ECONOMIC, EDIBLE AND MEDICINAL POTENTIAL OF *Tinospora cordifolia* FOR SOCIO-ECONOMIC DEVELOPMENT OF WATERSHED RISSA-KHAD, DISTRICT MANDI OF HIMACHAL PRADESH

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Abstract

Tinosporacordifolia (Willd.) Miers is known by its local name gulje and common name giloye in watershed Rissa-khad. Gulje has tremendous indigenous uses and closely intermingled with socio-economic tradition of local people. It is an excellent source of food, fodder, medicine and income. All the parts of plants viz leaf, stem and aerial roots are edible, medicinal and useful for people. A local sweet dishes HALWA and SIRRA is prepared from extract of stem and aerial roots of gulje. SIRRA is considered medicinal and believed that it should be eaten once in a year for good health. Gulje flour and SIRRA are marketed and can increase the income of people. Other indigenous uses of guljeare it is used as a fodder and tying material. Focused study on economic, edible and medicinal potential of plant at species level is very poorly attempted and has not been done earlier on Tinosporacordifolia in watershed Rissa-khad. So present study has been done on economic, edible and medicinal potential of Tinosporacordifolia and its role in socio-economic development of watershed Rissa-khad of Distt. Mandi Himachal Pradesh.

Keywords: *Traditional Knowledge, Edible, Water-shed, Economic Potential*

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Introduction

Himalayan forest is rich source of useful plants for local people. The indigenous knowledge and practices revolve around traditional values of resource use that include subsistence, socio-cultural and economic-commercial values and traditional practices of resource use. They used plant diversity in various forms i.e., medicine, wild edible/food, fodder, fuel, timber, making agricultural tools and various other purposes1. Wild edible with medicinal value are gradually gaining importance in our food or to treat diseases due to their well-known no side effect on body as compare to drugs. Tinosporacordifolia (Willd.) Miers is one of such naturally growing plant of watershed Rissa-khad harvested by inhabitants for its edible and medicinal uses. All parts of plants viz leaf, stem and aerial roots are edible and medicinal. It is a member of family Menispermaceae with synonyms Tinospora verrucose, Cocculuscordifolius, Menispermumcordifolium, Plant is known by a number of common names Amrita, Duyutige, Gado, Giloe, Giloya, Guduchi, Gulancha, Heartleaf moonseed, Teppatige, Tinofend Guduchi, Giloyand localname Gulje. Gulje is a large, deciduous, perennial climbing shrub of watershed Rissa-khadhaving weak and fleshy stem it sends down long, thread-like aerial roots that get rooted to the soil when roots touch the ground. A local sweet dishes HALWA and SIRRA is prepared from extract of stem and aerial roots of gulje. SIRRA is considered medicinal and believed that it should be eaten once in a year for good health. It is sold at high price in local market and a easy source of income for local people of study area. Traditional knowledge of using gulje is declining day by day and is at verge of extinction among young generation, so it need to be documented and promoted.

Objective of study

1. To know the habit, habitat, nativity and distribution range of Tinosporacordifolia in watershed Rissa-khad.
2. To document the indigenous uses of Tinosporacordifolia in watershed Rissa-khad.
3. To assess the edible potential of Tinosporacordifolia in watershed Rissa-khad
4. To analyze medicinalpotential of Tinosporacordifolia to treat diseases.

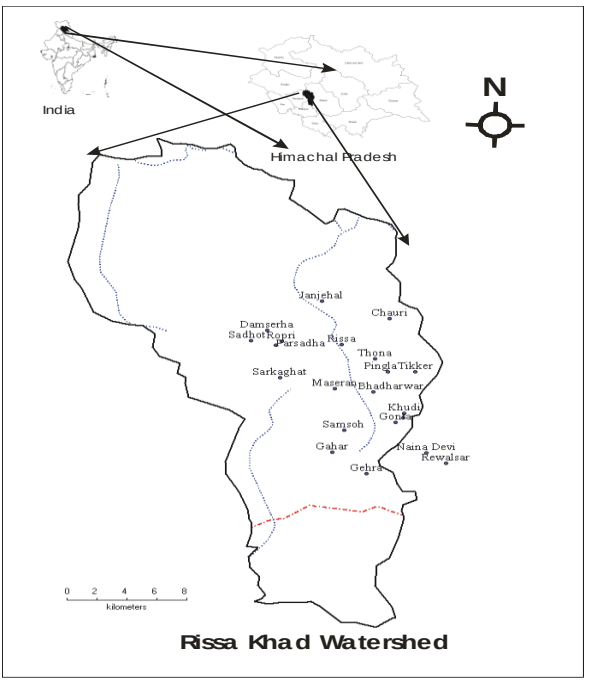
5. To assess economic potential of Tinosporacordifolia for socio-economic development of watershed Rissa-khad.

Methodology

Study is based on both primary and secondary data. Rapid samplings of the gulje was conducted throughout the watershed. Species is identified with the help of local flora2,3,4. The knowledgeable persons were interviewed through questionnaire and information on the local names, plant part(s) used, indigenous knowledge and practices of using gulje was gathered and analyzed. Nativity of the species has been identified following Anonymous (1883-1970)5andSamantet al., 1998b6.Market survey was done to assess economic potential of gulje.

Study Area

The present study has been conducted in Rissa Khad Watershed (310 37' 38" N latitudes and 760 48' 20" E longitudes) of Mandi district, Himachal Pradesh. It covers approximately 123.07 Km2 area and represents 20 panchayats and 132 villages. The altitude of the watershed ranges from 700-2150m. It supports diverse habitats, species, communities and Ecosystems. The vegetation mainly comprises of sub-tropical and temperate types and mostly dominated by broad leaved deciduous and evergreen species and coniferous species. The watershed is inhabited by a large number of villages with 11,258 households and 33,458 human populations. The total livestock population is 11,214(Statistical Department H.P.).



Discussion

Morphology of Gulje plant

Plant is a large, deciduous extensively spreading climbing perennial shrub upto 15m tall. It is with several elongated twining branches and aerial roots. Leaves simple, alternate, exstipulate, long petioles up to 15cm long, roundish, pulvinate, both at the base and apex with the basal one longer and twisted partially and half way around. Lamina broadly ovate or ovate cordate, 10-20 cm long or 8- 15 cm broad, 7 nerved and deeply cordate at base, membranous, pubescent above, whitish tomentose with a prominent reticulum beneath. Flowers unisexual, small on separate plants and appearing when plant is leafless, greenish yellow on axillary and terminal racemes. Male flowers clustered, female usually solitary. Sepals 6, free in two series of three each, the outer ones are smaller than the inner. Petals 6 free smaller than sepals, obovate and membranous. Fruits aggregate of 1-3, ovoid smooth drupelets on thick stalk with sub terminal style scars, red, scarlet or

orange coloured. Seeds curved or half-moon shape, endospermic, cotyledons flattened, leaflike, radicle short.



Images showing morphology of Gulje

Distribution and Nativity

It is commonly seen twining around other plants like hedges and small trees for support in dry deciduous forests, capable of growing to the tops of tall trees. Gulje is distributed throughout the warmer parts of watershed up to analtitude of 1,400 meters. Plant is native of Indian oriental.

Indigenous Uses

All the parts of plants viz leaf, stem and aerial roots are edible and useful for local people. A local sweet dishes HALWA and SIRRA is prepared from extract of stem and aerial roots of gulje. SIRRA is considered medicinal and believed that it should be eaten once in a year for good health. Leaves of gulje are also used as a tonic tea. Stem and roots of this plant are given to milchcattle for enhancing milk production. The aerial roots of gulje are used as a tying material for tying bundles of fuel and fodder in villages.



Harvesting of Gulje

Edible Potential

Leaves of guljeare used as a tonic tea. Branches and aerial roots of the plant are dipped inside water; it makes its akin soft. They are unskinned, ground dried and powdered into flour which is then used to prepare HALWA along with sooji (somalina)a local sweet dish. Sooji is mixed to avoid natural bitter taste of gulje flour.HALWA ofgulje flour is considered medicinal and recommended to eat 3-4 times in a year. Flour sometime also mixed with wheat flour and made into chapatti for harnessing its medicinal value to treat arthritis and diabetes. Another traditional dish SIRRA is also prepared from starch extracted from stem and branches. Starch extracted is allowed to ferment at least for seven days, after that fermented paste is sieved and small sized tablets are prepared and sun dried. Only precaution required is to change water every day at least 2 times to avoid foil smell of fermentation. Sun dried tablets are now ready for preparing SIRRA.

Gulje Ka HALWA

Ingredient

Guljeflour, 200 g; sooji,50 g, vegetable oil or clarified butter,250g; sugar, 200; dry coconut powder,50g; raisins and other grated dry fruits,25g.

Method:

Put 250 g ghee (clarified butter) in a pan and roast guljeflour and soojiwell. Add to it water three times more of roasted flour, keep on stirring it and add

sugar, cook till water absorb and then add coconut powder and grated dry fruits, Now gulje HALWA is ready to serve.

Sirra

Ingredient:

Guljesirra, 1/2 kg; vegetable oil or clarified butter,250g; sugar, 250 g

Method:

Make paste of sirra and sugar with 3-4 glasses of water and keep it for 10 to 15 minutes so that sugar gets mixed with sirra properly. Put oil or clarified butter in a non-stick pan and add to it this paste of sirra and sugar. Cook for 15-20 minutes by thoroughly stirring. Now sirra is ready to serve.

Dried Gulje Powder or flour

Gulje Sirra Raw

Cooked Gulje Sirra

Medicinal Potential

Plant can be used as a good source for beneficial drugs and its quantified values can be used as a tool for a drug to obtain a quality control profile7. The stem, root and whole plant are alterative, antidote, aphrodisiac, diuretic, febrifuge and tonic 8.9. The plant is also commonly used in a variety of other complaints including rheumatism, urinary disease, general debility, bronchitis and infertility. It is useful in vitiated conditions of vata, burning sensation, hyperdipsia, helminthiasis, dyspepsia, flatulence, stomachalgia, intermittent fevers, chronic fevers, inflammations, gout, vomiting, cardiac debility, skin diseases, leprosy, erysipelas, anaemia, cough, asthma, general debility, jaundice, seminal weakness, uropathy and splenopathy. Stem: Bitter, astringent, sweet, thermogenic, anodyne, anthelmintic, alterant,

antiperoidic, antispasmodic, anti-inflammatory, antipyretic, antiemetic, digestive, carminative, appetize, stomachic, constipating, cardiotonic, depurative, heamatinic, expectorant, aphrodisiac, rejuvenating, galacto-purifier and tonic 10,11.

Table 1.1 Major and sub groups of natural products present in different parts of Tinosporacordifoliaand their biological activities.

Active Component	Compound	Plant Part	Biological Activity (In Human being)
Alkaloids	Berberine, Choline, Tembetarine, Magnoflorine, Tinosporin, Palmetine, Isocolumbin, Aporphine alkaloids, Jatrorrhizine, Tetrahydropalmatine	Stem, Root	Anti-viral infections, Anticancer, anti-diabetes, inflammation, Neurological, immune modulatory, psychiatric conditions13.14
Diterpenoid Lactones	Furanolactone, Clerodane derivatives [(5R,10R)-4R-8Rdihydroxy-2S-3R:15,16diepoxy-cleroda-13 (16), 14-dieno-17,12S:18,1Sdilactone], Tinosporon, Tinosporides, Jateorine, Columbin	Whole Plant	Vasorelaxant: relaxes norepinephrine induced contractions, inhibits Ca++ influx, anti-inflammatory, anti-microbial, antihypertensive, anti-viral. Induce apoptosis in leukemia by activating caspase-3and bax, inhibits bcl-215,16.
Glycosides	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside Syringin, Syringinapiosylglycoside, Pregnane	Stem	Treats neurological disorders like ALS, Parkinsons, Dementia, motor and cognitive deficits and neuron loss in spine and hypothalamus, Immuno modulation, Inhibits NF-kBand act as nitric oxide scavenger to show anticancer activities17,18.

	glycoside, Palmatosides, Cordifolioside A, B, C, D and E		
Steroids	β–sitosterol, δ-sitosterol, 20 β-hydroxyecdysone, Ecdysterone, Makisterone A, Giloinstero	Shoot	IgA neuropathy, glucocorticoid induced osteoporosis in early inflammatory arthritis, induce cell cycle arrest in G2/M phase and apoptosis through c-Myc suppression. Inhibits TNFα, IL-1 β, IL-6 and COX-219,20
Sesquiterpenoid	Tinocordifolin	Stem	Antiseptic21
Aliphatic compound	Octacosanol,	Whole	Anti-nociceptive and anti-inflammatory. Protection against 6hydroxydopamine induced parkinsonisms in rats. Down regulate VEGF and inhibits TFN- α from binding to the DNA22-23.
Others	(a,4-di hydroxy-3methoxy-benzyl)-4-(4- compounds hydroxy-3methoxy-benzyl)tetrahydrofuran, Jatrorrhizine, Tinosporidine, Cordifol, Cordifelone, Giloinin, Giloin, N-transferuloyltyramine as diacetate, Tinosporic acid	Root, Whole Plant	Protease inhibitors for HIV and drug resistant HIV 24,25

Economic Potential

SIRRA is prepared and sold by members of various Self -Help Groups at the rate of 800 Rs per 1kg. So by preparing and selling SIRRA people can enhance

their income also. A large number of commercial products of gulje (Table 1.2) are also available in market showing its tremendous commercial value. But people of watershed not use this easily available climber upto its fullest.

Table1.2 Pharmaceutical products of T. cordifolia and their biological roles

Name of Market Product	Biological Roles	Products
Guduchi	The immune system and the body's resistance to infections	
Madhu Mehari	Cure by urinary problems, maintain blood sugar, fatigue	
Safe herb	Cure by Anemia and sexual disabilities.	

Cirrholiv-ds syrup	Hepatoprotective	
Abhaibhubejhr	Anti-stress	

Other Uses

Guljeis considered best fodder by inhabitants of water-shed Rissa -Khad to increase the milk production in milch cattle. Gulje roots and stem are also used as a tying material for tying fodder and fuel.

Results

1. Guljeis a multipurpose vine with tremendous medicinal value and also harvested as a fodder and as a tying agent.
2. Altitudinal range of Gulje in watershed is upto 1,400 meters. Plant is native of Indian oriental.
3. The plant is edible and is useful in treating large number of diseases, documented medicinal uses of guljeare enormous, but people of watershed mainly employ this plant to treat arthritis, joint pain, diabetes anduric acid by consuming stem and root decoction or by consuming its traditional recipes. They use starch obtained from the stem and root of in the treatment of diarrhea and dysentery. The fresh plant is more effective than the dried.

4. Plant has a great potential to act as a commercial plant, both at local and national market.
5. Mass plantation, sustainable harvesting, commercial extraction and selling will promote gulje as a mean of income generation and socioeconomic development for local people of water-shed Rissa khad.

Conclusion

Traditional knowledge of using gulje is declining day by day and ispoor among young generations due to urbanization and westernization. This knowledge will be lost in near future unless efforts have been done. In spite of huge commercial value and abundance availability of gulje in watershed inhabitants do not use this plant upto its optimum potential. If utilized properly, it can be a best commercial wild product to raise socio-economic status of local people.

Recommendation

1. Food value of gulje both in dry or fresh form should be calculated.
2. Awareness is needed among masses for its economic potential, sustainable harvesting and optimum utilization.
3. Government intervention is required to promote its marketing as raw material.
4. Himachal Pradesh being a biodiversity rich region of Western Himalaya endowed with many important medicinally important plants. So, a small-scale herbs processing industry should be step-up for better promotion and felicitation of economically important wild plants.

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