



# Phytocosmetics from the African Herbal Pharmacopeia

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Received 18 Apr. 2017

Accepted 24 May 2017

Published 3 July 2017

## Abstract

The urge of every human being is perhaps beauty, the one quality that pleases the senses and that is why aesthetic representation has always been a matter of utmost value. Utilization of herbs is as ancient as the human race. *Aloe vera*, for example, is one of the most recognized African plants in the ancient history of humanity dating back to an Egyptian papyrus from 3500 BC to the great Greek philosopher Aristotle who enumerated the medicinal benefits of this remarkable plant. A plethora of acclaimed biological properties such as bleaching agent, anti-acne, anti-wrinkle, and anti-pigmentation among others exist in various herbal cosmetics. The use of phytocosmetics in the African culture is perhaps the oldest and most diverse of all other herbal pharmacopeia. Rural Africa is especially bestowed with the most attainable and most reasonably priced phytocosmetics prescribed by traditional healers accessible to the local community and sometimes the only option left for skincare in such remote areas. Nonetheless, there is still a paucity of updated compendium of propitious phytocosmetics from the African herbal pharmacopeia. The aim of this review is to present an updated general review of a few plants which are among the most popular and promising phytocosmetics from the African pharmacopeia. In this attempt, key scientific databases have been screened to probe trends of the rapidly increasing amount of scientific publications on phytocosmetics from the African herbal pharmacopeia. This review will also help to amplify the significance of phytocosmetics of African origin with different aspects, such as phytochemical profile, botanical aspects, biological properties, traditional uses, taxonomy, and clinical studies as well as future trials regarding the usage of these plants have been overviewed.

**Keywords:** Pharmacopeia, Africa, Phytocosmetics, Phytochemical



## Introduction

Cosmetic use antedates ancient history.<sup>1</sup> Purposes like concealing the signs of aging, the seduction of lovers, and intimidating enemies were deeply related to the application of cosmetics in ancient times.<sup>1</sup> During the Stone Age, some of the ancient Homo sapiens utilized crayons made from red ochre pigments revealing the first proof of body art.<sup>2</sup> The creation of make-up was basically for religious, hygienic, curative and aesthetic aims and each culture had their own original style in its application.<sup>2</sup> For instance, the early Egyptians took a lot of pride in their neatness and grooming and cosmetics were an integral part of their daily hygienic routine.<sup>3</sup> The hot and dry climatic conditions of Egypt were the main reasons behind the utilization of creams and oils for protection.<sup>3</sup> Essential elements from herbs of the majority of perfumes utilized in that period of time in religious practices and preservation of the dead were cedar, peppermint, almond oil, rosemary, rose, *Aloe vera*, sesame oil, chamomile, and lavender to name a few.<sup>3</sup> Anti-wrinkle concoctions with ingredients like fresh squeezed olive oil, cypress, and scent mixed with freshly obtained milk was applied on the face for a week by Egyptians.<sup>4</sup> Furthermore, ancient Egypt was the birthplace of aromatherapy; women used oils with exquisite, sugary perfumes and fragrance derived from

pine trees and flowers, which demonstrates the vital role cosmetics played for this civilization.<sup>4</sup>

With an existence spanning thousands of years, the word cosmetics brings the perception of fragrance and make-up to people's minds.<sup>5</sup> Females in general were the target of cosmetic companies with respect to the product itself.<sup>5</sup> Before the 1990s, a general perception was that cosmetics were only meant for females. However, the truth is that both males and females are the new audiences of the cosmetic industry.<sup>5</sup> Estée Lauder, back in 1976, launched a line especially created for men – "Skin supplies for men", becoming the inaugural females' cosmetic company to design such a line.<sup>5</sup> The global cosmetic market is commonly divided into five prime business sectors, namely hair care, skin care, color (make-up), toiletries and fragrances.<sup>6</sup> These segments are concordant and through their plethora of products they are successful in satisfying consumers' expectations and needs with respect to cosmetics.<sup>6</sup> Cosmetic products can be further split into segments like mass production and premium in accordance to cost, distribution channels and brand prestige used.<sup>6</sup> Famous multinational cosmetic companies include L'Oreal, Estée Lauder, Beiersdorf, Natura, Shiseido, Coty, and L'Occitane.<sup>7</sup>

Leading by 35% of the total market share, skin care is the



highest cosmetic sector with respect to the 5 prime sectors mentioned.<sup>8</sup> Next in place is the hair care sector with 23% followed by makeup (17%), fragrances with 13%, hygiene (11%) and others with 1%.<sup>8</sup> The highest sale of cosmetics is noted in the Asia, Pacific regions with 35% followed by Western Europe (22%), North America (21%), Latin America (12%), Eastern Europe (7%), and Africa, Middle East (3%).<sup>8</sup>

Globally speaking, the premium segment attributed 28% of total sales in 2010 while the mass production segment was credited for the rest of the 72%.<sup>6</sup> According to Barbalova,<sup>6</sup> most of the worldwide premium sales is centered within advanced markets like France, Japan and the US. Geographically, the cosmetic market can be partitioned into two segments—those whose share in global revenue is the highest and external regions where the market share is moderately low.<sup>6</sup> With the highest shares in global revenues Western Europe, North America, Asia-Pacific and Latin America are those regions that stand out.<sup>6</sup> Moreover, the cosmetic industry in BRIC countries (Brazil, Russia, India, and China) has witnessed a dramatic expansion with a substantial contribution to the global growth of this market since the turn of the century.<sup>6</sup> With a 21% share of the worldwide cosmetic market in 2010 and an expected rise in their share up to 25% of the total market value in 2015, Brazil, Russia, India and China have strongly outshined their respective positions globally.<sup>6</sup>

### China's Emerging Cosmetic Market

According to the luxury and cosmetics financial factbook of 2014, the advancement of a better plan of action for the prospect of the Chinese market is among the pivotal areas of prime interest that leaders should pay particular attention to over the next years.<sup>7</sup> For a long time, both the tourist and domestic market for China trade have been regarded as an elixir for accessible development.<sup>7</sup> In 2014, on a global scale, China was the second highest consumer country in the cosmetic market.<sup>9</sup> As reported by the National Bureau of Statistics of China (NBS) in 2014, the retail transaction of cosmetics firms (with staff numbering over 60 and yearly sales of 5 million Yuan) gained 182.5 billion Yuan.<sup>9</sup> Nevertheless, a marginal slowed growth of 10.0% of yoy (year-on-year) in 2014 was noted as compared to 13.3% of yoy in 2013. Exclusive of the noted slowed growth, China's cosmetic market has a lot of scope for expansion with the online retailing rising rapidly.<sup>9</sup> Moreover, leading international cosmetic brands, namely Amorepacific of South Korea, Estée Lauder of the U.S, Shiseido of Japan, and L'Oreal of France have proposed to reduce the prices of their products which are imported to China referring to the fact that local authorities have decided to decrease import taxes by 3% as of 1st June 2015.<sup>9</sup>

### Herbs as Cosmetics

Herbs are commonly described as the non-woody plants that die away after blooming.<sup>10</sup> This description has been

extended to each and every plant of which the entire or portion is used as a cosmetic.<sup>10</sup> The acquisition of fresh herbs can be made by assembling them from the growth in one's own garden, in the wild or simply by buying from the market or health stores.<sup>10</sup> Roasting, steaming, stir-baking, alcoholic beverages or other materials are methods by which herbal materials are extracted.<sup>11</sup> While herbal preparations are characterized as the origin for refined herbal products and can involve compressed or powdered herbal products, as well as fatty oils, extracts or tinctures of herbal products.<sup>11</sup> Concentration, fractionation, extraction, purification or other biological or physical methods are among the ways to produce herbal preparations.<sup>11</sup> The usage of the concept of mixture herbal product is relevant when one or more herbs are utilized.<sup>11</sup> Together with the active ingredients, finished herbal products and mixture herbal products may include excipients.<sup>11</sup> Nevertheless, addition of chemically specified active substances inclusive of synthetic compounds and/or segregated constituents from herbal materials to finished products or mixture products are not regarded as herbal.<sup>11</sup>

Along with plant extracts, parts of plants like the roots, barks, leaves, flowers, seeds, buds, fruits and stems are recognized in the utilisation as cosmetics.<sup>12</sup> Normally, they are extensive in their applications and aim at serving as antioxidants, cleansing, immunostimulants, hydration, tanning, colored cosmetics, radical-scavenging, whitening, preservatives, and thickening agents among others.<sup>12</sup> Rejection of chemically synthesized ingredients in cosmetics is observed as market tendency nowadays, even if there is a rise in the use of progressive pharmaceutical and scientific elements in skin care products.<sup>12</sup> According to Goliath,<sup>12</sup> this trend is contemplated with the constant rise of natural beauty and personal care items, that usually refrain from the use of chemicals like sulfates (sodium lauryl/laureth sulfate), silicones, paraben, phthalates (dissolvents usually utilized in perfumes), paraben and more synthetic preservatives. A plethora of acclaimed biological properties such as bleaching agent, anti-acne, anti-wrinkle, anti-pigmentation, among others exist in various herbal cosmetics.<sup>12</sup> On the other hand, in order to know the genuine results on the skin, absorption of these bioactive compounds is primordial.<sup>12</sup> During the preparation of herbs as cosmetics, herbs are utilized in three methods, the first being the complete extracts or a single molecule acquired from the distillation of the concentrate *Aloe vera* gel; second, the selective extract, namely ginkgo or wheat germ; and lastly as a distinct natural molecule namely coenzyme Q10 vitamins.<sup>13</sup> Presently, forms like dried, raw and crushed herbs utilizing a mortar pestle are commonly in use.<sup>13</sup>

Phytonutrients also known as phytochemicals utilized from a plethora of botanicals in cosmetics usually perform two roles: first, body care and second, as compounds to activate biological processes at the level of the skin, eventually producing an essential source of nourishment for hale skin and hair.<sup>14</sup> Mainly, botanical cosmetics are

abundant supplies of proteins, isoprenoids, vitamins, antioxidants, hydrocolloids, essential oils as well as other biologically active substances.<sup>14</sup> These concentrates cater to various characteristics depending on their composition.<sup>14</sup> Antimicrobial, antioxidant, and tyrosinase inhibition activities are among numerous properties reported in the extracts from herbs.<sup>14</sup>

For instance, antioxidant botanicals are commonly divided into 3 classes according to the types of their compounds namely polyphenols, flavonoids, and carotenoids.<sup>15</sup> Polyphenols also known as polyphenolics, being an extensive class, and are comprised of numerous molecules such as oleuropein from olive leaf, rosmarinic acid from rosemary and hypericin from Saint John's Wort.<sup>15</sup> Apart from antioxidant activity, flavonoids provide safety against UV and act as a metal chelating agents.<sup>2</sup> On the other hand, carotenoids are associated with vitamin A in terms of structures and are comprised of numerous retinols for example retinoic acid.<sup>15</sup>

Furthermore, the cosmetic industry has a rising concern in the substitution of chemically synthesized antimicrobials in products applied directly to the skin.<sup>14</sup> Usually plants protect themselves through the synthesis of phenolic compounds.<sup>14</sup> The mode of action of these compounds is through the interaction with the microbe's cell wall, resulting in modifications at the level of membrane flow, and eventually killing the cell.<sup>14</sup> Strictly speaking, polyphenols are organic antimicrobials which enhance the time period of numerous products by preventing the proliferation of harmful microbes.<sup>14</sup> According to research, one example of such an extract is from the leaves of pequi (*Caryocar brasiliense* Camb), a native fruit from Brazil which demonstrated antibacterial action against *Staphylococcus aureus*, *Escherichia coli*, *Enterococcus faecalis* and *Pseudomonas aeruginosa*.<sup>14</sup>

### **Phytocosmetics From the African Pharmacopeia** **Natives' Perception and Attitude Towards Beauty**

In Africa, routine skin care is undertaken using various distinct practices.<sup>16</sup> Traditionally speaking, according to the African traditional medicine (ATM), there is always an escalating demand for medicinal plants in the usage of specific skin conditions, ailments as well as cosmetics.<sup>17</sup> The usual practices consist of skin care associated at a neonatal stage, with beauty as a whole entity for the females in preference and for the individual well-being.<sup>16</sup> In relation to skin care for newborns, for instance, it is a common practice in Africa that the use of herbs in daily bathing and soaking purposes for babies is believed to have beneficial health effects such as protection against illnesses.<sup>16</sup> Additionally, there are diverse ways in the mode of preparations for the herbs as cosmetics for instance, decoction, infusion, paste, poultice and these include most parts of the plant ranging from the leaves to the whole plant including the fruits, seeds, rhizomes among others.<sup>17</sup> In urban areas, skin care for beauty is prominent among women.<sup>16</sup> The reason behind this

perception is due to the very fact that in certain rural African areas, skin care is closely related to sexuality. That is, the more the woman is prone to skin care, the more sexually active she is speculated to be.<sup>16</sup> Thus bearing in mind that in rural communities where marriage is strictly defended, skin care practices are not so common.<sup>16</sup> However, a majority of urban dwellers adhere to skin care routines for an overall individual well-being and personal satisfaction.<sup>16</sup> 75% is the known estimate by the World Health Organization about the usage of herbal medicines including the use of herbs as cosmetics among African societies, consequently clearly demonstrating increasing interest in phytocosmetics.<sup>18</sup>

### ***Adansonia digitata* L. (Malvaceae)-Baobab**

*Adansonia digitata* L., usually known as "baobab" (Malvaceae, subfamily Bombacoideae) is considered as the biggest and exceptional succulent plant across the globe.<sup>19</sup> Basically, the genus *Adansonia* is believed to originate from Madagascar where various endemic species have been reported and also *Adansonia digitata* L. is found.<sup>20</sup> Baobab is commonly found in dry parts of central Africa as well in the south (Malawi, Zimbabwe, Mozambique, and South Africa), east (Kenya, Uganda, Tanzania) and west countries such as Mali, Benin, Senegal, Ivory Coast, Cameroon and Burkina Faso.<sup>19</sup> Interestingly, over the last 10 years, various parts of this tree have been researched and proven to be beneficial and thus, has garnered massive interest in the world of pharmacy, medicine, cosmetics and research.<sup>21</sup> This is because of its several traditional usages as a cosmetic, nutritional and medicinal plant.<sup>21</sup> The fruit from this magnificent tree is reported to produce a subtle oil which is a considerably rich moisturizer with the presence of Linoleic acid, the most commonly utilized fatty acids in cosmetic products.<sup>19,22</sup> Furthermore, baobab seed oil is considered among one of the vital fixed oils constituent in cosmetic products.<sup>19</sup> With properties like non-allergic, non-irritating, greatly nutritive and highly perviousness, the baobab seed oil is appropriate for use on skin.<sup>19</sup> Baobab oil or fruit pulp consists of various vitamins that are indispensable for skin care.<sup>19</sup> These consist of vitamins D3, vitamin E known for its antioxidant and anti-aging properties and vitamins A and F catering to cell restoration and revitalization.<sup>19</sup> Improvement of skin tone and skin flexibility is experienced with the application of this oil, since it is reported to relieve pain and restore the epithelial tissues rapidly.<sup>19</sup> Baobab seeds are also great sources of iron, lysine, calcium and thiamine.<sup>19</sup> According to published literature, the baobab capsule pulp is reported to contain a high amount of vitamin C—7 to 10 times higher than the amount of vitamin C in oranges, thus accounting for its exceptional antioxidant qualities.<sup>19</sup> The existence of phytosterols, flavonoids, fatty acids, minerals and vitamins in baobab has been well documented through phytochemical research.<sup>19</sup> In addition, as per scientific reports, baobab possesses biological qualities such as anti-inflammatory, antimicrobial, and antiviral activities

to name a few.<sup>19</sup> Consequently, the worldly demand for baobab seed oil and fruit pulp has drastically expanded in the cosmetic industries especially for the addition of baobab seed oil in cosmetic formulations because of its high fatty acid content.<sup>19</sup>

#### ***Aloe vera* (Asphodelaceae)-Aloe vera**

With the rapid growth of herbs as cosmetics worldwide, *Aloe vera*, historically and traditionally is known for its plethora of curative benefits and is among the most commonly utilized herbs in the world.<sup>23</sup> This high-ranking plant is also acknowledged as one of the oldest medicinal plants and has a long recorded acclaimed history existing since biblical times.<sup>24</sup> The therapeutic characteristics of *Aloe vera* have been reported for 1000 years back by primeval civilisations including Africa, Egypt, Greece, Persia, and India.<sup>25</sup> Furthermore, according to legendary reports, this plant, named “the silent healer”, “the wand of heaven”, “heaven’s blessing” or the “Plant of Immortality” by the Egyptians, is believed to have been utilized by the Egyptian Queen Nefertiti, known as “the most beautiful woman who ever lived,” and Queen Cleopatra VII, in their routine skin care.<sup>25,26</sup> Subsequently, showcasing the exquisite medicinal legacy of this intricate plant which is of African origin and whose existence dates since 2000 years already.<sup>26</sup> *Aloe vera*, another type of Aloe, a plant similar to a cactus, is among one of the most popular plants in use for centuries due to its amazing beneficial properties like anti-inflammatory, antioxidant, antifungal, antibacterial and injury restoration to name a few.<sup>27</sup> Basically, this plant can be divided into 2 parts, namely the gel and the latex whereby the 2 consist of bioactive ingredients essentially polysaccharides (acemannan being the most activated) and anthraquinones.<sup>27</sup> The substantial use of *Aloe vera* in cosmetics, for example, as a moisturizer, is supported by published literature.<sup>27</sup> *Aloe vera* can be found widely in cosmetic products ranging from shampoos, shaving creams, perfumes, sunscreens, toothpaste and cleansers.<sup>27</sup> The gel of this plant is commonly acknowledged for its moisture-retaining ability for a lengthy time period along with its calming effects.<sup>27</sup> Moreover, 50 ppm (parts per million) of anthraquinone is the threshold limitation applied in Aloe-based constituents utilized in cosmetics in order to avoid phototoxicity.<sup>27</sup> According to the Food and Drug Administration in the United States, *Aloe vera* gel has been authorised to be utilized externally only as a cosmetic.<sup>27</sup>

#### ***Aloe ferox* Mill. (Xanthorrhoeaceae)-Bitter Aloe or Cape Aloe**

*Aloe ferox* Mill. (= *A. candelabrum* A. Berger), frequently recognized as the Cape aloe or the bitter aloe, is a polymorphic genus native of Lesotho and South Africa especially in the Cape coastal part, in Swellendam found in the west and spreading to KwaZulu-Natal in the east of the country.<sup>28,29</sup> Recently, *Aloe ferox* has garnered huge recognition as an active constituent in cosmetic

formulations.<sup>28</sup> Generally, *Aloe ferox* has been utilized in small doses as a ‘blood purifier’ for acne problems, leaf concoctions for washing hair, and lately, the inner leaf parenchyma has begun to be much in demand as an ingredient in cosmetic products.<sup>18</sup> The addition of the *Aloe* gel is frequent in several cosmetic products such as sunscreens, shampoos, cleansers, and moisturizers.<sup>28</sup> Biological properties such as being antimicrobial, anti-inflammatory and antioxidant among others have been scientifically reported to be possessed by this much coveted plant of the cosmetic industry.<sup>28</sup> In addition, according to the phytochemical literature study of *Aloe ferox*, it has been well documented that it contains a plethora of phenolic compounds such as anthrone, anthrone-C-glycosides, chromones, anthraquinones as well as other phenolic compounds which have biological activity.<sup>29</sup> Furthermore, aloesin has been proven to cause inhibition of hyperpigmentation on human skin after UV exposure in a dose-dependent way and an altogether cure of aloesin and arbutin causes a supplemental result.<sup>28</sup> Consequently, aloesin, known to be light absorbent, is a favorable active ingredient in cosmetic and therapeutic applications such as in anti-hyperpigmentation formulations and sunscreens.<sup>28,29</sup>

#### ***Kigelia africana* (Lam.) Benth. (syn. *K. pinnata* (Jacq.) DC.) (Bignoniaceae)-Sausage tree**

Amidst the African medicinal plants, *Kigelia africana* (Lam.) Benth. (syn. *K. pinnata* (Jacq.) DC.) is known to be among the most acknowledged because of its distribution which covers tropical regions.<sup>30</sup> *K. africana* originates from the African continent where it is widely spread in the western, central and southern regions.<sup>30</sup> It is recognized as the sausage tree or cucumber due to its extremely large fruits which suspend from elongated fibrous stalks.<sup>31</sup> *K. africana* is an absolute African herbal medicinal plant with broad primeval medicinal and cosmetic applications.<sup>6</sup> The use of this amazing plant for its medicinal and cosmetic practices dates back a long time in rural African countries.<sup>31</sup> Concoctions from various parts of *K. africana* were utilized by traditional African healers to cure an extensive range of skin problems such as eczema, fungal infections, psoriasis, boils as well as for general skin care.<sup>31</sup> *K. africana* consists of 2 flavonoids (quercetin and luteolin) and steroidal saponins.<sup>31</sup> In some African communities, women use the fruit extract of this plant to apply on their breasts since it is considered beneficial in the development of the bust and in boosting the stability and firmness of breast collagen fibres.<sup>30,31</sup> Furthermore, the removal of sunspots, also recognized as ‘Solar Keratosis’, especially on the face and hands is done with the application of cream made from *K. africana*’s fruit extract.<sup>31</sup> Examples of cosmetics derived from the fruit of this amazing plant are shampoos, scalp applications and a variety of skin creams.<sup>31</sup> The reason behind the use of *K. africana* as one of the active components in cosmetics is that this plant helps in the purification of skin, stimulation of circulation,

tightening of the delicate skin around the eyes, diminishing of wrinkles in depth, reducing of fine lines, deep cleansing with the elimination of impurities, enhancing tone elasticity thus lightening skin pigmentation and lessening of skin blemishes.<sup>31</sup> Recently it has been reported that the anti-inflammatory and antimicrobial properties of *K. africana* may amplify its dermatological outcomes.<sup>30</sup> While another study conducted regarding the quality of being toxic to human cells and irritation on the human epidermis in vitro of this plant showed that its compound and extract are apparently safe for topical application.<sup>30</sup> Eventually, specific products such as antioxidant agents, anti-inflammatory agents and cosmetic skin strengthening agents could be included in the list of the cosmetics based from *K. africana*.<sup>31</sup> It is not surprising that the biological properties of this plant are garnering profound interest from the cosmetic industry on the basis of well researched and affirmed anecdotal proofs advocating its efficacy in skin care among the African community.<sup>30</sup>

#### ***Vitellaria paradoxa* (Gaertn. f.) (Sapotaceae)-Shea Tree**

Previously recognized as *Butyrospermum paradoxum* (Gaertn. f.), the shea tree or karité in French, is from the Sapotaceae family also acknowledged as *Vitellaria paradoxa* (Gaertn. f.).<sup>32</sup> Basically, being of African origin, the shea butter tree occurs in places with 400-1800 mm rainfall annually.<sup>33</sup> There are 2 major varieties of shea nut tree, namely *Vitellaria paradoxa* found in West Africa and *V. nilotica* which is grown in southern Sudan and northern Uganda.<sup>32</sup> Species of this plant are found to be distributed throughout Africa from the western to the eastern end, north of Guinea, south of Sahel, Savannah regions, Mali, Ghana to name a few among the 19 countries.<sup>34</sup> Typically, the shea tree has been described as a vital economic and social entity in the African continent and forms part of the priority list of the African Genetic Resources by FAO.<sup>34</sup> The shea butter fat derived from the shea butter seed is easily accessible especially in countries where the Shea tree's growth is almost everywhere.<sup>33</sup> Shea tree nuts/seeds are subjected to various processes to transform into shea butter fat which is a vital component in cosmetics, traditional medicine in the African rural regions, and in soap making primarily due to its important fat content.<sup>35</sup> The shea butter has a strong smell and is yellowish white in color.<sup>13</sup> Interestingly, as a cosmetic, shea butter is utilized as an emollient in creams, sunscreens, and as a cure for burns and muscle pains as well.<sup>36</sup> With about 8% of high fraction content of curative properties, shea butter emerges as a highly valued cosmetic as well as medicinal substance in the African continent and on a global platform.<sup>32</sup> The fatty acid profile of shea butter consists of mainly 5 prime fatty acids which are arachidic, linoleic, palmitic, oleic and stearic fatty acids whereby all aid in the protection and revitalization of damaged hair and skin.<sup>35</sup> Moreover, shea butter naturally consists of minerals and vitamins such as A, E and F which subsequently help in balancing, smoothing, moisturizing, and acting

as anti-aging agent with the provision of skin collagen to the applied regions.<sup>35</sup> Described as an ideal dry skin emollient, shea butter is a beneficial product as a cream for the rejuvenation of dry and dull skin on the scalp or the body.<sup>35</sup> Shea butter is also used as a pre warm bath cream for infants in the promotion of soft and smooth skin in the north of Ghana.<sup>32</sup> The presence of allantoin (a substance acknowledged for its stimulation in the multiplication of healthy tissues in ulcerous injuries) in shea butter plays a pivotal role in its healing qualities.<sup>33</sup> A wide range of chemicals, for example, antioxidants like water-soluble catechins, triterpenes such as phenols, sterols, butyrospermol and oil-soluble tocopherols, are naturally incorporated into the shea butter accounting for its innumerable therapeutic properties.<sup>34</sup> With such a physico-chemical composition profile, shea butter is undoubtedly a highly marketable potential raw material for the production of a wide range of products for the cosmetic industry.<sup>35</sup>

#### ***Ximenia americana* (Olacaceae)-Tallow Wood/Yellow Plum**

*Ximenia americana* belongs to the family of the Ximeniaceae previously Olacaceae, which is comprised of eight species which are trees small in size and shrubs covered by thorns.<sup>19</sup> Six of the eight species are spread throughout the African countries and the 2 other species, namely *X. americana* and *X. caffra* Sond., are found in Namibia.<sup>37</sup> Considered a multifunctional plant, *Ximenia* species remain an integral part of the African continent, especially in the sub-Saharan regions, due to its domestic integration in the daily lives of local societies.<sup>38</sup> This plant is economically very viable for the African countries due to its plethora of ethnomedicinal, nutritional as well as cosmetic uses.<sup>37</sup> Usually, *Ximenia caffra* is the habitual name also used for *Ximenia americana*.<sup>38</sup> Traditionally, the seeds of *X. americana* are grinded to extract the oil which is then utilized in a mixture with red ochre as a cosmetic for hair and skin.<sup>37</sup> Normally, the production of oil from the seeds is high.<sup>19</sup> *Ximenia* oil is utilized as a lipstick, lip balm, as an emollient, in the manufacture of anti-aging cosmetic products, conditioner, shampoo for brittle, damaged, dry hair, as eye products cosmetics, and as an anti-acne agent in skin care products.<sup>38</sup> The prime reason behind the addition of *Ximenia* oil in emollient products is the presence of ximenynic acid in this precious oil.<sup>19</sup> *Ximenia* oil consists of very long fatty acid chains with a total increase of up to 40 carbon atoms which is scarcely found in nature.<sup>19</sup> Consequently, due to the composition of various long chain fatty acids such as stearic acids, linoleic, linolenic and stearic acid which are scientifically proven to be effective upon application on skin surface, notably explain the cosmetic benefits of *Ximenia* oil.<sup>19</sup> Furthermore, according to scientific research, ximenynic acid is a blood perfusion booster upon application thus enhancing overall blood circulation and is proven to be very beneficial for cellulite.<sup>19</sup> Additionally, *X. americana* is

known for its potential antioxidant activity and free radical scavenging properties.<sup>39</sup> According to the Maikai study,<sup>39</sup> the phytochemical composition of *Ximenia americana* reported the existence of terpenoids, saponins, cardiac glycoside, alkaloids, anthraquinones, flavonoids, and tannins thus indicating the prominent antioxidant nature of *Ximenia* oil.<sup>39</sup> With such a phytochemical profile, *X. americana* has been identified as a very promising in the cosmetic industry.<sup>39</sup>

### Miscellaneous Plants

*Citrullus lanatus* Thunb. belonging to the family of Cucurbitaceae, frequently named as watermelon (*Citrullus lanatus*) is extensively spread and is grown naturally in countries like Malawi, Mozambique, Zimbabwe, South Africa, Namibia, Botswana and Zambia.<sup>40</sup> Basically, this plant is a native of the Sahara Desert and Kalahari region of Africa and for more than 3000 years, it has been distributed widely throughout the African continent.<sup>40</sup> Intriguingly, *Citrullus lanatus* antioxidant in nature, is a rich source of vitamins A, B and C as well as water, magnesium, sodium, potassium, carbohydrates, carotenoids, arginine and lycopenes.<sup>40</sup>

Traditionally, the seed oil from this plant known since the ancient Egyptian civilization, was utilized in skin care for the maintenance of healthy skin and for skin rejuvenation.<sup>19</sup> With main constituents of fatty acids such as stearic, linoleic, oleic and palmitic, the seed consists of 20-40% oil.<sup>40</sup> With such an important amount of essential fatty acids, this oil with a subtle texture is extremely moisturizing and hence is a favourably apt emollient in skin care formulations since it helps in the restoration of elasticity and nourishment of the skin.<sup>19</sup> Furthermore, with the naturally existing carotenoids and fatty acids, *C. lanatus* is also utilized in the manufacture of soaps and face masks for delicate skin.<sup>40</sup> Consequently, *C. lanatus* is a fruit bestowed with innumerable biological properties with immense scope in the formulations of cosmetic products.<sup>19</sup>

Another example of such a plant of highly cosmetic importance is *Sclerocarya birrea* Sond. commonly known as Marula, a Savannah tree native of South Africa and forms part of the Anacardiaceae family.<sup>40</sup> Historically, the marula oil has been utilized by the natives of South Africa as a shampoo for dry, fragile, damaged hair and to soothe cracks in dry skin.<sup>19</sup> Another classic traditional example showcasing the hugely moisturizing potential of the marula oil is that women from the Limpopo region of South Africa utilize this oil as a body lotion for hands, face, and feet as well as for massaging babies.<sup>40</sup> This exquisite oil is extremely rich in fatty acids especially in naturally occurring oleic acids accounting for its silky touch with an outstanding 'slip factor' which is perfect for a massage oil and marula oil has been reported to be antioxidant in nature as well as aiding in the reduction of redness and dryness upon application.<sup>19</sup> With the possession of such great oxidative stability, effortless absorption, presence of

linoleic acid (4%-7%), tocopherol constitution and high amount of oleic fatty acids, *S. birrea* Sond. is undoubtedly a huge potential for the cosmeceutical industry.<sup>40</sup>

### Side Effects of Phytocosmetics

Botanicals as cosmetics is becoming more and more popular nowadays. Moreover, in contradiction to the famous conviction regarding the benefits of natural constituents, various reports of side effects experienced have been enumerated by users.<sup>41</sup> According to a study on skin reactions regarding the topical use of botanicals back in 2014, it was reported that contact urticarial, allergic contact dermatitis, adverse response due to phototoxicity and irritant contact dermatitis were among the common side effects encountered.<sup>41</sup> Allergic contact dermatitis is the most popular harmful reaction reported from the cutaneous application of herbs.<sup>42</sup> Plants and botanicals responsible for these adverse effects are numerous: for example, herbs, seeds, vegetables such as potato and carrot, fruits like tomato, banana, peach and apple, and tea among many others.<sup>43</sup> In accordance with scientific literature, plants like *Aloe vera* (weak sensitizer), tea tree, marigold and chamomile are also known to induce allergies and irritations.<sup>42</sup> Nevertheless, the prime security controversy is the famous delusion that a natural product is necessarily equivalent to a safe product, an illusion backed by shareholders from fields of economy, media and politics.<sup>43</sup>

### Conclusion

Africa has an exquisite tradition of the use of plants, cultures, species, and a huge range of climates and consists of both natural and human resources to be an even greater manufacturer of phytocosmetics. The cosmetic potential of the African herbal pharmacopeia are colossal. Plants as cosmetics still enact a vital role in the daily skincare routine of many African countries with the sheer evidence from several ethnobotanical surveys underlying its huge traditional prevalence, especially in villages. It is clearly evident from the literature that there is a renewed interest in African phytocosmetics whether on a local or global platform. Nonetheless, there are still many big challenges that are required to be conquered and addressed for its full potential to be conceived as the efficient use of phytocosmetics has not been ratified meticulously with resilient scientific criteria to emulate existing conventional cosmetics. For a smooth integration of phytocosmetics in the world of beauty products, specific measures such as thorough pharmacological research, generation of baseline information of those plants, bio-activity of active ingredients, safety test of active components, mechanism of actions of plant extracts, clinical studies from the preparations of those taxa in question, specialised expertise, and pilot plant facilities are needed to be implemented. Furthermore, economically speaking it could be a boost for some African countries with promoting value-while processing local plants as raw materials for local cosmetic

industries with simple dosage forms regulated and packed at small cost using suitable technology. Additionally, further analysis of the preparations from prospective plants could eventually lead to a quantum leap in the discovery of new skincare products.

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