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Medical ethnobotany survey of the Senegalese community living in Cagliari (Sardinia, Italy)

Andrea Maxia[1, 3], Alexia Demurtas[1], Sanjay Kasture[2, 3]*, Veena Kasture[2, 3], Veronica Fadda[1], Giulia Ventroni[1], Alfredo Maccioni[1], Arianna Marengo[1] & Cinzia Sanna[1]

[1]Department of Life and Environment Sciences, Botany and Botanical Garden Division, University of Cagliari, Italy; [2]Sanjivani College of Pharmaceutical Education & Research, Kopargaon, 423603, India; [3]APRIN– Applied Plant Research International Network, Viale Sant' Ignazio 13, 09123 Cagliari, Italy

E-mail: kasturesb1@gmail.com

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The present work aims to study the use of plant species with curative intent within the Senegalese community who live in the city of Cagliari (Sardinia, Italy). The article mainly focuses on the integration of traditional medicine and biomedicine, on the codification of knowledge capital, behaviors, as well as health information. The purpose of this investigation is to: shed light on this interesting and somewhat unknown wealth of knowledge, enhance it and evaluate the process of integration with the local culture. We have tried to define, through an ethnobotanical survey, the plant species used traditionally to treat various ailments and gather the knowledge that different members of the community have of them. The survey revealed the use of 23 plant species belonging to 11 families, with a prevalence of *Fabaceae* (30.4%), *Anacardiaceae*, *Combretaceae* and *Malvaceae* (13% each). An overall analysis of data showed that, in addition to the therapeutic uses to treat diseases of easy resolution, there are also applications for specific diseases, such as leprosy, diabetes and malaria.

Keywords: Traditional knowledge, Sardinia, Senegal, Ethnobotany

IPC Int. Cl.8: A61K 36/00, A61G 10/00, A01D 20/46, A01D 16/02, A01D 6/67, A01D 6/69

Since the 19th century, there has been a massive migration of people from the developing countries to the developed ones. This has resulted in a new social reorganization that becomes multi-ethnic, with obvious influences on society, economics and culture. These changes are inevitably related to the contact, the exchange and comparison among migrant groups - which bring with them a wealth of knowledge, customs and traditions, which enrich host societies.

The ethnobotany can be an effective tool to evaluate the effects of "contact" between people originally distant - both geographically and culturally - as it allows to draw attention to how much of the wealth of knowledge remains in a migrant people, following the encounter with a culture often very different from that of origin.

The current state of scientific research in relation to local knowledge of medicinal plants and food, as well as the conceptualization of the processes of health/ illness, the categorization of the uses of the plant species is limited to a few research groups, who have presented specific realities within migrant groups in Italy[1-3], Europe, and elsewhere[4-11]. The medical-anthropological and ethnobotanical research has produced numerous results in the African continent. Over the past 20 yrs, there have been numerous ethnobotanical surveys in different sub-regions of Sardinia to encode Traditional Botanical Knowledge (TBK). This body of knowledge, however, is slowly fading and smoothing on the most common plant species on the island territory[15-30].

This is the context of the "new" minorities, who are focused mainly in the cities to find a source of employment, and the "old" migrant communities, who settled in territories often deserted where it is easy to transfer a "piece" of their country of origin[3], to speak in their own language and to follow, in their entirety, their own traditions. More than 20 yrs ago, the city of Cagliari and its territory welcomed the first migration from Senegal. The group currently consists of about 1,100 inhabitants, as officially reported by the Police Headquarters in Cagliari (Fig.1).

The Senegalese community is heterogeneous because the geographical origins and ethnicities are

*Corresponding author

different. Most immigrants come from the cities of Diourbel (52%), Kaolack (27%), Dakar (11.5%) and Fatick (5.7%) and the remaining 3.8% from other cities. The data relating to their integration into the labor market indicate that the majority of them have found employment in the agricultural sector and in the itinerant trade.

In the literature, scientific works about the TBK in the Senegalese community in Cagliari are not available. The only information available is a result of informal discussions that took place with representatives of the community. Instead, the cultural heritage of Senegal concerning the use of medicine and traditional nutrition[31] is well documented. The scientific papers describe a popular medicine in the hands of a few specialists of traditional medicine, in traditional healers or *Tradipraticien*[32-36] and orally transmitted. Specific studies deal with ethno-pharmaco-botanical surveys of entire families and/or botanical species which are particularly common in the Senegalese territory[33, 36] which is often combined with the medicinal use and the traditional cooking[37, 38]. In any case, the approach to medicine and traditional food is closely related to the systematic study of plant diversity in the territory of Senegal[39].

The Region of Sardinia began to be affected by a migration of the modern type around the 80s of the 20th century. In particular, flows from Senegal started from the mid-80s, but intensified over the next decade. This work tries to define the plant species used by the Senegalese community of Cagliari and the knowledge that the different members of the community have with them. In particular, the objectives of this study are:

- To document and collect traditional knowledge on the medicinal uses of plant species used in the Senegalese community of Cagliari;
- To understand how the surroundings can influence the traditional uses (urban, natural, rural environment, etc.);
- To understand the degree of knowledge of each specific uses of plant species identified;
- To compare and verify the data obtained with the data reported in the literature;
- To evaluate how the current use of the plants used by the community is influenced by the Sardinian popular traditions (indigenous);
- To evaluate how many plant species were lost in respect to the place of origin.

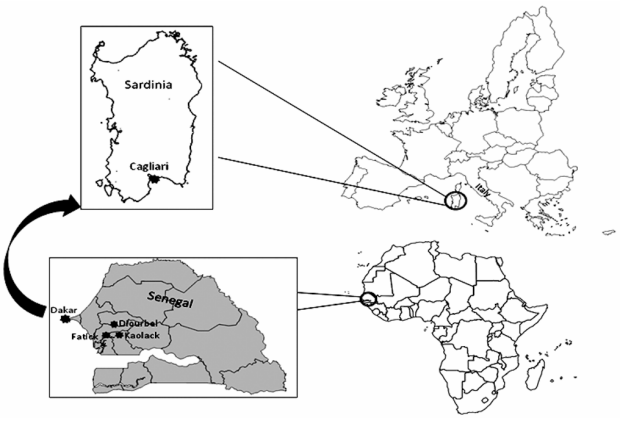

Fig. 1-Location of the study area

Methodology

Ethnographic background

Analyzing the topic of the Senegalese traditional medicine, it is necessary to make some observations about religion and brotherhood (*taiqât*) *Muridiyya*, the predominant one among migrants in Cagliari. The *taiqât Muridiyya* is undoubtedly the most important Islamic brotherhood in Senegal, not because of the number of adherents but because it is the only truly native, founded in the nineteenth century. The Senegalese community is characterized by strong internal cohesion and the organization of their *taiqât*, especially when combined with the *Wolof* (largest ethnic group in Senegal). In general, the immigrant is never alone. He goes away from Senegal after a choice taken inside the family or brotherhood. In Sardinia, he is greeted by the brothers already integrated that provide practical help, from home to work, and they welcome him immediately into the local group called the *taiqât Muridiyya*.

The “traditional healers” in Senegal are recognized by their community as herbalists, phytotherapists, or people who know about the herbs, or who provide for their collection in the country for the purpose of making medicines or selling. Then there are the *Tradipraticien*, or traditional healers, who are attributed with "supernatural" powers. They exert a non-conventional medical practice aimed at restoring the relationship between man and his social context. As in Senegal, even in the Sardinian tradition there are exacting people with the so-called "gift", that is the ability to interact and influence the plant and animal world and, of course, the human being. For this reason, in the Sardinian ethno-botany, the use of certain plant species with curative intent is often

accompanied by the recitation of prayers, chants and magic and religious rituals.

Location of the study area

The city of Cagliari, Sardinia's capital, is perched on 7 limestone hills, overlooking the Baia degli Angeli. The city was probably founded by the Phoenicians. In the 6th century BC, it became the largest Phoenician necropolis in the Mediterranean. The favorable position of the island, and especially of Cagliari, facing the major ports of Africa and Sicily promoted trade on the sea and the consequent conquest of the Romans in the third century BC. The modern Cagliari is in fact a "container" of ancient civilizations and different cultures, the same that came from the sea (Phoenicians, Romans, Pisans, Genoese, Spanish, and Piedmontese) suitably mixed with the indigenous culture (the Nuragic civilization) of its territory. Currently, the historic center of Cagliari could be defined as a country incorporated within the city, and it is the area culturally and commercially more lively. This is the place where most of the Senegalese community lives. It is a well-organized group with representatives with a medium - high cultural level, engaged almost full time for interaction with the territory. From the first simple and informal talks interesting points emerged on the retention by the Senegalese community of folk traditions related to the "food" and the "healthcare" using different plant species from homeland.

Field and laboratory studies

The survey covered the territory of Cagliari with an ethnobotanical research which lasted from June 2011 to June 2012 on the track of some international works carried out in Northern Europe[4,7,9] and Italy[40].

Guided interview method with pre-made cards was used for data collection, according to the latest ethno-pharmacological survey directions[41]. Interviews were carried out in Italian and French languages on a sample of 52 male persons, of which 44% live in Cagliari since less than 10 yrs, 31% from a period between 10-20 yrs and 25% from a period between 23 yrs. Only 9.6% of respondents did not speak Italian.

Species have been identified and transcribed with the Linnaean binomial and in the language spoken by the community[39]. Updates provided by Angiosperm Phylogeny Group[42]are used for the taxonomic classification. Some interviewees, often older and residents for more time in Sardinia, offered themselves as mediators to understand the linguistic nuance of the different ethnic groups that make up the community. The orally acquired data were processed and compared with the plant samples (whole plant or parts thereof) which are used by the community. The vegetable matrices were preserved with the most suitable method, depending on the plant was entire, portioned, crushed, fresh or dried, packaged or otherwise. The normal techniques of fitognosia were followed, when it was possible, for the identification of the samples. Where it was not possible, in the case of mixtures of different herbal drugs (that is, part/ parts of a plant used for preparing medicines), for their recognition, and subsequent identification of the plant species, general schemes have been used, through macroscopic examinations (shape, size, etc.), microscopic (absence, presence of starch etc.), sensory (bitter, sweet, aromatic, etc.) and preliminary chemical tests[43,44].

Data analysis

The data were collected and stored in a systematic way. Plant species described have been identified with the Linnaean binomial, the family membership, the vernacular name, the type of preparation and therapeutic use.

The therapeutic indications reported in **Table 1** were prepared with the help of some members of the community, interpreting the reports for traditional use of each plant species identified. The preparation was made by grouping and splitting the data value in use, diversity, etc. in homogeneous categories, for a critical analysis of the entire study work.

Results and discussion

The investigation has shown the use of a non conspicuous number of plant species (23), probably due to the fact that the availability of data in certain periods of the year (winter) is almost nonentity (Table 1). In fact, the 23 plant species identified, and information on them, were found for the most part during the summer, when the community increases in number due to the strong seasonal migration. Some species are found in small shops in the historic center of the city throughout the year, while most come directly, by courier, from the country of origin.

Table 1 shows that the plants that are most used by Senegalese migrants in Cagliari belong to eleven families, with a prevalence of *Fabaceae* (30.4%), *Anacardiaceae*, *Combretaceae* and *Malvaceae* (13% each).

Table 1— Medical plant remedies used by Senegalese migrants in Cagliari

Botanical taxa and Family	Folk name	Part(s) used	Preparation(s)	Folk therapeutic use(s) or ailment(s) treated
Anacardiaceae				
Anacardium occidentale L.	*Darkasé, Darkasu*	B	Extract	Hypoglycemic, Antihypertensive
		Le	Essential oil	Antidepressant
Lannea acida A. Rich.	*Son*	B	Decoction, infusion	Antidiarrheal, digestive disorders, treatment of hemorrhoids, rickets, tooth decay
		Rt	Decoction	Abortion, venereal diseases
		Le	Decoction	Antidiarrheal, scurvy, wounds
Mangifera indica L.	*Mâgo, Bumango*	B	Decoction	Antidiarrheal, toothache
		Le	Decoction	Diuretic, respiratory diseases
			Direct ingestion	Antidiarrheal
Apocynaceae				
Calotropis procera (Aiton) Dryand.	*Faftan*	Lx	Direct application	Analgesic, toothache
		Rt	Direct application	Toothache (prevention)
			Decoction	Leprosy, gastro-intestinal diseases, vermifuge
		Le	Infusion	Antihypertensive
			Decoction	Asthma, antitussive, leprosy
Asparagaceae				
Alòe vera (L.) Burm.f	*Aloes*	Le	Direct application	Skin inflammation, fungicidal, anti- seborrhea, arthritis, rheumatism, anti-inflammatory, bactericidal
			Decoction	Laxative
Combretaceae				
Combretum glutinosum Perr. ex DC.	*Rat*	St	Fumigation	Wounds
		Le	Decoction	Impotence, febrifuge, rheumatism, syphilis, malaria
		B	Decoction	Impotence, febrifuge, rheumatism, syphilis
		Fr	Direct application	Wounds
		Rs	Direct application	Filling tooth
		Rt	Decoction	Impotence, febrifuge, rheumatism, syphilis
Guiera senegalensis J.F. Gmel	*Nger*	Rt	Macerated	Diarrhea, dysentery
		Le	Direct application	Wounds, sores
			Decoction	Antitussive, respiratory diseases
Terminalia avicennioides Guill. & Perr.	*Robrob*	B	Direct ingestion	Emetic, hypoglycemic
		Rt		
Fabaceae				
Acacia seyal Delile	*Surur*	B	Infusion	Dysentery, bacterial skin infections, aphrodisiac, astringent, emollient, rhinitis, intestinal disease, arthritis, bronchitis
		Rs	Direct application	Childbirth stimulating, febrifuge
Bauhinia reticulata DC	*Ngigis*	B/Fr	Direct application	Anti-inflammatory, analgesic, depurative
			Fumigation	Mumps
		Le	Direct application	Anti-inflammatory, analgesic, depurative, antiseptic
			Fumigation	Mumps
Senna italica Mill. syn. *Cassia italica* (Mill.) F.W. Andrews	*Laidur*	B		
		Rt	Infusion	Laxative
		Le		
Cassia sieberiana DC.	*Sédéń*	B	Decoction	Tonic
		Rt	Macerated	Depurative, febrifuge, diuretic, anti-anemic
			Decoction	Tonic, aphrodisiac, impotence
			Infusion	Antidiarrheal, stomach ache
		Le	Macerated	Depurative, febrifuge, diuretic, anti-anemic
			Decoction	Tonic, burns, pleurisy
		Fr	Decoction	Tonic
Cordyla pinnata (A.Rich.) Milne-Redh.	*Dimb*	B	Decoction	Respiratory diseases

(*Contd.*)

Table 1— Medical plant remedies used by Senegalese migrants in Cagliari—(*Contd.*)

Botanical taxa and Family	Folk name	Part(s) used	Preparation(s)	Folk therapeutic use(s) or ailment(s) treated
Tamarindus indica L.	*Dakkar*	Fr	Cataplasm Decoction	Rheumatism, laxative, scurvy, cicatrizant Anti-malaria
		B	Decoction Direct ingestion	Tonic, astringent, fever, inflammation Digestive
		Le	Decoction Cataplasm	Analgesic, anti-arthritic, sore throat, cough, Conjunctivitis
Vigna unguiculata (L.) Walp.	*Ńébé*	Fr/Le	Macerated	Vermifuge
Malvaceae				
Adansonia digitata L.	*Bui, Gui*	Se	Oil	Burns, cicatrizant
		Le	Decoction	Anti-inflammatory, diaphoretic, expectorant, febrifuge, hypotensive, antiasthmatic, uro-genital diseases, insect bites, vermifuge
		Lx	Direct application	Wounds, sores
		Fr	Cataplasm Decoction	Analgesic, antidiarrheal, smallpox, measles, conjunctivitis Febrifuge, antimalarial, intestinal regularizer
Grewia damine Gaertn.	*Kel*	B Rt	Macerated, decoction	Diuretic, vermifuge, laxative, sores, intestinal inflammation, muscle pain, tonic, colic
Hibiscus sabdariffa L.	*Bisap*	Fl	Infusion, decoction	Antiseptic, conjunctivitis, diuretic, mild laxative
Meliaceae				
Carapa procera DC.	*Tulukuna*	Se	Oil	Skin irritations, sores, rheumatism, insect repellent
Moringaceae				
Moringa oleifera Lam.	*Sap-Sap*	Le	Infusion	Diabetes, hypertension, dysentery, vermifuge, respiratory diseases, conjunctivitis
		Se		Hypertension
		Fl		Conjunctivitis, vermifuge, respiratory diseases
Sapotaceae				
Vitellaria paradoxa C. F. Gaertn.	*Karité,Shea, Ghariti*	Se	Oil	Muscle pains, joint pain, rheumatism, nasal decongestant, vulnerary, hair reinforcing.
Zingiberaceae				
Zingiber officinale Roscoe	*Jinjer, Dinjar*	Rt	Decoction	Antiemetic, gastric protective, colds, nasal decongestant, febrifuge, expectorant, carminative, tonic, aphrodisiac,
			Direct ingestion	Toothache
			Oil	Insect repellent
Zygophyllaceae				
*Balanites aegyptiaca (*L.) Delile	*Sump*	B	Fumigation Macerated Infusion	Respiratory diseases, Gastric diseases, anthelmintic Antidote

B: Bark, Rt: Root, Le: Leaves, Fr: Fruits, Se: Seeds, Rs: Resin, Fl: Flowers, St: Stem, Lx: Latex.

Fig. 2 shows that the parts of plants which are most used are the leaves (26.4%), the bark (24.5%), and root (17%). Regarding the therapeutic uses listed by the interviewees, 14.5% of them refer to treatments of diseases and disorders affecting the digestive system, 11.6% refer to the skin and the 10.3% to the urogenital system. The remaining therapeutic uses (39.6%) refer to treatment of minor ailments for example febrifuge, analgesic, anti-inflammatory, etc. included in the category "Others", because they could not be classified in the other categories. Generally, the herbal drugs are used as decoctions (37.9%) and by direct application (18.2%) from leaves, roots and bark, without being subjected to special handling. Only in some cases the production is performed for the most part in villages of origin, following a procedure unchanged over the years, and then sent to the Senegalese community of Cagliari (such as for the production of butter *Vitellaria paradoxa*). The plants most commonly used, as indicated by the majority of respondents, were *Adansonia digitata*, *Vitellaria paradoxa* and *Grewia bicolor*.

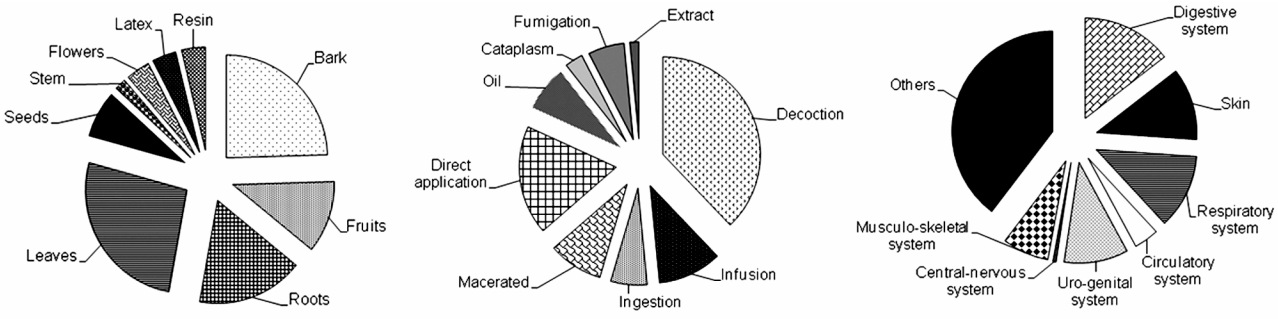

Fig. 2-Part(s) used, preparation(s) and therapeutic use(s) or ailment(s) treated of quoted botanicals in the Senegalese community in Cagliari

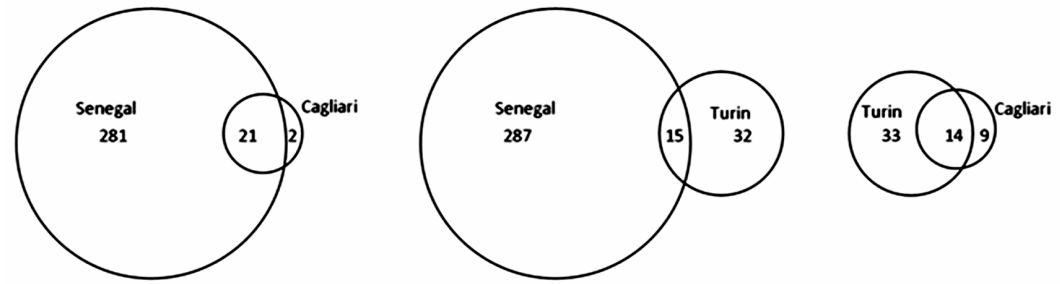

Fig. 3-Comparative medical ethnobotany of the Senegalese community living in Cagliari and in Turin[40] (Italy) and the *Pharmacopée sénégalaise*[31]

An overall analysis finds that, in addition to the therapeutic uses aimed at pathologies of easy resolutions, there are also applications for specific diseases. *Acacia seyal* and *Calotropis procera* are used in the treatment of bacterial infections, such as leprosy, *Moringa oleifera* in the treatment of diabetes, while *Adansonia digitata* is effective in the treatment of malaria, as well as *Combretum glutinosum* and *Tamarindus indica*.

The survey identifies the high level of satisfaction from respondents about traditional treatments. 95.7% say they have tangible benefits from traditional treatments, while only 4.3% say they have partial benefits. These data denote that the traditional use of plants is widespread in the migrant community residing in Cagliari. It is interesting to note that, despite several years of permanence of the Senegalese community in Sardinia, there is little evidence proving the loss of their traditions. Only 13.5% of respondents prefer to use conventional medicine, while others say they prefer traditional remedies.

Fig. 3 shows the comparison of the data processed in the work of Kerharo (1967) in Senegal[31] and Ellena *et al*. (2012) in the Senegalese community of Turin (Italy) [40] with the data obtained from this work.

From this comparison it should be noted that the Senegalese community living in Cagliari uses about 21 plant species (7%) out of 302 species reported by *Pharmacopée sénégalaise*[31], compared with 15 species (5%) of the Senegalese community of Turin (Italy) [40]. Only two species (*Aloe vera* and *Zingiber officinale)* represent 8.7% of the total number plant species identified and used in the community of Cagliari and not included in *Pharmacopée sénégalaise*[31], compared with 53.1% of the Senegalese community of Turin[40]. This identifies profound differences in the processes of cultural integration in the two different localities. Finally, between the two Senegalese communities living in Italy – Cagliari and Turin – the species in common were fourteen.

Conclusion

The survey highlighted similarities between the ethnobotanical traditions of Senegalese migrants in Cagliari (TMSe) and the Sardinian native population (TMSa) in the practice and procedures of administration of herbal drugs. Although the plant species are different, magic-cultural aspects that the Senegalese healer and the Sardinian healer practice in the treatment of the disease are very similar.

In TMSa and TMSe the administration of herbal drugs is preceded in some cases from the recitation of prayers, songs and/or healing rituals[45,46]. In some cases, the disease is seen as "divine punishment" and as such can be cured by invoking divine help. The confidence in the effectiveness of the remedy (which produces the placebo effect) is even more important than its intrinsic power. The function of "healers" is attributed to religious figures (in the case of the Senegalese folk medicine) or to those having knowledge about the plants and rituals to be used (in TMSa and TMSe). The authority of healers is unquestionable, as the outcome of the treatment is often beneficial. Healers take care of their patients according to the principles of holistic medicine: they take into account the conditions of life of the patient and they examine them carefully in order to form an idea of personality and weaknesses of the subject under consideration.

However, in both communities (Senegalese and Sardinian), the inhabitants of the urban centers turn to physicians more often than those who live in the countryside, but if the treatment fails, they do not hesitate to address to traditional medicine. To be sure not to get wrong, they turn to both medicines. In fact it is true that problems such as the evil eye or misfortune are the exclusive prerogative of traditional medicine, while at observation level diagnostics, the folk medicine cannot compete with Western medicine.

It is also evident that the Senegalese migrants frequently resort to the remedies used in their traditional medicine, probably because of the strong attachment, despite the distance, to the uses of the village community to which they belong. Similarly, the belief in the therapeutic efficacy of some plant species also persists in some Sardinian communities largely isolated until a short time ago. The research shows that the Senegalese community in Cagliari does not make use of native species of Sardinia. *Aloe vera* and *Zingiber officinale* are the only two species not included in *Pharmacopée sénégalaise*[31] but widely distributed and used in various traditional medicines around the world.

Often the processes of integration for these communities are held back by the lack of specific health policies. This phenomenon occurs not only in Italy, but is also observed in many "Western" countries, where communities of migrants are daily becoming more conspicuous and relevant to the host countries.

This study highlighted the knowledge and experience of the Senegalese community in Cagliari, as regards the use of plants in the self-medication. The study shows that traditional knowledge can be shared between communities and there is need to put in place the most sensitive health policies aimed at the integration of information obtained from the migrants.

Acknowledgment

The biological resources identified by the researchers are deposited in the Herbarium of Cagliari - University of Cagliari collection - to facilitate the future users in order to obtain free information in observance of guideline of the TBK. Researchers worked in respect of the rights of Traditional Owners to preserve the cultural integrity of their Indigenous Cultural and Intellectual Property. The authors acknowledge the assistance of the Senegalese community of Cagliari (Italy).

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