



# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Ethnobotanical approaches and phytochemical analysis of *Chamaerops humilis* L. (Arecaceae) in the area of Tlemcen (western Algeria)

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### ABSTRACT

In this work, we were interested of the ethno botanic study of *Chamaerops humilis* L. in different districts in the region of Tlemcen (Algeria). The survey which was carried out on the field shows the social role and the impact of this species on the local populations. The most used parts of the plant are the heart of palm, the spadices and the leaves. The therapeutic indications which emerge from the investigation cards analysis show the various therapeutic uses. These indications are confirmed by a phytochemical analysis of the spadices, the heart of palm and the leaves. This shows the presence of chemical groups such as: Flavonoïds, Tannins, Steroids, Saponins, Unsaturated and Terpenoid Sterols, which have a definite role on the human body.

**Keywords:** *Chamaerops humilis* L., ethno botanic study, phytochemical analysis.

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## INTRODUCTION

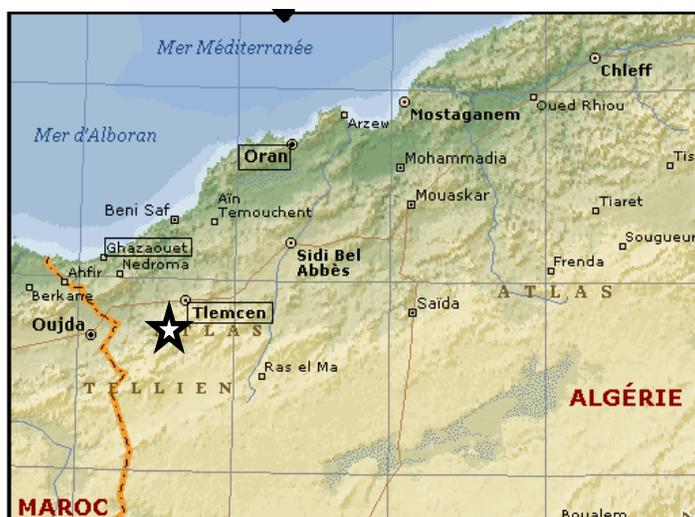
Currently, the medicinal plants have an important value in the social life of many societies. In Africa, approximately 70% of the population use traditional medicine [1]. In the area of Tlemcen (North-western Algeria) the vegetable species with therapeutic characteristics are very coveted. The most used plants are: *Ammoides verticillata*, *Thymus ciliatus*, *Thymus capitatus*, *Myrthus communis*, *Eucalyptus globulus*, *Ceratonia siliqua*, *Inula viscosa*, *Mentha piperita*, *Mentha puleium*, *Malva sylvestris*, *Marrubium vulgare*, *Rosmarinus officinalis*, *Lavandula stoechas*, *Olea europea* [2, 3]. All the plant parts can be used: roots, stem, leaves, flowers, fruits and seeds. The diseases treated by phytotherapy are much diversified and can go from a simple influenza to the chronic diseases [2-8]. *Chamaerops humilis* L. a species that is widely active in the Mediterranean west [9, 10]; is referred to as a medicinal plant by certain researchers [11-14]. In 1846 Munby [15] notes that this taxon was edible in North Africa.

We should note that no work has been carried out on its ethno botanic status and the chemical composition of the parts used in traditional medicine. In the rural world of Tlemcen this species is used for therapeutic ones.

In this study, we are interested in both an ethno botanic follow-up of this species in the districts that are located in the mountainous chains of Tlemcen (mounts of Tlemcen and mounts of Traras in the North-West of Algeria), and also in researching the chemical components of the leaves, the spadices and the heart of palm.

## MATERIAL AND METHODS

### Study area



★ Study area

Fig. 1: Map of study area

The ethno botanic follow-up was carried out in the districts of Tlemcen (mounts of Tlemcen and mounts of Traras). Geographically speaking, Tlemcen's mounts average coordinates are 1° 38' longitude W and 34° 37' latitude NR (Khemis) and Traras' mounts average coordinates are 1° 45' of longitude W and 34° 59' latitude NR (Nedroma). Eight districts on the whole were subject to the follow-up on the field: Azails, Beni-Snous, Bouhlou, Oued Chouly, Ain Fezza (mounts of Tlemcen), Djebala, Fellaoucene and Honaine (mounts of Traras) (Figure 1). It must be noted that the population dwelling in the sampled zones is estimated at 59133 and the vegetation is mainly made up of a mosaic of forests and matorrals. The principal species of these formations are : *Quercus faginea*, *Quercus suber*, *Quercus ilex*, *Quercus coccifera*, *Pinus halepensis*, *Juniperus oxycedrus*, *Chamaerops humilis*, *Asparagus stipularis*, *Asparagus acutifolius*, *Asparagus albus*, *Calycotome intermedia*, *Withania frutescens*, *Olea europea*, *Ampelodesma mauritanicum*, *Thymus ciliatus*, *Lavandula stoechas*, *Lavandula multifida*, *Rosmarinus officinalis*, *Stipa tenacissima*.

### **Presentation of the studied species**

*Chamaerops humilis* L. is a monocotyledone pertaining to the family of Arecaceae (Palmae) which counts two genres in North Africa [9, 10]. It presents a feather-grass (trunk) which generally remains short, bulbiform and covered with black reticulate fibers coming from the disintegration of the old sheaths. Laid out in a crown-like shape, the ever-green leaves present a completely opened fan-like limb that is split up to the 2/3 and even deeper. The spadices are picked up, short, more or less branching and are surrounded by 2 spathes that are more or less welded at the base. Flowering occurs between March and April. The fruits are subglobulous and oblong bays. They go from reddish yellow to brown red when mature, presenting a fleshy, internally fibrous and not very thick pericarp. The seed presents a ruminated dog-edged endosperm. The fruits are mature between October and November.

### **Ethno botanic investigation**

To fix the social status of this species, we carried out a field study between 2007 and 2009. This ethno botanic study implied the use, the marketing, the domestication, the distribution and the conservation state of *Chamaerops humilis* L. The operation aimed at identifying the impact of this species on the local population's everyday life. Structured questionnaires were then applied to four classes of people implied in the medicinal plants. They include: tradi-experts, herbalists, the medicinal-plants traders, foresters and citizens of the various districts. To conclude this work and in order to have reliable information on the therapeutic virtues of the plant we targeted an age higher than 30.

### **Vegetable material and the extract preparation techniques**

#### **Vegetable material**

According to the survey carried out on the field and the analysis of the questionnaires, it appears that the parts used are: the leaves, the heart of palm and the spadices. The samples

were collected in March and April 2008. They were washed with running water then dried in the shade under ventilation, safe from daylight, and at room temperature.

After drying, the samples were cut out in small pieces, and then ground in a mortar to obtain a fine powder which would be used in the preparation of the extracts.

### Phytochemical studies

The main chemical components in the extracts were characterized by colored reactions [16]: alkaloids (reagents of Dragendorff and Mayer), the flavonoids (reaction of the cyanidine), the saponosids (foam index), the tannins (ferric chlorides), reducing compounds (reagent of Fehling), sterols and terpens (reagents of Liebermann Buchard) and by setting up their chromatographic profiles by CCM.

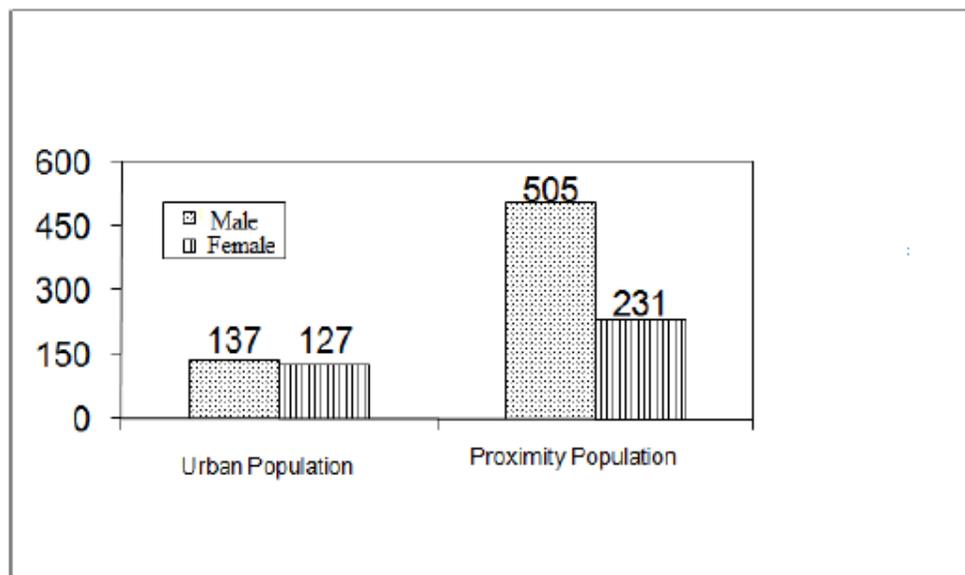
## RESULTS AND DISCUSSION

### Ethno botanic Status

At the end of the ethno botanic investigation held in 8 districts and after the analysis of the used cards, it appeared that out of 1000 questioned people 642, among whom 505 from nearby villages and hamlets are of male sex. Table 1 and Figure 2 show the cards analysis results by sex, population and part of the plant used for the various treated diseases.

Table 1. Results obtained by sex and part of *Chamaerops humilis* L. used for the various treated diseases

Parts used	Diseases treated	Total number	Men	Women
Leaves	Diabetes	52	82.7%	17.3%
Heart of palm	Carminative	819	83.9%	16.1%
	gastritis	751	78.8%	21.2%
	Gastro-enteritis	578	83.2%	16.8%
	Gastralgia	763	85.7%	14.3%
	Stimulant	69	100%	0%
	Diarrhoea	42	100%	0%
	Wound of stomach	432	87.7%	12.3%
	Constipation	616	73.2%	26.8%
Spadice	Carminative	617	85.6%	14.4%
	gastritis	594	81.7%	18.3%
	Gastro-enteritis	684	75.6%	24.4%
	Gastralgia	593	80.3%	19.7%
	Stimulant	93	93.6%	6.4%
	Wound of stomach	312	74.0%	26%
	Diarrhoea	51	100%	0%
	Constipation	579	73.8%	62.2%



**Fig. 2: Repartition of the population by sex and localization**

Thus, it appeared that the most used parts are: the spadices, the heart of palm and the leaves.

We noticed that the use of the parts having therapeutic virtues is not made in the same way and that the used elements are prepared in different methods. The preparation techniques process goes through raw macerations, decoctions and use of the spadices and heart of palm.

Moreover, nine therapeutic indications were noted: carminative, gastralgia, anti-diarrhoea, gastritis, gastro-enteritis, wounds of the stomach, diabetes, constipation and toning. All these therapeutic indications are generally related to the digestive tract diseases (Figure 3a and Figure 3b).

Statistically speaking and according to the analysis results, the heart of palm and the spadices are the most used parts (Table 1). It is noticed that 81.9 % of the answers consider that the heart of palm has a carminative role against only 61.7% for the spadices. 75.1% of the questioned people think that the heart of palm treats the gastritis and 59.4% state the same thing for the spadices. On the other hand, 57.8% of the answers describe the heart of palm as an effective treatment to fight gastro-enteritis, against 68.4% for the spadices. Moreover, 76.3% consider that the heart of palm plays a role in the regularization of the gastralgia and only 59.3% think the same thing for the spadices. 61.6% of the inhabitants consider that the heart of palm facilitates the intestinal transit and 57.9% favour the spadices. Stomach wounds are treated too according to the investigation statistics 43.2% reveal the positive effect of the heart of palm and only 31.2% for the spadices. Hence, we note that some people use this plant in the treatment of the diarrhoeas (4.2% for the heart of palm and 5.1% for the spadices). On the other hand, a few people think that *Chamaerops humilis* is a stimulant (16.2%) and even

fewer (5.2%) believe the leaves to be a treatment for diabetes (hypoglycemiatic effect). Finally, we note that men use this plant more than the women.

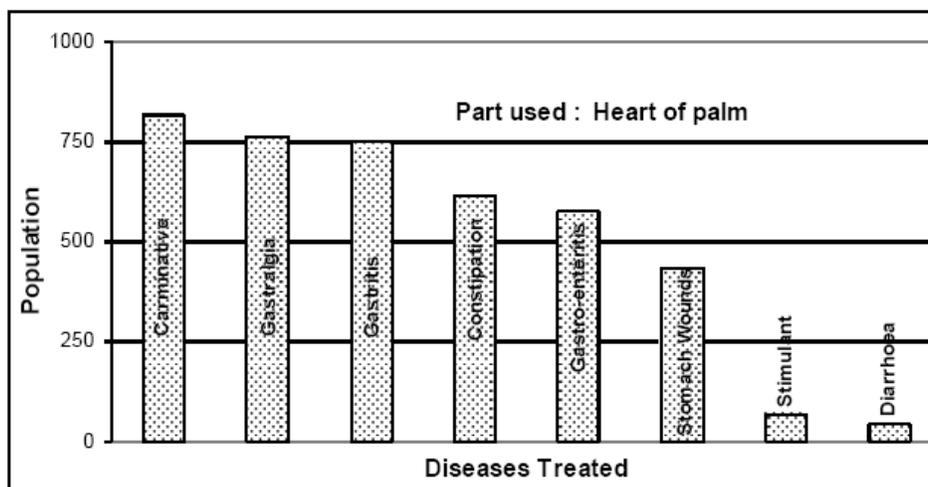


Fig. 3a. Diseases treated by *Chamaerops humilis* L., part used: heart of palm

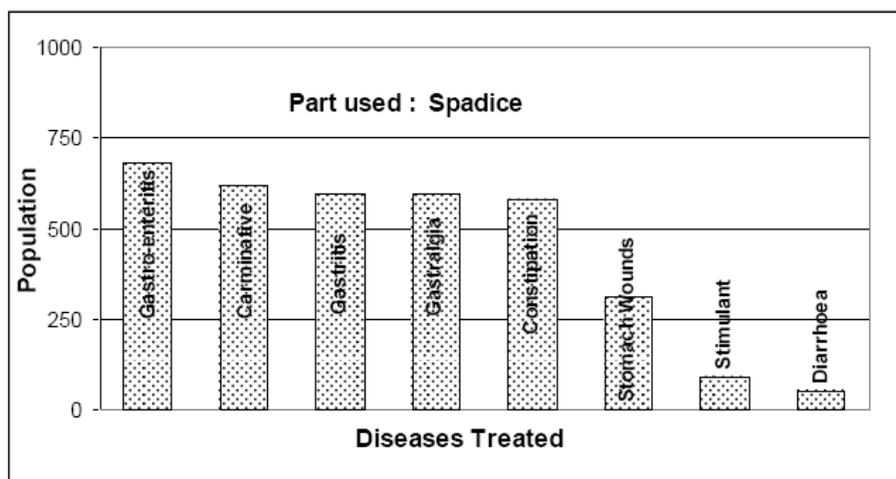


Fig. 3b. Diseases treated by *Chamaerops humilis* L., part used: spadice

During this study, we clearly notice that no answer reported the fruit or the roots as parts of the vegetative apparatus having therapeutic virtues. However, (Bnouham et al. [12] mentioned the use of the fruit of *Chamaerops humilis* in the treatment of the diabetes in their work. In the same context, Allali et al. [17] mentioned that the roots of this plant are used in the same treatment in west of Algeria. Nevertheless, these researchers give no information about the methods and the parts of the used plant.

However, Beghalia et al. [18] note that the sheath extracts of *Chamaerops humilis*, used in the form of decoction inhibit the nucleation, the growth and the calcium oxalate crystals aggregation phase.

## Phytochemical analysis

The phytochemical screening that was carried out on the different parts of the plant shows the presence of many chemical groups. The results are shown in table 2. The plus sign (+) means the presence of the chemical compounds group, while the minus sign (-) indicates the absence of phytochemicals.

The analysis of this table shows the presence of the following chemical compounds groups: Flavonoïds, Tannins, Steroids, Saponins, Unsaturated and Terpenoid Sterols. It is the presence of these chemical compounds groups which certainly reinforces the therapeutic virtues of this plant.

**Table 2. Chemical composition of different part of *Chamaerops humilis* L.**

Chemical Groups	Parts of plant		
	Health of palm	Spadices	Leaves
Tannins	+	+	+
Flavonoïds	+	+	+
Steroids	+	+	+
Unsaturated Terpenoid Sterols	+	+	+
Saponins	+	++	+++
Alkaloids	---	---	---

Thus, several researchers show that the flavonoïds play an important part in the organism. They are anti-inflammatory [19], antiviral, antitumor, hypotensor and diuretic [16], anti carcinogens and reduce the risk of cardiovascular diseases [20]. Inuma et al. [21] consider that the flavonoïds inhibit the antibiotic-resistant microbes.

The tannins have biological properties related to their capacity to form complexes, especially with proteins. They also allow the increase in capillary resistance and the reduction in its permeability, as well as the increase in venous tonicity and the stabilization of collagen [16]. They make tissues more flexible, drain excessive secretions and repair damaged tissues [5]. These compounds can tan the skin and give a feeling of astringency [22]. They have anti-oxidizing properties and would stop microbes' development.

On the other hand, Chung et al. [23] showed that the growth of many mushrooms, yeasts, bacteria and viruses was inhibited by the tannins which have various physiological effects. They are anti-irritant, anti-inflammatory, anti-microbial and pest-destroying [24]. They are also used to treat nonspecific diarrhoeas as well as mouth and throat inflammations [25].

The phytochemical screening shows the presence of saponins in all parts of the studied plant. They are abundant in the leaves (+++) and fairly present in the consumable parts: Spadices (++) and heart of palm (+). Fluck [26] considers saponins as a special category of

glycosides that have soapy characteristics. Sodipo et al. [27] showed also that this family of compounds has anti-fungal effect.

Although many alkaloids are toxic, some can be used in medicine for their analgesic properties. In the present case, we note the absence of alkaloids in all the analyzed parts. Thus, this plant presents no risk of toxicity.

### CONCLUSION

The ethno botanic survey carried out in the different districts shows the social role and the impact of *Chamaerops humilis* on the local populations and confirms the observations made by Munby in 1846. The most used parts are the heart of palm, the spadices and the leaves. The therapeutic indications which arise from the examination of the investigation cards show the positive effect of this plant on the digestive tract problem. The statistical analysis reveals the carminative effect of this plant and the role it plays in the treatment of the gastritis, gastroenteritis and the gastralgia. Hence, stomach wounds can be treated by the consumption of the heart of palm and the spadices. These indications are confirmed by the presence of chemical compounds which have an unquestionable role in traditional medicine. The presence of the chemical groups (tannins, flavonoids, saponins, steroids, unsaturated sterols and terpenoids) explains the therapeutic virtues of this taxon.

In the order to supplement the scientific corpus of this species in the public health field, anti-fungal and antimicrobial studies will be the subject of other investigations.

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