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Review Article

Underutilized Medicinal Plant in Ethiopia: The Case of Aloe Species

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Abstract

Ethiopian aloe species are known for traditional medicine for both human and livestock as well as for the preparation of various cosmetic products such as soap and lotion. The aloe species contributed great economic and social benefits for many local communities. In recent years, there has been a growing interest in the use of aloe species in the beauty and wellness industry. Many international companies have started to source aloe from Ethiopia, recognizing its high quality and potency. However, there are concerns about the sustainability of aloe harvesting in Ethiopia. Due to the high demand for aloe products, there has been an increase in over-harvesting without replanting and unsustainable practices. This has led to a decline in some aloe species that hastens the need for better management and conservation efforts. Government and non-government groups should pay attention in order to minimize the damage to the aloe species. Traditional medicine practitioners, research institutes, and universities as well as biodiversity conservation institutes should give attention to the valuable aloe species in the country. As the species are declining from time to time, the devotions of the Ministry of Agriculture, Ministry of Labor and Skill, and Biotechnology Institute are essential to ensure the sustainability and proper uses of these valuable plants for future generations.

Keywords

Aloe Species, Conservation, Medicinal Values

1. Introduction

Ethiopia is home to a diverse range of medicinal plants such as different Aloe species, Echinops Kebericho Mesfin, Thymus schimperi, and Otostegia integrifolia [8]. These medicinal plants are widely used among the traditional healers. However, most of the medicinal plants are harvested from the wild with no preplanned replacement as the collection and preparation of the plants for the traditional medicines are conducted secretly. Aloe species are succulent perennial medicinal plants from the Aloaceae family. The Aloe species have been used for centuries in traditional Ethiopian medicine, and are known for their healing properties and nutritional value. Both humans and livestock benefited from the Aloe species through wild harvesting [1]. Aloe species have high economic, social, health, and environmental values [15]. However, Aloe species are left on marginal land, riversides, and mountains as there is a lack of awareness on the conservation and cultivation of the plants.

Farmers lack techniques for preparing seedlings, production, protection, and postharvest handling practices. Inappropriate harvesting is one of the big problems in the case of the

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wild-grown Aloe species. Agronomic practices of Aloe species are seldom known in the country. But, thanks to Professor Sebsebe Demisse and his team, about 46 Aloe species have been identified, described, and documented so far. Ethiopian Institute of Agricultural Research, Ethiopian Biodiversity Institute, Biotechnology Institute, and different universities has been conducting research and development activities to mitigate the above problems. There are also findings of the Aloe species research development activities from abroad. Some of the findings have been published in different channels. Some of them include species identification and conservation, ethnobotanical studies, propagation techniques, and medicinal importance.

There are also published articles on postharvest handlings that can be examples. However, there is no dependable broad source of the information that enables commercialization of the endemic aloe species in Ethiopia. Hence, the current review indicates the major and very important information on Aloe species in Ethiopia particularly for the academicians, producers, traders, processors, and policymakers.

2. Literature Review

2.1. Aloe Botanical Description

Aloe is a succulent plant with over 650 species and it belongs to the Asphodelaceae family [6, 14]. Aloe plants can vary in size and appearance depending on the species, but most have a rosette shape with thick, fleshy leaves. The leaves can range in color from green to gray-green and are often covered in small white spots [9, 10]. Aloe leaves are succulent, meaning they store water, allowing the plant to survive in dry and arid conditions. The leaves of the aloe plant are long and taper towards the tip, with sharp spines along the edges. These spines act as a defense mechanism against herbivores and also help to reduce water loss by creating a thick boundary layer around the leaves. The leaves are arranged in a spiral pattern, with new leaves continuously growing from the center of the rosette. There are also Aloe species with no spines at the edge of the leaves. The aloe plant also produces flowers, which can vary in color from yellow to orange. The flowers are tubular in shape and grow on tall stalks above the leaves. They are pollinated by birds and insects, and once pollinated; they produce small, oval-shaped fruits containing seeds. The aloe species propagated both by vegetative way and sexual reproduction method and are able to live many years [3, 10, 21]. The best way of propagation for the commercial farming is by using mass propagation (tissue culture technology) [12, 15].

2.2. Ecologies

Aloe species can survive and productive in various agro-ecologies that range from sea level to highland areas. According to [14] majority of the aloe species found in altitude of above 500 masl while few found below 500 masl. These species are an important component of the Ethiopian dry-land ecosystem, including pastoralist and agro-pastoralist areas where the amount of rain is low [13, 21]. Because of the nature of the aloe plants, many of them survive without proper care in harsh environments. However, lack of proper care and maintenance becoming the main challenges.

2.3. Aloe Species to Ethiopia

According to [16], aloe consists 46 species which were distributed in all floristic region of the country, such as, Afar, Arsi, Bale, Gamo Gofa, Gojam, Gonder, Harerge, Kefa, Shewa, Sidamo, Tigray, Wellega and Welo floristic regions. The areas encompasses different agro-ecologies, different people having multiple cultural statuses with respect to the use of the aloe species. Moreover, [21] reported other endemic aloe species called *aloe purcherrima* in Ethiopia. it is very important for both human and livestock health treatments and common among many traditional healers who called it `Sete rate` which means female aloe in Amharic language.

Table 1. *Some aloe species endemic to Ethiopia.*

Endemic aloe species	Specific locations, Altitude (masl)	Reference
Aloe massawana	100-1500	[16]
Aloe ankoberansis	Northern parts, high altitudes	[16]
Aloe benishangulana	Assosa, Benishangul-Gumuz in Welega floristic region	[5]
Aloe ghibensis	Ghibe Gorge, Kefa floristic region	[5]
Aloe weloensis	Dessie in Welo floristic region	[4]
Aloe welmelensis	Welmel River in Bale floristic region	[5]
Aloe abyssinica		[9]
Aloe purcherrima	Highland areas, 2480–2750masl	[9]

The followings are some of the pictorial representations of the indigenous aloe species identified and reported so far in Ethiopia. All are important and have strong linkage with the cultures of the communities.

Figure 1. *Aloe ankoberensis.*

Figure 2. *Aloe purcherrima.*

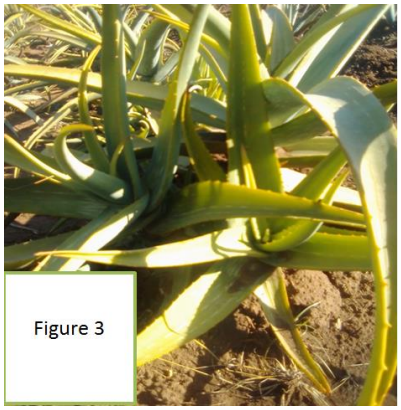

Figure 3. *Aloe tewoldei.*

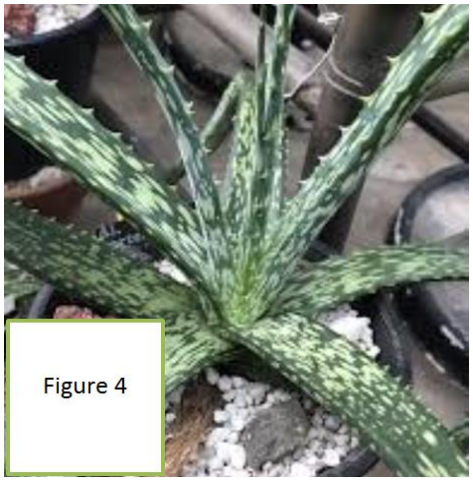

Figure 4. *Aloe bertemariae.*

Uses of Aloe species

Ethiopia is known for its rich and plant diversity, with a wide range of species that are used for various purposes [8, 13]. One such plant is the Aloe species, which is native to the country [20]. However, despite its abundance, many of the Ethiopian aloe species are underutilized and not given the attention they deserve. In this review, we will discuss the importance of these underutilized aloe species and the potential they hold for various industries.

First and foremost, the Aloe species is known for its medicinal properties [8]. It has been used for centuries in traditional Ethiopian medicine to treat various ailments such as skin infections, digestive issues, and respiratory problems [8, 13]. Some species, like Aloe vera, are well-known and widely used in the global market for their healing properties. However, there are many other aloe species in Ethiopia that have not been fully explored for their medicinal properties.

One such species is Aloe macrocarpa, also known as the Ethiopian aloe [19]. This species is endemic to Ethiopia and has been traditionally used for its anti-inflammatory and wound healing properties [18, 17]. It is also known to have anti-bacterial and anti-fungal properties, making it a potential candidate for the development of new drugs and treatments [2]. However, due to the lack of research and commercialization, this species remains underutilized. Generally, aloe has valuable cosmetic products for its moisturizing and anti-aging properties [18, 17]. However, there are many other aloe species in Ethiopia that have not been explored for their cosmetic benefits. For example, Aloe schweinfurthii, also known as the Ethiopian tree aloe, has been found to have high levels of antioxidants, making it a valuable ingredient for anti-aging products [7]. Similarly, Aloe abyssinica, also known as the Ethiopian soap aloe, is rich in saponins, which have cleansing and moisturizing properties, making it a potential ingredient for soaps and shampoos [11].

In addition to its medicinal and cosmetic benefits, the Aloe species also has great potential for the agricultural industry

[16]. Aloe plants are known to be drought-resistant and can thrive in harsh environments, making them suitable for cultivation in drought-prone areas of Ethiopia. They can also be used as fodder for livestock, and their medicinal properties can benefit both the animals and the farmers [14].

It is evident that the underutilized Ethiopian aloe species have immense potential for various industries. However, the lack of research and commercialization has hindered their development and utilization [20]. Therefore, there is a need for more investment in research and development of these species, as well as creating awareness about their potential and promoting their commercialization. This will not only benefit the local economy but also contribute to the global market of aloe-based products.

Hence, the underutilized Ethiopian aloe species have a lot to offer in terms of medicinal, cosmetic, and agricultural benefits [13, 14]. It is essential to recognize and utilize these species to their full potential, not only for the benefit of Ethiopia but also for the global market. With the right investment and promotion, these underutilized aloe species can become a valuable asset for the country's economy and contribute to the well-being of its people.

3. Threat Factors and Future Prospects

Ethiopian aloe species are not only known for their medicinal benefits but also for their economic importance [10]. These plants are a valuable source of income for many local communities, which sell aloe-based products such as creams, lotions, and juices [7, 13]. In recent years, there has been a growing interest in the use of aloe species in the beauty and wellness industry. Many international companies have started to source aloe from Ethiopia, recognizing its high quality and potency. However, there are concerns about the sustainability of aloe harvesting in Ethiopia. Due to the high demand for aloe products, there has been an increase in over-harvesting and unsustainable practices. This has led to a decline in some aloe species and the need for better management and conservation efforts.

4. Conclusion

In conclusion, Ethiopian aloe species have a long history of traditional use and are highly valued for their medicinal and nutritional properties. Currently, the demand for aloe products continues to grow and there is wild harvesting without proper handling techniques. Hence, it is important to do ex-situ and in-situ conservation and ensure sustainable harvesting practices to preserve these valuable plants for future generations.

Abbreviations

MASL: Meter Above Sea Level
EIAR: Ethiopian Institute of Agricultural Research
WGARC: Wondo Genet Agricultural Research Center

Conflicts of Interest

The author declares no conflict of interest.

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