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Piscicidal Plants of Nepal: Checklist, Ethnobotanical Uses and Indigenous Practices

Ananda R. Joshi* and Kunjani Joshi**

*Former Director General, SACEP, Colombo, Sri Lanka
**Harvard University Herbaria, USA
Email: ajoshi@gmail.com, kunjanijoshi@gmail.com

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Introduction

Fish catching with the aid of plants and their parts is an ancient practice. The rural communities of Nepal collect piscicidal plants and their parts from various habitats, such as forest, scrub, grassland, cultivated fields, wetlands and riverbanks and use them following traditional methods and practices to stupefy fish. However, at present, the piscicidal plants and their ethenobotanical information are being eroded as a result of haphazard exploitation of resources, habitat destruction and land use change (Joshi and Joshi, 2005). The loss of traditional knowledge within cultures undergoing rapid change is just as irreversiable as the loss of species (Joshi and Joshi, 2004). Hence, priority should be given to document the useful plants and their uses along with indigenous knowledge, methods and practices. Though some ethnobotanical initiatives related to the piscicidal plants have already taken (Bhandary and Shrestha, 1982; Joshi and Joshi, 2005a; Karki and Rai, 1982; Regmi and Karna, 1989; Manandhar, 1989), less priority has been given to the systematic and comprehensive enumeration of these species and their conservation in an integrated manner. Therefore, an attempt has been made to document and enumerate the piscicidal plants with exising traditional uses and practices.

Study Areas and Methods

The ethnobotanical information were collected from the villages of the various districts of Nepal. The complex geomorphology, climatic variations and other physical characteristics make these villages rich in diverse habitats with useful species including the piscicidal plants. These areas are inhabited by different ethnic tribes, who have rich knowledge on ethnobotanical information. Ethnobotanical information was collected using various techniques and also verified with secondary sources.

Enumeration of Species

The plant species, which are reported to have piscicidal effects, are enumerated in Table 1. Seventy-nine piscicidal plants belonging to 35 families are arranged alphabetically by genus–species, family followed by local names, and parts of the plant used. Among the documented species, the family Fabaceae was most frequently represented with a total of 11 species, followed by Polygonaceae 7, Euphorbiaceae 6, Ateraceae 5 and others with less than 5 species.

Indigenous Knowledge and Practices

The local people have excellent knowledge of species identification, usefulness of the plants and traditional practices. Though the main occupation of villagers of the study areas is agriculture, fishing is an alternative source of income. They collect fish for food and also for sale in nearby markets. Maghi tribes are mainly involved in fishing occupation and used to utilize all parts or a certain part of the plant as fish poison. Sometimes for catching fish from rivers, the flow of water is checked either by erecting a temporary wall of mud and stones or by diverting the water current into small temporary ponds. The plant or a plant part is crushed and thrown into the water. The fish poison makes the fish float in a stupefied state and come to the surface of water from where they are easily captured.

According to the information of the local people, some species are preferred for fish poison and frequently used. These species are *Agave cantala, Buddleja asiatica, Buddleja paniculata, Engelhardia spicata*, *Euphorbia royleana*, *Juglans regia*, *Persicaria hydropiper*, and *Sapium insigne.*

Table 1. Piscicidal plants of Nepal.

Botanical name	Nepali name	Parts of the plant used	References
Acacia pennata (L.) Willd. (Fabaceae)	Arari, Arare	Bark, Fruit, Stem	Chimere *et. al*. (2000); Joshi & Joshi (2005a); Manandhar (1989, 2002)
Agave cantala Roxb. ex Salm.-Dyck (Agavaceae)	Nalu	Whole plant, Leaf	Bhandary & Shrestha (1982, 1999); Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989, 2002); Regmi & Karma (1989)
Aisandra butyracea (Roxb.) Baehni (Sapotaceae)	Chyuri	Bark, Oil	Manandhar (1989)
Albizia chinensis (Osbeck) Merr. (Fabaceae)	Kalo Siris, Siris	Bark	Joshi & Joshi (2005a)
Albizia lucidior (Steud.) I. Nielson ex Hara (Fabaceae)	Pakhe, Tapre siris	Bark	Manandhar (1989, 2002)
Anagallis arvensis L. (Primulaceae)	Asinle, Kalo gojale	Whole plant	Manandhar (1989, 2002)
Anemone vitifolia Buch.-Ham. ex DC. (Ranunculaceae)	Dhanero, Madilo	Whole plant	Manandhar (1989, 2002)
Annona squamosa L. (Annonaceae)	Sarifa, Banjhi	Leaf	Manandhar (1989, 2002)
Artemisia dubia Wall. ex Besser (Asteraceae)	Titepati, Nagadamani	Leaf, Young shoot	Joshi & Joshi (2005a); Siwakoti & Siwakoti (2003)
Artemisia indica Willd. (Asteraceae)	Banjhi, Titepati	Leaf	Joshi & Joshi (2005a)
Berberis aristata DC. (Berberidaceae)	Chutro	Bark	Joshi & Joshi (2005a)
Buddleja asiatica Lour. (Loganaceae)	Bhimsen pati, Sano phultis	Leaf	Bhadari & shrestha (1982, 1999); Joshi (1991); Joshi & Joshi (2005a & b); Joshi (1991); Karki & Rai (1982); Manandhar (1989, 2002)

Buddleja paniculata Wall. (Loganaceae)	Tarey Pati, Phultis	Leaf	Bhadari & Shrestha (1982, 1999); Joshi & Joshi (2005a & b); Karki & Rai (1982); Manandhar (1989, 2002)
Careya arborea Roxb. (Lecythidaceae)	Kumbhi, Bhorle	Bark, Leaf, Root	Ghimere *et. al.* (2000); Joshi & Joshi (2005a); Manandhar (2002)
Casearia elliptica Willd. (Flacoutiaceae)	Tamo dedri	Fruit	Manandhar (1989, 2002)
Casearia graveolens Dalz. (Flacourtiaceae)	Salam dedri	Bark, Leaf, Fruit	Joshi & Joshi (2005); Manandhar (1989)
Cassia fistula L. (Fabaceae)	Rajbriksya	Seed	Ghimere *et. al*. (2000); Joshi (1988); Joshi & Joshi (2005a)
Coriaria nepalensis Wall. (Coriariaceae)	Bhuin Machino	Leaf	Joshi & Joshi (2005b)
Croton roxburghii N.P. Balakr. (Euphorbiaceae)	Aule	Seed oil	Manandhar (2002)
Cyathula tomentosa (Roth.) Moq. (Amaranthaceae)	Anko ghans, Ankhle kuro	Root	Joshi & Joshi (2005a); Manandhar (1989, 2002)
Dalbergia stipulacea Roxb. (Fabaceae)	Tatiher	Root	Manandhar (1989, 2002)
Daphne bholua Hamilton ex D. Don. (Thymelaeaceae)	Kagate pate	Bark, Leaf	Joshi (1988); Manandhar (1989, 2002)
Datura metel L. (Solanaceae)	Kalo dhaturo	Leaf	Joshi & Joshi (2005a)
Desmodium laxiflorum DC. (Fabaceae)	Tiplay	Stem	Mander and Chaudhary
Desmodium oojeinense (Roxb.) H. Ohashi (Fabaceae)	Sainsare, Panjan,	Bark	Ghimere *et. al.* (2000); Manandhar (2002)
Diploknema butyracea (Roxb.) H.J. Lam. (Sapotaceae)	Chyuro	Bark, Oil	Manandhar (2002)
Dioscorea deltoidea Wall. (Dioscoreaceae)	Bhyakur	Tuber, Leaf	Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989)
Duabanga grandiflora (Roxb. ex DC.) Walp. (Sonneratiaceae)	Malfare, Lampate	Bark	Manandhar (1989, 2002)
Edgeworthia gardneri (Wall.) Meisn. (Thymelaeaceae)	Argeli, Arkalepat	Bark, Leaf	Joshi & Joshi (2005a & b); Manandhar (1989, 2002)
Engelhardia spicata Lesch. ex Blume (Juglandaceae)	Mauwa	Young leaf	Chaudhary *et.al* (2002); Joshi (1988); Joshi & Joshi (2005a); Joshi (1991); Manandhar (1989)
Entada phaseoloides (L.) Merr. (Fabaceae)	Rukh Simi	Seed	Manandhar (1989, 2002)
Eupatorium odoratum L. (Asteraceae)	Banmara	Whole plant	Joshi & Joshi (2005a)
Euphorbia royleana Boiss (Euphorbiaceae)	Sudi	Whole plant (latex)	Bhandary & Shrestha (1982, 1999); Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989, 2002)
Euphorbia tirucalli L. (Euphorbiaceae)	Thakal	Whole plant	Regmi (1982); Regmi & Karna (1989)
Euodia fraxinifolia (D. Don) Hook. f. (Rutaceae)	Bokuna, Kunukape	Bark, Fruit, Seed	Manandhar (1989, 2002)

Gynocardia odorata R. Br. (Flacourtiaceae)	Gandare, Gantay	Fruit, Bark	Manandhar (1989, 2002)
Hedyotis scandens Roxb. (Rubiaceae)	Aamkholi, Boki lahara	Whole plant	Manandhar (1989)
Holarrhena pubescens Wall. ex G. Don (Apocynaceae)	Kerchi, Indrajau	Stem, Leaf	Joshi & Joshi (2005a)
Hydrocotyle hirsuta Sw. (Umbelliferae)	Seetapaue P.K. Mukharjee	Whole plant	Manandhar (1989, 2002)
Jatropha curcas L. (Euphorbiaceae)	Sajiwa, Arin	Whole plant (latex)	Joshi & Joshi (2005a)
Juglans regia L. (Juglandaceae)	Okhar	Immature fruit	Bhandary & Shrestha (1999); Chaudhary *et al.* (2002); Chhetri & Joshi (2002); Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989, 2002); Regmi (1982); Regmi & Karna (1989);
Litsea cubeba (Lour.) Pers. (Lauraceae)	Sivakoti	Bark, Leaf, Fruit	Siwakoti & Siwakoti (2003)
Lyonia ovalifolia (Wall.) Drude (Ericaceae)	Angeri	Young leaf	Chhetri & Joshi (2002); Joshi (1988); Joshi & Joshi (2005a)
Madhuca longifolia (Koeing) Macbride (Sapotaceae)	Mahuwa	Bark, Oil	Manandhar (1989, 2002)
Maesa argentea (Wall.) A. DC. (Myrsinaceae)	Bhogate	Leaf	Manandhar (1989, 2002)
Maesa chisia Buch.-Ham. ex D. Don. (Myrsinaceae)	Bilauni, Thinke	Root, Bark, Leaf	Joshi & Joshi (2005a); Manandhar (1989, 2002)
Maesa macrophylla (Wall) A. DC (Myrsinaceae)	Pahle phal, Bhogate	Leaf	Bhandary & Shrestha (1982, 1999); Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989, 2002)
Melia azedarach L. (Meliaceae)	Bakaino	Fruit	Joshi & Joshi (2005a)
Meliosma dilleniifolia (Wall. ex Wight & Arn.)) Walp. (Sabiaceae)	Kipuli	Root	Dangol and Gurung (1999)
Millettia extensa (Benth.) Baker (Fabaceae)	Sano Bhogate	Dry Bark, Root	Ghimere *et. al. (*2000); Joshi & Joshi (2005a); Manandhar (1989, 2002)
Millettia fruticosa (DC) Benth ex Baker (Fabaceae)	Tsuni	Bark, Leaf	Manandhar (1989, 2002)
Millettia pinnata (Linn.) (Fabaceae)	Karanj, Panigrahi Sadam	Leaf, Seed	Manandhar (2002)
Myrica esculenta Buch.-Ham. ex D. Don. (Myricaceae)	Kaphal	Bark	Joshi (1988); Manandhar (1989, 2002)
Osbeckia stellata Buch.-Ham. ex D. Don. (Melastomataceae)	Angeri, Rato chulsi	Whole plant	Chhetri & Joshi (2002); Joshi (1988)
Persicaria barbata (L.) Hara (Polygonaceae)	Kuro (Jan) Jhar, Thulo piriya	Whole plant, Leaf	Dangol (2000-2001); Ghimere *et. al.* (2000);

			Joshi & Joshi (2005a); Manandhar (1989, 2002)
Persicaria chinensis (L.) H. Gross (Polygonaceae)	Kesuro (Lo)	Whole plant	Chettri & Joshi (2002)
Persicaria glabra (Willd.) M. Gomez de la Maza (Polygonaceae)	Seto Jhar	Whole plant	Manandhar (2002)
Persicaria hydropiper (L.) Spach. (Polygonaceae)	Piper, Ratnaulo	Whole plant	Chettri & Joshi (2002); Dangol (2000-2001) Joshi & Joshi (2005a & b); Karki & Rai (1982); Manandhar (1989, 2002); Regmi & Karna (1989); Siwakoti & Siwakoti (2003)
Persicaria lapathifolia (L.) S.F. Gray (Polygonaceae)	Bhui Jhar	leaf	Siwakoti *et.al.* (2005)
Persicaria pubescens (Bl.) Hara (Polygonaceae)	Seto pire	Whole plant	Manandhar (1989, 2002)
Persicaria viscosa (Buch.-Ham. ex D.Don.) Nakai (Polygonaceae)	Banpire	Whole plant	Bhandary & Shrestha (1982, 1999); Joshi & Joshi (2005a); Manandhar (1989)
Phyllanthus urinaria L. (Euphorbiaceae)	Amala Jhar, Ajata, Bhui Amala	Whole plant	Dangol (2000-2001)
Piptanthus nepalensis (Hook) D. Don. (Fabaceae)	Sulgasi (L), Siksike	Bark, Leaf	Manandhar (1989, 2002)
Plumeria rubra L. (Apocynaceae)	Chuwa, Golaichi	Bark	Manandhar (1989, 2002)
Ricinus communis L. (Euphorbiaceae)	Aiselu, Andi	Leaf, Seed	Joshi & Joshi (2005a &b);
Rhododendron arboreum Sm. (Ericaceae)	Laliguras	Young leaf	Joshi & Joshi (2005b); Manandhar (1989, 2002)
Rubia manjith Roxb. ex Fleming, (Rubiaceae)	Majitho	Whole plant	Joshi & Joshi (2005a);
Sapium insigne (Royal) Benth. ex Hook. F. (Euphorbiaceae)	Khirro	Bark, leaf	Bhandary & Shrestha (1982, 1999); Joshi & Joshi (2005a); Karki & Rai (1982); Manandhar (1989, 2002)
Sapindus mukorossi Gaertn. (Sapindaceae)	Ritha	Fruit	Regmi & Karma (1989)
Schima wallichii (DC.) Korth (Theaceae)	Chilaune, Nini	Leaf, Bark, Fruit	Bhandary & Shrestha (1982)Joshi & Joshi (2005a & b); Manandhae (1989, 2002);
Securinega virosa (Roxb. ex Willd.) Baill. (Euphorbiaceae)	Ban Nimaro, Paileti	Bark	Manandhar (1989, 2002)
Shorea robusta Gaertn. (Dipterocarpaceae)	Sal	Bark	Joshi & Joshi (2005);
Solanum aculeatissimum Jacq. (Solanaceae)	Bhiskanda, Kantakari	Fruit	Joshi (1988); Manandhar (1989, 2002)
Spilanthes calva DC. (Asteraceae)	Lato ghans	Whole plant	Manandhar (1989)
Spilanthes paniculata Wall. ex DC. (Asteraceae)	Bhuin Timur, Lato ghans	Whole plant	Manandhar (1989, 2002)

Ulmus wallichiana Planch. (Ulmaceae)	Dhamaro, Dhamaro	Bark, Leaf	Manandhar (2002)
Verbascum thapsus L. (Srophulariaceae)	Gaus Lauchhar	Whole plant	Manandhar (1989, 2002)
Xeromphis spinosa (Thunb.) Keay (Rubiaceae)	Mainphal	Bark, Ripen fruit	Dangol and Gurung (1999), Gurung, Dangol & Bhandary (1999); Manandhar (1989)
Zanthoxylum armatum DC (Rutaceae)	Timur, Bhale Timur	Bark, leaf	Joshi & Joshi (2005a); Regmi and Karna (1989); Manandhar (1989, 2002)

Strategies for Sustainable Management

The following strategies are recommended for sustainable management of useful plant diversity.

1. *Inventory, Chemical Screening and Documentation of the Species*

Many parts of the biogeographical areas of the country have still remained unexplored. Hence, it is strongly recommended that major thrust should be given to an intensive inventory and documentation of piscicidal plants and their products. Emphasis should also be given to analyse chemical components of the plants and the parts which are used to stupefy fishes. A more systematic investigation of some of these plants may lead to the discovery of new economically useful products.

2. Documentation of Traditional information, methods and practices

The rural people have developed unique indigenous knowledge related to the uses of plant resources due to constant association with the forests. These existing valuable information are needed to be documented before lost or disappeared. As there is lake of the documentation system, priority should be given to develop a system for the systematic recording of the information related to the ethnobotanical uses and indigenous knowledge of the species.

3. *Conservation of useful species and their habitats*

Though forests, scrubs, grasslands and waste lands are the major habitats of the pecicidal plants, most of them appear to be restricted only to shaded forest habitats. An obvious conclusion that can be drawn from this picture is that deforestation and habitat destruction due to land use change would pose a serious threat to the species. Even without tree-removal, extensive grazing of domestic animals in the forests can be damaging to some species. When questioned about the changing status of the existing plants, our respondents listed some important species such as *Coriaria nepalensis*, *Sapium insigne* and *Zanthoxylum armatum* which have also declined in abundance during the last decade. The trend of decline of abundance of the useful species shows that action for conservation is urgently needed. Hence, efforts should be directed to formulate and implement appropriate strategies and programs related to the conservation and sustainable uses of these plants and their products taking consideration of the needs of the people.

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References

Bhandary, H.R. and Shrestha, P. 1982. Ethnobotanical exploration of the poisonous plants of Kathmandu Valley. *Proc. First Nation. Sci. Tech. Cong*. National Council of Science and Technology, Kathmandu, Nepal. pp.89-97.

Bhandary, H.R. and Shrestha, P. 1999. Poisonous plants of Kathmandu Valley. In: T.C. Majupuria and R.K. Majupuria (eds.), *Nepal-Nature's Paradise*, (), M. Devi, Gwalior, India. pp.151-158

Chaudhary, R.P., Nepal, M., Gupta, V.N.P. and Vetaas, O.R. 2002. Traditional use of plants by the indigenous peoples of makalu-barun region, eastern Nepal. In : R.P. Chaudhary, B.P. Subedi, O.R. Vetaas and T.H. Aase (eds.), *Vegetation and Society: Their Interaction in the Himalayyas, Tribhuvan University, Nepal and University of Bergen, Norway*, pp83-97.

Chhetri, R.B. and Joshi, Rekha 2002. Ethnobotany of non-timber forest product in Langtang National Park, Nepal. *Proceeding of International Seminar on Mountains – Kathmandu*. March 6-8, 2002, RONAST, Kathmandu, Nepal. pp 469-472.

Dangol, D.R. 2000-2001. Aquatic plant resources and their uses : observation from Beesh Hazar Lake, Chitwan. *J. Inst. Agric. Anim. Sci.* 21-22, 119-133.

Dangol, D.R. and Gurung, S.B. 1999. Ethnobotanical study of Darai tribe in Chitwan District, Nepal, *Proceeding of III National conference on Science and Technology*, March 8-11, 1999, RONAST, Nepal, pp. 1194-1213.

Ghimere, S.K., Shrestha, A.K., Shrestha, K.K. and Jha, P.K. 2000. Plant resources use and human impact around Royle Bardia National Park, Nepal. *J. Nat. Hist. Mus.* 19, 3-26.

Gurung, S.B., Dangol, D.R. and Bhandary, A. 1999, Preliminary study on plant communities of forest ecosystem in Chitwan, Central Nepal. *Proceeding of III National conference on Science and Technology*, March 8-11, 1999, RONAST, Nepal, pp1571-1578.

Joshi, A.R. 1988. *A Study of the Environmental Relationship of Certain Village Communities in the Central Development Region of Nepal*, Ph.D. Thesis, University of Wales, Cardiff, UK.

Joshi, A.R. and Joshi, Kunjani, 2005a. Piscicidal plants of Bagmati watershed , Nepal: Indigenous practices. *Ethnobotany* 17, 184-186.

Joshi, A. R. and Joshi, Kunjani 2005b. Non-Timber forest Products of Bagmati and Langtang watershed, Nepal : raw materials of plant orign and their indigenous uses.*Journal of Non-Timber Forest Products* 12(2), 76-86.

Joshi, Kunjani 1991. The uses of wild plants by local communities in the mountainous region of Nepal, *Mountain Environment and Development* 1(2), 43-52.

Karki, K.B. and Rai, A.K. 1982. Observations on the effectiveness of some local plants used as fish poison, *Proc. First Nation. Sci. Tech. Cong*., National Council of Science and Technology, Kathmandu, Nepal. pp. 270-273.

Manandhar, N.P. 1989. Ethnobotanical notes on some Piscicidal plants of Nepal. *Ethnobotany* 1, 57-59.

Manandhar, N.P. 2002. *Plant and People of Nepal*. Timber Press Inc., Portland, USA

Mandar, L.N. and Chaudhary, R.P. Medicinal plants and their traditional use by tribal people of Saptari District, Nepal. In : Bhuju, D.R., Sharma, A.P., Prashad, B.N., Joshi, K.K., Rajbhandary,K.R., Jha, P.K., Joshi, S.D. and Karmachrya, S.B. (eds.), *Proceedongs of First National Botanical Conference*, August 11-12,1992, Nepal Botanical Society, Kathmandu,
Nepal, pp33-42.

Regmi, P.P. 1982. The unexploited plant potentials of Nepal. *Proc. First Nation. Sci. Tech. Cong*., National Council of Science and Technology, Kathmandu, Nepal. pp. 153-167.

Regmi, P.P. and Karna, P.L. 1989. Weeds and other plants of pesticidal values in Nepal. Proceedings of National Conference on Science and Technology, April 24-29, 1988., RONAST, Kathmandu, Nepal. pp.161-173.

Siwakoti, M. and Siwakoti, S. 2003. Ethenomedicinal Uses of plants among the Limbu of Morang District, Nepal. *Ecoprint* 59 (1), 79-84.

Siwakoti, M., Shivakoti, K.P., Karki, B. and Siwakoti, S. 2005. Ethnobotanical uses of plants among Rajbansi and Dhimal ethnic communities of Eastern Nepal. *J. Nat. Hist. Mus*. 22, 41-56.