



Use of ichthyotoxic plant Mugwort (*Artemisia vulgaris* L.) for Fishing: An Indigenous practice in Sikkim

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ABSTRACT

A field study on use of ichthyotoxic plant for eco friendly fishing by the local people of Sikkim was conducted in the East District of Sikkim. Sikkim state is mainly inhabited by Lepcha tribes, Bhutia tribes and Nepali people. They use their indigenous knowledge of different ethnic plants for catching fishes easily. In the survey for collecting information structured questionnaire and informal interviews with the local people was done. During fishing operation 4-6 people use to make a group for collection of plants, preparation of plant paste by crushing and thereby putting the prepared paste in the holes between rock beds of the river. Employing this method the fisher folk are able to catch 2-10 kg of fish per fishing operation in a day depending upon the availability of fishes in the river. The fishing through this technique is suitable during the winter season from September to March.

Key Words: *Artemisia vulgaris*, ichthyotoxic, indigenous, Sikkim.

INTRODUCTION

Sikkim is a small multi-ethnic state of India, located in the Eastern Himalayan region having a geographical area of 7096 km² (Gopiet al, 2016). Lepchas, Bhutias and Nepalese are the three major ethnic groups in Sikkim, in which, the Lepchas are the native inhabitants. Although, the Lepchas community are native to the state but the majority of population belongs to the Nepalese community (70% of the total population). Compared to other ethnic community groups, the Lepchas are still successful in conservation of their traditional practices. The agriculture is the main occupation of these people and in year 2016 the state was declared as the first fully organic state of India. These community households are maximally dependent on multiple sources of agriculture, horticulture, animal husbandry and up to some extent on fishing. Their main source of income is agriculture and animal husbandry, while, fishing is done by the people living nearby rivers for their local consumption. Fish provides necessary protein in the diet of these communities.

In most parts of the world, from the ancient period of time peoples of tribal communities had utilized various plant products of diverse natures in order to facilitate capture of fish. The practice of this kind of effort is considered as one of the great ecological and ethno-botanical importance and has usually attracts a lots of the researchers to explore the traditional practices used by the different indigenous tribal people. Although, with the advancement of new techniques this method of fishing is now declined as the wholesale destruction of all size of fish is involved (Howes, 1930). Fishing by employing various ethno-botanicals is an age old technique used by various tribes to get their food. These techniques are orally transmitted from one generation to another with insufficient documentation. Further, the development of advance technique in this field and easy availability of food substitute makes these practices towards threats of extinction. Hence, the documentation of such techniques and the plants used for such practice is a prime need of the present day before

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these techniques become obsolete and unknown to researchers.

Mugwort (*Artemisia vulgaris* L.) is an ethnic plant has been reported to use by local Sikkimese people for various traditional practices. The essential oil of *Artemisia vulgaris* is effective against *Tribolium castaneum* (Herbst), *Callosobruchus maculatus* (F.) and *Rhizopertha dominica* (F.), some of the major pest in storages (Sharifian *et al*, 2016). The ethanolic rhizome extract of *Artemisia vulgaris* was found to inhibit the hatching of egg (50%) and caused second-stage juvenile mortality and galling of the root-knot nematode *Meloidogyne megadora* (Costa *et al*, 2003). Their ethanolic leaf extracts were reported to have larvicidal activity (Masottiet *al*, 2012).

In the present study an attempt was made to document the fish catching potential of Mugwort (*Artemisia vulgaris* L.) and to explore the technique behind, used by the local indigenous people of Sikkim, India.

MATERIALS AND METHODS

The present study was performed during the year 2014-15 in the East District of Sikkim covering the villages viz. Assamlingzay, Ranipool, Ranka, Saramsa, 9th mile, Martam and Singtam adjacent to Rani Khola (Rani River) geographically located between 27°17' N latitude and 88°59' E longitude. The Rani Khola is tributary of Teesta river and flows near the state capital, Gangtok (Fig. 1). The river is rich in fish diversity and the major fishes present in the river are *Schizothorax spp.* (Asala), *Neolissocheilus spp.* (Katley), *Garra spp.* (Buduna) and *Pseudecheneis spp.* (Kabrey) (Toppo *et al*, 2011). In the survey for collecting information simple structured questionnaire and informal interviews with the local people was done. The majority of the respondents were male mostly fisher folk, daily wage labourers and farmers ranging between the age group of 25- 55 years belonging to the different communities. The prior informed consent (PIC) was taken from the Panchayat member

as per the convention on biological diversity (CBD) guidelines to record and publish the method on fish capturing to publicize the knowledge in public domain. The temperature of the river water was recorded with the help of thermometer at weekly interval and average was worked out.

RESULTS AND DISCUSSION

It was observed that depending upon the seasonal variation, water current and water level the fisher folks employ numerous approaches for catching fish. The river in this hilly terrain consist rocks and boulders of different sizes with hollow space utilized by fishes for their proper shelter. During summer and rainy season fishes usually live in the open water and migrate upward in search of smaller stream but during winter they live under the rock and boulders in groups. In the rainy season the water is muddy with high level and fast water current. During this season, the fisherman mostly uses hook and caste net for catching fishes. While, in the winter season the water level is low with low current and water is clear. During this season, the fisher folk usually catch the fishes by diverting the river flow and by using certain traditional practices such as use of *Artemisia vulgaris* plant. The fishing through this technique is suitable during the winter season from September to March when the temperature of water remains in the range of 5.4-11.9 °C, in this season fishes mainly Snow trout locally known as 'Asla' (Fig. 2) lives under rocks. During fishing 4-6 people use to make a group for collection of plants, preparation of plant paste by crushing and execute the method (Fig. 3). The fisherman searches for hollow space below the rock in the river water where the fishes are normally present. The entrance of the rock hole is closed by using a jute bag, plastic or cloths and then the crushed plants were placed inside the space below the rock, the fishes died due to toxic effect of the plant paste were collected by the fisherman (Fig. 4). Employing this method the fisher folk are able to catch 2-10 kg of fish per fishing operation in a day depending upon the availability. Similar type of

Use of ichthyotoxic plant Mugwort

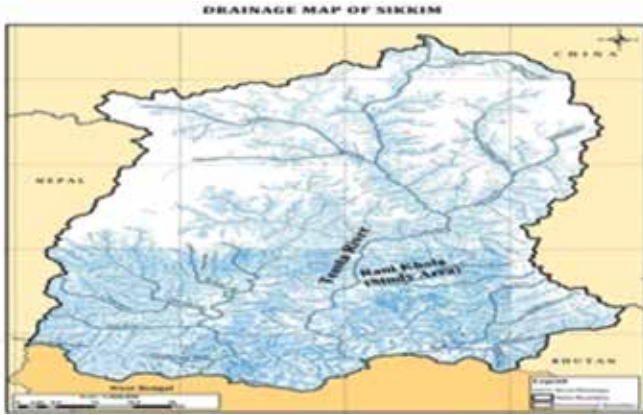


Fig 1. Map of the studied area (http://www.sikknvis.nic.in/Database/Rivers_781.aspx)



Fig 2. Fish (Snow trout) caught using *Artemesia vulgaris* plant extract (Photo Courtesy, Bimal Gurung, Sikkim University)



Fig 3. Crushing of (*Artemesia vulgaris*) leaves and stem using stone (Photo Courtesy VivekYadav, Sikkim University)



Fig 4. Dead fish collected by Fisherfolks (Photo Courtesy, Bimal Gurung, Sikkim University)

fishing method by taking the advantage of behavior of fishes hiding between rocks in river beds also reported (Hussain *et al*, 2016). This method of fish catching is sustainable and has no any drastic effect on fish population as the ichthyotoxic plant (*Artemesia vulgaris* L.) is effective only when the water level is low and the technique is used during short period of winter season. Similar findings by use of various ichthyotoxic plants, used by Miri tribe of Arunachal Pradesh (Tag *et al*, 2005) and traditional usages of ichthyotoxic plant *Barringtonia asiatica* (L.) by the Nicobari tribes (Ravikumar *et al*, 2015) also support and encourage the future studies in context to discover more ichthyotoxic plant used in ecofriendly means.

CONCLUSION

The indigenous technique of using *Artemesia vulgaris* as an ichthyotoxic plant is unique and sustainable. Such technique should be preserved by the community for sustainable harvest of fish from riverine system. Now a days various destructive method of fishing is adopted by fisherman such as use of electric battery, chemical poison and bleaching powder which is easier but harm the ecosystem and diversity of fish. The plant poses good piscicidal property and further research is needed to check its pesticidal property for utilization in organic agriculture.

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REFERENCES

- Costa S D S D R, Santos M S N D A, and Ryan M F (2003). Effect of *Artemisia vulgaris* rhizome extracts on hatching, mortality, and plant infectivity of *Meloidogyne megadora*. *J Nematol* **35**(4): 437-442.
- Gopi R, Avasthe R K, Kalita H, Kapoor C, Yadav A, Babu S and Das S K (2016). Traditional pest and disease management practices in Sikkim Himalayan region. *International J Bio-resource and Stress Management* **7**(3): 471-476.
- Howes F N (1930). *Fish-Poison plants*. In: Bulletin of miscellaneous information. Vol 4 (Royal Botanic Gardens, Kew). 129-153.
- Hussain S M, Sen D, Riba T, Pathak M and Singh R K (2016). Fishing in the Siang belt of Arunachal Pradesh, India: Learning Traditional Ecological Knowledge of Adi and Galo communities. *Indian J Tradit Knowle* **15**(4): 685-692.
- Masotti V R, Jong L D, Moreau X, Rabier J, Laffont-Schwob I and Thiery A (2012). Larvicidal activity of extracts from *Artemisia* species against *Culex pipiens* L. mosquito: Comparing endemic versus ubiquitous species for effectiveness. *C. R. Biologies* **335**: 19-25.
- Ravikumar T, Nagesh-Ram, Dam-Roy S, Krishnan P, Grinson-George, Sankaran M, Sachithanandam V (2015). Traditional usages of ichthyotoxic plant *Barringtonia asiatica* (L.) Kurz. by the Nicobari tribes. *Journal of Marine and Island Cultures* **4**: 76-80.
- Sharifian I, Hashemi S M and Darvishzadeh A (2013). Fumigant toxicity of essential oil of Mugwort (*Artemisia vulgaris* L.) against three major stored product beetles. *Arch Phytopathol Plant Protect* **46** (4): 445-450.
- TagH, Das A and Kalita P (2005). Plants used by the Hill Miri tribe of Arunachal Pradesh in ethnofisheries. *Indian J Tradit Knowle* **4**(1): 57-64.
- Toppo S, Rahman H and Haque N (2011). *Fish Biodiversity as an Indicator of Riverine Status of Sikkim*. In: Arrawatia ML, Tambe S (ed) *Biodiversity of Sikkim - Exploring and Conserving a Global Hotspot*, Information and Public Relations Department, Government of Sikkim, 221-232.

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