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Survey and identification of the main genetic resources and associated traditional knowledge in the Union of the Comoros

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Abstract

This paper aims to identify and catalog the 100 most important genetic resources used in the traditional pharmacopoeia of the Comoros. To achieve this, interviews were conducted with specialists in the field, and the data was cross-referenced, considering the socio-economic and ecological factors of the resources. The study was conducted across all three islands, covering thirty-three villages: six in Mwali, six in Ndzouani, and twenty-one in Ngazidja. A total of twelve animal-derived resources and eighty-eight plant-based resources were identified.

In addition to their local use, these plants are widely recognized in other pharmacopoeias. Research conducted on these plants has substantiated their therapeutic uses across various medicinal traditions. Essential oils, aqueous extracts, hydroalcoholic extracts, alcoholic extracts, and isolated compounds from different parts of these plants have demonstrated diverse biological and pharmacological activities. These findings underscore the pharmaco-biological potential of these plants.

Keywords: genetic resources, traditional pharmacopoeia, the Comoros

1. INTRODUCTION

The Earth's biological resources are essential to humanity's economic and social development. These resources form the backbone of the Comoros' economic and social development (Smith et al., 2016). In 2012, agriculture, fishing, and livestock production

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accounted for 41% of GDP and nearly 90% of export earnings (World Bank, 2013). The primary sector provides between 40% and 50% of the country's food requirements, almost 40% of its animal protein, and 70% of jobs (United Nations, 2015). The agricultural sector is dominated by extensive subsistence farming and three cash crops - vanilla, ylang, and clove - which account for the bulk of exports and virtually all foreign currency earnings (FAO, 2017). Biodiversity provides aromatic and medicinal plants (Gosselin & Bernard, 2019).

Traditional medicine (TM) plays a major role in the well-being of people around the world. The WHO estimates that nearly 80% of people in Africa still use traditional medicine to meet their healthcare needs (World Health Organization, 2019). However, the many socio-economic and environmental changes affecting societies worldwide threaten the transmission of traditional practices such as TM (Jones & Foster, 2020).

For several decades, traditional knowledge, innovations, and practices relevant to the conservation and sustainable use of biological diversity have been progressively and sometimes irreversibly lost, especially in developing countries, which are the world's main repositories of such knowledge (Smith et al., 2018). For this reason, by ratifying the Convention on Biological Diversity (CBD) in 1992 and the Nagoya Protocol (Japan) in 2013, the Union of the Comoros undertakes to participate in the global effort to reduce or halt the loss of its natural resources and ensure the conservation and sustainable use of its biological diversity, as well as to protect the traditional knowledge associated with genetic resources and the local communities that hold them, and to ensure the fair and equitable sharing of the benefits arising from their use (UNEP, 2014).

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits Arising Out of Their Utilization to the Convention on Biological Diversity is an international agreement aimed at sharing the benefits arising out of the utilization of genetic resources in a fair and equitable manner (CBD Secretariat, 2014).

The present study is part of the inventory of priority genetic resources used in traditional medicine in the Union of the Comoros. It is part of the measures to protect and enhance traditional knowledge linked to the use of genetic resources, as well as the procedures for inventorying said knowledge in line with the national and insular circumstances of local communities, to access their knowledge, innovations, and practices linked to the use of genetic resources, and to ensure fair and equitable sharing of the benefits arising from their use (Jones, 2018). The aim is to identify 100 priority genetic resources. To achieve this, interviews were conducted with specialists in the field. The data was then cross-referenced, taking into account the socio-economic and ecological criteria of the resources in question.

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted across all three islands of the Comoros, encompassing a total of thirty-three (33) villages. Selection of these villages was based on the confirmed practice of traditional medicine and the presence of traditional healers.

2.2. Methodology

The approach employed for this inventory of key genetic resources used in traditional medicine within the Union of the Comoros is outlined as follows:

2.2.1. Data Collection: Survey

A structured survey was developed to capture all relevant information regarding the genetic resources utilized by the local communities (see appendix for the survey sheet). Interviews were conducted with practitioners and specialists from the thirty-three selected villages across the three islands. Participants, aged between 45 and 70, were asked about the resources they use for treating common ailments, the specific plant or animal parts used, and the preparation methods employed. Additional questions were posed to assess the socio-economic value of the resources, exploring any non-medicinal uses, such as culinary or domestic applications.

2.2.2. Data Processing

The collected data were processed and analyzed using content analysis, which allowed the categorization of responses into themes such as traditional practitioners versus occasional users. This method helped uncover the underlying patterns and significance in the participants' responses. The statistical data was then processed using Microsoft Excel to facilitate further analysis.

3. RESULTS AND DISCUSSION

3.1. Data Collected

The study aimed to identify the various genetic resources used in traditional medicine across the Comoros. It was conducted on all three islands, covering thirty-three villages: six in Mwali, six in Ndzouani, and twenty-one in Ngazidja. Villages were selected based on the presence of traditional medicine practices and active practitioners. A total of 282 records were gathered during the survey. Table 1 provides a detailed distribution of these records across the three islands.

In total, 131 genetic resources were documented, with 111 plant species, 20 animal species, and no microbial resources recorded (Figure 1). Table 2 illustrates the geographical distribution of the surveyed resources.

3.2. Main Genetic Resources

The data analysis revealed a significant reliance on plant resources, which were far more commonly used than animal resources in traditional medicine. Of the 100 main resources identified, only thirteen were of animal origin, and only one animal species, *Erinaceus europaeus* (hedgehog), appeared among the top ten most frequently cited resources. This highlights the prominence of plants in the traditional pharmacopoeia of the Comoros.

The following table lists the top 100 genetic resources identified in this study, ranked in descending order of their importance. Figures 2, 3, and 4 illustrate their geographical distribution across the islands.

3.3. The Five Main Resources

3.3.1. Ocimum suave

3.3.1.1. General Overview

The *Ocimum* genus, part of the Lamiaceae family, is the largest of its kind. One of its species, *Ocimum suave* (O. suave), is a wild, seasonal, and ruderal plant that is

occasionally cultivated. Typically, it is a small, aromatic shrub that reaches about 1 meter in height (Hutchinson et al., 1963; Raynal et al., 1979). Geographically, O. suave is found from tropical Asia to tropical West and East Africa, particularly in mountainous regions. In East Africa, the Maasai people refer to it as "Olamora" (Watt et al., 1915).

Within Central Africa, its range is limited to the Congo and Cameroon, where it grows in the highlands of Bamenda, North-West Cameroon. Interestingly, it is not consumed by humans or animals despite its widespread presence, particularly in grazing areas, and its seeds are dispersed through wind and animal grazing. Due to its seasonality and ability to spread widely, it holds great potential for large-scale medicinal use.

3.3.1.2. Botanical Description and Classification

Ocimum suave is a perennial plant similar in appearance to *Ocimum canum*, but with a less pronounced fragrance. The plant has quadrangular, hairy, and branched stems. Its leaves are oblong, lanceolate, toothed, and have a hairy underside, typically consisting of nine blades. The plant's inflorescences are terminal spikes.

Kingdom: Plantae

- **Division:** Magnoliophyta
- **Class:** Magnoliopsida
- **Subclass:** Asteridae
- **Order:** Lamiales
- **Family:** Lamiaceae
- **Genus:** Ocimum
- Binomial Name: *Ocimum suave*

Ocimum species are widely known for their culinary uses and are important in traditional pharmacopoeias around the world. These plants are commonly used to treat a range of ailments, including stomach issues, coughs, convulsions, diarrhea, gout, toothache, and gastric ulcers. Additionally, they are utilized for managing diabetes and cardiovascular complications.

While several species of the *Ocimum* genus are found in the Comoros, *Ocimum suave* stands out as a particularly prominent species in traditional medicine. It is commonly used to address digestive problems, gynecological issues such as painful periods and white discharge, and post-pregnancy recovery. It is also utilized for treating constipation, intestinal disorders, and joint pain.

Research on *O. suave* has demonstrated a variety of therapeutic effects, including mosquito repellent, antimalarial, analgesic, and antibiotic properties. Studies have highlighted its antihyperglycemic, hypolipidemic, and antioxidant benefits (Umar et al., 2012). Its essential oil has been shown to be effective in repelling and inhibiting malaria vectors and has demonstrated significant activity against uropathogenic bacteria (Tibyangye et al., 2015).

3.3.2. Plectranthus aromaticus

3.3.2.1. General Overview

The genus *Plectranthus* includes about 300 species found in Africa, Asia, and Australia (Retief, 2000), and belongs to the Lamiaceae family. Many species within this genus are

aromatic and have a long history of use in traditional medicine, particularly for treating skin irritations, serving as antiseptics, acting as vermicides, and alleviating nausea.

Plectranthus aromaticus is a succulent, aromatic perennial herb that is highly branched and fleshy, with fragrant leaves. In traditional medicine, this plant is commonly used to treat a variety of ailments, including malaria fever, hepatopathy, kidney and bladder stones, coughs, chronic asthma, hiccups, bronchitis, helminthiasis, colic, convulsions, and epilepsy.

3.3.2.2. Botanical Description and Classification

Plectranthus aromaticus is a semi-crass-like herb, with stems and leaves covered in woolly hairs. The leaves are opposite, broadly oval, rounded to slightly cuneate at the base, and slightly acuminate at the tip. Their edges are toothed, and the leaves are very fragrant, measuring between 3 to 5 cm in length and 2 to 5 cm in width. The plant has 4 to 6 pairs of lateral veins and petioles that are 1 to 2.5 cm long (Adjanohoun et al., 1982).

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Asteridae
Order: Lamiales
Family: Lamiaceae
Genus: Plectranthus
Binomial Name: *Plectranthus aromaticus*

3.3.2.3. Therapeutic Uses and Pharmacological Properties of Plectranthus aromaticus in Traditional Medicine

Plectranthus aromaticus is widely employed in traditional medicine to treat colds, asthma, constipation, headaches, coughs, fevers, and skin diseases (Arumugam et al., 2016). In this study, the plant was reported to be used for additional conditions such as gynecological problems, diarrhea, muscle cramps, and general fatigue.

Various studies have investigated the therapeutic properties of *Plectranthus aromaticus*, revealing its antioxidant, antimicrobial, anti-inflammatory, analgesic, diuretic, and cytotoxic effects (El-Hawary et al., 2012). Moreover, the essential oil of the Comorian species has demonstrated notable antimicrobial activity (SOS Hassane et al., 2011).

3.3.3. Annona muricata

3.3.3.1. General Overview

Annona muricata L., commonly known as soursop, belongs to the Annonaceae family. It has a wide pantropical distribution and is a small, widely distributed tree originating from Central America. The fruit of *Annona muricata* is often used in juices, sweets, and sorbets and is regarded as one of the most important tropical fruits globally. It contributes significantly to the economy in tropical regions of America, Australia, Africa, and Malaysia.

3.3.3.2. Botanical Description and Classification

Soursop is a bushy shrub characterized by alternate, thick, oval leaves that are shiny on the upper surface, glabrous, and slightly acuminate at the tip. The flowers of the

plant have fleshy, valvular petals, with the outer petals being smaller than the inner ones. The fruit is ovoid or kidney-shaped, spiny, and can reach up to 2 kg in weight (Adjanohoun et al., 1982).
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Magnoliidae
Order: Magnoliales
Family: Annonaceae
Genus: Annona
Binomial Name: *Annona muricata*

3.3.3.2. Pharmacological Properties and Traditional Uses of Annona muricata (Soursop)
Traditionally, the leaves of *Annona muricata* (soursop) have been utilized to treat a wide range of ailments, including headaches, insomnia, cystitis, liver problems, diabetes, hypertension, and inflammation. The leaves are also known for their antispasmodic and antidysenteric properties (Sousa et al., 2004; Di Stasi et al., 2002). Additionally, the roots of *Annona muricata* are valued for their antiparasitic and pesticidal effects (Gleye et al., 1997).

Numerous studies have attributed various pharmacological properties to this plant, including antinociceptive and anti-inflammatory effects (Sousa et al., 2010), antiviral activity (Gonzalez et al., 2008), antimicrobial properties (Paarakh et al., 2009), as well as anticarcinogenic and genotoxic effects (Pathak et al., 2010). Research on the leaves and seeds of *Annona muricata* has led to the isolation of several acetogenins, which demonstrate promising antitumoral, cytotoxic, antiparasitic, and pesticidal activities (Gajalakshimi et al., 2012).

In the context of the survey, the plant was found to be used for treating a variety of conditions, including dizziness, constipation, hypertension, malaria, and cancer. Additionally, it is said to possess gynaecological properties, particularly in the treatment of painful periods, and is believed to have positive effects on male sterility.

3.3.4. Euphorbia hirta
3.3.4.1. General Overview
Euphorbia hirta (E. hirta), commonly known as "asthma weed," belongs to the Euphorbiaceae family. It is a small, annual herb that thrives in tropical regions. The plant typically grows upright with a slender stem and can reach a height of 80 cm, although it is sometimes seen lying down (Basma et al., 2011).

3.3.4.2. Botanical Description and Classification
Euphorbia hirta is a broad-leaved, annual herbaceous plant with a hairy stem and numerous branches extending from the base to the tip. The leaves are opposite, elliptical, oblong, or lanceolate, with slightly toothed margins and a darker upper surface. The plant produces small, numerous flowers grouped into dense cymes approximately 1 cm in diameter. When cut, the stem and leaves release a white or milky sap. *Euphorbia hirta* is commonly found in open waste areas, stream banks, meadows, roadsides, and paths (Sandeep et al., 2009; Basma et al., 2011).

- **Kingdom:** Plantae
- **Division:** Magnoliophyta

- **Class:** Magnoliopsida
- **Subclass:** Rosidae
- **Order:** Euphorbiales
- **Family:** Euphorbiaceae
- **Genus:** Euphorbia
- **Binomial Name:** *Euphorbia hirta*

3.3.4.3. Uses of *Euphorbia hirta*

Euphorbia hirta is a widely used plant in traditional medicine, known for its broad spectrum of therapeutic applications. It is commonly used to treat asthma, coughs, diarrhea, and dysentery (Basma et al., 2011; Ogbolie et al., 2007). The plant is also employed in the treatment of intestinal parasites, peptic ulcers, heartburn, bronchitis, hay fever, laryngeal spasms, emphysema, colds, kidney stones, menstrual disorders, sterility, and venereal diseases.

In addition to these uses, *Euphorbia hirta* is recognized for its ability to treat various skin and mucous membrane ailments and is used as an antiseptic. It is also applied as an analgesic for headaches, toothaches, rheumatism, colic, and pain during pregnancy (Basma et al., 2011).

Several pharmacological properties have been attributed to *Euphorbia hirta*, including antioxidant (Sharma et al., 2014; Subramanian et al., 2011; Basma et al., 2011), antimicrobial (Shanmugapriya Perumal et al., 2012; Rajeh et al., 2010), antimalarial (Liu et al., 2007), antidiabetic (Maurya et al., 2012; Subramanian et al., 2011; Kumar et al., 2009), antihyperlipidemic (Maurya et al., 2012), anti-inflammatory (Sharma et al., 2014), and anticancer (Sharma et al., 2014) effects.

Phytochemical analyses of the plant have revealed the presence of various bioactive compounds, such as reducing sugars, terpenoids, alkaloids, steroids, tannins, flavonoids, saponins, cardiotonic glycosides, and other phenolic compounds (Shanmugapriya Perumal et al., 2012; Basma et al., 2011).

3.3.5. Moringa oleifera

3.3.5.1. General Overview

Moringa oleifera, native to the sub-Himalayan regions of India, Pakistan, Bangladesh, and Afghanistan, belongs to the Moringaceae family. Known since antiquity, this tree has been used by the ancient Romans, Greeks, and Egyptians and is now widely naturalized in many tropical regions. It is found in India, Ethiopia, the Philippines, Sudan, West, East and South Africa, tropical Asia, Latin America, the Caribbean, Florida, and the Pacific islands. All parts of the tree are edible (Fahey, 2005). In addition to its medicinal uses, Moringa is utilized in various fields such as biomass production, animal fodder, biogas, green manure, and biopesticides (Fuglie, 1999).

3.3.5.2. Botanical Description and Classification

Moringa oleifera is a small tree or shrub that can grow up to 5 meters tall. It has thick grayish or brownish bark, and its compound leaves are 2-3 times imparipinnate, with 4 or 5 pairs of opposite pinnae. The flowers are white, forming axillary or terminal panicles. The fruit is an elongated, linear silique, reaching up to 20 cm long and 2 cm wide.

Kingdom: Plantae

Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Dilleniidae
Order: Capparales
Family: Moringaceae
Genus: Moringa
Binomial Name: Moringa oleifera

3.3.5.3. Uses of *Moringa oleifera*

Moringa oleifera is primarily used by local populations to combat malnutrition, anemia, and other nutritional deficiencies, particularly in infants and nursing mothers (Sheeran, 2011). The leaves of the plant are rich in essential nutrients, including vitamins A, C, E, and B, calcium, potassium, magnesium, manganese, selenium, and iron. They also contain essential amino acids such as isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine.

Medicinally, Moringa is used to address fatigue and various deficiencies. Its leaves are known for their anti-tumor, anti-inflammatory, and antibacterial properties (Vergara et al., 2017). The seed oil is particularly notable for its nutritional and cosmetic benefits. It is rich in fatty acids, such as oleic acid (omega 9) and palmitoleic acid (omega 7), which contribute to cardiovascular health and help manage diabetes. Moringa oil also has moisturizing and reparative properties, aiding in skin healing, slowing the aging process, and preventing the appearance of wrinkles. As a result, the cosmetic industry is increasingly interested in its properties for preventing dry mucous membranes (Nicolle, 2018).

In this study, *Moringa oleifera* was found to be used in the treatment of nutritional deficiencies, diabetes, vision problems, painful periods, blood circulation issues, hypertension, as an antidepressant, and for managing anemia.

For more details and clarity on the distribution of the data, the following tables and figures are added in the annex:

- **Table 3**: The hundred most important genetic resources
- **Table 4**: The hundred most important genetic resources (continued)
- **Table 5**: The hundred most important genetic resources (continued)
- **Table 6**: The hundred most important genetic resources (continued)
- **Table 7**: The hundred most important genetic resources (continued)
- **Figure 1**: Percentage of surveyed resources
- **Figure 2**: Distribution of harvested and used genetic resources in Ngazidja
- **Figure 3**: Distribution of harvested and used genetic resources in Ndzouani
- **Figure 4**: Distribution of harvested and used genetic resources in Mwali

These additional elements provide a more detailed explanation and a clear overview of the results obtained during this study.

4. CONCLUSION

This study provides a comprehensive inventory of the priority genetic resources used in traditional medicine across the Union of the Comoros. The primary objective was to identify 100 key genetic resources utilized in local healthcare practices. To achieve this,

interviews were conducted with specialists in traditional medicine, and the data collected were cross-referenced with socio-economic and ecological criteria relevant to each resource.

The research covered all three islands of the Union of the Comoros, spanning thirty-three villages: six in Mwali, six in Ndzouani, and twenty-one in Ngazidja. In total, 282 records were gathered, leading to the identification of 131 genetic resources, including 111 plant resources, 20 animal resources, and no microbial resources. The findings highlight the significant reliance of the local populations on plant-based remedies, as plant resources accounted for the majority of the medicinal resources identified.

Through data processing and analysis, we were able to pinpoint the 100 most important genetic resources, which include 13 animal-based resources and 87 plant-based resources. The study underscores the vital role of plant resources in traditional medicine, particularly in the treatment of common ailments, and highlights the rich biodiversity of the Comoros archipelago in supporting these practices.

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ANNEX

Tables:

Table 1 : *Data distribution*

Islands	Number of villages	Total cards
Mwali	6	49
Ndzouani	6	80
Ngazidja	21	153

Table 2*: Distribution of resources by island*

Iles	Resources		
	Animal	Vegetal	Total
Mwali	0	41	41
Ndzouani	11	42	53
Ngazidja	9	74	83

Table 3*: The hundred most important genetic resources*

	Local name	Scientific name	Family	Therapeutic propreties
1	Roulé (NG, Mw), Ntroulé (Nd)	*Ocimum suave*	Lamiaceae	Painful periods, Constipation, intestinal problems, pregnancy, Cleaning after childbirth, White discharge, Joint problems
2	Paraouvé (Nd, Mw), Nadombwé (NG)	*Plectranthus aromaticus*	Lamiaceae	Gynecological problems, Cough, Headaches, Flu, Body, Diarrhea, Malaria, Crazy, Cramps
3	Konokono (NG)	*Annona muricata*	Annonaceae	Vertigo, Constipation, Hypertension, Malaria, Cancer, Painful periods, Male sterility
4	Mdoindzia (NG), Foudofoudo (NG)	*Euphorbia hirta*	Euphorbiaceae	Diarrhea, Typhoid, Stomach ache
5	Mmondjé (NG)	*Moringa oleifera*	Moringaceae	Nutrition, Diabetes, Vision, Painful periods, Blood circulation, Hypertension, Antidepressant, Anemia
6	Karanfou (NG, Nd, Mw)	*Eugenia aromatica*	Myrtaceae	Cramp, Strength, Stomach ache, Cough, Headache, Digestive disorders, Mouthwash, Toothache, Sore throat, Diarrhea (Cholera)
7	Landa (NG, Nd, Mw)	*Tenrec ecaudatus*	Erinaceidae	Asthma, Cataracts, Heart disease, Respiratory disorders
8	Mbera (NG)	*Psidium guajava*	Myrtaceae	Stomach ache, V arious pains, Diarrhea
9	Mzavka (Nd, Mw), Mbonobo (NG)	*Persea americana*	Lauraceae	Stomach ache, Boils, Anemia
10	Poipoiyi (NG)	*Carica papaya*	Caricaceae	Stress, Urinary tract infections, Triglyceride, Cholesterol, Stomach, Constipation
11	Mboi sera, Tramba mzungu (NG)	*Lantana camara*	Verbenaceae	Hypertension, Anemia, Stomach ache, Malaria, Flu
12	Mnazi (NG)	*Cocos nucifera*	Arecaceae	Headaches, Cough, Gynecological problems
13	Margoz (NG, Nd, Mw)	*Momordica charantia*	Cucurbitaceae	Stroke, Diabetes, Hemorrhoids, Abdominal pain, Diarrhea, Stomach ache
14	Dara (NG, Mw)	*Piper capense*	Piperaceae	Asthma, Stomach ache, Diarrhea, Wound
15	Rambou Msirou (NG)	*Piper pyrifolium*	Piperaceae	Headache, Malaria, Flu, Cramp, Hip pain, Diarrhea, Gives strength
16	Mgnimba (NG)	*Cordia mixa*	Boraginaceae	Fracture
17	Sanamaka (NG)	*Cassia occidentalis*	Fabaceae	Pregnancy (baby's health before birth), Anemia, Hypertension, Stomach problems, Asthma, Conjunctivitis, Cancer
18	Mtso (NG, Nd, Mw)	*Coesalpinea bonduc*	Fabaceae	Gynaecological problems, Diarrhoea, Cramp, Hernia, Hypertension
19	Mri Mzoungou (NG)	*Jatropha curcas*	Euphorbiaceae	Eyes, Gynecological problems, Headaches
20	Mdarassini (NG)	*Cinnamomum verum*	Lauraceae	Strength, Cramp, Cancer
21	Nochi (Ndjizi) (NG, Nd, Mw)	*Apis mellifera*	Apidae	Cough

22	Doungoiwoungwé (NG, Nd, Mw)	*Cissus quadrangularis*	Vitaceae	Internal cold, Stomach ache, Inflammation
23	Dzindzanu (NG, Nd, Mw)	*Curcuma longa*	Zingiberaceae	Stroke, Loss of white blood, Stomach problems
24	Paraouvé doumé (Nd, Mw), Nadomboé ya maka (NG, Nd, Mw)	*Plecthrantus*	Lamiaceae	Stomach ache, Diarrhea
25	Sandzé (NG, Nd, Mw)	*Cimbopogon citratus*	Poaceae	Headaches, Stroke, Stomach aches
26	Shivoundzé (Nd, Mw)	*Phylarthron comorense*	Bignoniaceae	Gynaecological problems, all kinds of illnesses
27	Tatounga (Mw)			Hernia, Cramp, Stomach ache
28	Ntsohowo (NG)	Bidens pilosa	Asteraceae	Anemia, Blood pressure
29	Mledjeza (NG), Mbwesa (NG)	Tambourissa sp	Monimiaceae	Constipation, Skin, Scar, Diarrhea, Gynecological problems
30	Bouwou (NG, Nd, Mw)	Adansonia digitata	Bombacaceae	Liver, kidney, stomach, Hypertension, diabetes, calcium, potassium
31	Konokono masera (Nd), Noni	Morinda citrifolia	Rubiaceae	Diabetes, Gynecological problems, Female sterility, Urine (baby), hormone
32	Mguirnadelle (NG)	Passiflora edulis	Passifloraceae	Hypertension, Constipation
33	Mkinini (NG)	Eucalyptus robusta	Myrtaceae	Malaria, Flu
34	Mnanvou, Bwa (NG)	Solanum nigrum	Solanaceae	Diarrhea, Stomach ache, Gastrointestinal problems
35	Mlazi (NG)	Woodfordia uniflora	Lythraceae	Stomach aches, Gynecological problems, Aphrodisiac, Rheumatism
36	Meya wani (Nd), Mma mani (NG)	Bryophyllum pinnatum	Crassulaceae	Diarrhea, Typhoid, Joint, Weakness
37	VIB (NG, Nd, Mw)	Merremia peltata	Convolvulaceae	Anemia, Paralysis
38	Mdesiré (NG)	Clidemia hirta	Melastomataceae	Diarrhea, Stomach ache
39	Kognodé (NG, Nd)	Aloes sp	Aloeaceae	All kinds of illnesses (stomach, head...), Diarrhea, Headache, Cramp, Fracture, Sprain
40	Myembé (NG)	Mangifera indica	Anacardiaceae	Diarrhea, Stomach ache
41	Chipvahara (Mw)	Aerva lanata	Amaranthaceae	Gynaecological problems, Female sterility, Painful periods, Internal cold
42	Ouhadjou (Mw)	Tamarindus indica	Caesalpiniaceae	Antitetanus, Trauma (Fracture, Sprain)
43	Nkoungoumanga (NG), Nkounkoumanga (Nd)	Myristica fragans	Myristicaceae	Hypertension, Stomach ache, Headache
44	Chidzala Mengoni (Mw)	Phyllanthus amarus	Phyllanthaceae	Diarrhea, Typhoid
45	Pankangnilé (Nd)	Alopias sp	Alopiidae	Hair, Skin, Liver, Strengthens Bones, Asthma
46	Zabadi (Ngava) (Nd)	Civettictis civetta	Felidae	Respiratory failure
47	Mfuriapa (NG, Nd)	Artocarpus altilis	Moraceae	Stomach problems, Respiratory problems, Cough, Asthma
48	Mhonko (Nd)	Rhizophora micronata	Rhizophoaracea	Diabetes, Malaria
49	Pihiro (Fankowa) (NG)	Achatina fulica	Achatinidae	Asthma
50	Unono wagepé (NG)	Helichrysum fulvescens	Asteraceae	Stomach ache, Intestinal pain, Diarrhea
51	Itsuzi (NG)	Paederia foetida	Rubiaceae	Infection, Dental pain, Impotence
52	Nkandza (NG)	Ocimum canum	Lamiaceae	Flu, Stomach problems
53	Kolokolo gnugni(NG)	Annona senegaliensis	Annonaceae	Fracture, Vertigo
54	Mtsuzi bwa (NG)	Dodonaea viscosa	Sapindaceae	All kinds of illnesses (stomach, head...), weakness
55	Mfenessi (NG)	Artocarpus heterophyllus	Moraceae	Fibroma, Asthma
56	Khanizo (Nd), Mbabawounandzo	Cardiospermum microcarpum	Sapindaceae	Headache, Low temperature, Fracture
57	Mtroundroi	Citrus sinensis	Rutaceae	Skin blemishes
58	Trili (Nd)	Carassius auratus	Cyprinidae	Dermatological problems, Calcium
59	Mbweza (Nd)	Octopus filvus	Octopodidae	Hepatitis B, Kidneys, Chest problems
60	Pweré (Nd)	Katsuwonus pelamis	Scombridae	Gas, Calcium, Growing children
61	Gnamaré (Nd)	Acanthopleura brevispinosa	Chitonidae	Brightens eyes, Strengthens sperm, Removes black scars
62	50 maladies (Nd)	Azadiracta		Headache, Stomach pain
63	Chiyazi (NG)	Dioscorea alata	Dioscoreaceae	Allergy
64	Mbé (NG)	Bos indicus	Bovidae	Stomach aches
65	Nessa (NG)			Constipation
66	Paka (NG)	Musa sp	Musaceae	Anemia
67	Wombo (Mboga) (NG)	Colocasia esculenta	Araceae	Malaria
68	Mnanas (NG)	Ananas comosus	Bromeliaceae	Calcium
69	Henné, Yina (NG)	Lawsonia inermis	Lythraceae	Skin diseases, Wounds
70	Basilic	Ocimum basilicum	Lamiaceae	Antispasmodic, Digestive problems
71	Singuiziou (NG)	Zingiber officinale	Zingiberaceae	Cough, sore throat
72	Mlitchi (NG)	Litchi sinensis	Sapindaceae	Skin

73	Mfandrabo (NG, Nd, Mw)	Aphloia theiformis	Aphloiaceae	Stomach aches
74	Mbatsé (Nd)	Ipomea batata	Convolvulaceae	Fibroma
75	Ntsouzi (Nd)	Cajanus cajan	Fabaceae	Hypertension
76	Trounda tamou (Mw)	Punica granatum	Lythraceae	Dermal problems
77	Poumpou (Mw)	Ipomea pes-caprae	Covolvulaceae	Malaria, Gynecological problems
78	Itsangu (NG)	Mucuna pruriens	Fabaceae	Hypertension, Hypothermia
79	Pamplemous	Citrus paradisi	Rutaceae	Pain
80	Katsi (Nd)			Pregnancy
81	Pervenche de Madagascar	Catharantus roseus	Apocynaceae	Liver disorder
82	Anfou (Nd, Mw)	Jasminium nummulariaefolium	Oleaceae	Whitening, Hemorrhoids, Palpitation, Hypertension
83	Mvono (Ricin) (Nd, Mw)	Ricinus communis	Euphorbiaceae	Female genitalia after childbirth, Knee, Hair
84	Mkayidi (NG)	Pilea microfila		Wound
85	Issambaha (NG)	Hibiscus furetensis	Malvaceae	Hip pain
86	Msulbari (NG)	Pterocarpus indicus	Fabaceae	Headaches
87	Mpatakali (NG)	Vernonia grandis	Asteraceae	Diabetes, Hypertension
88	Yilali (NG)	Datura metel	Solanaceae	Asthma
89	Foulamboi (NG)	Guetterda speciosa	Rubiaceae	Stomach aches
90	Ipamlendjé (NG)	*Ipomea indica*	Convolvulaceae	Headaches
91	Ndjeni (NG)	*Tragia furialis*	Urticaceae	Hypertension, Diabetes
92	Nkame za masera (NG)	*Abrus precatorius*	Fabaceae	Diabetes
93	Dadjilé (NG)	*Senna tora*	Fabaceae	Hips (muscles)
94	Kandzi (NG)	*Pteridium aquilinum*	Dennstaedtiaceae	Abdominal pain
95	Mhamba (NG)	*Fluegggea virosa*	Phyllanthaceae	Malaria
96	Wudziya (NG)	*Oxalis sp*	Oxalidaceae	Wound, Mycosis
97	Mroungamati (NG)	*Cissus quadra*		Hypertension, Stomach problems
98	Saza (NG)	*Saccostrea cucculata*	Ostreidae	Wound (Healing)
99	Pigeon	*Columba livia*	Columbidae	Respiratory problems, coughing, stomach problems
100	Ndema (NG)	*Pteropus seychellensis comorensis*	Pteropodidae	Hair loss, Impotence, Skin
101	Mkadi (Nd, Mw)	*Ocimum basilicum*	Lamiaceae	Flu

FIGURE CAPTIONS

Figure 1: Percentage of resources surveyed
Figure 2: Distribution of genetic resources harvested and used in Ngazidja
Figure 3: Distribution of genetic resources harvested and used at Ndzuani
Figure 4: Distribution of genetic resources harvested and used at Mwali

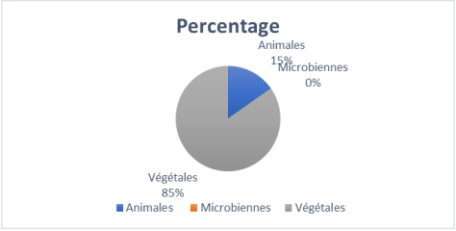

Figure 1: Percentage of resources surveyed

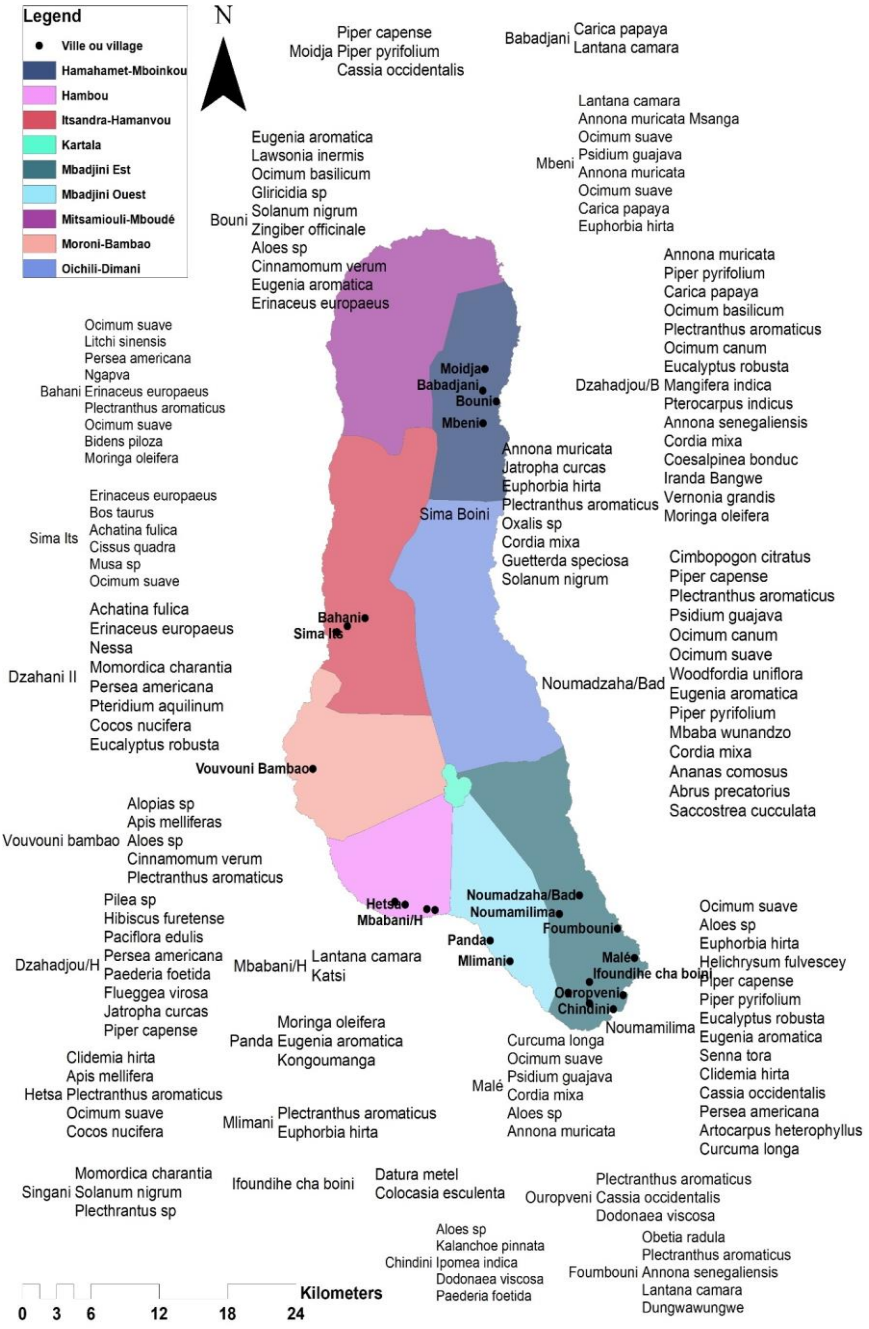

Figure 2: Distribution of genetic resources harvested and used in Ngazidja

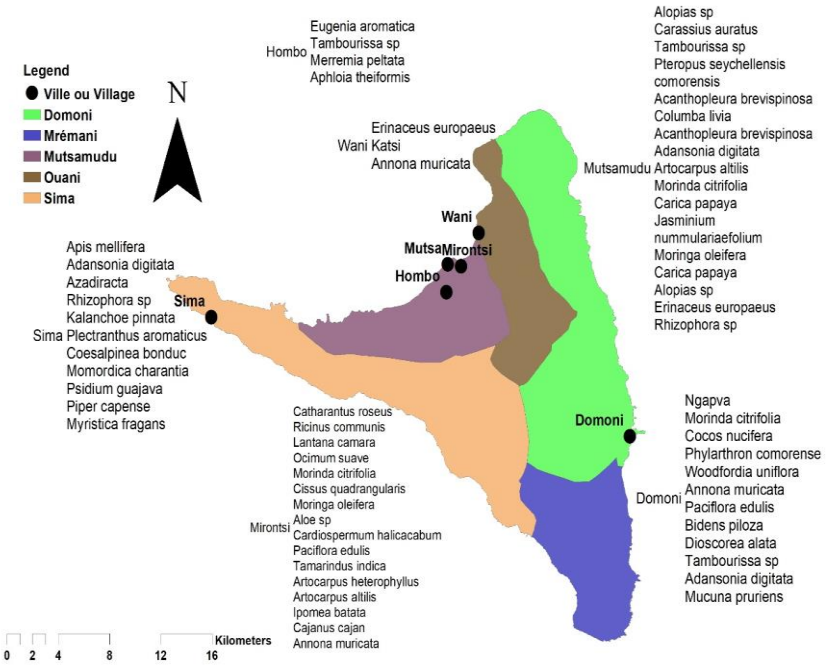

Figure 3: Distribution of genetic resources harvested and used at Ndzuani

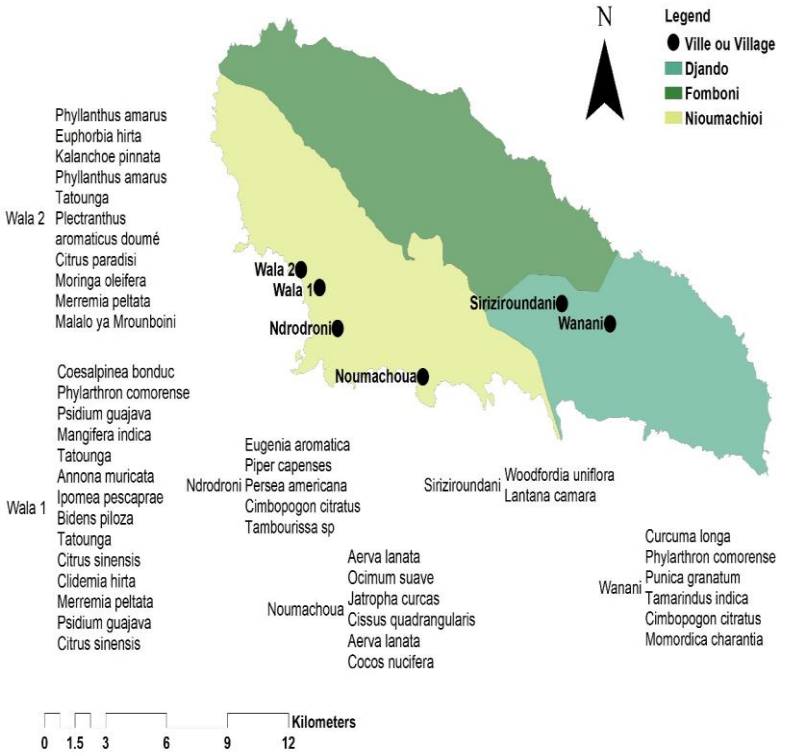

Figure 4: Distribution of genetic resources harvested and used at Mwali