Ethnobotany of Drumstick (*Moringa oleifera*) in the Koshi region of Bihar and Tarai area of Nepal.

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Abstract:

Drumstick (*Moringa oleifera*) belongs to the family of Moringaceae. In the Koshi region, it is known as 'Sahjan' whereas in Tarai area of Nepal it is called as 'Moonga'. A survey was conducted in different villages of Koshi region of Bihar (India) and Tarai area of Nepal for the ethnobotanical study regarding the medicinal and economic use of Drumstick. All parts of Drumstick (roots, bark, leaves, flowers, fruits and seeds) are very useful in improving health. The trees of Drumstick are used as animal feed and human food. It is used as an effective remedy for malnutrition. Drumstick is rich in nutrition owing to the presence of a variety of essential phytochemicals present in its leaves, pods, and seeds. Drumsticks can generate significant revenue with very less costing as has been observed in the Koshi Region. People of the region often attribute this analogy to the plant's name : *sahjana* implies *sahaj dhan.* The logical reason for the tree being a source of good income lies in the fact that newly planted sapling starts bearing fruits in a short span of about 6-12 months. Moreover, about 900 - 1200 trees can be planted in an acre of land to generate upto 4000 kg of pods. In the wholesale market, the value of these pods are around Rs40/kg. Thus, an annual income of around Rs1.6lakh can be earned from just the pods of the tree. The bark, flowers and leaves are also in demand in the developed markets. Drumsticks are also exported to the European and Gulf countries from India. Bearing significant economic value, it has medicinal properties and other uses too. The barks and roots can be boiled in water to extract decotion which can treat a number of diseases. The leaves help in skin problems, scurvy and pneumonia. Seeds act as anti-inflammatory and antimicrobial agents. It can fulfill the life necessities of both human beings and livestock and it can also be used as growth enhancers for main crops without the degradation of natural resources.

Keywords : Drumstick, Moringa oleifera, Koshi region, Sahjan, Bihar, Medicinal and Economic.

Introduction

Drumsticks (Moringa oleifera) is originally a native plant of India, but has become naturalized in tropical and subtropical areas throughout the world. It grows in both wet and warm climates and survives in infertile soils even under drought conditions (Bouman et.al.,2014). It requires sandy or loamy soil. *Moringa oleifera* is propagated in two main ways : by sowing and by cutting. In Sudan, the direct seeding method is followed as it has high germination rates. Since drumsticks seeds are expected to germinate within 5-12 days after seeding and can be implanted at a depth of 2 cm in the soil. In India, it is propagated by stem cutting In the Koshi region of Bihar and Tarai area of Nepal, the climatic conditions are very suitable to grow Drumsticks. The relative easiness with which Drumstick spreads sexually and asexually and it's low demand for soil nutrients and water and ability to support poor and dry soils, makes it easy to produce and manage. The population is growing day by day but the resources are depleting. In 1968, a young Stanford biologist named Paul Ehrlich published a short book called, 'The Population Bomb.' This widely read book warned of the dangers of continuing rapid population growth, especially in the poor countries of the world.

The rapid increase in human population is increasing the food and basic requirements, which is in turn threatening environmental conservation and enlarging the gap between the availability of resources and the meeting of human necessities. People are fulfilling their requirements for food and shelter by depleting natural resources. Plant scientists are exploring the types of plants that can fulfill the life necessities of both human beings and livestock but can also be used as growth enhancers for main crops without the degradation of natural resources. Over the last few years, underutilized crops and trees have captured the attention of plant scientists, nutritionists, and growers. *Moringa oleifera* is one of those plants that has been neglected for several years but now is being investigated for its fast growth, higher nutritional attributes, and utilization as a livestock fodder crop. It can be grown as a crop on marginal lands with high temperatures and low water availability, where it is difficult to cultivate other agricultural crops. The loss of medicinal and economic plants of Koshi region affects both the health, income and thus, the standard of living of the people here. There is a serious need to study and document these plants. For improvement of life and economy of the local people of these regions, social forestry, cultivation and documentation of ethno-medicinal and economic plants is essential. More than 150 species of medicinal plants occur in Bihar. 50% of these plants are available in the Koshi region of Bihar and Tarai area of Nepal. Some of the plant species which were reported to occur abundantly half a century ago have become rare due to overexploitation and floods. Plant species, in which all parts like root, bark, leaves, flowers, fruit and seeds are of medicinal importance, requires maximum attention for their protection.

Methodology

The survey was done during the period of 2011- 2012 and information was collected based on close consultation with local informants. Ethnobotanical information was collected from people of different areas of Koshi region of Bihar (India) and Tarai area of Nepal. Survey was conducted in sample areas(towns and villages), carefully chosen to represent the Koshi region of Bihar and Nepal plains. Folk medicine sellers, *Vaidyas* and villagers were consulted. The literature review is based on online published materials.The analysis focused on the current state of knowledge on distribution, utilisation, nutritional value, propagation and management of species.

Medicinal value of Drumstick (Literature Review):

- Roots are soaked in water and boiled to obtain decotion and Seeds hextract as remedies for toothache and antiparalytic (Anwar, et.al.,2007)

- Barks are boiled in water and soaked in alcohol to obtain decotion and extracted respectively, that can be used to treat stomach ailments, poor vision, joint pain, diabetes, anemia and hypertension (Abe and Ohtani,2013, Popoola and Obeme,2013).

- Leaves are used in skin disease, hair problems, ear infections ,scurvy, pneumonia and to control blood pressure & blood sugar (Rockwood et.al.,2013; Choudhary et.al.,2013).

- Flowers are used to cure urinary problems. These are antiarthritic agent and have hypocholesterolemic properties (Fuglie,2005; Sutalangka et.al.,2013).

- Pods are beneficial in the diet to control obesity. It is also helpful in treatment of joint pains, diarrhea liver and spleen problems (Fuglie, 2005).

- Seeds help in treating STDs, epilepsy gout and act as antiheroes, anti-inflammatory and antimicrobial agents (Rockwood et.al.,2013; Kasolo et.al.,2010; Nair and Varalakshmi,2011).

	Parts of Drumsticks are	**Nutritional substances**
	Root	Alkaloids (moriginine and morphine) and

		Minerals.
	Bark	Magnesium, Sodium and Calcium
	Leaves	Protein, Vitamins, Alkaloids, Glycosides and Amino acids
	Flowers	Calcium, Potassium and Amino acids
	Pods	Lipids, Protein, Fiber, Fatty acids and Non structural Carbohydrates
	Seeds	Oleic acid, Antibiotics, Protein, Vitamins (A&B) and Amino acids

Different parts of Drumstick Trees

Result

Ethnic people of the Koshi region of India and Tarai area of Nepal believe that Drumstick is a magical tree. It has numerous medicinal properties, nutritional value and also economic value. These claims were well supported in the survey. Local *vaidyas,* who were among the respondents also talked about the medicinal uses of Drumsticks in great detail and all of it was found to be in accordance with the literature review. Some new information (not found in the literature review) about the medicinal properties of *Moringa oleifera* also found from the survey.

Benefits of Drumstick tree (*Moringa oleifera*)

- Roots are used in toothache and antiparalytic.
- Barks are used for stomach ailments, joint pain.
- Leaves of Drumstick are used in lot of problems:-

    1. It is good for hair and skin.
    2. It is used to stabilize the blood sugar level.
    3. It is used as an antiseptic and an anti - inflammatory agent.
    4. It is beneficial in healing of wounds, minor cuts and burns quickly as it reduces the clotting time.
    5. Its leaves are used to increase lactation in nursing mothers. Consuming leaves is very good for the health of the mother and the baby.

- Flowers are good sources of calcium, potassium and Amino acids. They are good for bones and teeth.

Conclusion

Drumstick has tremendous use value, both economical and medicinal and thus, really stands up to the name of the magical tree given to it by the local people. With the potential to single handedly benefit the health & wellness, income earning and standard of living of people, the cultivation of Drumsticks at a large scale should be promoted. In addition to this, it's health and medicinal benefits need to be documented and utilised scientifically.

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