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Therapeutic use of *Rosmarinus officinalis* L. (Lamiales Lamiaceae) and description of its medicinal flora cortege in Algeria

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ABSTRACT *Rosmarinus officinalis* L. (Lamiales Lamiaceae), Rosemary, is an aromatic and medicinal plant distributed throughout the Mediterranean Sea and the rest of Europe. It is typically Mediterranean and in Algeria is widespread in different regions. *Rosmarinus officinalis* is known and used since ancient times for its culinary, medicinal and aromatic (in perfumery) virtues. It is widely used as a condiment in the Mediterranean basin and in England; also there are honey specially produced from the nectar of the flowers of Rosemary called "Honey of Narbonne" or "Rosemary honey". It is very used in agri-food as conservative and antioxidant, for the conservation of meat and fats. The essential oil used in doses greater than 2 to 3 drops/day would cause risk of nephritis and gastroenteritis. The leaves and flowering tops would have the same effect at excessive doses. Our work is focused on the study of the diversity of the floristic cortege of *R. officinalis* species taking into account two geographically different stations: Sidi Djilali and Beni Saf.

KEY WORDS *Rosmarinus officinalis*; medicinal flora; coastal station; steppe.

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INTRODUCTION

Traditional medicine and plants world live in close connection, as the first one draws its raw material from the second to make remedies. All drugs falling within Western medicine, must overcome a pharmacological experimentation in order to verify their activity and to ensure their safety.

Rosmarinus officinalis L. (Lamiales Lamiaceae) is one of the medicinal plants which are in use since antiquity in the entire Mediterranean basin. It is placed in the category of purifying plants for its action on the digestive and urinary systems and as stimulant plant for its essential oil showing anti-rheumatic virtues and positive effects on fertility and pregnancy. In gastronomy it is used also as a spice for food preparation and preservation of food (i.e. meat). Today, *R. officinalis* is entered in modern medicine through herbal nature specialties where it appears often in association with other plants.

MATERIAL AND METHODS

To study the dynamics of the floristic cortege of *R. officinalis*, it is necessary to know the factors that encourage their diffusion. To carry out this work we have chosen two stations located in two different areas of the country:

• coast: the station of Sidi Safi belonging to the municipality of Beni Saf

• steppe: station of Sidi Goretti belonging to the municipality of Sidi Djilali.

The two stations are located in semi-arid environments and characterized by a rainy season from November to April and a drought summer lasting about 5 to 6 months.

For all medicinal species and each station types, morphological, biological and phytogeographic distributions have been taken into account in order to assess the floristic richness of medicinal plants in the study area.

The oil of Rosmarinus officinalis

Rosmarinus officinalis essential oil contains scents of camphor, pinenes, cineol, and verbenone; it also contains flavonoids (diosmin, Luteolin), diterpenes, like the rosmadial and carnosolic acid, but also lipids (alkanes and alkenes), steroids (acid triterpenes aleanolique, acid ursotique), phenolic acids (rosmarinic acid, chlorogenic acid) and phytoestrogens, showing effects comparable to the female hormones.

Rosmarinus officinalis oil stimulates circulation and invigorates the nervous system, skin, liver and gall bladder. Is refreshing, antiseptic and antibacterial, and even diuretic and purifying; moreover, it is an antidepressant with antifungal properties, prevents and reduces spasms, tempers flatulence and regulates digestion. It hunts large colds and pain. And, on an emotional level, the oil soothes mental exhaustion and clarifies the spirit.

Use of Rosmarinus officinalis

The dried leaves of *R. officinalis* are commonly used in gastronomy (see I.T.E.I.P.M.A.I., 1991). Still, *R. officinalis* enters the composition of Vinegars. Its high content of borneol gives it powerful antiseptic properties which makes it the bactericide of choice in cannery (see I.T.E.I.P.M.A.I., 1991).

The essential oil used in doses greater than 2 to 3 drops/day would cause risk of nephritis and gastroentheritis (leaves and flowering tops would have the same effect at excessive doses).

The essential oil is avoided in people with epilepsy and hypertension, children and pregnant and lactating women.

The toxicity

A plant is considered toxic when it contains one or more substances harmful to humans or animals, the use of which causes death or more or less serious varied disorders (Fournier, 2001).

Many toxic plants are listed by several Anti Poison centres (see for example Patrick, 2003; Flesch, 2005).

The study of acute plant toxicity is usually performed by intra-peritoneal injections of different extracts in laboratory animals, the plant is considered toxic when the mean lethal dose (LD50) is 500 mg/kg or less (Marles & Norman, 1994). Among all deemed toxic plants, some are lethal in case of injection while others do cause minor, mainly digestive, disorders.

All parts of the plant have the toxic principles, but especially roots and seeds do, since they contain aconitine - a diterpenoid alkaloid - with a mainly neurological and cardiac toxicity (Flesch, 2005). Depending on the duration, frequency and quantity of toxic products to which an individual is exposed, there are several types of toxicities (Damien, 2002). Humans are constantly exposed to either acute or sub-acute or even chronic toxicity (Bismuth et al., 1987).

RESULTS AND DISCUSSION

Obtained results are shown in Table 1 and figures 1–4. The study area comprises 66 medicinal species distributed in 31 families, with the predominance of Lamiaceae (17%), Liliaceae (15%) and Apiaceae (8%). Asteraceae, Brassicaceae, Fabaceae and Cupressaceae are represented only by 6 or 5 %; while other families are only poorly represented.

Generally speaking, biological types or forms of the species reflect biology and a certain adaptation to the environment (Barry,1988).

The coexistence of many biological types, in a same station, no doubt accentuates the floristic richness of a given site, taking also into account the importance that annuals can take in arid zones during some favourable years (Florer & Pontanier,1982).

The spectrum composition of the study area revealed the predominance of Therophytes> Chamaephytes>Geophytes>Phanerophytes>Hemicryptophytes.

As said, the dominant biological type is represented by the Therophytes with a percentage of

TAXA	FAMILIES	BIO TYPES	MORPHO TYPES	COROTYPE
Ajuga chamaepitys (L.) Schreb.	Lamiaceae	TH	HA	EUR-MED
Allium nigrum L.	Amaryllidaceae	GE	HV	MED
Ammoides verticillata (Duby) Briq.	Apiaceae	TH	HA	MED
Aristolochia longa L.	Aristolochiaceae	GE	HV	MED
Arum italicum Mill.	Araceae	TH	HA	ATL-MED
Asparagus acutifolius L.	Liliaceae	GE	HV	MED
Asparagus albus L.	Liliaceae	GE	HV	W-MED
Asparagus stipularis Forsk.	Liliaceae	GE	HV	MACAR-MED
Asphodelus microcarpus L.	Liliaceae	GE	HV	MACAR-MED
Astragalus lusitanicus Lam.	Fabaceae	TH	HA	ALG-ORAN-MED
Borrago officinalis L.	Boraginaceae	TH	HA	W-MED
Bryonia dioica Jacq.	Cucurbitaceae	TH	HA	AS-EUR
Carduus pycnocephalus L.	Asteraceae	HE	HV	AS-EUR
Chamaerops humilis subsp *argentea* André	Arecaceae	CH	LV	MED
Chenopodium album L.	Chenopodiaceae	TH	HA	COSM
Chrysanthemum coronarium (L.) Spach	Asteraceae	TH	HA	MED
Chrysanthemum x *grandiflorum*	Asteraceae	TH	HA	END
Cynodon dactylon (L.) Pers.	Poaceae	GE	HV	COSM
Clinopodium nepeta (L.) Kuntze	Lamiaceae	CH	HV	AS-EUR
Daphne gnidium L.	Thymelaeaceae	CH	LV	MED
Daucus carota L.	Apiaceae	TH	HA	MED
Drimia maritima (L.) Stearn	Liliaceae	GE	HV	MACAR-MED
Echium vulgare L.	Boraginaceae	TH	HA	MED
Erica multiflora L.	Ericaceae	CH	LV	MED
Eryngium maritimum L.	Apiaceae	CH	LV	EUR-MED
Euphorbia helioscopia L.	Euphorbiaceae	TH	HA	AS-EUR
Fedia cornucopiae (L.) Gaertner	Valerianaceae	TH	HA	MED
Fumana thymifolia (L.) Spach ex Webb	Cistaceae	TH	HA	AS-EUR-MED
Globularia alypum L.	Plantaginaceae	CH	LV	MED
Herniaria hirsuta L.	Caryophyllaceae	TH	HA	PAL-TEMP
Jasminum fruticans L.	Oleaceae	CH	LV	MED
Juniperus oxycedrus L.	Cupressaceae	PH	LV	ATL-MED
Juniperus phoenicea L.	Cupressaceae	PH	LV	MED
Kundmannia sicula (L.) DC.	Apiaceae	TH	HA	MED
Lavandula dentata L.	Lamiaceae	CH	LV	W-MED
Lavandula multifida L.	Lamiaceae	CH	LV	MED
Lavandula stoechas L.	Lamiaceae	CH	LV	MED
Lobularia maritima (L.) Desv.	Brassicaceae	TH	HA	MED

Table 1. Listing of related medicinal species associated with *Rosmarinus officinalis* in the study area.

TAXA	FAMILIES	BIO TYPES	MORPHO TYPES	COROTYPE
Lonicera implexa Aiton	Caprifoliaceae	TH	HA	MED
Malva sylvestris L.	Malvaceae	TH	HA	MED
Marrubium vulgare L.	Lamiaceae	TH	HA	COSM
Muscari comosum (L.) Mill.	Liliaceae	GE	HV	MED
Muscari neglectum Guss. ex Ten.	Liliaceae	GE	HV	EUR-MED
Nepeta multibracteata Desf.	Lamiaceae	TH	HA	PORTUGAL A.N
Olea europea L.	Oleaceae	PH	LV	MED
Ononis spinosa L.	Fabaceae	CH	LV	AS-EUR
Pallenis maritimus (L.) Greuter	Asteraceae	TH	HA	MACAR-MED
Pinus pinaster Aiton	Pinaceae	PH	LV	W-MED
Pistacia lentiscus L.	Anacardiaceae	PH	LV	MED
Plantago major L.	Plantaginaceae	HE	HV	AS-EUR
Ranunculus repens L.	Ranunculaceae	TH	HA	PAL
Rhaphanus raphanistrum L.	Brassicaceae	HE	HV	MED
Retama raetam (Forssk.) Webb et Berthel.	Fabaceae	CH	LV	MED
Rosmarinus officinalis L.	Lamiaceae	CH	LV	MED
Rubia peregrina L.	Rubiaceae	TH	HA	ATL-MED
Rumex bucephalophorus L.	Polygonaceae	TH	HA	MED
Ruta chalepensis L.	Rutaceae	TH	HA	MED
Smilax aspera L.	Liliaceae	GE	HV	MAC-MED-ETH-IND
Tamus communis L.	Dioscoreaceae	TH	HA	ATL-MED
Tetraclinis articulata (Vahl) Mast.	Cupressaceae	PH	LV	IBERO-MAURIT-MATH
Teucrium fruticans L.	Lamiaceae	CH	LV	MED
Teucrium polium L.	Lamiaceae	CH	LV	EUR-MED
Thapsia garganica L.	Apiaceae	CH	LV	MED
Thymus serpyllum L.	Lamiaceae	CH	LV	END.N.A
Tulipa sylvestris L.	Liliaceae	GE	HV	EUR-MED
Viburnum tinus L.	Adoxaceae	CH	LV	MED

Table 1. Listing of related medicinal species associated with *Rosmarinus officinalis* in the study area.

about 41%. This dominance is primarily due to their resistance to drought in the steppe areas. Nevertheless, the Chamaephytes also keep a place very important with a percentage of 27%. Benabadji et al. (2004) reported that grazing promotes the installation, in a comprehensive manner, of the Chamaephytes often refused by herds. Geophytes are in 3rd position, followed by Phanerophytes (9%) with bulbous and rhizomatous medicinal species. Hemicryptophytes are scarsely represented in the study (only 5%), probably due to the poverty in organic matter of the soil, as previously stressed by Barbero et al. (1989).

From the morphological point of view, the vegetation of the study area is marked by heterogeneity between woody, herbaceous, perennials and annuals medicinal.

The herbaceous annuals are dominant in the study with a percentage of 41% which is probably connected to the invasion of Therophytes (which are generally herbaceous annual). Roman (1987)

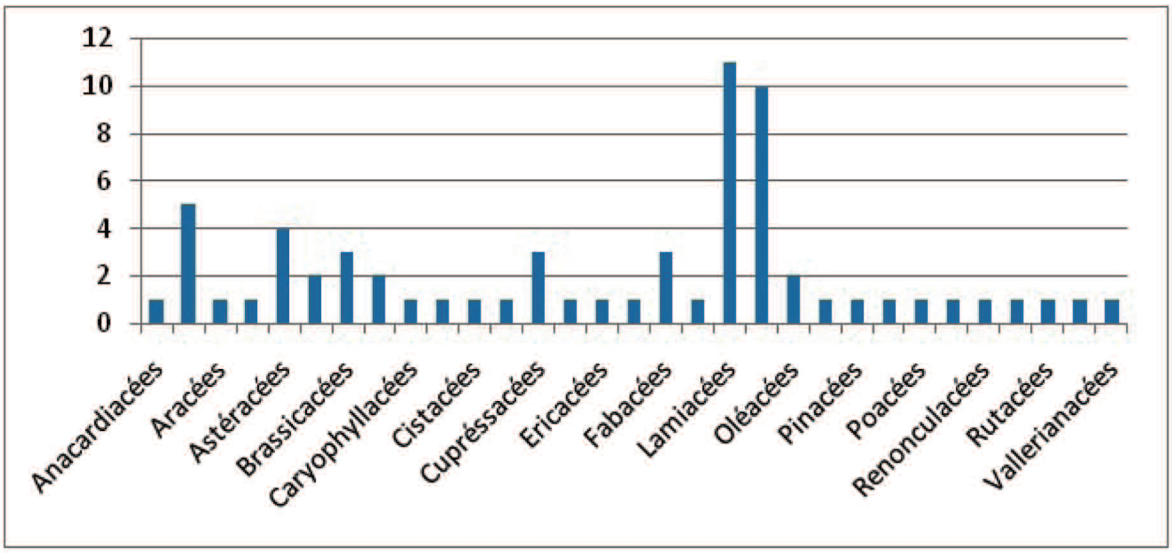

Figure 1. Percentage of families of medicinal plants from the study area.

already highlighted the existence of a good correlation between biological types and many phenomorphologic characters.

Despite the dominance of annuals, perennial woody plants retain an important place with 35%. Herbaceous perennials are the least represented with 24%.

Phytogeography is studying the distribution of plant species on the surface of the globe (see Lacoste & Salanon, 1969). The reasons why a species does not exceed the limits of its geographical range can be many including: climate, soil, history or isolation by natural barriers.

In our study we showed (Fig. 4) the predominance of the Mediterranean biogeographical types species with a percentage of 59%, followed by cosmopolitan elements (16%), Asian elements (6%) and Euro-Mediterranean and W-Mediterranean species (5% each). The other biogeographic elements are very little represented.

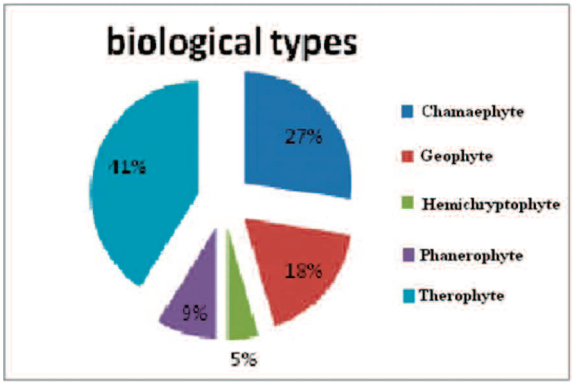

Figure 2. Biological types of medicinal plants from the study area.

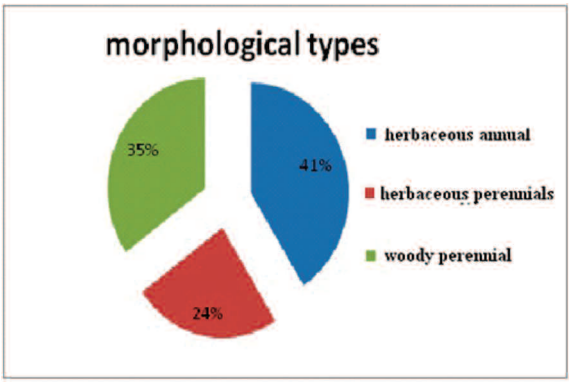

Figure 3. Morphological types of medicinal plants from the study area.

CONCLUSIONS

The therapeutic use of *R. officinalis* is analyzed.

Floristic cortege of Rosemary in the study area is marked by the dominance of Lamiaceae, Liliaceae and Apiaceae. Therophytes are dominant, reflecting a strong anthropic action.

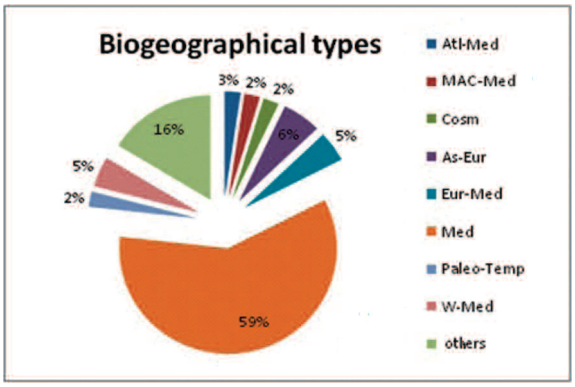

Figure 4. Biogeographic patterns of medicinal species from the study area.

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