

Ethnobotanical study of *Hammada scoparia* (Pomel) Iljin in the region of Naâma (south-western Algeria)

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Abstract

The *Hammada scoparia* is a relatively common and characteristic steppe species of the Saharan Atlas of south-western Algeria. It has several ecological, medicinal and floristic interests. The description of its ethnobotany in the region of Naâma will contribute to a better knowledge and valorization of this species.

An ethnobotanical survey was carried out using 100 questionnaires undertaken from October 2014 to September 2015 with users, herbalists, traditional healers and the local population of Naâma.

The exploitation of the results of the ethnobotanical survey made it possible to identify the different ways of using and exploiting *Hammada scoparia*. More than 45% of the population uses this plant against poisonous reptile bites such as scorpions, snakes and vipers as well as the treatment of digestive tract diseases, injuries, skin inflammations and diabetes. The species *Hammada scoparia* is a perennial chamaephytic plant with many therapeutic virtues, the most important of which remains its action in the treatment of scorpion stings.

Keywords: Ethnobotany, *Hammada scoparia*, medicinal plant, Naâma

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1. Introduction:

Medicinal plants remain an important and determining source for pharmacology and drug development. The constituents of plants are used directly as therapeutic agents but also as raw materials for drug synthesis or as models for pharmacologically active compounds (Ameenah, 2006). They remain a source of medical care in developing countries in the absence of a modern medical system (Tabuti *et al.* 2003).

The south of Naâma (Saharan Atlas) covers important plant resources spread over the plains, mountains, chotts, dayas and desert areas. It is rich in medicinal and aromatic plants (Saharan and steppes) used in traditional medicine by the local population, as the case of the following species: *Artemisia campestris* subsp., *Artemisia herba-alba* Asso., *Rhanterium suaveolens* Desf., *Ephedra alata* subsp., *Anabasis articulata* subsp., *Hammada scoparia* (Pomel) Iljin, *Hammada schmittiana* (Pomel) Botsch., *Gymoncarpos decander* Forssk, *Asteriscus graveolens* Subsp., *Anvillea radiata* Coss. & Durieu, *Morettia canescens* Boiss., etc.

The choice was guided on the species of Remth (*Hammada scoparia*) which is very rich in bioactive molecules, and is considered as a potential source of new drugs (Ksouri *et al.* 2012). She is also known for her therapeutic virtues used in folk medicine against scorpion envenomations (scorpion stings) in the south of Naâma. The scorpionism remains a real public health problem in Algeria. According to I.N.S.P. (2009), the number of reported scorpion stings is over 50 000 cases and between 50 and 100 deaths per year. For the region of Naâma, every year there are fatal cases of scorpion stings.

The objective of this work is to acquire knowledge on the therapeutic use of *H. scoparia* in traditional medicine in the southern region of Naâma.

2. Materials and methods:

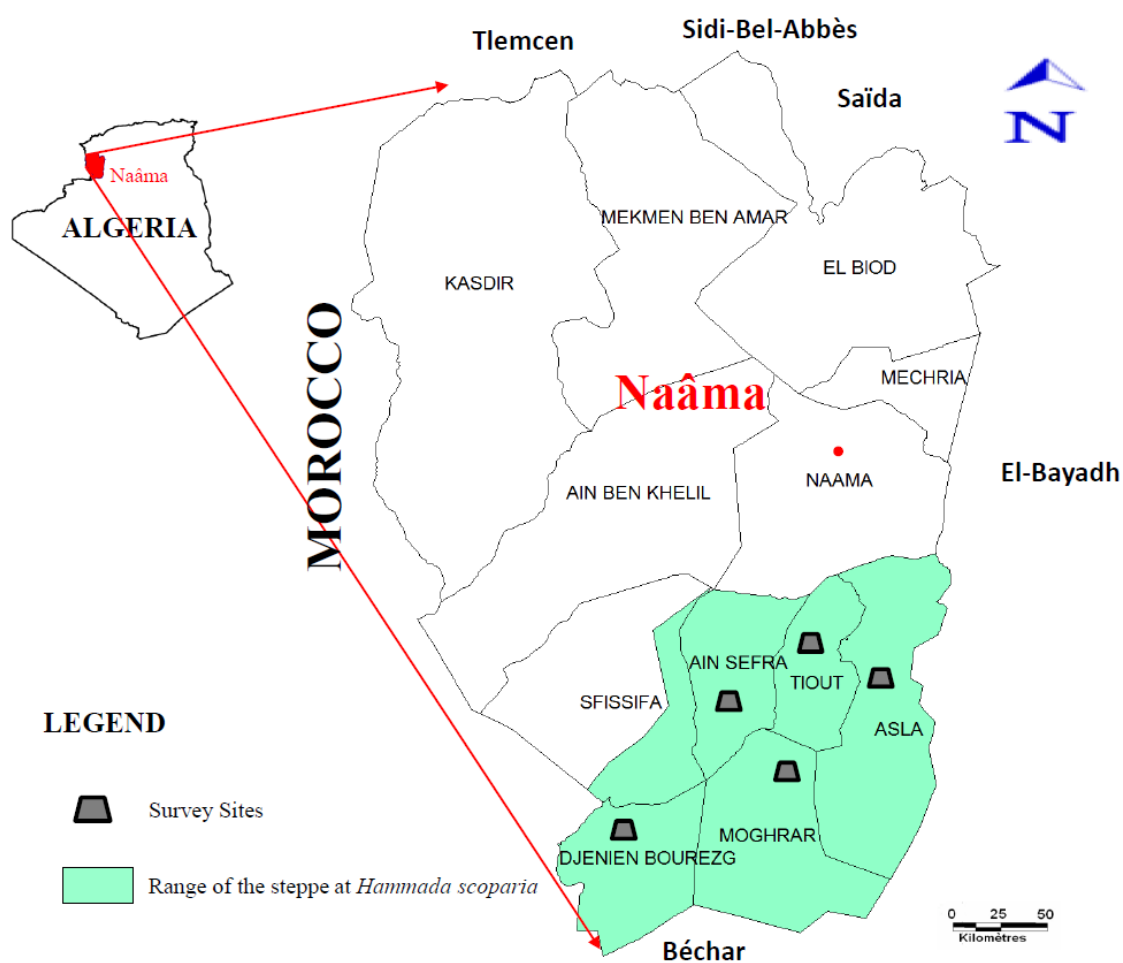
2.1. Location of survey sites (south of Naâma)

The department of Naâma is bounded to the north by the Tellian Atlas and to the south by the Saharan Atlas. It covers an area of 29,514 km², or 1.14% of the national territory, and has a population estimated in 2018 at 268721 inhabitants (D.P.S.B., 2018).

The ethnobotanical survey was conducted through 5 sites (Fig.1), spread over all municipalities to get an overview of local traditional uses. The communes were selected, for the most part, on the basis of their accessibility in order to obtain fairly representative information. At the level of each site, 20 fact sheets have been thoroughly completed (Table 1).

Table 1. Distribution of Surveys by site

Survey Sites	Study Locality	Number of Respondents
Site 1	Ain Séfra	20
Site 2	Asla	20
Site 3	Tiout	20
Site 4	Moghrar	20
Site 5	Djeniene Bourezg	20
Total		100

**Figure 1.** Location of survey sites in the department of Naâma

2.2. Presentation of the biological study material (*Hammada scoparia*)

Hammada scoparia (Pomel) Iljin, Saline with broom in French, the Remth in Arabic, small dense and dark bush (Fig.2), of variable form.

It is a steppe species of the family Amaranthaceae characteristic of the Saharan Atlas Oranian, it has several nomenclatures *Haloxylon scoparium* Pomel, *Arthrophytum scoparium* (Pomel) Iljin, *Salsola articulata* Forssk., *Haloxylon articulatum* (Cav.) Bunge (Quézel et Santa, 1962; Le Houérou, 1995 Boulos, 1999).

It is a bushy chamaephytic plant not exceeding 80 cm in height and 10 cm in diameter, bears articulated leaves and solitary flowers and grouped at the top of twigs, with a vertical and horizontal root system to maintain the soil and protect it against erosion (Boucherit, 2018 ; Boucherit *et al.* 2018). *H. scoparia* occurs on loamy soils, usually on degraded sagebrush steppes. It is very common on regs with gypsum soils. This bitter pasture is scorned by the cattle that graze it only by necessity (Maire, 1962; Boucherit *et al.* 2018).



Figure 2. Morphological appearance of *Hammada scoparia*, a) Leaves, b) Flowers, c) Stem, d) Seeds (Boucherit *et al.* 2018)

2.3.Methodological approach

An ethnobotanical survey is carried out on the floristic taxon of *H. scoparia* during the campaign (2014/2015) with the local population in the south of Naâma.

One hundred (100) ethnobotanical survey cards (Table 2) are distributed to respondents from different categories (traditional practitioners, herbalists and people with traditional medicinal plant know-how). The survey form developed is inspired by the work of several authors: Mehdioui and Kahouadji, 2007, Salhi *et al.* 2010, Benkhiguel *et al.* 2011; Khitri *et al.*, 2016; El Hilah *et al.* 2016; Boucherit, 2018; etc.

The interviewees' interview approach was based on the vernacular dialogue of the local population divided between the two sexes, taken separately within their environment.

Table 2. ethnobotany survey form

Date:		
Town:		
1	Informant	Sex: •Male <input type="checkbox"/> •Female <input type="checkbox"/>
		Age:
		Level of study: Illiterate <input type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> University <input type="checkbox"/>
2	Plant material (<i>H. scoparia</i>)	The parts used of the plant: •Leaf <input type="checkbox"/> •Stem <input type="checkbox"/> •Flower <input type="checkbox"/> •Fruit <input type="checkbox"/> •Seed <input type="checkbox"/> •Root <input type="checkbox"/> •Aerial Part <input type="checkbox"/>
		Modes of preparation: • Herbal tea <input type="checkbox"/> •Infusion <input type="checkbox"/> •Decoction <input type="checkbox"/> •Powder <input type="checkbox"/> •Cataplasm <input type="checkbox"/> •Maceration <input type="checkbox"/> <input type="checkbox"/> •Others <input type="checkbox"/>
3	Diseases treated	•Digestive system <input type="checkbox"/> • Respiratory system <input type="checkbox"/> •Circulatory system <input type="checkbox"/> •Scorpionic envenom <input type="checkbox"/> • Cutaneous diseases <input type="checkbox"/> •Others <input type="checkbox"/>

3. Results:

The exploitation of the results of the surveys obtained shows that phytotherapy is practiced by the population whatever the age group, the level of study or the sex.

3.1. Age class and Level of schooling

Generally, people between the ages of 20 and 70 use this plant (Fig.3.a); 33% have secondary education, 29% are university students and only 24% and 14% are illiterate and primary respectively (Fig.3.b). Women and the elderly had the greatest use of medicinal plants.

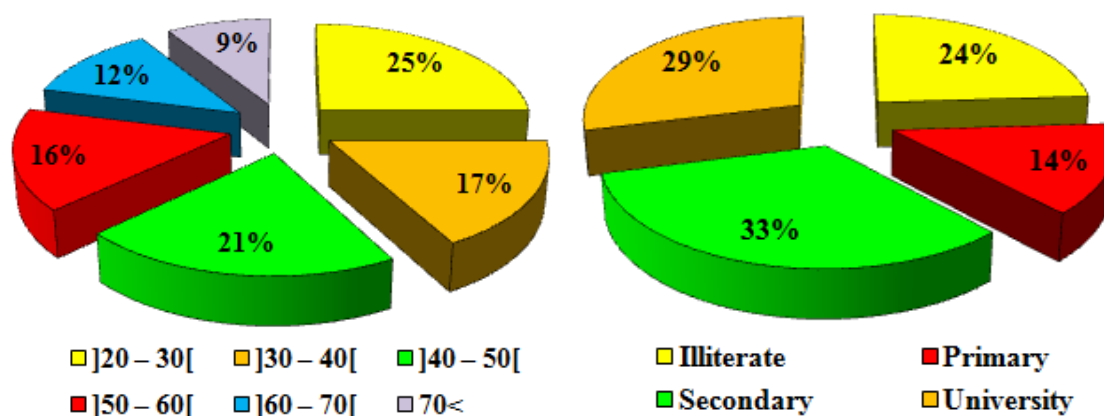


Figure 3. Distribution of Frequency of Use of Medicinal Plants, a) by Age Group b) by Level of Study

3.2. Part used of the plant and Modes of preparation

The aerial parts (leafy stem) are most commonly used with a percentage of 90.47% (Fig. 4.a) and the powder preparation remains the most dominant mode in this region with 32.89% (Fig.4.b).

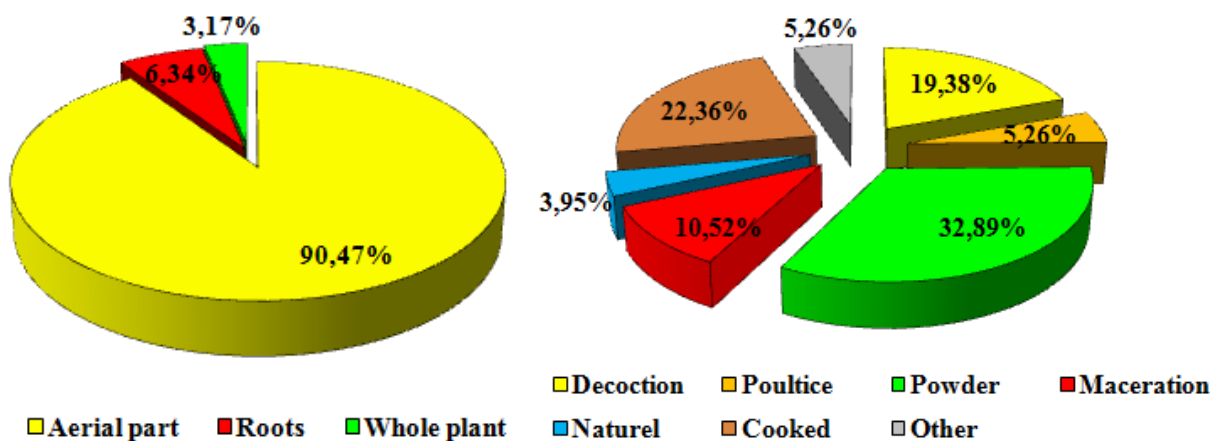


Figure 4. Classification of *Hammada scoparia* in the region of Naâma, a) The used parts, b) Modes of preparation

3.3. Diseases treated

In the Naâma region, field surveys of the local population reveal that the plant has multi-purpose because it is used for the treatment of several symptoms (scorpion stomach, gastric problem, brain cold, Hemorrhoids, etc.).

The local population of Naâma is advocated the species of *H. scoparia* against scorpion stings 33% (Fig.5).

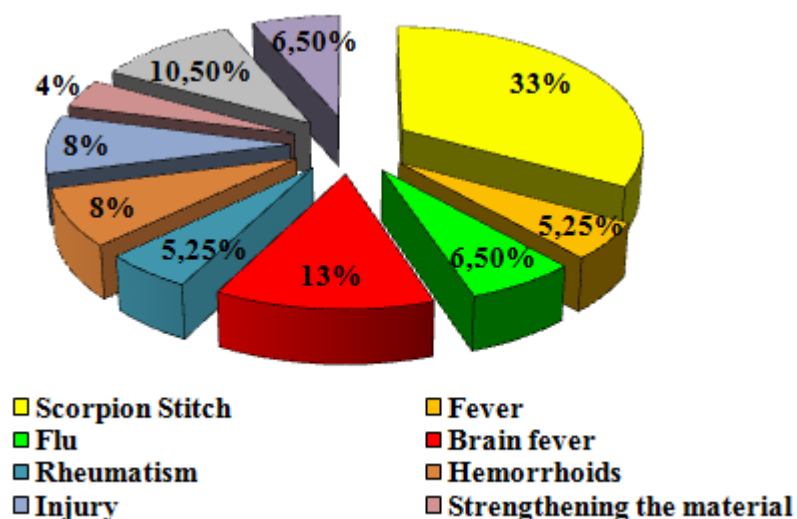


Figure 5. Classification of diseases treated with *Hammada scoparia* in the region of Naâma

Discussion:

The people of the Naâma region only use traditional medicine guided by tradition or the customs handed down from one generation to the next for this health care despite the revolution of medical technology. For example, people's standard of living, low conventional medical coverage and their habitat far from hospitals, and the high cost of drugs call for the use of plants. According to [Salhi et al. \(2010\)](#), traditional herbal medicine is still solicited by people who trust popular practices and cannot afford to bear the burden of modern medicine.

The analysis of the results of the ethnobotanical survey on the species *H. scoparia* frequently used the population in traditional medicine in the south of Naâma, makes it possible to highlight the following findings:

The level of education of respondents affects all categories and especially users have an average level of education and illiterate. The knowledge of the informants and their level of schooling are also a variant to be taken into account because, in traditional medicine, the statements of an illiterate or an expert intermingle ([El Rhaffari et al. 2002](#)).

The aerial part by leafy branches of this shrub is the most used. This is consistent with the literature since the leaves are the central photochemical reactions, so rich in active ingredients, and they are easy to harvest parts ([Khitri et al. 2016](#)).

Oral administration, which groups together the majority of methods of preparation; internal powder, decoction, maceration, is the best known and the most recommended. These are rules that respond to the treatment of the most common pathologies in this region ([Ciulei, 1982; El Hilah et al. 2016](#)). The powder preparation is the most used mode for the most fragile parts (leaves, aerial parts), while the decoction is indicated for the hardest parts ([Khitri et al. 2016](#)).

Investigations carried out with the local population of Naâma show that *H. scoparia* species is recommended against scorpion stings, treatment of envenomations (snake bites, viper bites and venomous insects at 45%). The same indications are indicated by [Bouchat, 1956, Adli and Yousfi, 2001, Maiza et al. 1993, Belakhdar, 1997; Salah et al. 2002; Boucherit et al. 2017](#).

Of particular interest, *H. scoparia* is a medicinal plant known to exhibit a broad spectrum of biological, pharmacological, and therapeutic activities ([Bourogaa et al. 2011](#)).

Several in vivo studies reported that polar extracts of *H. scoparia* leaves has potent antioxidative activity and hepatoprotective effects against ethanol-induced liver injury in male rats ([Bourogaa et al. 2013, Bourogaa et al. 2014](#)). The leaf extracts of *H. scoparia* have molluscicidal activity and major alkaloids ([Mezghani-jarraya et al. 2009](#)).

Other therapeutic uses of the species in the region are noteworthy as the care of gastric problems (acidity, ulcer, stomach ache, gastroenteritis, food poisoning, etc.); this type of treatment is by [Adli and Yousfi \(2001\)](#) in the Djelfa region. The species is also used as an anti-diabetic agent by infusion

of the aerial part of the plant; the same use described [Bnouham et al. \(2002\)](#). It is also used against inflammations and wounds; the use of powder mixed with oil of olive by external use, this indication is also applied by the Moroccan population ([Eddouks et al. 2002](#)) and appears to be effective against bloating, sourness and therapy of the urinary tract and for the treatment of rheumatism.

Conclusions:

The ethnobotanical study carried out on the plant species of *H. scoparia*, characteristic of the steppe formations of the Saharan Atlas of Algeria, shows that it is ethno-botanically interesting. The species has many therapeutic virtues, the most important of which is the treatment of poisoning of reptiles and poisonous insects, especially scorpion. The species is also used to treat or relieve diabetes, fever, gripes, injuries, gastric problems and inflammations.

The results obtained constitute a very valuable reference and source of information for the valorization of this botanical taxon in the fields of phytochemistry and pharmacology with a view to discovering and searching for new active principles that can be used and capable of curing certain diseases.

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