



Review Paper

Wild edible plants consumed by different ethnic groups of Nepal- A review

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Abstract

Nepal is rich in floral and ethnic diversity although it is a small country. Wild plants are collected and used for edible purposes by ethnic groups of Nepal for a long period. Wild edible plants have a noteworthy role in food security and income generation for the rural ethnic peoples of developing countries. Very few researches have been carried out on wild edible plants of Nepal. Our study attempts to review and compile research articles on wild edible plants consumed by different ethnic groups of Nepal. Altogether 36 published articles accessed through Research Gate and Google Scholar were studied. A total of 261 wild edible plant species from 101 families were found to be consumed by 23 ethnic groups of Nepal. The maximum numbers of plants (154 species) from 72 families were used for vegetables. Ethnic knowledge of most of the ethnic groups on wild edible plants is still unexplored in Nepal. Traditional knowledge on uses of wild edible plants is degrading because of the modernization and socio-cultural changes; hence proper documentation of ethnobotanical knowledge on wild edible plants is required.

Keywords: Edible plants, Ethnic diversity, Ethnic groups, Ethnobotanical knowledge, Wild plants.

Introduction

Nepal is a small country occupying only 0.1% of the global land but rich in biodiversity as well as cultural diversity¹. It harbors 118 types of ecosystems and 3.2% of the worlds' flora¹. According to census-2011, there are 126 ethnic groups (people having their native languages, cultures, and belief systems) in Nepal².

The correlation of ethnic people with plants is studied under the ethnobotany³. People of developing countries collect plants to meet their fundamental needs of food, shelter, livelihood support, etc. for a long period^{4,5}. Consuming wild plants as a food is an age-old practice^{3,5}.

In Nepal, about 394 wild plants are used for different edible purposes⁶. Wild edible plants are those plants naturally originated in the wild habitat which are consumed for food purposes⁷. The Rural people of Nepal still collect wild plants for self-consumption and selling in the market⁸. Wild edible plants have contributed to the food security, livelihood and income generation of rural, poor, marginalized and ethnic groups in Nepal⁶. They are vital sources of minerals and vitamins⁹, also an important resource for the subsistence of ethnic groups¹⁰. Although wild plants are important sources of food to rural ethnic groups, the knowledge on consuming wild edible plants is at risk due to abandonment of traditions, change in lifestyle, and feeding habits of ethnic people¹¹⁻¹³. Wild edible plants are losing their value due to poor marketing and habitat degradation¹⁴.

Many researchers have contributed to the documentation of ethnobotanical knowledge in Nepal, but very few researches have been done focusing on wild edible plants. However, no review study has been done till now on wild edible plants relating to ethnic groups of Nepal.

Therefore, this study has attempted to review and compile all research articles on wild edible plants consumed by different ethnic groups of Nepal.

Methods

The entire data was obtained from a review of published articles until August 2020. Research Gate and Google Scholar were the primary tools used for obtaining the whole data³⁶ on wild edible plants consumed by ethnic groups of Nepal, with the keywords; 'Wild edible plants', 'Ethnic groups', 'Wild food', etc. Very little research has been done on wild edible plants in Nepal. We considered only those articles focusing on wild edible plants relating to ethnic groups of Nepal for our study.

Results and discussion

Our study found a total of 261 species of wild plants from 101 families consumed as a food by 23 ethnic groups of Nepal. Whole plants or plants' parts; leaves, fruits, flowers, stem, tender shoot, tuber, and bark were used in the form of vegetables, fruits, pickle, tea, baking powder, oil, spices, juice, cheese, smoked and raw. The uses of plants for different edible purposes are given in Table-1 to Table-7.

Table-1: Plants used for vegetables.

Scientific name, Vernacular name and Family name	P. U.	Ethnic groups	Sources
<i>Abelmoschus esculentus</i> (L.) Moench, Ramtoriya, Malvaceae,	F	B, Ch, D, K, M, N, T and To	15
<i>Abelmoschus moschatus</i> Medik, Latakasturi, Malvaceae	F	Ba	8
<i>Aconogonum molle</i> (D.Don) H. Hara, Thotni, Polygonaceae	TS	N	8
<i>Agaricus campestris</i> L., Gobre Chyau, Agaricaceae	W	Bh, C, Ch, D, K, N, Sa, Sh and T	18, 17
<i>Allium wallichii</i> Kunth, Ban Lasun, Amaryllidaceae	L	N	8
<i>Alternanthera sessilis</i> (L.) R. Br. ex. DC., Bhiringi Jhar, Amaranthaceae	L	Ba	8
<i>Amanita hemibapha</i> (Berk. & Broome) Sacc., Rato Anda Chyau, Amanitaceae	W	Sh	18
<i>Amanita chepangiana</i> Tulloss & Bhandary, Jamane, Amanitaceae,	W	C	16
<i>Amanita vaginata</i> (Bull.) Lam., Seto Anda Chyau, Amanitaceae	W	Sh	18
<i>Amaranthus cruentus</i> L., Lunde, Amaranthaceae	L	B and T	19
<i>Amaranthus hybridus</i> L., Lunde, Amaranthaceae	L	B and T	19
<i>Amaranthus spinosus</i> L., Kande Lunde, Amaranthaceae	L and TS	Ba and R	8, 11
<i>Amaranthus viridis</i> L., Lunde, Amaranthaceae	TS	C and N	8, 16
<i>Amaranthus lividus</i> L., Ban Lunde, Amaranthaceae	TS	C	16
<i>Amorphophallus campanulatus</i> (Roxb.) Blume ex Decne., Ole, Araceae	Tu	Th	20
<i>Anagallis arvensis</i> L., Armale, Primulaceae	L	T	8
<i>Arisaema erubescens</i> (Wall.) Schott, Jhyapuli, Araceae	W	R	11
<i>Arisaema consanguineum</i> Schott, Kal, Araceae	TS	C	16
<i>Arisaema tortuosum</i> (Wall.) Schott, Sarpa Makai, Araceae	L and Tu	Bh, Ch, D, K, N, S, Sh and T	8, 17
<i>Artocarpus heterophyllus</i> Lam., Rukh Katahar, Moraceae	F	B, Ba, Ch, D, K, M, N, T and To	8, 15
<i>Armillariella mellea</i> (Vahl) P. Kumm, Chiple Chyau, Tricholomataceae	W	Sh	18
<i>Arundinaria falcata</i> Nees., Nigalo, Poaceae	TS	Ch, K, Kh, Sa and Tk	21
<i>Asparagus racemosus</i> Willd., Kurilo, Asparagaceae	TS	C, Ch, K, Kh, N, R and Sa	8, 11, 16, 21, 22
<i>Auricularia auricula-judae</i> (Bull.) J. Schrot., Thalthale Chyau, Auriculariaceae	W	Ch, N and T	23
<i>Auricularia mesenterica</i> (Dicks.) Pers., Natkali, Auriculariaceae	W	C	16
<i>Bambusa tulda</i> Roxb., Nigalo, Poaceae	TS	Ba, N and T	8
<i>Basella alba</i> L., Poi Sag, Basellaceae	TS	Ba, N and T	8

<i>Bauhinia malabarica</i> Roxb., Gochhi, Fabaceae	F and Fl	C	16
<i>Bauhinia purpurea</i> L., Tanki, Fabaceae	TS	T	8
<i>Bauhinia semla</i> Wunderlin, Kalo Koiralo, Fabaceae	Fl	B, Ch, D, K, Ku, M, R, Sa and Tk	11, 16, 24
<i>Bauhinia vahlii</i> (Wight & Arn.) Benth., Bhorla, Fabaceae	Fl	B, Ch, D, K, Ku, M, R, Sa and Tk	11, 16, 24
<i>Bauhinia variegata</i> L., Koiralo, Fabaceae	Fl	B, C and R	8, 11, 16
<i>Bidens pilosa</i> L., Kalo Kuro, Asteraceae	TS	Ba, D, K, M, N and To	8, 15
<i>Blumea lacera</i> (Burm. f.) DC., Kukure, Asteraceae	L	Th, M	8, 20
<i>Boehmeria platyphylla</i> Buch.-Ham. ex. D.Don, Kamle, Urticaceae	L	N and T	8
<i>Boerhavia diffusa</i> L., Punarnava, Nyctaginaceae	TS	N and T	8
<i>Boletus auripes</i> Peck, Seto Martip, Boletaceae	W	Sh	18
<i>Boletus pulverulentus</i> Opat., Kalo Martip, Boletaceae	W	Sh	18
<i>Bombax ceiba</i> L., Simal, Bombacaceae	Fl	Ba, N, R and T	8, 11
<i>Bondarzewia berkeleyi</i> (Fr.) Bondartsev & Singer, Chamre, Bondarzewiaceae	W	C	16
<i>Brassica campestris</i> L. var. <i>sarson</i> Prain, Sarson, Brassicaceae	TS and L	B, Ch, D, K, M, N, T and To	15
<i>Cajanus scarabaeoides</i> (L.) Thouars, Bonkutti, Fabaceae	F	Ba	8
<i>Cantharellus cibarius</i> Fr., Besare Chyau, Cantharellaceae	W	B, Ch, D, G, K, M and Sh	18, 23
<i>Cassia fistula</i> L., Rajbrikshya, Fabaceae	F	R	11
<i>Chenopodium album</i> L., Bethe, Amaranthaceae	TS	Ba, C and R	8, 11, 16
<i>Chenopodium ambrosioides</i> L., Rato Bethe, Amaranthaceae	TS	N and T	8
<i>Chlorophytum nepalense</i> (Lindl.) Baker, Danti Saag, Asparagaceae	L	T	8
<i>Chroogomphus tomentosus</i> (Murr.) O. K. Mill., Kujir, Gomphidiceae	W	Sh	18
<i>Cirsium wallichii</i> DC., Thakal, Asteraceae	S	T	8
<i>Clavulina cinerea</i> (Bull.) J. Schrot., Che Shyamo, Clavellinaceae	W	Sh	18
<i>Clematis buchananiana</i> DC., Junge lahara, Ranunculaceae	L	B, Ba, N and T	8, 19
<i>Clavulinopsis fusiformis</i> (Sowerby) Corner, Kesari Chyau, Clavariaceae	W	Ch, N and T	23
<i>Colocasia esculenta</i> (L.) Schott, Karkalo, Araceae	W	R	11
<i>Commelina benghalensis</i> L., Kane, Commelinaceae	TS and L	Ba, N and R	8, 11
<i>Coprinus comatus</i> (O.F.Mull) Pers., Gobre chyau, Agaricaceae	W	B, Ch, D, G, K, M, N and T	23

<i>Crateva unilocularis</i> Buch.-Ham., Siplikan, Capparaceae	TS, L	Ba, C and T	8, 16 and 23
<i>Crotalaria alata</i> Buch.-Ham. ex D.Don, Singesinge, Fabaceae	TS	Ba and Ch	8, 16
<i>Crotalaria albida</i> Roth, Bhediphal, Fabaceae	F	Ba and T	8
<i>Crotalaria pallid</i> Aiton, Chhin-chhine, Fabaceae	F	Ba	8
<i>Crotalaria sessiliflora</i> L., Sokrok, Fabaceae	F	Ba and T	8
<i>Crotalaria tetragona</i> Roxb. ex Andr., Bhugan, Fabaceae	F	C	16
<i>Deeringia amaranthoides</i> (Lam.) Merr., Sakhinu, Amaranthaceae	TS	C	16
<i>Dendrocalamus hamiltonii</i> Gamble, Bans, Poaceae	TS	B, Ba, Ch, D, K, M, N, R, T and To	8, 11, 15
<i>Dendrocalamus strictus</i> (Roxb.) Nees., Bans, Poaceae	TS	C	16
<i>Dioscorea alata</i> L., Ghar Tarul, Dioscoreaceae	Tu	R	11
<i>Dioscorea bulbifera</i> L., Bhyakur, Dioscoreaceae	Tu	Ba, Bh, C, Ch, D, K, Kh, N, R, Sa, Sh, T and Tk	8, 11, 17, 21, 22
<i>Dioscorea deltoidea</i> Wall. ex Griseb., Githa, Dioscoreaceae	Tu	Ba, C, R and T	8, 11, 16
<i>Dioscorea esculenta</i> (Lour.) Burkill, Suthnee Tarul, Dioscoreaceae	Tu	C	16
<i>Dioscorea hamiltonii</i> Hook.f., Ban Tarul, Dioscoreaceae	Tu	Ba, C and T	8, 16
<i>Dioscorea hispida</i> Dennst., Bharlang, Dioscoreaceae	Tu	Ba, C and T	8, 16
<i>Dioscorea pentaphylla</i> L., Mithe Tarul, Dioscoreaceae	Tu	B, C, Ch, D, K, M, N, T and To	15, 16
<i>Diplazium esculentum</i> (Retz.) Sw., Nigro, Woodsiaceae	Tu and L	C and R	11, 16
<i>Drepanostachyum falcatum</i> (Nees) keng f., Ghore Nigalo, Poaceae	TS	B, Ch, D, K, M, N, T and To	15
<i>Dryopteris cochleata</i> (D.Don) C. Chr., Ghiu Niuro, Dryopteridaceae	TS	B, Bh, C, Ch, K, M, N, R, Sa, Sh, T and Tk.	11, 16, 17, 21, 22, 25
<i>Eclipta prostrata</i> L., Bhiringaraja, Asteraceae	L	Ba and T	8
<i>Emilia sonchifolia</i> (L.) DC., Dudhe, Asteraceae	L	Ba	8
<i>Euphorbia hirta</i> L., Dudhe Jhar, Euphorbiaceae	L	Ba and T	8
<i>Fagopyrum dibotrys</i> (D.Don) Hara, Tite Fapar, Polygonaceae	L	Ba and T	8
<i>Fagopyrum esculentum</i> Moench, Mithe Fapar, Polygonaceae	L	Ba, N and T	8
<i>Girardinia diversifolia</i> (Link) Friis, Allo, Urticaceae	TS	B, Ba, Ch and Tk	8, 16, 26
<i>Gomphus clavatus</i> (Pers.) Gray, Ea-Shyamo, Gomphaceae	W	Sh	18
<i>Gomphus floccosus</i> (Schw.) Singer var <i>floccosus</i> , Kumbhe Chyau, Gomphaceae	W	Sh	18
<i>Grifola frondosa</i> (Dicks.) Gray, Nangrey Chyau, Meripilaceae	W	B, Ch, D, G, K and M	23

<i>Hericium erinaceus</i> (Bull.) Pers., Thakre Chyau, Hericiaceae	W	Ch, N and T	23
<i>Holarrhena pubescens</i> Wall. ex G.Don, Khirro, Apocynaceae	L	Ba	8
<i>Houttuynia cordata</i> Thunb., Gandhe, Saururaceae	L	Ba	8
<i>Hydnnum repandum</i> L., Kasturi Chyau, Hydnaceae	W	Sh	18
<i>Hygrophorous</i> sp. Fr., Petok Shyamo, Hygrophoraceae	W	Sh	18
<i>Hypholoma capnoides</i> (Fr.) P.Kumm., Taktale, Strophariaceae	W	Sh	18
<i>Impatiens bicornuta</i> Wall., Tiuri, Balsaminaceae	L	Ba and T	8
<i>Indigofera cassioides</i> DC., Mirmire, Fabaceae	Fl	Ba and T	8
<i>Laccaria laccata</i> (Scop.) Cooke, Jhari Chyau, Hydnangiaceae	W	B, Ch, D, G, K, M and Sh	18, 23
<i>Lactarius piperatus</i> (L.) Roussel, Dudhey Chyau, Russulaceae	W	B, Ch, D, G, K and M	23
<i>Laetiporus sulphureus</i> (Bull.) Murr., Rato Chyau, Polyporaceae	W	B, Ch, D, G, K, M, Sh and T	17, 23
<i>Lathyrus aphaca</i> L., Ban Keshari, Fabaceae	L	N and T	8
<i>Leccinum</i> sp. Gray, Omi Shyamo, Boletaceae	W	Sh	18
<i>Lilium nepalense</i> D.Don, Khiraula, Liliaceae	L	T	8
<i>Lycoperdon perlatum</i> Pers., Padke Chyau, Agaricaceae	W	C	16
<i>Lygodium japonicum</i> (Thunb.) Sw., Parewavuri, Lygodiaceae	TS	Ba	8
<i>Macropanax dispermus</i> Grierson, Chinia, Araliaceae	TS	N	8
<i>Malva verticillata</i> L., Lafe Sag, Malvaceae	TS	N, T	8
<i>Morchella esculenta</i> Fr., Gucchi Chayu, Morchellaceae	W	B, Ch and Tk	26
<i>Moringa oleifera</i> Lam., Shitalchini, Moringaceae	F	N and T	8
<i>Mucuna pruriens</i> (L.) DC., Kauso, Fabaceae	F	Ba	8
<i>Myrsine semiserrata</i> Wall., Kali Kaath, Primulaceae	F	C	16
<i>Natsiatum herpeticum</i> Buch.-Ham., Kalilahara, Icacinaceae	TS	Ba	8
<i>Oenanthe javanica</i> (Blume) DC., Chanati, Apiaceae	L	Ba, N and T	8
<i>Ophioglossum nudicaule</i> L. f., Jibre Saag, Ophioglossaceae	L	Ba and T	8
<i>Ophioglossum reticulatum</i> L., Jibre Saag, Ophioglossaceae	TS	C, Ch, K, Kh, Sa and Tk	16, 21
<i>Oudemansiella radicata</i> (Rehl.) Singer, Physalacriaceae	W	Ch, N and T	23
<i>Oxalis corniculata</i> L., Chariamilo, Oxalidaceae	L	R	11
<i>Paxillus involutus</i> (Batsch.) Fr., Dhangba Shyamo, Paxillaceae	W	Sh	18

<i>Persicaria runcinata</i> Buch.-Ham. ex. D.Don, Ratnaaulo, Polygonaceae	L	Ba and T	8
<i>Phoenix acaulis</i> Roxb., Khajuri, Arecaceae	S	R	11
<i>Phoenix loureiri</i> Kunth., Thakal, Arecaceae	TS	Ba and T	8
<i>Pholiota squarrosa</i> (Oeder) Kumm., Chiple chyau, Strophariaceae	W	Ch, N and T	23
<i>Phytolacca acinosa</i> Roxb., Jaringo Saag, Phytolaccaceae	L	B, Ch, D, G and K	27, 28
<i>Plantago erosa</i> Wall., Churnajhar, Plantaginaceae	L	Ba and T	8
<i>Pleurotus cornucopiae</i> (Paulet) Rolland, Kaldune Chyau, Pleurotaceae	W	C	16
<i>Pleurotus nepalensis</i> Corner, Kanne Chyau, Pleurotaceae	W	Bh, C, Ch, D, K, N, Sa, Sh and T	16, 17
<i>Portulaca oleracea</i> L., Kulfasag, Portulacaceae	TS	Ba	8
<i>Pouzolzia zeylanica</i> (L.) Benn. & R. Br., Banpaate, Urticaceae	L	Ba, N and T	8
<i>Pteris biaurita</i> L., Niuro, Pteridaceae	L	Ba, N, R and T	8, 11
<i>Ramaria botrytis</i> (Pers.) Ricken, Kauli Chyau, Gomphaceae	W	Bh, Ch, D, K, N, Sa, Sh and T	17, 18, 23
<i>Ramaria flava</i> (Sch.) Quel., Che Shyamo, Gomphaceae	W	Sh	18
<i>Remusatia pumila</i> (D. Don) H.Li & A.Hay, Jaluka, Araceae	TS	C	16
<i>Rhodocollybia butyraceae</i> (Bull.) Lennox, Kharshya, Marasmiaceae	W	Sh	18
<i>Rhododendron arboreum</i> Sm., Lali Gurans, Ericaceae	Fl	C, Ch, K, Kh, Sa, R and Tk	11, 16, 23
<i>Roripa indica</i> (L.) Hiern., Pahelejhar, Brassicaceae	L	Ba	8
<i>Roripa nasturtium-aquaticum</i> (L.) Hayek, Kholesag, Brassicaceae	L	Ba, N and T	8
<i>Rumex nepalensis</i> Spreng, Halhale, Polygonaceae	L	Ba, N and T	8
<i>Russula chlorides</i> (Krombh.) Bres., Chhatey Chyau, Russulaceae	W	Ch, N and T	23
<i>Saussurea</i> sp. DC., Hyak Sag, Asteraceae	TS	C	16
<i>Schizophyllum commune</i> Fr., Mizu Chyau, Schizophyllaceae	W	C	16
<i>Scleroderma aurantium</i> (L.) Pers., Kukhura ful, Sclerodermataceae	W	C	16
<i>Senna tora</i> (L.) Roxb., Tapre, Fabaceae	F	Ba	8
<i>Setaria glauca</i> (L.) P. Beauv., Aam Muja, Poaceae	Sd	C	16
<i>Smilax aspera</i> L., Kukurdaino, Smilacaceae	TS	C, Ch, Kh, K and Sa	16, 21
<i>Solanum torvum</i> Sw., Seto Bihi, Solanaceae	F	Th	20
<i>Solanum xanthocarpum</i> Schrad. & H. Wendl., Kantakari, Solanceae	F	Th	20

<i>Sonchus asper</i> (L.) Hill, Dudhe, Asteraceae	L	Ba, N and T	8
<i>Sonchus oleraceus</i> L., Dudhe, Asteraceae	TS and L	R	11
<i>Stellaria media</i> (L.) Vill., Armal Jhar, Caryophyllaceae	L	N and T	8
<i>Stellaria monosperma</i> Buch.-Ham. ex D. Don, Jethimadhu, Caryophyllaceae	L	Ba and T	8
<i>Talinum cuneifolium</i> (Vahl) Willd., Chiniasag, Talinaceae	L	Ba and T	8
<i>Tectaria coadunata</i> (Wall. ex Hook. & Grev) C.Chr., Danthe, Tectariaceae	L	Ba, N and T	8
<i>Termitomyces clypeatus</i> (R.) Heim, Gobrey Chyau, Lyophyllaceae	W	Ch, N and T	23
<i>Termitomyces eurhizus</i> (Berk.) R. Heim., Madkine Dhamire, Lyophyllaceae	W	C	16
<i>Tragopogon gracilis</i> D.Don, Dowacha, Asteraceae	L	Ba, N and T	8
<i>Trichosanthes wallichiana</i> (Ser.) Wight, Indreni, Cucurbitaceae	F	C	16
<i>Tupistra aurantiaca</i> (Baker) Wall. ex Hook., Chwolacha, Asparagaceae	L	T, N	8
<i>Tylopilus eximius</i> (Peck) Singer, Kyakti, Boletaceae	W	Sh	18
<i>Urtica dioica</i> L., Sisnu, Urticaceae	TS and L	Ba, Bh, C, Ch, D, K, N, R, Sa, Sh, T	8, 11, 16, 17, 22
<i>Youngia japonica</i> (L.) DC., Chaulane, Asteraceae	L	Ba, N	8

Abbreviations used in tables: P.U.=Parts used: Bk= Bark, F= Fruits, Fl= Flowers, L= Leaves, S= Stem, TS= Tender Shoot, Tu= Tuber and W= Whole plant, Ethnic groups: B= Brahmin, Ba= Bankariya, Bh= Bhujel, Bi= Bista, C= Chepang, Ch= Chhetri, D= Damai, G= Gurung, K= Kami, Kh= Khas, Ku= kumal, M= Magar, N= Newar, R= Raji, Ra= Rai, Sa= Sarki, Sh= Sherpa, Sr= Satar, T= Tamang, Th= Tharu, Ti= Tibetan, Tk= Thakuri and To= Tolonge

Table-2: Plants used for fruits.

Scientific name, Vernacular name and Family	Ethnic groups	Sources
<i>Aegle marmelos</i> (L.) Corr. Serr., Bel, Rutaceae	B, C, Ch, D, K, Ku, M, R, Sa, Th and Tk	11, 16, 29 and 24
<i>Ardisia solanacea</i> Roxb., Kholi Kafal, Primulaceae	R	11
<i>Artocarpus lakoocha</i> Roxb., Badahar, Moraceae	Ba, C and R	8, 11, 16 and 22
<i>Bassia butyracea</i> Roxb., Chiuri, Sapotaceae	B, C, Ch, D, K, Ku, M, R, Sa and Tk	11, 16, 22 and 24
<i>Bauhinia vahlii</i> (Wight & Arn.) Benth., Bhorla, Fabaceae	B, Ch, D, K, Ku, M, R, Sa and Tk	11, 16 and 24
<i>Berberis aristata</i> DC., Chutro, Berberidaceae	B, Ch, D, K, Ku, M, R, Sa and Tk	11, 16, 24 and 26
<i>Bridelia retusa</i> (L.) A.Juss., Gayo, Phyllanthaceae	R	11
<i>Callicarpa macrophylla</i> Vahl, Guyelo, Lamiaceae	R	11
<i>Capparis spinosa</i> L., Ban Bhendo, Capparaceae	R	11
<i>Castanopsis indica</i> (Roxburgh ex Lindl.) A. DC., Katus, Fagaceae	B, C, Ch, D, K, M, N, T and To	15, 16 and 22

<i>Cipadessa baccifera</i> (Roth) Miq., Pairetee, Meliaceae	B, Ch, D, K, M, N, T and To	15
<i>Cleistocalyx operculatus</i> (Roxb.) Merr. & L.M.Perry, Kyamuno, Myrtaceae	R	11
<i>Coccinia grandis</i> (L.) Viogt, Golkankri, Cucurbitaceae	R	11
<i>Dendrophthoe falcata</i> (L.f.) Etting. Ainjeru, Loranthaceae	Mu, Sr and T	30
<i>Duchesnea indica</i> (Andr.) Focke, Bhui Kafal, Rosaceae	R	11
<i>Elaeagnus latifolia</i> L., Guyalo, Elaeagnaceae	D, G and K	28
<i>Ensete glaucum</i> (Roxb.) Cheesman, Ban Kera, Musaceae	C	16
<i>Entada phaseoloides</i> (L.) Merr., Pangra, Fabaceae	C	16
<i>Eulophia dabia</i> (D. Don) Hochr., Hatti Paila, Orchidaceae	B, Ch, D, G, K, Ra and T	31
<i>Feronia limonia</i> (L.) Swingle, Karaunte Kanda, Rutaceae	B, Bh, Ch, K, N, Ma, N and Ra	25
<i>Fragaria nubicola</i> Lindl. ex Lacaita, Bhui Kafal, Rosaceae	Bh, Ch, D, K, N, Sa, Sh and T	17
<i>Ficus auriculata</i> Lour., Nimaro, Moraceae	C and R	11, 16
<i>Ficus benghalensis</i> L., Bar, Moraceae	R	11
<i>Ficus hispida</i> L.f., Thotne, Moraceae	Ba and R	8, 11
<i>Ficus palmata</i> Forssk., Bedu, Moraceae	B, Ch, D, K, Ku, M, Sa and Tk	24
<i>Ficus racemosa</i> L., Dumri, Moraceae	C and R	11, 16
<i>Ficus semicordata</i> Buch.-Ham. ex Sm., Khaniyu, Moraceae	C, Ch, D, K, Ku, M, Sa, R and Tk	11,16 and 24
<i>Grewia oppositifolia</i> Buch.-Ham. ex D.Don, Ghotli, Malvaceae	Ch, D, K, Ku, M, Sa and Tk	24
<i>Grewia sclerophylla</i> Roxb., Phorso, Malvaceae	B, Bh, Ch, K, M, N and Ra	25
<i>Helixanthera ligustrina</i> (Wall.) Danser, Ainjeroo, Loranthaceae	G and M	30, 31
<i>Herpetospermum pedunculosum</i> (Ser.) C. B. Clarke, Kurkure, Cucurbitaceae	Ba	8
<i>Mangifera indica</i> L., Aanp, Anacardiaceae	Th	29
<i>Mangifera sylvatica</i> Roxb., Nepal Aanp, Anacardiaceae	C	16
<i>Martynia annua</i> L., Baghjuge, Martyniaceae	R	11
<i>Morus alba</i> L., Kimbu, Moraceae	Ch, D, K, Ku, M, Sa and R	11, 24
<i>Morus macroura</i> Miq., Chanaru, Moraceae	B, C, Ch, K, M, N, T and To	15, 16
<i>Murraya koenigii</i> (L.) Spreng., Mitho Neem, Rutaceae	C and R	11, 16
<i>Myrica esculenta</i> Buch.-Ham. ex D.Don, Kafal. Myricaceae	B, C, Ch, D, K, Ku, M, Sa, R and Tk	11, 16 and 24
<i>Nicandra physaloides</i> (L.) Gaertn., Ishmahol, Solanaceae	R	11

<i>Phoenix acaulis</i> Roxb., Khajuri, Arecaceae	R	11
<i>Phyllanthus emblica</i> L., Amala, Phyllanthaceae	B, C, Ch, D, K, Ku, M, Sa, R, Th and Tk	11, 16, 22, 24, 26 and 29
<i>Prunus persica</i> (L.) Batsch, Aaru, Rosaceae	Ch, D, K, Ku, Sa and Tk	24
<i>Psidium guajava</i> L., Amba, Myrtaceae	C	16
<i>Punica granatum</i> L., Anar, Punicaceae	Ch, D, K, Ku, Sa and Tk	24
<i>Pyracantha crenulata</i> (D.Don) M. Roem., Ghangaru, Rosaceae	Bh, Ch, D, K, N, Sa, Sh and T	17
<i>Rubus ellipticus</i> Sm., Ainselu, Rosaceae	B, C, Ch, D, K, Ku, R and Sa	11, 16, 22, 24 and 26
<i>Rubus paniculatus</i> Sm., Kalo Ainselu, Rosaceae	Bh, Ch, D, K, N, Sa, Sh and T	17
<i>Rubus pentagonus</i> Wall. ex Focke, Rato Ainselu, Rosaceae	Bh, Ch, D, K, N, Sa, Sh and T	17
<i>Rubus rugosus</i> Hegetschw., Bhaise Ainselu, Rosaceae	R	11
<i>Schleichera oleosa</i> (Lour.) Oken, Kusum, Sapindaceae	C and R	11, 16
<i>Semecarpus anacardium</i> L. f., Bhalayo, Anacardiaceae	Ch, D, K, Ku, M, R, Sa and Tk	11, 24
<i>Solanum nigrum</i> L., Kalo Bihi, Solanaceae	R	11
<i>Syzygium cumini</i> (L.) Skeels, Jamun, Myrtaceae	Ch, D, K, Ku, M, R and Tk	11, 16 and 24
<i>Tamarindus indica</i> L., Imli, Fabaceae	C	16
<i>Terminalia bellirica</i> (Gaertn.) Roxb., Barro, Combretaceae	R	11
<i>Terminalia chebula</i> (Gaertn.) Retz., Harro, Combretaceae	R	11
<i>Vicia angustifolia</i> L., Kutilkosa, Fabaceae	Ba and R	8, 11
<i>Viscum album</i> L., Harchur, Santalaceae	C, G, N, T, Th, R and Sr	30, 31
<i>Ziziphus mauritiana</i> Lam., Bayar, Rhamnaceae	Ch, D, K, Ku, M, R, Sa and Tk	11, 24

Table-3: Plants used for pickles.

Scientific name, Vernacular name and Family	P. U.	Ethnic groups	Sources
<i>Aloe vera</i> (L.) Burm. f., Ghiu Kumari, Asphodelaceae,	Fl	B, Ch, K, N and Sh	32
<i>Amorphophallus campanulatus</i> (Roxb.) Blume ex Decne., Ole, Araceae	Tu	Th	20
<i>Antidesma acidum</i> Retz., Archal, Phyllanthaceae	F	C	16
<i>Bauhinia malabarica</i> Roxb., Gochhi, Fabaceae	Fl	C	16
<i>Bauhinia variegata</i> L., Koiralo, Fabaceae	Fl	Ba, C and R	8, 11 and 16
<i>Bergenia ciliata</i> (Haw.) Sternb., Pakhanbed, Saxifragaceae	Fl	B, Ch, D, K, M, N, T and To	15
<i>Brassica campestris</i> L. var. <i>sarson</i> Prain, Sarson, Brassicaceae	L	B, Ch, D, K, M, N, T and To	15

<i>Cannabis sativa</i> L., Ganja, Cannabaceae	Sd	C	11, 16
<i>Choerospondias axillaris</i> (Roxb.) B. L. Burtt., Lapsi, Anacardiaceae	F	B and T	19
<i>Crateva unilocularis</i> Buch.-Ham., Siplikan, Capparaceae	TS	Ba, C and T	8, 16 and 22
<i>Dendrocalamus hamiltonii</i> Gamble, Bans, Poaceae	TS	B, Ba, Ch, D, K, M, N, R, T and To	8, 11 and 15
<i>Drepanostachyum falcatum</i> (Nees) keng f., Ghore Nigalo, Poaceae	TS	B, Ch, D, K, M, N, T and To	15
<i>Ficus lacor</i> Buch.-Ham., Kavro, Moraceae	L	R, N	8, 11
<i>Gomphus clavatus</i> (Pers.) Gray, Ea-Shyamo, Gomphaceae	W	Sh	18
<i>Gomphus floccosus</i> (Schw.) Singer var <i>floccosus</i> , Kumbhe Chyau, Gomphaceae	W	Sh	18
<i>Leccinum</i> sp. Gray, Omi Shyamo, Boletaceae	W	Sh	18
<i>Mentha spicata</i> L., Pudina, Lamiaceae	L	D, G and K	28
<i>Oxalis corniculata</i> L., Chariamilo, Oxalidaceae	L	R	11
<i>Phyllanthus emblica</i> L., Amala, Phyllanthaceae	F	B, C, Ch, D, K, Ku, M, R, Sa, Th and Tk	11, 16, 22, 29, 24, 26 and 29
<i>Ramaria flava</i> (Sch.) Quel., Che Shyamo, Gomphaceae	W	Sh	18
<i>Rhododendron arboreum</i> Sm., Lali Gurans, Ericaceae	Fl	C, Ch, K, Kh, R, Sa and Tk	11, 16 and 21
<i>Rhus javanica</i> L., Bhakimlo, Anacardiaceae	F	B, Ch, D, K, Kh, M, N, Sa, T, Tk and To	15, 21
<i>Smilax ovalifolia</i> Roxb. ex D.Don, Kukurdaino, Smilacaceae	F	R	11
<i>Tamarindus indica</i> L., Imli, Fabaceae	F	C	16

Table-4: Plants used for baking powder.

Scientific name, Vernacular name and Family	P. U.	Ethnic groups	Sources
<i>Boehmeria rugulosa</i> Wedd., Daar, Urticaceae	Bk	B, Ch, D, K, M, N, R, T and To	11, 15
<i>Bombax ceiba</i> L., Simal, Bombacaceae	Bk	Ba, N, R and T	8, 11
<i>Sterculia villosa</i> Roxb. ex Sm, Khava, Malvaceae	Bk	B, Ch, D, K and Tk	27

Table-5: Plants used for tea.

Scientific name, Vernacular name and Family	P. U.	Ethnic groups	Sources
<i>Ocimum sanctum</i> L., Tulsi, Lamiaceae	L	R	11
<i>Osiris wightiana</i> Wall. ex Wight., Bakhre Kursani, Santalaceae	L	G and T	31
<i>Rhododendron anthopogon</i> D. Don, Sunpati, Ericaceae	Fl	G, M and Ti	33
<i>Rhododendron lepidotum</i> Wall., Bhale Sunpati, Ericaceae	Fl	G, M and Ti	33
<i>Thymus linearis</i> Benth., Jungali Ajwain, Lamiaceae	L	G, M and Ti	33

Table-6: Plants eaten raw.

Scientific name, Vernacular name and Family	P. U.	Ethnic groups	Sources
<i>Achyranthes bidentata</i> Blume, Datiwan, Amaranthaceae	S	B, Ch, D, K, M, N, T and To	15
<i>Echinochloa crus-galli</i> (L.) Beauv., Samo Ghans, Poaceae	Sd	C	16
<i>Helminthostachys zeylanica</i> (L.) Hook, Majurgoda, Ophioglossaceae	TS	C	16
<i>Lamium tuberosum</i> Hedge, Jip-tsi, Lamiaceae	Fl	G and Ti	33
<i>Mallotus nepalensis</i> Mull. Arg., Phirphire, Euphorbiaceae	Sd	C	16
<i>Morina longifolia</i> Wall., Kaandamasee, Caprifoliaceae	Bk	B, Ch, D, K, M, N, T and To	15
<i>Nephrolepis cordifolia</i> (L.) K. Persl, Pani Amala, Nephrolepidaceae	Tu	B, C and T	16, 19
<i>Pinus roxburghii</i> Sarg., Rani Sallo, Pinaceae	Sd	C and R	11, 16

Table-7: Plants used for spices, oil, juice, cheese and smoking.

Scientific name, Vernacular name and Family	P.U.	Uses	Ethnic groups	Sources
<i>Allium hypsistum</i> Stearn, Jimbu, Amaryllidaceae	W	Spices	Bi, G and K	34
<i>Auricularia polytricha</i> (Mont.) Sacc., Dhurko Chyau, Auriculariaceae	W	Cheese	Sh	18
<i>Bassia butyracea</i> Roxb., Chiuri, Sapotaceae	Sd	Oil	B, C, Ch, D, K, Ku, M, Sa, R and Tk	11, 16, 22 and 24
<i>Bauhinia vahlii</i> (Wight & Arn.) Benth., Bhorla, Fabaceae	Sd	Oil	B, Ch, D, K, Ku, M, R, Sa, and Tk	11, 16 and 24
<i>Cinnamomum tamala</i> (Buch.-Ham.) T. Nees & Eberm., Dalchini, Lauraceae	L and Bk	Spices	Th	29
<i>Nicotiana tabacum</i> L., Tambakhu, Solanaceae	L	Smoking	C	16
<i>Rhododendron arboreum</i> Sm., Lali Gurans, Ericaceae	Fl	Juice	C, Ch, K, Kh, R Sa and Tk	11, 16 and 21
<i>Woodfordia fruticosa</i> (L.) Kurz, Dhairo, Lythraceae	Fl	Juice	R	11

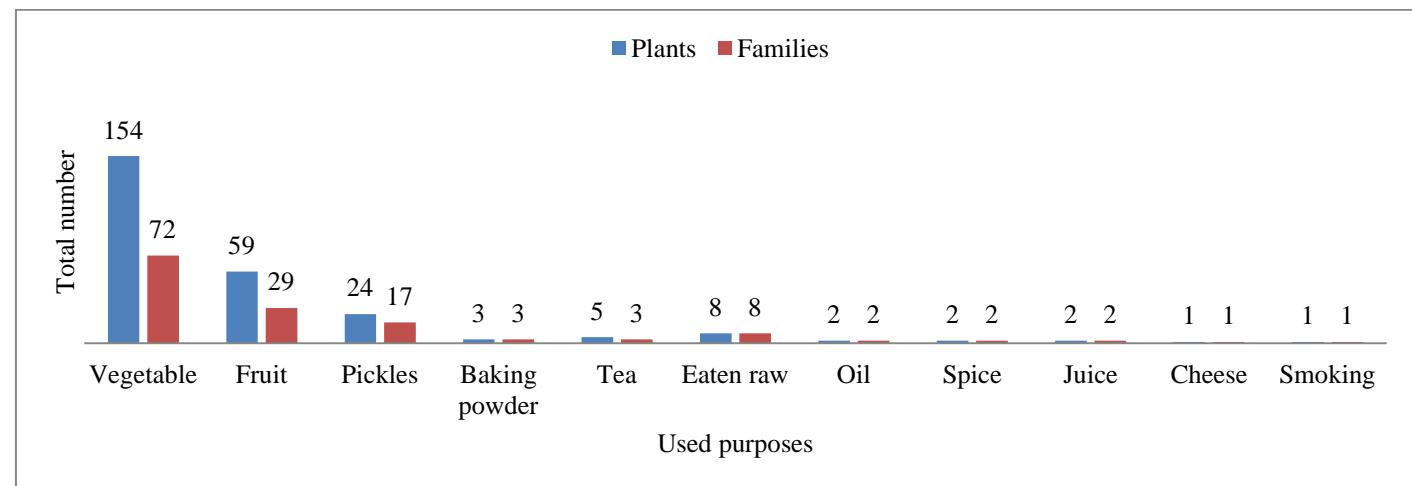


Figure-1: Number of plants and families used for different purposes.

The maximum numbers of wild plants were used for vegetables (154), followed by fruits (59), pickle (24), eaten raw (8), tea (5), baking powder (3), oil (2), spices (2), juice (2), cheese (1) and smoking (1). The number of plants and families used for different purposes is mentioned in Figure-1.

Conclusion

Wild plants are important sources of food for ethnic people residing in rural areas of Nepal. A total of 261 wild edible plant species from 101 families were found to be consumed for food by 23 ethnic groups of Nepal. Whole plants or plants' parts were used in the form of vegetables, fruits, pickles, etc. The maximum numbers of plants (154 species) were used for vegetables. However, the consuming practices are at risk due to socio-cultural transformation and modernization. The use-value, nutritional value, commercial, and marketing value of wild edible plants are needed to analyze. Proper documentation on traditional uses of wild edible plants is necessary to serve future generations. Threatened edible species should be identified and cultivated in native lands for their long term conservation. Sustainable harvesting strategies should be practiced to stop overexploitation. Researches focusing on wild edible plants relating the ethnic groups are required to be carried out.

References

1. GoN/MoFSC. (2014). National biodiversity strategy and action plan 2014-2020. Government of Nepal, Ministry of Forests and Soil Conservation, Singhadurbar, Kathmandu, Nepal.
2. CBS (2012). National population and housing census 2011, National Report. Kathmandu, National Planning Commission2012.
3. Schultes, R. E., & von Reis, S. E. (1995). Evolution of a Discipline. Vol. 414, Portland, Ore: Dioscorides Press. DOI: <https://doi.org/10.5860/choice.34-0297>
4. Upadhyay, Y., Poudel, R. C., Shrestha, K. K., Rajbhandary, S., Tiwari, N. N., Shrestha, U. B. and Asselin, H. (2012). Diversity of use and local knowledge of wild edible plant resources in Nepal. *Journal of Ethnobiology and Ethnomedicine*, 8(1), 16. DOI: <https://doi.org/10.1186/1746-4269-8-16>
5. Schippmann, U., Leaman, D. J. and Cunningham, A. B. (2002). Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. *Biodiversity and the ecosystem approach in agriculture, forestry and fisheries*. FAO, Rome, Italy, pp. 1-21.
6. Dangol, D. R., Maharjan, K. L., Maharjan, S. K. and Acharya, A. K. (2017). Wild edible plants of Nepal. In Conservation and Utilization of Agricultural Plant Genetic Resources in Nepal. Kathmandu: Proceedings of 2nd National Workshop, 22nd May. pp. 22-23.
7. Reyes-García, V., Menendez-Baceta, G., Aceituno-Mata, L., Acosta-Naranjo, R., Calvet-Mir, L., Domínguez, P. and Rodríguez-Franco, R. (2015). From famine foods to delicatessen: Interpreting trends in the use of wild edible plants through cultural ecosystem services. *Ecological Economics*, 120, 303-311. DOI: <https://doi.org/10.1016/j.ecolecon.2015.11.003>.
8. Joshi, N. (2014). Utilization pattern and conservation status of plant resources of Makawanpur district, central Nepal. Ph. D. thesis. Central Department of Botany, Tribhuvan University, Nepal.
9. Odhav, B., Beekrum, S., Akula, U. S. and Baijnath, H. (2007). Preliminary assessment of nutritional value of traditional leafy vegetables in KwaZulu-Natal, South Africa. *Journal of Food Composition and Analysis*, 20(5), 430-435. DOI: <https://doi.org/10.1016/j.jfca.2006.04.015>
10. You-Kai, X., Guo-Da, T., Hong-Mao, L., Kang-La, Y. and Xiang-Sheng, D. (2004). Wild vegetable resources and market survey in Xishuangbanna, Southwest China. *Economic Botany*, 58(4), 647-667. DOI: [https://doi.org/10.1663/0013-0001\(2004\)058\[0647:WVRA MS\]2.0.CO;2](https://doi.org/10.1663/0013-0001(2004)058[0647:WVRA MS]2.0.CO;2)
11. Thapa, L. B., Dhakal, T. M. and Chaudhary, R. (2014). Wild edible plants used by endangered & indigenous Raji Tribe in Western Nepal. *International Journal of Applied Sciences and Biotechnology*, 2(3), 243-252. DOI: <https://doi.org/10.3126/ijasbt.v2i3.10969>
12. Bhattacharai, S., Chaudhary, R. P. and Taylor, R. S. (2009). Wild edible plants used by the people of Manang district, central Nepal. *Ecology of Food and Nutrition*, 48(1), 1-20. DOI: <https://doi.org/10.1080/03670240802034996>
13. Benz, B. F., Cevallos, J., Santana, F., Rosales, J. and Graf, S. (2000). Losing knowledge about plant use in the Sierra de Manantlan biosphere reserve, Mexico. *Economic Botany*, 54(2), 183-191. DOI: <https://doi.org/10.1007/BF02907821>
14. Joshi, N., Kehlenbeck, K. and Maass, B. L. (2007). Traditional, neglected vegetables of Nepal: Their sustainable utilization for meeting human needs. In *Conference on International Agricultural Research for Development*, Tropentag. 9th-10th Oct. pp.1-10.
15. Malla, B. and Chhetri, R. B. (2009). Indigenous knowledge on ethnobotanical plants of Kavrepalanchowk district. *Kathmandu University Journal of Science, Engineering and Technology*, 5(2), 96-109.
16. Rijal, A. (2011). Surviving on Knowledge: Ethnobotany of Chepang community from mid-hills of Nepal. *Ethnobotany Research and Applications*, 9, 181-215. www.ethnobotanyjournal.org/vol9/i1547-3465-09-181
17. Sigdel, S. R., Rokaya, M. B. and Timsina, B. (2013). Plant inventory and ethnobotanical study of Khimti hydropower project, central Nepal. *Scientific World*, 11(11), 105-112.

- <https://www.nepjol.info/index.php/SW/article/view/8563/6960>
18. Giri, A. and Rana, R. (2008). Ethnomycological knowledge and nutritional analysis of some wild edible mushrooms of Sagarmatha National Park (SNP), Nepal. *Journal of Natural History Museum*, 23, 65-77. DOI: <https://doi.org/10.3126/jnhm.v23i0.1841>
19. Ambu, G., Chaudhary, R. P., Mariotti, M. and Cornara, L. (2020). Traditional Uses of Medicinal Plants by Ethnic People in the Kavrepalanchok District, Central Nepal. *Plants*, 9(6), 759. DOI: <https://doi.org/10.3390/plants9060759>
20. Singh, S. (2015). Ethno botanical study of some wild herb species Parsa District Forest of Nepal. *Journal of Pharmacognosy and Phytochemistry*, 4(1), 32-40. www.phytojournal.com
21. Kunwar, R. M. (2003). Ethnobotanical notes on flora of Khaptad National Park (KNP), far-western Nepal. *Himalayan Journal of Sciences*, 1(1), 25-30. DOI: <https://doi.org/10.3126/hjs.v1i1.182>
22. Aryal, K., Berg, A., and Ogle, B. (2009). Uncultivated plants and livelihood support—A case study from the Chepang people of Nepal. *Ethnobotany Research and Applications*, 7, 409-422. <http://ethnobotanyjournal.org/index.php/era/article/view/255>
23. Adhikari, M. K., Devkota, S. and Tiwari, R. D. (2005). Ethnomycological knowledge on uses of wild mushrooms in western and central Nepal. *Our Nature*, 3(1), 13-19. DOI: <https://doi.org/10.3126/on.v3i1.329>
24. Bhatta, L. R. (1999). Ethnobotanical study in a village at Rukum district, Nepal. *Banko Janakari*, 9(2), 40-43. DOI: <https://doi.org/10.3126/banko.v9i2.17665>
25. Sigdel, S. R. and Rokaya, M. B. (2011). Utilization of plant resources in Dang district, West Nepal. *Banko janakari*, 21(2), 45-54. DOI: <https://doi.org/10.3126/banko.v21i2.9143>
26. Budhathoki, A. and Manandhar, B. (2019). An Assessment of NTFPs Contribution to the Livelihoods of Rural People: A Case Study from Kalika Community Forest of Surkhet District, Nepal. In International Conference on Natural Resources, Agriculture and Society in Changing Climate. 17th-19th Aug. pp.34.
27. Kunwar, R. M., Shrestha, K. P. and Bussmann, R. W. (2010). Traditional herbal medicine in Far-west Nepal: A pharmacological appraisal. *Journal of Ethnobiology and Ethnomedicine*, 6(1), 35. DOI: <https://doi.org/10.1186/1746-4269-6-35>
28. Gurung, L. J., Rajbhandary, S. and Ranjitkar, S. (2008). Indigenous Knowledge on Medicinal Plants in Midhills of Nepal: A Case Study of Sikles of Kaski District, Nepal. *Medicinal Plants in Nepal: An Anthology of Contemporary Research*. Ecological Society of Nepal, Kathmandu, pp.152-163.
29. Bishokarma, B. K., Kinsey, C. K., Dangol, D. R. and Chaudhary, P. (2005). Folk use of plant resource at Madi valley of Chitwan District, Nepal. *Banko Janakari*, 15(2), 28-33. DOI: <https://doi.org/10.3126/banko.v15i2.348>
30. Kunwar, R. M., Adhikari, N. and Devkota, M. P. (2005). Indigenous use of mistletoes in tropical and temperate region of Nepal. *Banko Janakari*, 15(2), 38-42. <https://www.nepjol.info/index.php/banko/article/view/350>
31. O'Neill, A. R. and Rana, S. K. (2016). An ethnobotanical analysis of parasitic plants (Parijibi) in the Nepal Himalaya. *Journal of ethnobiology and ethnomedicine*, 12(1), 14. DOI: <https://doi.org/10.1186/s13002-016-0086-y>
32. Pandey, B. P., Chaudhary, R. P., Sigdel, S. and Pradhan, S. P. (2020). Ethnobotanical Knowledge of Khandadevi and Gokulganga Rural Municipality of Ramechhap District of Nepal. *Ethnobotany Research and Applications*, 20, 1-32. <http://www.ethnobotanyjournal.org/index.php/era/article/view/2027>
33. Ghimire, S. K. and Aumeeruddy-Thomas, Y. (2009). Ethnobotanical classification and plant nomenclature system of high altitude agro-pastoralists in Dolpo, Nepal. *Botanica Orientalis: Journal of Plant Science*, 6(1), 56-68. <http://www.cdbtu.edu.np/botanica-orientalis>
34. Nepal, R. C. (2006). Status, Use and Management of Jimbu (Allium spp.): A Case Study from Upper Mustang, Nepal. (Unpublished master's thesis). Norwegian University of Life Sciences, Norway.
35. Ray, A., Ray, R. and Sreevidya, E. A. (2020). How many wild edible plants do we eat—Their diversity, use, and implications for sustainable food system: An exploratory analysis in India. *Frontiers in Sustainable Food Systems*. 4, 56. DOI: <http://doi.org/10.3389/fsufs.2020.00056>
36. Gautam, D., Basnet, S., Karki, P., Thapa, B., Ojha, P. and Poudel, U. (2020). A Review on Dendrochronological Potentiality of the Major Tree Species of Nepal. *Journal of Forest Research*, 9(2), 227. DOI: <https://doi.org/10.35248/2168-9776.20.9.227>