



Original Research Article

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The Ethno-botanical Studies of Medicinal and Aromatic Plants in Sakteng Wildlife Sanctuary, Trashigang, Bhutan

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Abstract

The study has documented 68 medicinal and aromatic plants (MAPs) of 59 genera belonging to 36 families, used by the local people of Merak, Sakteng and Joenkhar areas in Sakteng Wildlife Sanctuary. The recorded medicinal plants comprised of trees (4 species), shrubs (10 species) and herbs (54 species). The different part (s) of the plants are used to treat various diseases/ailments like chronic gastritis, gynaecological diseases, rheumatism, diarrhoea, bilious fever and many other disorders. Local people have good knowledge in plant identification and their uses. Documentation of these species will preserve the traditional knowledge of plants and help in the conservation of the medicinal and aromatic plants.

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Introduction

The use of plants for medicinal purposes has been there in practice since the time immemorial and even to these days, the people depend on the plants in their surroundings. Almost 80% of population in world rely upon plant based traditional medicines for primary health care (Gopal, et al., 2014). Besides it, the medicinal plants are also used widely across the world in modern drug discoveries (Wangchuk et al., 2008). In Bhutan, medicinal plants are used widely in the various treatment regimens, as many as 300 species of medicinal plants growing in the different regions have been recognized and more than 200 of them are used by the Institute of Traditional Medicine Services (Wangchuk, 2004).

Sakteng Wildlife Sanctuary is blessed with rich diversity of medicinal plants and the people, still practices aged old tradition of using plants to cure many diseases like diarrhoea, fever, wounds, septic diseases, blood diseases, joint pain, for relieving body pain and various gynaecological diseases. The local people of Sakteng Wildlife Sanctuary are semi nomadic highlanders commonly known as *Brokpas* and they mainly depend upon livestock farming for their livelihood. The protected areas of Bhutan are unique from rest of the world due to the presence of settlements within it, thus making the management to cater the needs of local people in and around it.

However, at present scenario the traditional usage of plants and their information are being degraded due to

modernization, loss of habitats, unsustainable land use pattern and over-extraction of natural resources (Joshi and Joshi, 2008). Thus, priority should be given to document the traditional knowledge of the plants. Various studies have also stated that the ethno-botany has crucial role in the field of resource management, conservation of biodiversity and socio-economic development of the region (Cunningham, 2001; Srivastava, 2007). Hence, the attempt was made to document the information collected from local people in the sanctuary and also from other sources.

Materials and methods

Study site

The ethno-botanical study was carried out in Merak, Sakteng and Joenkhar areas under Sakteng Wildlife Sanctaury, Trashigang district of eastern Bhutan (Fig. 1). The sanctuary with an area of 740.60 km² was established in 2003 to represent the easternmost temperate and alpine ecosystems of Bhutan (WWF-

Bhutan and SWS, 2011). The sanctuary is one of the remotest protected area (PA) comprising mainly of Merak and Sakteng *geogs* (block) in Trashigang district and a part of Lauri *geog* (block) in Samdrup Jongkhar district. It also borders with the Indian State of Arunachal Pradesh in north and east. The several field surveys in the study areas were undertaken during the year 2016.

Data collection

Ethno-botanical information was gathered through semi-structured interview (Sujarwo et al., 2014) and open-ended participatory discussions with local informants (Joshi and Joshi, 2008) residing in the study area. Flora of Bhutan of different volumes by Grierson and Long (1984 and 1991) were referred for plant identification. The various works done by Tsarong (1994), Thinley (2004), Dakpa (2007), Thinley (2010), and Interim Framework for Management of Non-wood Forest Products by Social Forestry and Extension Division (2011) were also referred for this ethno-botanical study.

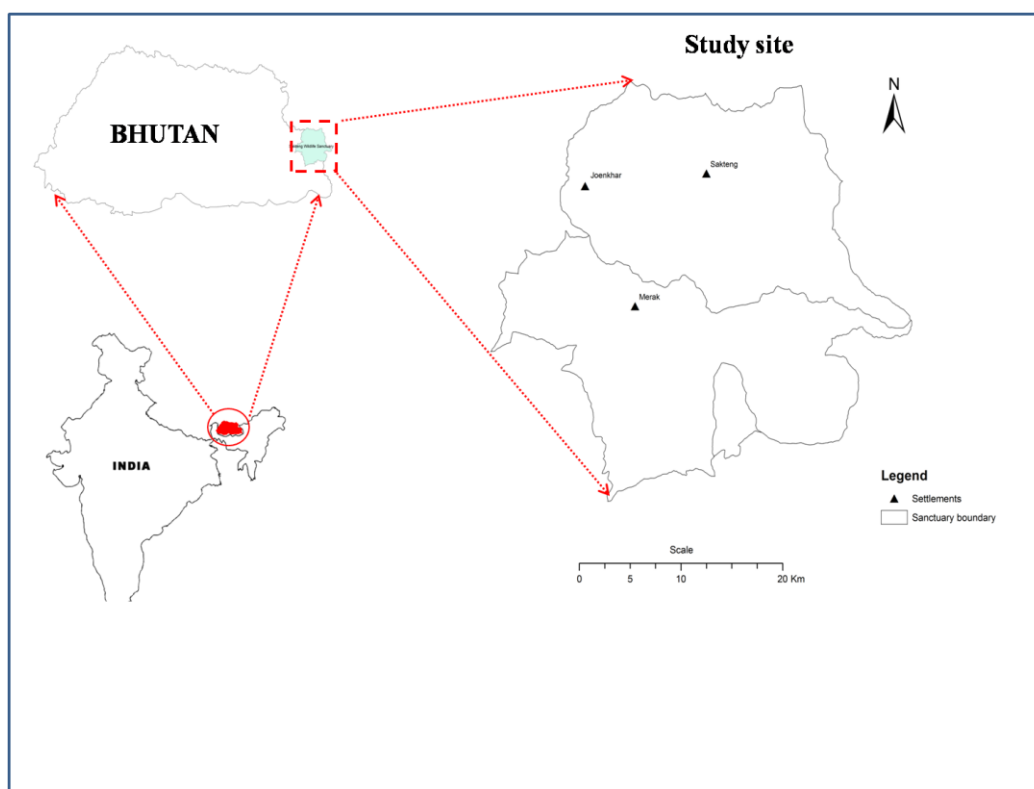


Fig. 1: Map showing the study site.

Results and discussion

The ethno-botanical survey in Sakteng Wildlife

Sanctuary has documented 68 species of medicinal and aromatic plants of 59 genera belonging to 36 families (Table 1).

Table 1. List of plant species and their information collected during ethno-botanical survey in Sakteng Wildlife Sanctuary, Trashigang, Bhutan.

Sl. No	Botanical Name	Family	Habit	Vernacular name	Part (s) used	Uses
1	<i>Aconitum orochryseum</i> Stapf	Ranunculaceae	Herb	Bongkar (Med)	Roots	Treats common cough and cold, bilious fever and dysentery.
2	<i>Aconitum patulum</i> Tamura	Ranunculaceae	Herb	Tsen-dhug (Dz)	Roots	Treatment of all types of pain and disorders due to worms.
3	<i>Aconogonon tortuosum</i> (D.Don) H. Hara.	Polygonaceae	Subshrub	Ngalachog (Dz)	Roots	Treats dysentery
4	<i>Aletris pauciflora</i> (Klotzsch) Handel-Mazzetti.	Nartheceiaceae	Herb	Tsa dromo (Br)	Flowers, leaves and stems	Treats lung and liver disorders.
5	<i>Anaphalis busua</i> (Buch.-Ham.) DC.	Compositae	Herb		Entire plant	It controls loss of blood and relieves swelling.
6	<i>Anaphalis triplinervis</i> (Smis) Sims ex C.B. Clarke.	Compositae	Herb		Entire plant	Relieves swelling and treats illness caused by poison.
7	<i>Anemone rivularis</i> Buch.-Ham. ex DC.	Ranunculaceae	Herb	Chokhor Mendo (Br)	Seeds	Treat poisonous snake bite and helps to relieve pain in body.
8	<i>Anisodus</i> sp.	Solanaceae	Herb	Yak gogo (Br)	Fruits	Fruits mixed with butter used to cure tooth ache
9	<i>Arisaema</i> sp.	Araceae	Herb	Doo (Br)	Roots	Relieve stomach pain
10	<i>Artemisia vulgaris</i> L.	Compositae	Shrub	Khenpa (Dz)	Leaves	Used to cure wound
11	<i>Aster diplostephioides</i> (DC.) C.B. Clarke	Compositae	Herb	Men metog (Dz)	Flowers	Treats chronic gastritis, lower fevers and heal wounds.
12	<i>Begonia</i> sp.	Begoniaceae	Shrub	Dukman (Br)	Roots and leaves	Treat illness caused by poison
13	<i>Bergenia purpurascens</i> (Hook.f & Thomson) Engl.	Saxifragaceae	Herb		Roots	Treats giddiness and used as antiseptic
14	<i>Bergenia stracheyi</i> (Hook.f. & Thomas) Engl	Saxifragaceae	Herb		Roots	Relieves swelling of limbs and cures diarrhea
15	<i>Bistorta affinis</i> (D.Don) Greene	Polygonaceae	Herb		Roots	Cures diseases related to lungs and dysentery.
16	<i>Caltha</i> sp.	Ranunculaceae	Herb	Chokhor Mendo (Br)	Flowers, leaves and stems	Relieves headache
17	<i>Cassiope fastigiata</i> (Wall.) D.Don	Ericaceae	Shrub		Leaves and stems	Treat cough, joint pain and indigestion
18	<i>Cinnamomum tamala</i> (Buch.-Ham.) T.Nees & Eberm.	Lauraceae	Tree	Shingtsa shing (Tsh-kha)	Leaves	Treats diarrhoea
19	<i>Codonopsis</i> sp.	Campanulaceae	Herb		Roots	Treat loss of appetite
20	<i>Cortia depressa</i> (D. Don) C. Norman	Umbelliferae	Herb	Gonuk mendo (Br)	Flowers and leaves	Treat fever, rheumatism and stomach ache.
21	<i>Cortiella hookeri</i> (C. B. Clarke) C. Norman.	Umbelliferae	Herb		Entire plant	Cure skin and infectious diseases.

Sl. No	Botanical Name	Family	Habit	Vernacular name	Part (s) used	Uses
22	<i>Cotoneaster microphyllus</i> Wall ex Lindl.	Rosaceae	Shrub	Katragpa roo (Tsh-kha)	Leaves, seeds and newly grown branches	Control excessive flow of menstruation and treat gynecological diseases.
23	<i>Cyananthus lobatus</i> Wall ex Benth	Campanulaceae	Herb	Marla mendo (Br)	Flowers	Used as mouth lip guard
24	<i>Cymbidium hookerianum</i> Rchb.f	Orchidaceae	Herb	Olachoto (Dz)	Flowers and seeds	Applied on cuts and injuries as a haemostatic.
25	<i>Delphinium</i> spp.	Ranunculaceae	Herb	Ja- goidh poey (Dz)	Flower, leaves, stems and seeds.	Heals sores and cure dysentery.
26	<i>Drosera peltata</i> Thunb.	Droseraceae	Herb	Burug ngo (Br)	Leaves	Used for pain killer and as a carminative.
27	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaita	Rosaceae	Herb	Sese mendo (Br)	Flowers, leaves and fruits	Lowers fever
28	<i>Gentiana algida</i> Pall.	Gentianaceae	Herb	Pangjoen karmo chhungwa (Med)	Flowers	Treats cough
29	<i>Hackelia uncinata</i> (Benth.) C.E.C. Fisch.	Boraginaceae	Herb	Eu metog (Tsh-kha)	Entire plant	Treats broken ligament and fractured bones.
30	<i>Halenia elliptica</i> D.Don	Gentianaceae	Herb	Ringgu (Br)	Entire plant	Treat common cold and lowers fever.
31	<i>Inula racemosa</i> Hook. F.	Compositae	Herb	Manoo (Med)	Roots	Treats indigestion and loss of appetite.
32	<i>Juniperus</i> spp.	Cupressaceae	Tree	Shoop (Dz)	Leaves	Treats common cold and reduces fever.
33	<i>Jurinea</i> sp	Compositae	Herb	Khurmong gepkar (Br)	Flowers, seeds and roots.	Gives strength to body and heals sores.
34	<i>Justicia adhatoda</i> L.	Acanthaceae	Shrub	Bashikha (Dz)	Leaves, thin branches, flowers and seeds.	Heals infectious sores and relieves pain.
35	<i>Ligularia amplexicaulis</i> DC.	Compositae	Herb	Dola (Br)	Leaves and roots	Heal sores
36	<i>Meconopsis paniculata</i> (D. Don) Prain	Papaveraceae	Herb	Chuser (Br)	Flowers	Helps to relieve fever
37	<i>Megacodon stylophorus</i> (C.B.Clarke) Harry Sm.	Gentianaceae	Herb	Kiyo (Br)	Roots	Paste of roots is applied on wounds and swellings.
38	<i>Myricaria rosea</i> W.W.Sm.	Tamaricaceae	Shrub	Wombur (Br)	Leaves	Cure cough and diarrhoea.
39	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D. Y. Hong.	Scrophulariaceae	Herb	Putishing (Dz)	Rhizomes	Used to treat cough
40	<i>Panax pseudo-ginseng</i> Wall.	Araliaceae	Herb	Ginseng (Tsh-kha)	Rhizomes	It is used as a rejuvenating and revitalizing tonic.
41	<i>Paris polyphylla</i> Smith.	Trilliaceae	Herb	Satuwa (Lh)	Rhizomes	Relieves body pain and fever.

Sl. No	Botanical Name	Family	Habit	Vernacular name	Part (s) used	Uses
42	<i>Parnassia nubicola</i> Wall ex Royle.	Parnassiaceae	Herb	Cheychey yuma (Dz)	Leaves, stems and flowers	Relieves severe pain.
43	<i>Pedicularis longiflora</i> Rudolph.	Scrophulariaceae	Herb	Lugru serpo (Dz)	Flowers, leaves, stems and seeds	Relieves fever
44	<i>Pedicularis siphonantha</i> D. Don	Scrophulariaceae	Herb	Gara Mendo (Br)	Flowers, leaves, stems and seeds	Relieves body pain and fever.
45	<i>Phlomis bracteosa</i> Royle ex Benth	Labiatae	Herb	Singser mendo (Br)	Flowers and leaves	Cures toothache, cough and cold.
46	<i>Plantago major</i> L.	Plantaginaceae	Herb		Entire plant	Control bleeding and treats dysentery.
47	<i>Podophyllum hexandrum</i> Royle	Berberidaceae	Herb	Bamarpo (Dz)	Entire plant	Treats skin diseases.
48	<i>Polystichum sp</i>	Dryopteridaceae	Herb	Zeb dhawai (Tsh-kha)	Roots	Treats common cold and dysentery.
49	<i>Potentilla coriandrifolia</i> D. Don	Rosaceae	Herb	Mikar mendo (Br)	Roots	Treat altitude sickness.
50	<i>Primula dickieana</i> Watt	Primulaceae	Herb	Phara mendo (Br)	Flowers	Control fever
51	<i>Primula munroi</i> Lindl	Primulaceae	Herb	Phara mendo (Br)	Flowers	Lowers fever and treats diarrhoea.
52	<i>Prunus sp.</i>	Rosaceae	Tree	Khamgu shing (Br)	Flowers, fruits and seeds	Improve digestion.
53	<i>Rheum acuminatum</i> Hook f. & Thomson	Polygonaceae	Herb	Churzhungma (Br)	Roots	Relieves body pain
54	<i>Rheum australe</i> D.Don	Polygonaceae	Herb	Chutsa (Dz)	Roots	Helps in treatment of chronic constipation and gall bladder problems.
55	<i>Rhodiola sp.</i>	Crassulaceae	Herb	Za mendo (Br)	Roots	Lowers the fever and also treat skin diseases.
56	<i>Rhododendron anthopogon</i> D.Don	Ericaceae	Shrub	Balu (Dz)	Leaves	Cure lung and stomach disorders
57	<i>Rhododendron fulgens</i> Hook. F.	Ericaceae	Shrub	Zhu-dhaang jabmar (Tsh-kha)	Flowers	It controls infection and cures dysentery.
58	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Chagmali shing (Tsh-kha)	Seeds	Used to treat wound on the body
59	<i>Rubia cordifolia</i> L	Rubiaceae	Herb/climber	Tsoy (Dz)	Stems and roots	Relieves swelling and cures diseases related to blood.
60	<i>Salvia nubicola</i> Wall ex Sweet.	Labiatae	Herb		Entire plant	Cures toothache and oral diseases.
61	<i>Sambucus adnata</i> Wall. ex DC.	Adoxaceae	Herb	Honmong (Br)	Leaves, flowers, stems and seeds	Treat skin diseases and wounds.

Sl. No	Botanical Name	Family	Habit	Vernacular name	Part (s) used	Uses
62	<i>Saussurea gossypiphora</i> D. Don	Compositae	Herb	Lugupo (Br)	Entire plant	Treats excess bleeding and septic diseases.
63	<i>Saussurea obvallata</i> (DC.) Edgew	Compositae	Herb	Cholu (Br)	Entire plant	Treatment of paralysis of limbs and relieves joint pains.
64	<i>Selinum tenuifolium</i> Wall. ex C.B. Clarke	Umbelliferae	Herb		Roots	Cures rheumatism and swelling.
65	<i>Swertia chirayita</i> (Roxb.) H. Karst.	Gentianaceae	Herb	Chairaito (Lh)	Entire plant	Relieves from nausea, headache and fever.
66	<i>Swertia hookeri</i> C.B. Clarke	Gentianaceae	Herb	Serphu Golu (Br)	Roots	Cure cough and also used as a pain killer
67	<i>Taxus baccata</i> L.	Taxaceae	Tree	Tay shing (Br)	Barks	Treats rheumatism, urinary problem and liver complaints
68	<i>Viola biflora</i> L.	Violaceae	Herb	Ta-mig (Med)	Leaves, stems, flower and seeds	Control headaches and heals sores.

Here the word “Kha” means the “Spoken Language”

Dz: Dzong-kha (National language of Bhutan), **Tsh-kha:** Tshangla-kha (of eastern Bhutan), **Br:** Brokpa-kha (of Merak and Sakteng), **Lh:** Lhotshampa-kha (of Southern Bhutan), **Med:** Bhutanese medicinal names.

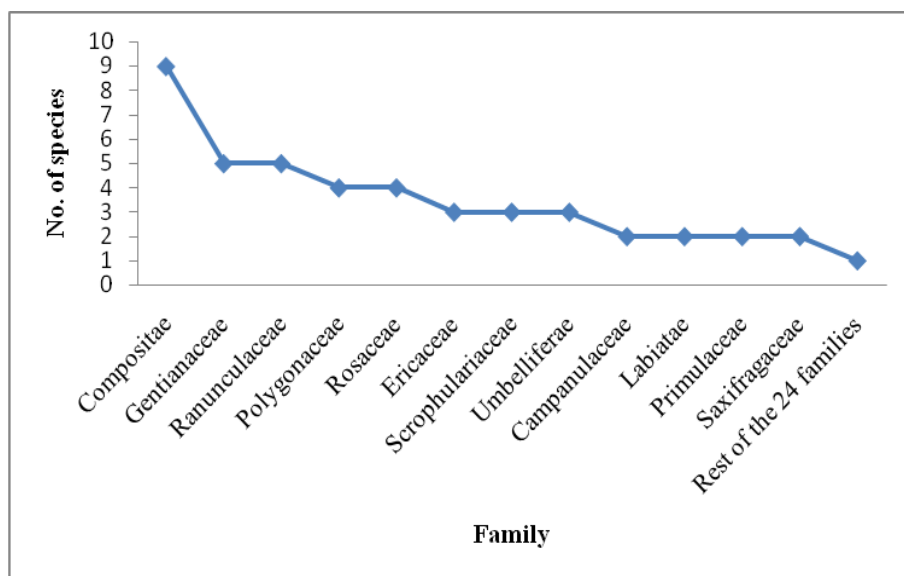


Fig. 2: Distribution of species amongst the family.

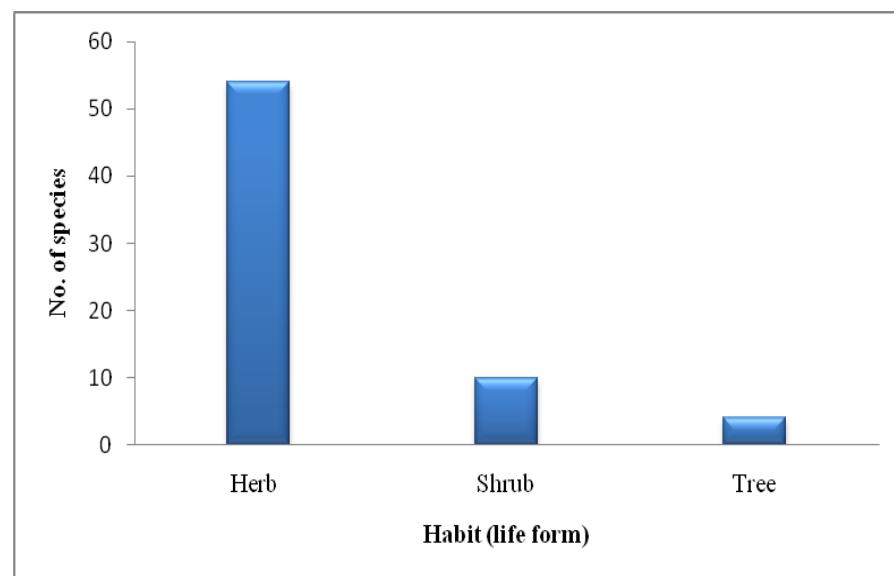


Fig. 3: Habit (life form) of the medicinal plants documented.

The major families were Compositae (9 spp.), Gentianaceae and Ranunculaceae each with (5 spp.), Polygonaceae and Rosaceae each with (4 spp.), Ericaceae, Scrophulariaceae and Umbelliferae each with (3 spp.), Campanulaceae, Labiatae, Primulaceae and Saxifragaceae each with (2 spp.) and rest of the 24 families were represented by single species (Table 1 and Fig. 2). On the basis of life form of plant (habit), 54 herbs, 10 shrubs, and 4 trees were documented (Table 1 and Fig. 3).

The various parts of the plant are used for medicinal purposes. For some plants, only one part is used while for others more than one part or entire plants are used. To give few example: roots of *Aconitum orochryseum* are used to treat common cold, bilious fever and dysentery; entire plant of *Anaphalis busua* are used to control loss of blood and relieves swelling; flowers and leaves of *Cortia depressa* are used to treat fever, rheumatism and stomach ache; rhizome of *Paris polyphylla* relieves body pain and fever; barks of *Taxus baccata* treats rheumatism, urinary problem, liver complaints and so on. The details of each plant are described in (Table 1) in an alphabetical order of botanical name followed by family, habit, vernacular name, part(s) used and uses.

Conclusion

This paper highlights that, local people keeps good information on the medicinal plants growing in their areas. They use traditional knowledge to cure various diseases, utilizing different parts of the medicinal plants. There is need to develop sustainable harvesting guidelines, for some of the species in consultation with Department of Forests and Park Services, after doing species-specific inventory and knowing conservation (protection) status of the species.

Encouraging community participation on the habitat protection may help to conserve some of the rare and threatened species.

The further extensive survey in and around the sanctuary area may record additional number of medicinal and aromatic plants.

Cautionary note

Authors would recommend the users to always seek advice from professional before using any part of the

plants as medicine and we will not be responsible for any adverse effects on anyone.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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