



Assessment of Some Tree Species in Semi-Arid Region of Nigeria with Potential of Enriching Organic Cosmetic Production

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The interest of consumers around the world is presently increasing toward the use of organic cosmetics. Forest tree extracts play a major role in organic cosmetic productions. This study evaluates forest tree species within semi-arid region of Nigeria with potential to enrich cosmetic industry. Extracts of six (6) common forest tree species found within semi-arid region of Nigeria were collected and incorporated into soap and cream productions. The forest tree species were *Acacia nilotica*, *Adansonia digitata*, *Azadirachta indica*, *Eucalyptus camadulensis*, *Moringa oleifera*, and *Salix babylonica*. A comparative analysis before and after using the soaps and creams for ten (10) months by eight (8) volunteered individuals were carried out to determine the efficacy of the products. The result shows a complete disappearance of all the skin issues of those with skin

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conditions such as skin blemishes, acne, pimples, skin discoloration, wrinkles, fine lines, body odor, and sores after ten months of usage. Skin glowing, smoothness, and even toned complexion were observed from those without skin conditions. Therefore, the development of cosmetic ingredients from various species of forest tree extracts can be an interesting option. It will encourage the cosmetic industries to go into large planting of different forest tree species needed for their cosmetic production and as a result the environmental pollution and degradation will be reduced.

Keywords: Tree extracts; organic cosmetic; potential; skin conditions; soap and cream.

1. INTRODUCTION

Forest bathing of the human skin involves the use of the tree extracts that are incorporated in organic cosmetics which are working to get our complexion healthier, most healing and less stressed from environmental pollution by greenhouse gases.

Forest skin care is a branch from the natural trend of the past few decades, which involved the use of forest tree-derived ingredients like *Adansonia* extracts, *Eucalyptus* extracts, *Salix* extracts, *Azadirachta* extracts, *Moringa* extracts, birch tree extracts, and so many other species having potent antioxidant abilities and are also anti-inflammatory powerhouses. According to Kim et al. [1], the awareness and evidence of the link between atmospheric pollution, premature aging, and an increase cellular oxidative stress and increase in reactive oxygen species (ROS) and matrix-metalloproteases (MMPs) is increasing. Molecules can act by forming a barrier (film) on the skin, directly interact with the pollutant by chelation, or help the skin fight by providing antioxidant activity. Cefali et al. [2] explained that molecules with aromatic rings in their structure such as flavonoids naturally absorb UV radiation between 200 and 400 nm (UVA and UVB), provide protection to the plant from excessive solar radiation, and can act as alternative sunlight filters in cosmetics. Lorigo and Cairrao [3] also explained that the anti-oxidant molecules from plants can help to support the natural antioxidant mechanism of skin and can be used to stabilize UV filters by preventing the accumulation of radicals.

Consumers are increasingly seeking cosmetic products without contentious synthetic chemicals. The global consumption of herbal cosmetics has shown spectacular growth in recent years due to the growing recognition of long-term health benefits [4]. According to the available market research, the current global natural and organic personal care products market is valued approximately US\$ 11 billion and is expected to reach US\$ 22 billion by 2022

(Liyanaarachchi et al., 2018). Thus, the global enormous demand for herbal cosmetics results in a huge trade from local to the international level [5]. Forest tree extracts treat skin conditions such as pimples, shaving bumps, body odour, skin blemishes, psoriasis, eczema, warts, detoxifies the skin, soothes and heal bites, stimulates cell turnover, deeply cleanses and restores the health of damaged skin. The organic cosmetics industry is valued very high in which the development of active ingredients of natural origin is exponentially growing. The development of cosmetic ingredients from forest tree extracts can therefore be an interesting option to increase the practice of forestry. The objective of this study is to assess the inventory and evaluates the common tree species found within semi-arid region of Nigeria with potential to enrich the organic cosmetic industry.

2. METHODOLOGY

2.1 Study Area

This study was carried out in Semi-Arid region of Northern Nigeria. The semi-arid region otherwise called drought prone areas of northern Nigeria lie within the Sudano-Sahelian region roughly north of Latitude 10°N, delineated by latitude 14°N; and between longitudes 2° 44' E and 14° 42'E [6,7]. The zone cuts across Sokoto, Kebbi, Zamfara, Katsina, Kano, Jigawa, Yobe Borno, Bauchi, Gombe, and Adamawa States respectively [8].

2.2 Data Collection Methods

Data were collected from *Adansonia digitata*, *Acacia nilotica*, *Azadirachta indica*, *Eucalyptus camadulensis*, *Moringa oleifera*, and *Salix babylonica* trees which were the Six (6) common species of forest trees found within the study area. Their extracts which include the leaves, the bark, the seeds, and the pods were collected. The leaves were dried and ground into powder form, the seeds were dried and oils were extracted from them, the bark was boiled and the water was collected, and the powder from the pod was collected.

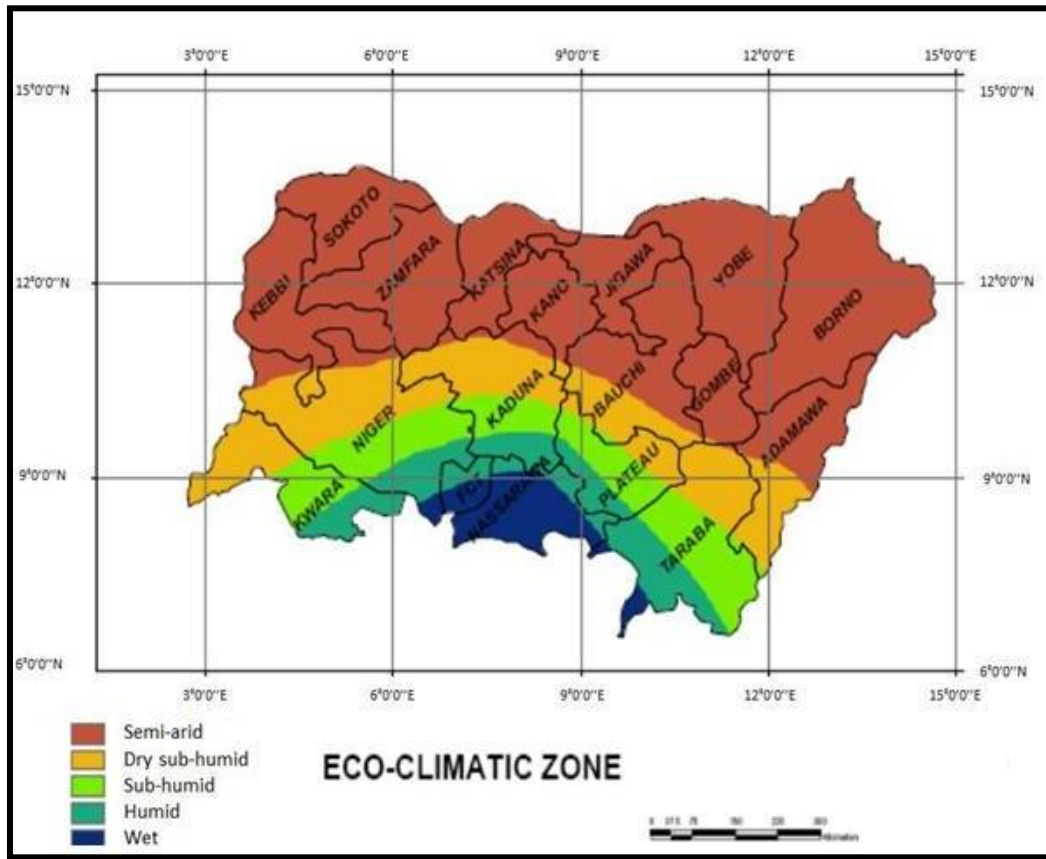


Fig. 1. Map of Sudano-Sahelian region of Nigeria showing Semi-Arid region
 Source: AbdulKadir et al. [7]

2.3 Method of Incorporating the Tree Extracts into Soap and Cream Productions

The Six (6) common species of forest tree extracts collected were incorporated as follows: i) *Adansonia digitata* (Baobab Tree) extracts: the white powder from the pod were added to the gel phase of soap and liquid phase of cream production. ii) *Acacia nilotica* (Gum arabic tree) extracts: the oil from the seeds and other seeds oil of the tree species in this study were used as the base oil for saponification process of the soap making and base oil for the creams. iii) *Azadirachta indica* (Neem tree) extracts: the powder from the grounded dried leaves were added to the soap at the gel phase. iv) *Eucalyptus camadulensis* (River red gum tree) extract: the powder from dried leaves were added to the soap at the gel phase. v) *Moringa oleifera* (Drum stick tree) extracts: the powder from the ground dried leaves were added to the soap at the gel phase. vi) *Salix babylonica* (Willow tree) extracts: the bark and the leaves were boiled and the collected aqueous extract

was used to make the solution of Sodium hydroxide for soap making and part of the collected boiled water was also used as the base water for cream production.

The extracts for the production were divided into Four (4) units. The first unit was the mixture of *Adansonia digitata* extracts and *Acacia nilotica* oil. The second unit was pure *Azadirachta indica* extracts. The third unit was pure *Moringa oleifera* extracts. The fourth unit was the extracts of *Eucalyptus camadulensis*; *Adansonia digitata*; *Acacia nilotica*; *Azadirachta indica*; *Moringa oleifera* and *Salix babylonica*.

2.4 Data Analysis

A comparative analysis before and after using the soaps and creams by Eight (8) volunteered individuals were carried out to determine the efficacy of the products. Among these eight individuals, two were having pimples, acne, skin blemishes and psoriasis; one person with warts, sores, and shaving bumps; one person with dry and scaly skin; one person with body odor; and

the rest three with no skin issues. The first mixture of soap was used for all the eight individuals for three months; the second mixture was used for all the eight individuals for three months; the third was used for the eight individuals for two months and the fourth was also used for all the eight individuals for two months.

3. RESULTS

Extracts of six (6) different tree species from five (5) families, six (6) orders, and one (1) Kingdom found within Semi-Arid region of Nigeria were collected and incorporated into soap and cream productions. Table 1 shows the list of forest trees incorporated into the soap and cream productions. Table 2 shows the extracts of the part of tree used in the cosmetic production. Four (4) sets of soap and Three (3) sets of cream were produced from the tree extracts. Fig. 2 shows the Four (4) sets of soap produced and Fig. 3 shows the Three (3) sets of cream produced.

The results of the first set produced (*Adansonia digitata* and *Acacia nilotica* soap and cream) which were used by eight (8) individuals for three months shows noticeable changes from those having skin issues and significant changes in the skin texture. The results of the second set produced (pure *Azadirachta indica* extracts soap with *Azadirachta indica* and *Moringa oleifera* extracts cream) which was used for three months

shows a significant reductions in the skin issues of those with pimples, acne, skin blemishes, psoriasis, warts, sores, shaving bumps, and body odor. The results of the third set produced which was used (pure *Moringa oleifera* extracts with *Azadirachta indica* and *Moringa oleifera* extracts cream) for two months shows significant changes in the skin textures and complexion. The skin issue of the person with dry and scaly skin was reduced to the minimum. The results of the fourth set (Mixtures of *Eucalyptus camadulensis*; *Adansonia digitata*; *Acacia nilotica*; *Azadirachta indica*; *Moringa oleifera* and *Salix babylonica* extracts soap and cream) which was used for two months shows a complete disappearance of all the skin issues. Skin glowing, smoothness, and even toned skin were observed.

4. DISCUSSION

The extracts of these tree species is a natural source of antioxidants, vitamins E and A which helps to neutralize pollutants in the skin. Due to the rich antioxidant content, these tree species extracts are used by the cosmetics industry in anti-ageing personal care products. Plant extracts from herbs, leaves, flowers, fruits, and seeds form an important group of botanical-based cosmetics known as cosmeceuticals [9]. The components of these formulations, especially antioxidants that prevent skin ageing and that possess photoprotective properties, can also be used in oral supplements, referred to as nutraceuticals [10].

Table 1. The list of tree species incorporated into the soaps and cream production

S/N	Tree species	Common names	Family	Order	Kingdom
1	<i>Acacia nilotica</i>	<i>gum arabic tree</i>	<i>Fabaceae</i>	<i>Fabales</i>	<i>Plantae</i>
2	<i>Adansonia digitata</i>	<i>Baobab</i>	<i>Malvaceae</i>	<i>Malvales</i>	<i>Plantae</i>
3	<i>Azadirachta indica</i>	<i>Neem tree</i>	<i>Meliaceae</i>	<i>Sapindales</i>	<i>Plantae</i>
4	<i>Eucalyptus camadulensis</i>	<i>African red gum tree</i>	<i>Malvaceae</i>	<i>Myrtales</i>	<i>Plantae</i>
5	<i>Moringa oleifera</i>	<i>Drum stick tree</i>	<i>Moringaceae</i>	<i>Brassicales</i>	<i>Plantae</i>
6	<i>Salix babylonica</i>	<i>Weeping Willow tree</i>	<i>Salicaceae</i>	<i>Malpighiales</i>	<i>Plantae</i>

Source: Author's Field Survey, (2022)

Table 2. The parts of tree extracts used in the cosmetics productions

S/N	Tree species	Part used for soap	Part used for cream
1	<i>Acacia nilotica</i>	oil from the seed	Oil from the seed
2	<i>Adansonia digitata</i>	Powder from the Pod and Seed oil	Seed Oil & Powder
3	<i>Azadirachta indica</i>	Dried Leaves Powder	Seed Oil
4	<i>Eucalyptus camadulensis</i>	Dried Leaves Powder	Leave and seed Oil
5	<i>Moringa oleifera</i>	Dried Leaves Powder	Seed oil
6	<i>Salix babylonica</i>	Bark extract	The bark extract

Source: Author's Field Survey, (2022)

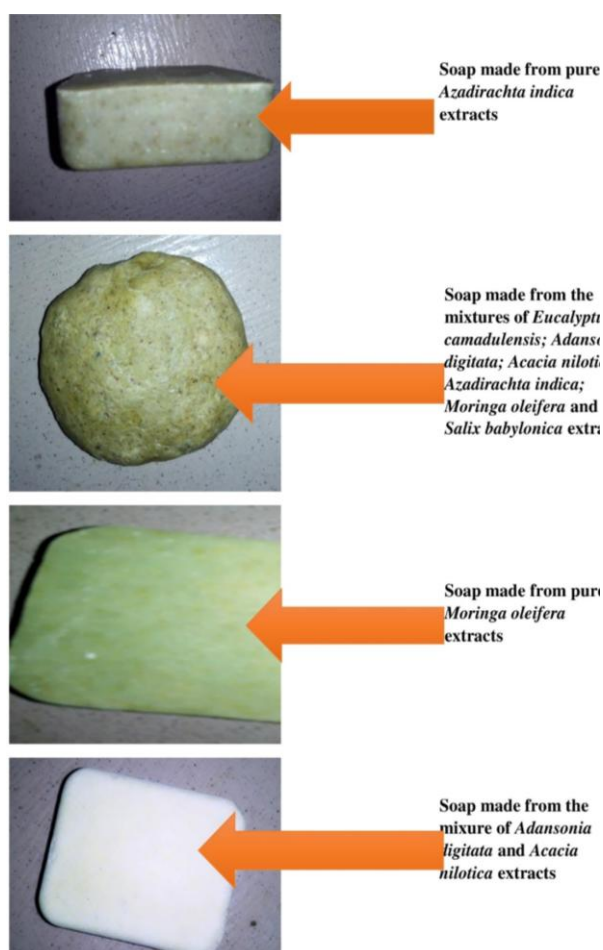


Fig. 2. The soaps produced from the forest tree extracts

Source: Author's Work, 2022

The soap and cream produced with the incorporation of *Eucalyptus camadulensis*; *Adansonia digitata*; *Acacia nilotica*; *Azadirachta indica*; *Moringa oleifera* and *Salix babylonica* extracts combined together were very active in treating skin pimples, acne, skin blemishes, psoriasis, warts, sores, shaving bumps, and body odor with changes in the skin textures and complexion. The formulated topical cream of *Acacia nilotica* extract is capable of reducing the signs of skin aging [11]. Different parts of *Acacia nilotica* plant such as the root, seed, leaf, bark, flower, fruit, gum and immature pod act as anti-mutagenic, strong antioxidant, anti-cancer, vasoconstrictor, spasmogenic, anti-asthmatic, cytotoxic, anti-pyretic, anti-diabetic, anti-plasmodia and anti-platelet aggregator agents [12]. Mak-Mensah and Firempong [13] who prepared toilet soap using neem oil explained that due to the phyto-constituents in neem oil and the favorable chemical characteristics of the soap, it can be used as medical and cosmetic toilet soap. Sidibe

and Williams [14] also reported that the Baobab seed oil is used for cosmetic applications to treat skin ailments. Furthermore, it contributes greatly to the livelihood of man in terms of medicine, fodder, and food [15]. According to Ayepola and Adeniyi [16] *Eucalyptus camaldulensis* leaves and bark are one of the richest plants in secondary metabolism compounds like essential oils, cineol, cuminal, phellandrene, aromadendral, valeraldehyde, geraniol, cymen, catechol, tannins, terpenes, isoprenoids, phenolics, cardiac glycosides, sterols, saponins and flavonoids. It has been found that leaves extracts of *Eucalyptus* species have shown many properties and several studies have brought to light the anti-hyperglycemic, antioxidants, antibacterial activity, ulcer-healing, cytotoxic effect, anti-inflammatory and analgesic effects [17]. Ali et al., [18] explained from their study that topical formulation of moringa extract is capable of revitalizing the skin and reducing signs of skin aging.

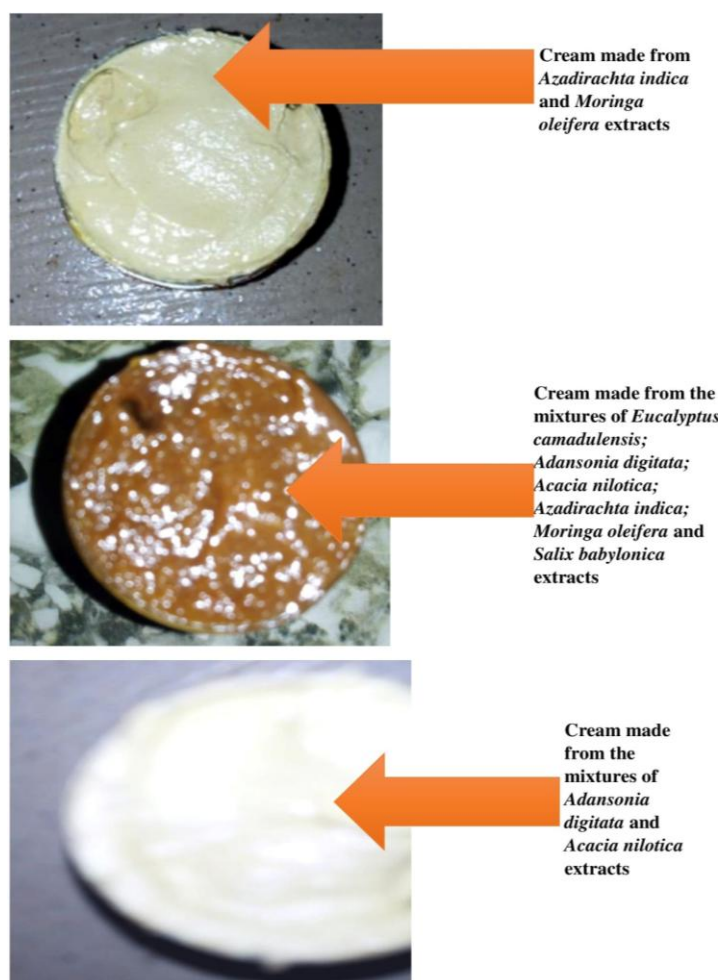


Fig. 3. The creams produced from the forest tree extracts

Source: Author's Work, (2022)

5. CONCLUSION

The potential antioxidant, anti-inflammatory, anti-fungal, anti-bacteria, etc. benefits of forest tree extracts in cosmetics are beneficial for a number of conditions that dermatologists routinely treat, such as psoriasis, warts, moles, rosacea, photo aging, wrinkles, skin cancer, skin blemishes, pimples, acne, body odor, and fine lines. Forest tree extracts have shown from this study that they are very useful in protecting the skin against harmful exogenous or endogenous factors. Therefore, cosmetic industries has the option of going into massive tree plantation in the near future to be able to meet up with the demands of forest tree extracts in organic products.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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