

**Identification of *Artemisia afra*  
for Access and Benefit Sharing activities**



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## **1. Introduction**

Ethiopia, which is rich in biological diversity, may hope to earn profit or make economic gains from its Plant, Animal and Microbial Genetic Resources. The country expects from bioprospecting of direct financial benefits of these genetic resources. There are evidences in the least megadiverse countries, where more access to Genetic Resources has been made for commercial purposes, whereas there are little attempts in the most megadiverse country of ours. Therefore, a setting is developed to identify the well-researched genetic resources of the country and advertise them to any bioprospectors.

For this, Ethiopia has issued proclamation on Access to genetic Resources and Community Knowledge and Community Rights (Proclamation No 482/2006) and Regulation 169/2009. Based on these frameworks, the country has been implementing the access and benefit sharing objective of the Convention on Biological Diversity (CBD). The Proclamation includes a range of issues such as ownership, user rights, and conditions for access, benefit sharing, types of benefits, powers and responsibilities among the others. The law bears the necessity of prior informed consent (PIC) to access genetic resources or community knowledge. Following PIC, the Institute including relevant stakeholders negotiates on mutual agreed terms (MAT) with the user of the genetic resource.

Therefore this call is intended to encourage any bioprospecting company or an individual who is interested to work on *Artemisia afra* (*Artemisia abyssinica*) of Ethiopia:

## **2. Taxonomy and Plant description of *Artemisia afra* and *Artemisia rehan***

*Artemisia afra* Jacq., commonly known as the African wormwood, belongs to the family *Compositae* (*Asteracea*). It is one of the most widely used southern African medicinal plant with essential oil components (Esteban *et al.*, 1986; Graven *et al.*, 1990). Indigenous people of Ethiopia (Bale) refer to *Artemisia afra* as 'Chigugn' (Amharic), Kapani (Oromgna), Kodo (Guragna). It is an evergreen perennial herb or deciduous subshrub with grey or green foliage leaves containing yellow florets. It is aromatic and it exudes a pungent, sweet smell when any part of the plant is bruised. It grows up to a height of about 1 meter, at an altitude range of 3070 and 3600metres a.s.l. (Mesfin Tadesse and Sebsebe Demissew, 1992).

## **3. Geographical distribution of *Artemisia afra***

*Artemisia afra* Jacq., is found throughout Africa as a common species in the southern, central and eastern Africa and extends as far north as Ethiopia. In Ethiopia, this plant is found in

Bale, Sidamo, Arba Minch and Keffa (Mesfin Tadesse and Sebsebe Demissew, 1992). It usually grows in rocky mountainous areas along forest margins and stream sides and its natural distribution extends from Bale mountains National Park (Dinsho) southeastern Ethiopia to northern parts of Ethiopia (Dawit Abebe, 1986).

#### **4. Ethnomedical use of *Artemisia afra***

*Artemisia afra* has a long history of domestic herbal use in both the Northern and Southern parts of Ethiopia. Juice of chopped leaves of *A. afra* mixed with water is traditionally taken orally for the treatment of roundworm and stomach pains in the Bale area of Ethiopia. The leaves are also chewed or the aroma is inhaled for stomachaches and headaches (Menassie Gashaw, 1991). Charred powder of leaves mixed with honey or edible oil is also used as remedies for eye diseases (crying eyes and cataract) and stomach cramps by the Northern people of Ethiopia. Leaf tea of this plant is used to treat coughs, colds and flu as well as bronchial and intestinal ailments. Milk decoctions of the whole plant or leaves are used in the treatment of haematuria, haemorrhoids, mumps, small pox, malaria, neuralgia, colitis and liver disorders. The plant also has tonic, stimulant, perfumic, antihelmintic (vermifuge) and antipyretic (febrifuge) properties (Jansen, 1981; Dawit Abebe and Ahadu Ayehu, 1993; Iwu, 1993).

#### **5. Scientific researches on *Artemisia* species and *Artemisia afra***

In the 1970's it was found that *Artemisia annua* contains an active principle, artemisinin, a novel antimalarial agent which have been shown to be potent against *Plasmodium falciparum* *in vitro* and *in vivo* (Klayman, 1993 cited in Phillipson, 1999). Crude ethanol extracts of aerial parts of this *Artemisia* species and some sesquiterpene lactones isolated from it were found to have antiulcerogenic property (Dias *et al.*, 2001; Foglio *et al.*, 2002).

In the previous studies, plant extracts of *A. afra* were studied for antihelmintic property by Berhanu Abegaz and Ermias Dagne (1979). Butanol extracts of *A. afra* were tested to be positive for anti-implantation effect but negative for uterotonic effect. On the other hand, the aqueous and ethanol extracts of the plant were tested to be negative for both uterotonic and anti-implantation effects (Belachew Desta, 1994). Moges Kassa *et al.* (1998) had reported about the *in vitro* anti-malarial activity of the crude extracts from the aerial parts of this plant. Aqueous *A. afra* extract had a hypertensive effect *in vivo* and a dose-dependent biphasic effect on the heart *in vitro* suggesting its potential use for the management of hypertensive

conditions (Guantai and Addae-Mensah, 1999). The antimicrobial property of *A. afra* has also been documented by Mangena and Muyima (1999). The plant material has been shown to be devoid of acute toxic effects (Guantai, 1990 cited in Guantai and Addae-Mensah, 1999). The antioxidant (potential free radical scavenging) activities of this plant along with *A. abyssinica* were examined by Burtis *et al.* (2001).

Until now research studies with *A. rehan* were largely concentrated on the antimalarial activity (Moges Kassa *et al.*, 1998). Moges Kassa *et al.* (2001) carried out *in vitro* cytotoxic tests of this antimalarial plant along with *A. afra* against a human leukemia monocyte cell line and the extracts of these plants at 0.23-23 mg/ml concentrations *in vivo* were proved to be not cytotoxic.

*Artemisia afra* leaf ethanol (ALE) and *Artemisia rehan* leaf ethanol (RLE) were found to significantly reduce both spontaneous rhythmic and agonist-induced contractions of mouse duodenum and guinea pig ileum which suggests the spasmolytic property of the plants and recommends the traditional folk use of the aerial and root parts of the plants for stomach pains and intestinal cramps (Abiyselassie Mulatu and Yalemteshay Mekonnen, 2007).

The acute and subchronic toxic effects of leaves of *Artemisia afra* on liver and kidney; and some blood parameters in rats were investigated and found to be relatively safe (Nikodimos Eshetu, 2015).

## **6. Pharmacological potential and compounds isolated from *Artemisia afra***

Alpha-thujone, beta-thujone, 1,8-cineole and camphor were reported as the major constituents of *A. afra* from South Africa. On the other hand, yomogi alcohol and artemisia alcohol acetate were reported to be the two major constituents of Ethiopian origin (Graven *et al.*, 1990; Tadele Worku and Rubiolo, 1996).

Previous works on the essential oil of *A. rehan* from Ethiopia revealed camphor and denavonone as major constituents (Berhanu Abegaz and Paulos G.Yohannes, 1982). The green parts of *A. rehan* Chiov. were found to contain vulgarin which is proved to be identical with compounds such as barrellin and judaicin (Berhanu Abegaz *et al.*, 1986).

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