Bioprospecting Potential of *Impatiens tinctoria* for Access and Benefit Sharing

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1. Introduction

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 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 interested to work on *Impatiens tinctoria* from Ethiopia.

2. The Plant Taxonomy and Morphological Description

Impatiens tinctori is known by English vernacular name, Balsamine or by the vernacular name in Amharic, "Insosila". It is a common perennial herbaceous plant species belonging to the genus *Impatiens* which comprises more than 1000 species and occurs in tropical and sub-tropical regions of Africa, Asia, Central America, and temperate regions of North Hemisphere. *Impatiens tinctoria* is one of the largest species in the genus and classified under Balsaminaceae family of Ericales order. More than 100 species of *Impatiens* have been identified in Africa and the most common one is *I. tinctoria. Impatiens tinctori* has five geographically isolated subspecies based on the differences in their leaf, flower and spur size:

- *I. tinctoria* subsp. *tinctoria*: Ethiopia, Sudan, Uganda, Zaire
- *I. tinctoria* subsp. *elegantissima*: Kenya, Uganda
- *I. tinctoria* subsp. *abyssinica*: Ethiopia
- *I. tinctoria* subsp. *latifolia*: Tanzania, Malawi, Zambia
- *I. tinctoria* subsp. *songeana*: Tanzania

The most important evidence is the presence of high concentration of *I. tinctoria* in East Tropical African countries such as Southeastern Sudan, Eritrea and Ethiopia, Western and Southern Kenya, Uganda, Democratic Republic of Congo, Southern Tanzania and Northern Malawi (African Plant Database, 2015).

Impatiens tinctoria is a glabrous, an upright, branching, perennial herb; the stem is up to 2 m tall, succulent hollow, and a large tuberous rootstock up to 30 cm × 10 cm that lies at or just below the soil surface. The leaves are large dark green, arranged spirally, simple, with no stipules, with up to 9 cm long petiole (sometimes bearing glands near the top), oblong-lanceolate to broadly ovate blade in shape, having cuneate base, acuminate apex, crenate to serrate margins, with up to 14 pairs of lateral veins. The flowers are bisexual, zygomorphic, fragrant, strongly and sweetly scented, especially in the evening. Fruits are cylindrical in shape and up to 4 cm long; it is fleshy, five-valved and explosively dehiscent capsule consisting of many ovoid and glabrous seeds.

3. Habitat, Geographic Distribution and Abundance

Impatiens tinctoria is usually found in damp, shaded places, in rainforest, forest fringes, stream margins, and shrub-filled gullies, hill slopes, grassy scrub, swampy or marshy sites, along streams and on shady banks, usually at elevation of altitude from 750 m to 3630 m. It prefers temperature between about 10^{o}C to 27^{o}C with night below 18^{o}C and it may be grown in a pot and brought indoors over the winter, where it may stay evergreen and continue flowering (Matthews *et al*., 2015).

Of the nearly 1,000 species of *Impatiens*, the greatest concentration is found in Asia, mainly China, the Himalayas, India, Southeast Asia, and on the neighboring Islands. Africa and Madagascar have a goodly number of the *Impatiens* species. *Impatiens tinctoria* is native to East Africa and *I. tinctoria abyssinica* is endemic to Ethiopia.

Impatiens tinctoria is widespread in Ethiopia as well as in Africa; therefore, it does not seem to be in danger of genetic erosion. Flora biodiversity assessment study in Oromia Region of Ethiopia recorded *I. tinctoria* as one of the most abundant herb species in Bonga Forest (Sisay Nune, 2008). Similarly, many floristic composition and community analysis studies in Ethiopia are in agreement with the extensive abundance of *I. tinctoria* in the country (Tesfaye Burju *et al.*, 2013; Fekadu Gurmessa *et al*., 2013).

4. Cultivation

Naturally*, I. tinctoria*, is found growing more widely in the wild than in the fields of farmers although it usually is cultivated for its famous flowers as an indoor and /or outdoor ornamental

plant in tropical and temperate regions. It is easy to cultivate and the cultivars make wonderful ground covers. In its native habitats, *I. tinctoria* grows in the loose leafy soil of the forest floor, making beautiful colonies. It can easily be propagated by stem cutting or seed germination. It can root easily in water or suitable light compost in a propagator. The explosive nature of *Impatiens* seed pods allows the seeds to be spread easily from a single planting.

5. Significance

Insosila is the dominant cash herb in Mahoney / Maichew, Tigray Region of Ethiopia. It is used by the local women as a cosmetic and traditional medicinal plant (Tilahun Amede and Mulugeta Taye, 2015). Insosila plays a great role in cosmetic, medicine and textile industries.

5.1. Cosmetic use

Cosmetic use of *I. tinctoria* is common in Ethiopia. Women cook and pound the inside of the tubers into a paste and apply to the palms, hands and to the feet where it turns the skin strong, dark reddish color and also makes nails black and shiny (Hedberg *et al*., 2006).

5.2. Ethnomedical use

Medicinally, root decoction is drunk as a purgative against abdominal pains. The stem is chewed to treat mouth and throat diseases. For instance, in an ethnobotanical study of traditional medicinal plants in Amhara Region of Northern Ethiopia, Messay Wolde-Mariam *et al.* (2015) reported that the chopped and crushed roots of Insosila being mixed with water are drunk once or twice for abortion purpose; and similarly, the chopped, crushed and boiled roots are drunk to treat arthritis. Treatment by Insosila helps to control fungal infections as well as to toughen the skin (Hedberg *et al.*, 2006).

5.3. Coloring / dyeing

Local plants such as Insosila are sources of natural colorants (Jihad, 2014). For instance, in general, the flower and crushed stem and leaf pastes of Balsaminaceae are used to produce brown, orange and red colors to dye garments such as silk, wool, and cotton (Kar and Borthakur, 2008: Singh *et al.*, 2015). More specifically, the juice of pounded roots of Insosila is one of the ingredients for a red ink and can be used in textile industries to dye cloths. Hence, the roots and

flowers of *I. trinctoria* can be used in different textile industries to dye garments in place of using synthetic chemicals (Jihad, 2014). Besides, Insosila is among the many plants used by Ethiopian painters to produce green color (Wion, 2010).

5.4. Economic Values

As Insosila plays a great role in cosmetic, medicine and textile industries, it is valuable to capitalize on responding to its local, national and international market demands. A survey of local market in Western Highlands of Ethiopia reported 2.6 mean of Insosila sellers in the market; and an estimated mean financial money value of 30 Birr from five visits (Zuberi *et al.*, 2014). This study also reported high local community market demand on Insosila due to its cosmetic nature particularly to color nails. A study in Tigray Region also recommended specialization and value addition to the highly demanded Insosila in Mahoney, Tigray Region of Ethiopia, for adornment, particularly by women (Tilahun Amede and Mulugeta Taye, 2015).

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