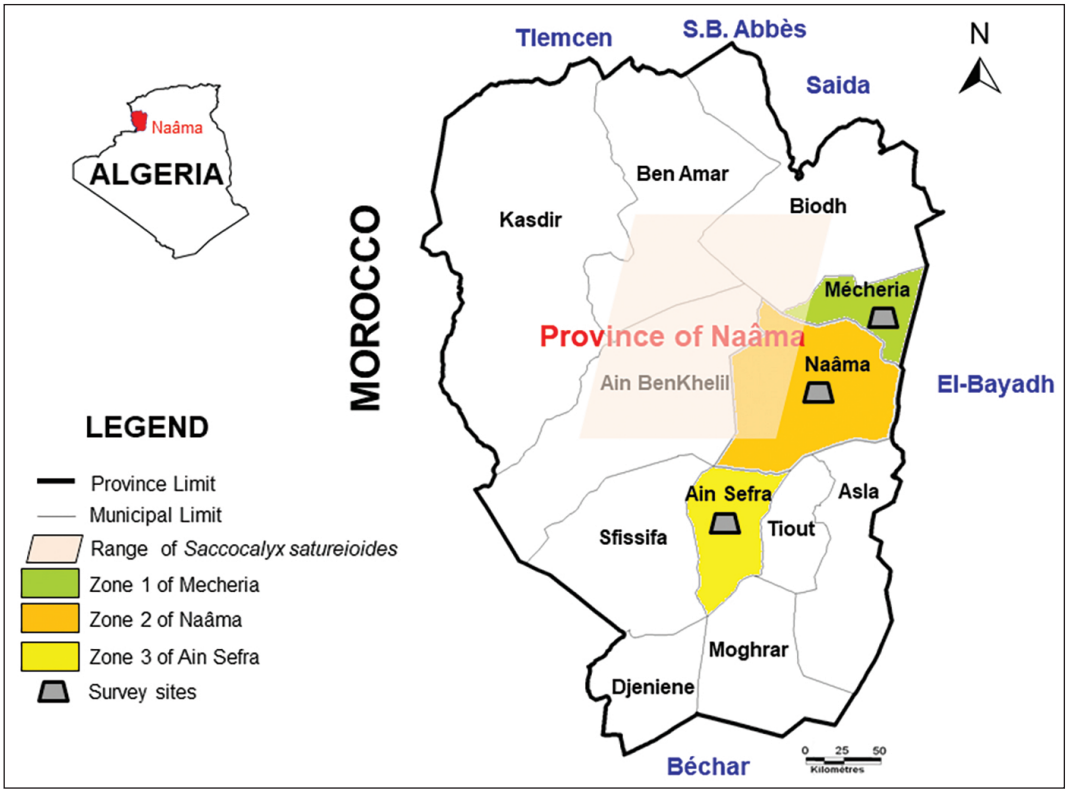

Fig. 1. Geographical locations of the survey sites in the province of Naâma

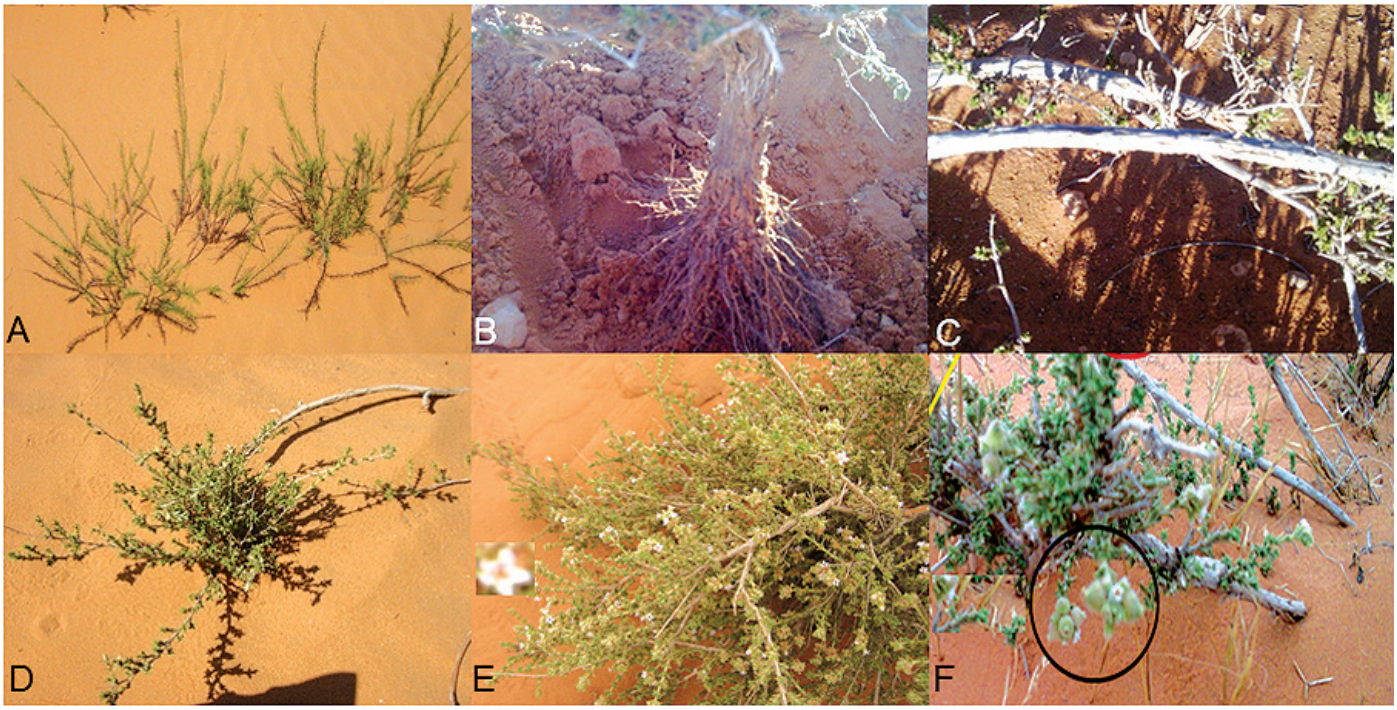

Fig. 2. Morphological characteristics of *Saccocalyx satureioides*
Explanations: A – aerial part, B – roots, C – stems, D – leaves, E – flowers, F – fruits (photograph by A. Benaradj)

with its deep root system. As a key endemic and endangered species, characteristic to all the Oglat Ed Daïra environments of the Ain Ben Khelil region (Naâma province), it is protected by the Decree 93-285 of 23 November 1993 (Bouzenoune 2003). In Algeria it is a widely distributed species: in the Saharan dunes , in the pre-desert zone, in the Hodna sub-sector of the Saharan Oran Atlas and of the Saharan Algerian Atlas as well as in the Saharan Constantine Atlas (Quézel & Santa 1963; Lahrech 2010).

S. satureioides is an aromatic plant growing to 20-100 cm (Fig. 2). It is a medicinal thyme scented plant, locally called Yazirel-erg. Among the morphological characteristics of this species are (Quézel & Santa 1963; Belmekki 2009):

Sheets: 4-6 × 2-3 mm lanceolate ovals, small, oblong or narrow, in small fascicles and ciliate at the base.
Rods: robust, rowers from 2 to 12 dm.
Flowers: regular and hairy calyx; white, pinkish or purple corolla, with four lobes.
Fruits: dry, separating into four articles.
Seeds: each fruit contains a seed.
Roots: swivelling deep, working together to retain the soil and allow it to tolerate drought.

2.3. Ethnobotanical survey

The ethnobotanical study of the medicinal plant *S. satureioides* at the level of the above-selected stations (Fig. 1) was carried out using a questionnaire among the local population. In total, simple and random samples of 40 people (herbalists and connoisseurs) from the neighbourhoods in the regions were surveyed from January to March 2015. The questionnaire made it possible to collect information about the surveyed people in the form of a profile (age, sex and academic level). It was also used to collect specific information on the therapeutic practices among the populations of these zones, in particular the vernacular name of the medicinal plant, the parts used, the method of preparation and the disease treated by it. Three zones were selected for the realization of our survey on the plant, subject to this study: Zone 1 of Naâma, Zone 2 of Mécheria and Zone 3 of Ain Sefra (Fig. 1).

3. Results

The results of the surveys, carried out at the level of the Naâma, Mécheria and Ain Sefra study zones and presented in the figures below, reveal, that the plants as the subject of this study are widely used in traditional medicine by the populations of each of the investigated stations.

Age group: The analysis of the use of the plant (*S. satureioides*) (Fig. 3A) shows that the most frequent users of the plant are people in the 40-48 age group (30.0%). While in the younger age groups only 15.0-20.0% of the people use the plant, in the older groups the number of people amounts to 5.0-20.0%.

Level of education: The results of the survey point out that the use of this medicinal plant is the

highest in the group with average education (30.0%), while only 25.0% of the users come from the illiterate and secondary education backgrounds. The users with primary or university education users amount to 10.0% (Fig. 3B).

Parts of the plant used for medicinal purposes: Our research shows that herbal medicine mostly utilizes leaves, flowers, fruit and seeds of the medicinal plant. At the surveyed sites it has been observed that one part of the same plant is often used for different medicinal purposes. Roots and the whole plants are not used. The respondents (32.5%) report that plant leaves are most often used, then flowers, fruit, seeds, aerial parts and stems, respectively (Fig. 3C).

Plant preparation techniques: The dominant mode of the medicinal plant *S. satureioides* preparation in the three surveyed zones is grinding to powder and maceration (31.0%). Among the other

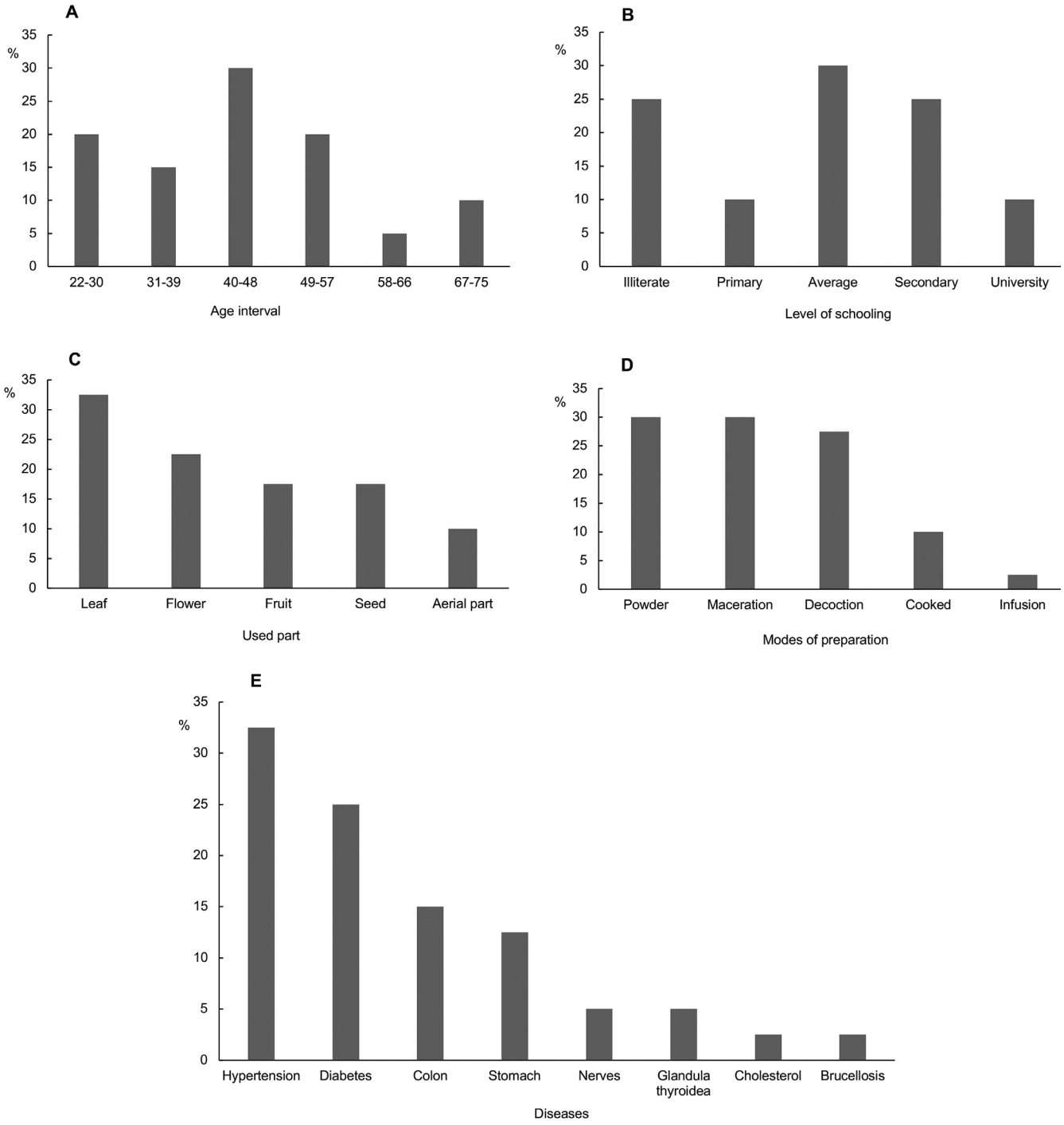

Fig. 3. The results of the survey on the use of *Saccocalyx satureioides* in traditional herbal medicine

Explanations: A – frequency of the use of the plant according to age group, B – the correlation between educational level of the respondents and the frequency of plant use, C – plant parts used for medicinal purposes, D – modes of plant preparation, E – ailments treated with the use of the plant

preparation procedures are: decoction (27.5%), boiling (9%) and infusion (2.5%). The use of poultices and the natural plant as such is close to zero.

The treatment of ailments with the medicinal plant: Within the three studied zones (Naâma, Mécheria and Ain Sefra) medicinal plants are used in the treatment of numerous diseases (Fig. 3E). The results of the ethnobotanical survey indicate that *S. satureioides* is highly advisable in the treatment of hypertension (32.0% of the respondents), diabetes (26.0% of the respondents) and various colon (15.0% of the respondents) and stomach (13.0% of the respondents) conditions.

4. Discussion

The survey carried out in three provinces of the region of Naâma (Algeria) facilitate the knowledge on the therapeutical uses of *Saccocalyx satureioides* plant. The results further indicate that traditional herbal medicine is more popular among middle-aged people than in other age groups ; especially the younger generation of people under 30 show little to no interest in herbal medicine. The obtained results further confirm the previous studies on the use of medicinal plants (Salhi *et al*. 2010; Aribi 2013; Bouallala *et al*. 2014; Adouane 2016; Benaradj *et al*. 2017; Boucherit *et al*. 2018; Bendif *et al*. 2021).

Medicinal plants are used by the indigenous communities, which often still depend on these resources for healing by herbalists and many other alternative and complementary medicine therapists. The indigenous citizens of this land have an indisputably vast knowledge about the cultivation and the usage of these plants, which allows them to keep this inspired by nature sociocultural heritage thriving (Blama & Mamine 2013).

Although several tons of these plants are consumed in Algeria each year in the form of either herbal tea, powder or others (Adouane 2016). According to Salhi *et al.* (2010), the users are always looking for the easiest method to prepare the phyto-medicines.

The usage of the plant's genetic resources, with the residual maximum efficiency in the therapeutic field, requires the knowledge which must verify its inventory and the therapeutic use. It is with this in mind that the study of the knowledge and development of the phytogenetic resources (Ould El Hadj *et al*. 2001) became an essential part of this research.

Our results confirm the previous studies in the form of similar surveys carried out by Ould El Hadj *et al.* (2003), de Chehma and Djebbar (2008), Adouane (2016), Benaradj *et al.* (2017) and Boucherit (2018). The possible treatment of diabetes with the use this plant was confirmed by several other authors: Allali *et al*. (2008) in the Jijel region; Bendimerad *et al*. (2009) in western Algeria; Belmekki and Bendimerad (2012) in southwestern Algeria; Benhedid and Raoudi (2021) in the region of Metlili (Algeria). Thus, this plant can be used as a culinary condiment and be also applied in the treatment of digestive disorders (e.g. gastric, stomach ailments, antidiuretic and vermifuge spasms). These same results were found by: Fourment and Roques (1941), Biondi *et al*. (2006); Bendahou *et al*. (2008), Belmekki (2009) and Boukezoula *et al*. (2022).

It may be noted, that some of the people, who were surveyed, reported the usage of this plant in the treatment of certain nervous diseases (at 6%), certain thyroid disorders (at 4%) and brucellosis as well as cholesterol-related ailments (at 2%). As a species *S. satureioides* is subject to several uses (nourishment, beekeeping, aromatic and medicinal purposes). According to Belmekki (2009), it can be used as herbal tea for the treatment of certain cases of brucellosis.

In the region of Djelfa (Algeria) it is recommended against colds (Adli & Youcefi 2001; Ziani 2017; Yabrir *et al*. 2018). According to Lahrech (2010), it can be also used as an infusion and decoction to cure infections of the respiratory tract (Bouhdib 2006; Bendahou *et al*. 2008; Kherkhache 2010). The plant is also often used in traditional medicine as a treatment for various skin lesions, e.g. against cutaneous leishmaniasis (Mostefa Sari *et al*. 2020).

This species, apart from its pharmacological properties used by modern medicine, is also of great interest in phytochemistry in the search for new molecules, which has been discussed in several studies (Bouhdib 2006; Allali *et al.* 2008; Belmekki 2009; Lahrech 2010; Belmekki & Bendimerad 2012; Demim 2016; Khaldi 2017, 2008; Maidi 2021).

The pharmacological value of the secondary plant metabolites is increasing, due to the ongoing discoveries into their potential roles in healthcare and as chemical precursors in developing new drugs (Achouri *et al*. 2013). Medicinal plants are used in different ways (decoction, maceration, infusion, etc.) and one or more of their parts can be utilized (root, leaves, flowers, etc.). They are usually consumed as tea or as infusions, prepared from different dried parts of the plant boiled in hot water. People appreciate them for their flavours, antioxidant activity and therapeutic applications (Djouab *et al.* 2013).

In Algeria, *S. satureioides* is considered a common herbal remedy, especially its leaves. Flowers and seeds are also used in traditional medicine.

The valorisation of the spontaneous plant bioresources for nourishment, medicinal and cosmetic purposes can constitute a way for the economic and social development for the regions (Lahmadi *et al*. 2013). Unfortunately, this species is in a state of alarming degradation (threatened to disappear completely/entirely) and is not the subject of any conservation and

rehabilitation measures/programs. Its preservation can only be ensured with the support of the local population by a rational and sustainable use of the natural resources (Benaradj 2017).

5. Conclusion

In the province of Naâma, herbal medicine is one of the traditional remedies to treat different types of diseases for the local population. The population of Naâma uses medical recipes made up from the medicinal plant *S. satureioides* in the form of decoction, maceration, cooked and powdered, for several therapeutic purposes e.g. to reduce the complications of hypertension diseases and diabetes, which are the most common among all of the ailments. Indeed, it is necessary and important to safeguard the phyto-therapeutic knowledge of the population of Naâma. This knowledge is part of the natural and cultural heritage of the Naâma people and should be valued within the framework of traditional pharmacopoeia, as it might be of use in herbal therapy in other areas of the world.

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Research concept and design: A. Benaradj
Collection and/or assembly of data: A. Benaradj
Data analysis and interpretation: A. Benaradj
Writing the article: A. Benaradj, H. Boucherit
Critical revision of the article: A. Benaradj
Final approval of article: A. Benaradj

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