Screening of mahoran plants for cosmetic applications.

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Figure 1 : Location of Mayotte

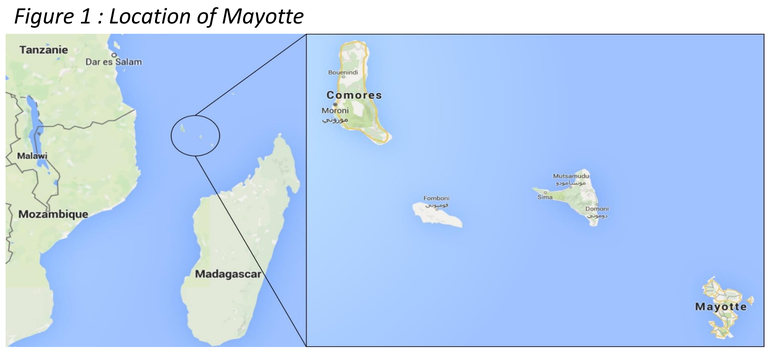


Figure 2: Reaction of DPPH in contact with a hydrogen donor. (A) Radical form. (B) Reduced form (Wang et al., 2016).

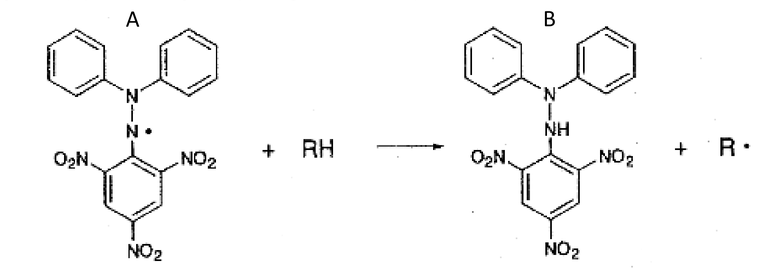


Figure 3 : Synthesis of 13-hydroperoxy-9,11-octa-decadienoic acid (13S-HPOD) and 9-hydroperoxy-9,11-octa-decadienoic acid (9S-HPOD) using lipoxygenase and linoleic acid (Andreou et al., 2009).

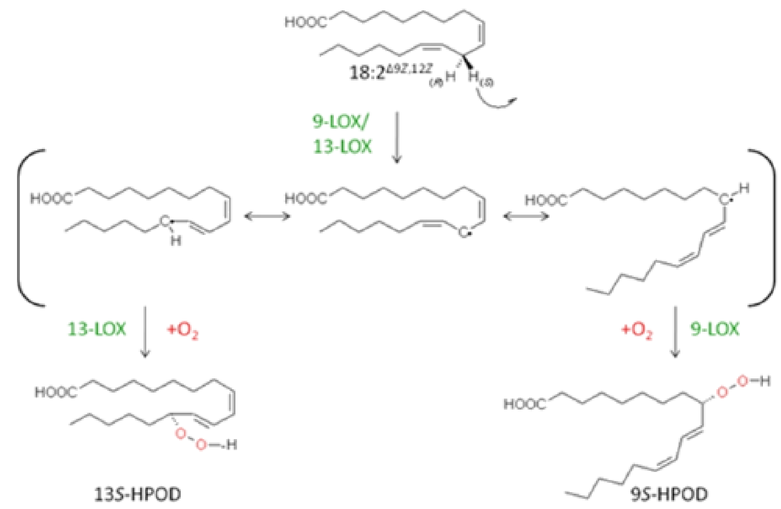
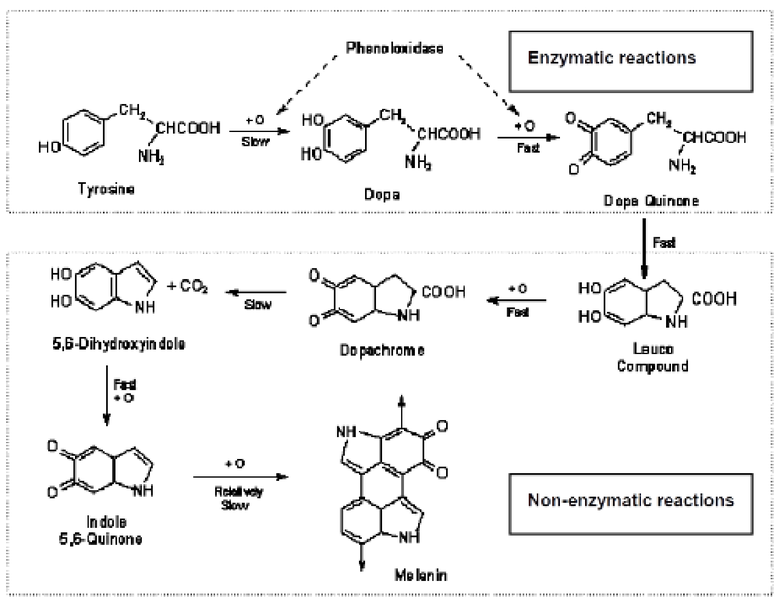


Figure 4 : Synthesis of melanin with enzymatic reaction involving phenoloxidase activity of tyrosinase (Kamkaen et al., 2007).



Introduction

Since time immemorial, people have used plants for energy and to cure themselves; these plants are deeply linked to our evolution and our culture. This study aims at identifying the plants used traditionally as cosmetics in Mahoran culture, in order to develop new products. Following a chemotaxonomical study and an ethnobotanical study, plant samples from different species (Table 1) were brought back from Mayotte and were analyzed so as to determine some of their biological activities such as skin soothing, skin whitening, and skin protection.

This works aims to develop a new branch of green cosmetics based on the Mahoran Flora, keeping in mind the environment and to provide a social and economic boost for the island.

Experimental methodology

Preliminary study

Chemotaxonomic study
- Bibliographic review
- Pharmacopeia from Madagascar, Seychelles, La Reunion
- 5 species

Ethnobotanical study
- 32 informants
- 92 species identified
- Species selection based on informant consensus

Protocol development
- Skin protection
- Skin soothing
- Skin whitening

Sampling

Table 1 : List of the sampled species issued from the ethnobotanical and chemotaxonomic study. Most organs available during the infield missions were collected in order to by analyzed. Crude extracts were realized using acetone.

Latin name	Latin name	Latin name
Acalypha hispida Bum. F.	*Kalanchoe pinnata* (Lam.) Pers.	*Paullinia pinnata* L.
Acalypha wilkesiana Müll. Arg.	*Lantana camara* L.	*Pandanus mayotteensis* H. St. John
Adansonia digitata L.	*Lawsonia inermis* L.	*Persea americana* Mill.
Aloes mayottensis A. Berger	*Leea guineensis* G. Don	*Sesamum indicum* L.
Cananga odorata (Lam.) Hook. f. & Thomson	*Litchi chinensis* Sonn.	*Syzygium aromaticum* (L.) Merr. & L.M. Perry
Erythroxylum corymbosum Boivin ex. Baill.	*Litsea glutinosa* (Lour.) C. Rob.	*Tamarindus indica* L.
Erythroxylum lanceum Bojer.	*Myristica fragans* Houtt.	*Zingiber zerumbet* (L.) Sm.

Biological activity evaluation

Skin protection
- Antioxidant activity
- α,α-diphenyl-β-picrylhydrazyl (DPPH) (Fig. 2)
- λ = 517 nm
- Reference : 6-Hydroxy-2,5,7,8-tetramethylchromane-2-carboxylic acid (TROLOX)

Skin soothing
- Anti-inflammatory activity
- Lipoxygenase pathway (Fig. 3)
- Substrate : linoleic acid
- λ = 234 nm
- 9 and 13 HPOD synthesis inhibition
- Reference : Nordihydroguaiaretic acid (NDGA)

Skin complexion
- Whitening activity
- Tyrosinase Pathway (Fig. 4)
- Substrate : L-DOPA
- λ = 475 nm
- Dopachrome synthesis inhibition
- Reference : Kojic acid

Results

Table 2 : Inhibition concentration 50 (IC50) of the most significant samples from the screening expressed in g/L of fresh material.

		Average IC50 (g/L)					Average IC50 (g/L)		
Species	**Organ**	**DPPH**	**Lipoxygenase**	**Tyrosinase**	**Species**	**Organ**	**DPPH**	**Lipoxygenase**	**Tyrosinase**
Acalypha hispida Burm. F.	Fresh leaves	0,434			*Myristica fragrans* Houtt.	Dry seeds		1,209	
	Dry flowers	1,350		85,707	*Paullinia pinnata* L.	Dry leaves	1,343		
	Fresh flowers	0,485				Dry liana	1,786		
	Dry leaves		187,134			Dry aerial roots	1,439		
Acalypha wilkesiana Müll. Arg.	Fresh leaves	0,396		31,750	*Persea americana* Mill.	Fresh leaves	0,889		
Cananga odorata (Lam.) Hook. f. et Thomson	Fresh flowers		6,700			Dry leaves	0,860	0,981	
	Dry leaves			7,355		Fresh kernel	2,164		68,460
Erythroxylum corymbosum Boivin ex Baill.	Dry leaves	0,538				Dry kernel	2,043	35,725	
	Dry wood			2,498		Dry roots	0,956		16,674
Kalanchoe pinnata (Lam.) Pers.	Fresh leaves	1,175			*Syzygium aromaticum* (L.) Merr. et L.M. Perry	Fresh leaves	0,455		
Lantana camara L.	Fresh leaves	1,589		87,800		Dry leaves	0,562		11,364
	Dry leaves	1,666				Dry wood	0,532		
Lawsonia inermis L.	Fresh leaves	0,562				Dry roots	3,228		11,369
	Dry leaves	0,906			*Tamarindus indica* L.	Dry leaves			
	Dry roots	0,958				Fresh leaves			8,300
Leea guineensis G. Don	Fresh leaves	0,281		7,575	*Zingiber zerumbet* (L.) Sm.	Dry leaves		4,060	36,552
	Dry leaves	0,607	2,710	0,374		Dry flowers		11,191	
	Dry fruits	1,410		10,108		Fresh rhizom		15,440	
	Dry roots	0,815				Dry rizhom		3,565	
Litchi chinensis Sonn.	Fresh leaves	1,670				Dry stem		11,380	487,320
	Dry leaves	0,499	2,050	2,746	Kojic acid				0,33814
	Dry wood	0,446			Nordihydroguaiaretique acid			0,07169	
	Dry roots	0,363		4,033	6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylique acid		0,00062		

Results and perspectives

Finally, out of the 21 species analyzed only 15 showed significant positive activities (Table 2). The most effective antioxidant activity was observed in fresh leaves from *Leea guineensis* G. Don. (IC50 = 0,281 g/L) and dried roots from *Litchi chinensis* Sonn. (IC50 = 0,346 g/L). The best results for the anti-inflammatory activity were observed in the dry leaves from *Persea Americana* Mill. (IC50 = 0,981 g/L) and *Myristica fragrans* Houtt. (IC50 = 1,209 g/L). The plant extracts showing the best anti-tyrosinase activity were the dry leaves from *Leea guineensis* G. Don. (IC50 = 0,374 g/L) and the dry wood from *Erythroxylum corymbosum* Boivin ex Baill. (IC50 = 2,498 g/L).

The following steps in this work will consist of separating the crude extracts of the most interesting samples in order to characterize the molecules responsible for the observed biological activities.

Perspectives

Molecular characterization

Thin layer chromatography
- Mobile phase profiling
- Major components identification
  - Terpenes
  - Alkaloids
  - Phenolic acids and flavonoids

Analytical HPLC
- Pre-preparative HPLC
  - Crude extract pretreatments
- Post-preparative HPLC
  - Molecular characterization

Preparative HPLC
- Plant extracts fractionation
- Fraction's biological activities evaluation
  - Synergistic effects
  - Antagonistic effects
  - …

Figure 5 : Leea guineensis G. Don

Acknowledgment and References

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