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Common wild ethnomedicinal tuberous plants of Asia

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ABSTRACT

Tuberous plants have always been used as food and medicine since ages. The carbohydrate content and other phytochemical constituents and their tubers make them the best form of nutraceutical. The diversity in the landscape in Asian countries makes the region a good place for the availability of wild tuberous plants. A literature survey and field work has been carried out to find the most common wild medicinal tuberous plants in Asian countries. The results revealed that the most common wild tuberous ethnomedicinal plants belong to the family Zingiberaceae, Araceae, Dioscoreaceae. Identifying these plants could be helpful as an alternative staple food or to meet the food scarcity during famine. With its potential to be used as a nutraceutical, selected tuberous plants can be used in the screening of future drugs.

Key words: Wild tuberous, Medicinal, Asian countries, Food security, Nutraceutical

Introduction

Since the beginning of human civilization, different plant parts have been used by humans for several purposes like food, shelter, firewood, spices, medicines, and some ritual purposes. The knowledge of plants and their benefits has been transferred from generation to generation through the memories and some writings like Unani, Siddha, and Ayurveda. With the urbanization and migration of people to urban areas, the knowledge of wild medicinal plants has very steeply decreased and with negligence, many wild plants are being removed from their natural habitat in the name of development. The

knowledge of medicinal plants is now more concentrated in the tribal communities or people living in and around the forest areas. (Hop *et al.*, 2020; Devi and Kumar, 2021). In the traditional system of medicine, plants always have been the first priority in the treatment of different diseases. The traditional uses of the plants are widely accepted throughout the globe and about 80% of the total population depends on the plants for their health care (Poonam and Singh, 2009; WHO, 1993). In most of the developing and developed countries, medicinal plants have much more demand than chemical drugs. Each plant species has a different mode of action to cure diseases. Different plant parts are also used to cure

different ailments. Mainly leaves, bark, roots and tubers are used in the preparation of medicine (Ummalyama *et al.* 2018).

Among all the wild plants, tuberous plants play a major role in the supplement of food and medicine (Edison *et al.*, 2006). The term tuber means the structure derived from stem or roots (Mauseth, 2012). Stem tuber arises from the thickening of the rhizome and the stolon whereas the tuberous roots are the modification of root. The tuberous plant has a storage organ commonly known as bulb, corm, tuber, or rhizome. The storage organ is used in perennation of a plant to provide energy and nutrients for regrowth during the next growing periods (Swarnkar and Katewa, 2008; Mohanty *et al.*, 2021). Some tuberous plants contain alkaloids, flavonoids, tannins, and phenolic compounds for which they are considered to have medicinal properties. (Behera *et al.*, 2020). Scientific investigation on the medicinal tuberous plants has been initiated in many countries due to its contribution to health care (Devi *et al.*, 2015). Many ethnobotanical studies were also carried out throughout the globe to know the medicinal values of the plant products. Due to the more demand for plant medicine, local people also pay attention to know more about the medicinal value and they are also trying to conserve the medicinal plants (Swarnkar and Katewa 2008). But there is still an ethnobotanical gap in the knowledge about tuberous plants. Keeping the importance of wild ethnomedicinal tuberous plants, an attempt has been made to enumerate the common wild ethnomedicinal tuberous plants through literature and field surveys.

Materials and Methods

The literature survey was carried out from most Asian countries where tuberous plants have been used as traditional ways of medicine. The field survey was carried out in different states of India from 2019 to 2021.

Study area

Asia is the largest continent on the planet, covering up to one third of land area of earth. It consists of different countries, mountains, floral and faunal diversity with the longest coastline. Asia is a home of many plateaus, areas of level high ground. The west Siberian plain, located in Central Russia is one of the largest areas of flat land in the world. Central Asia is

covered by a large area called Steppe. Lake Baikal located in Southern Russia is known to be the deepest lake in the world (National Geography, 2017). Asia has mostly diverse climatic features which range from arctic to subarctic in Siberia to Tropical in Southern India and South East Asia. Because of a wide range of climate combined with a highly complex topography and a variety of habitats, Asia is one of the world's richest places in terms of plant diversity (Crowther *et al.*, 2015). Asia's natural landscape is incomparable, hence the continent is recognized as one of the major zones of biodiversity hotspots (Squires, 2013). Plants are the primary sources of human necessities including food, timber, and medicine. Hence, identifying the diversity of tuberous medicinal plants is important as Asian

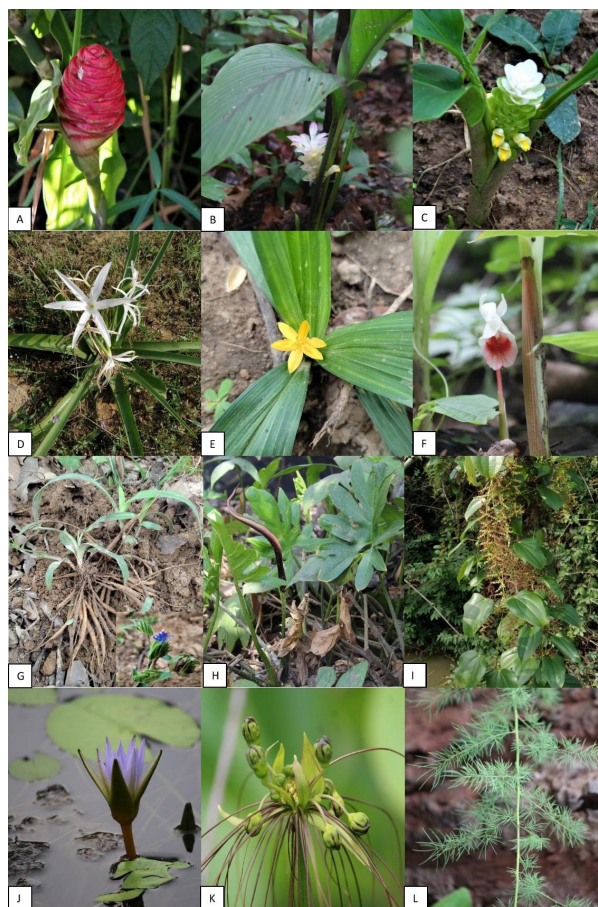


Fig. 1. Some common wild tuberous medicinal plants A) *Zingiber zerumbet* B) *Curcuma caesia* C) *Cucurma longa* D) *Crinum asiaticum* E) *Curculigo orchioides* F) *Boesenbergia longiflora* G) *Cyanotis tuberosa* H) *Lasia spinosa* I) *Dioscorea oppositifolia* J) *Nymphaea nouchali* K) *Tacca leontopetaloides* L) *Asparagus racemosus*

Table 1. Wild common ethnomedicinal tuberous plants of Asia

Scientific name	Family	Medicinal Uses	References
<i>Actinoscirpus grossus</i> (L.f.) Goetgh. & D.A. Simpson	Cyperaceae	Used as laxative & cooling agent	Edison <i>et al.</i> , 2006
<i>Acorus calamus</i> L.	Acoraceae	Substitute for ginger	Bhuvanewari <i>et al.</i> , 2015 and Present Study
<i>Aconitum lethale</i> Griff.	Ranunculaceae	Against inflammation	Sharma and Ramawat, 2016
<i>Adenia hondala</i> (Gaertner) de Wilde	Passifloraceae	Against stomach problems in cattle	Rajesh <i>et al.</i> , 2019
<i>Ampelocissus latifolia</i> (Roxb.) Planch. (Rhizome)	Vitaceae	To cure bone fracture	Swarnkar and Katewa, 2008
<i>Alocasia macrorrhizos</i> (L.) G.Don	Araceae	Relieves scorpion sting	Edison <i>et al.</i> , 2006 and Present Study
<i>Alpinia calcarata</i> (Haw.) Roscoe.	Zingiberaceae	Against gastric trouble and respiratory ailments	Ferdous <i>et al.</i> , 2018 and Present Study
<i>Alpinia galanga</i> (L.) Willd.	Zingiberaceae	Against fever & rheumatism	Edison <i>et al.</i> , 2006 and Present Study
<i>Alpinia conchigera</i> Griff.	Zingiberaceae	Against stomach upset and fever	Ibrahim <i>et al.</i> , 2018
<i>Alpinia nigra</i> (Gaertn.) Burt	Zingiberaceae	Against rheumatism	Present Study
<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Against asthma	Ramanathan <i>et al.</i> , 2014
<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Against bronchitis, Against tumors, Against seminal weakness, Against cattle diseases, Against abdominal pain	Bhuvanewari <i>et al.</i> , 2015; Shinde 2015; Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Amorphophallus bulbifer</i> (Roxb.) Blume	Araceae	Against worm infestation	Present Study
<i>Amorphophallus sylvaticus</i> Kunth.	Araceae	Against sexual disorders, Against piles, Against cough and inflammation	Bhuvanewari <i>et al.</i> 2015; Shinde 2015; Ramanathan <i>et al.</i> 2014
<i>Amomum subulatum</i> Roxb.	Zingiberaceae	Against high blood pressure	Present study
<i>Anemarrhena asphodeloides</i> Bunge	Asparagaceae	Against skin diseases	Nalawade <i>et al.</i> 2003
<i>Anthogonium gracile</i> Wall.	Orchidaceae	Relief from cracking heels	Lokho 2012 and Present Study
<i>Aponogeton echinatus</i> Roxb.	Aponogetonaceae	Against leucorrhea	Present study
<i>Arisaema tortuosum</i> (Wall.) Schott	Araceae	Against worm infection	Present study
<i>Arisaema leschenaultii</i> Blume	Araceae	Against complications of snakebite.	Upasani <i>et al.</i> 2018
<i>Asparagus adscendens</i> (Roxb.) Kunth	Asparagaceae	Improves immune system	Sharma and Ramawat 2016
<i>Asparagus racemosus</i> Willd.	Asparagaceae	Against leucorrhea; Against nervous disorders; Increase lactation in nursing mothers	Ramanathan <i>et al.</i> 2014; Swarnkar and Katewa 2008 and Present Study
<i>Asparagus sarmentosus</i> L.	Asparagaceae	Roots are aphrodisiac	Edison <i>et al.</i> , 2006
<i>Asplenium nidus</i> L.	Aspleniaceae	Against rheumatism	Nguyen <i>et al.</i> , 2019
<i>Begonia annulata</i> K.Koch	Begoniaceae	Antidote	Wangchuk <i>et al.</i> , 2011
<i>Bergenia crassifolia</i> (L.) Fritsch.	Saxifragaceae	Against diarrhea	Shikov <i>et al.</i> , 2014
<i>Bongardia chrysogonum</i> (L.) Spach	Berberidaceae	Against epilepsy	Assaf <i>et al.</i> , 2013
<i>Borassus flabellifer</i> L.	Arecaceae	Against obesity	Bhuvanewari <i>et al.</i> , 2015
<i>Canna indica</i> L.	Cannaceae	Against gonorrhoea	Swarnkar and Katewa, 2008 and Present Study
<i>Cautleya spicata</i> (Sm.) Baker	Zingiberaceae	Anticoagulant	Wangchuk <i>et al.</i> 2011
<i>Ceropegia bulbosa</i> Roxb.	Asclepiadaceae	Used as energetic tonic	Shinde, 2015
<i>Cheilocostus speciosus</i> (J.Koenig)			

Table 1. Continued ...

Scientific name	Family	Medicinal Uses	References
C.D. Specht.	Zingiberaceae	Against diabetes	Rahman <i>et al.</i> , 2013 and Present Study
<i>Chlorophytum borivilianum</i>	Liliaceae	Against fungal infection	Sharma and Ramawat, 2016
Santapau & R.R. Fern.			
<i>Chlorophytum tuberosum</i> Roxb.	Asparagaceae	Used to recover weakness	Shinde, 2015
<i>Cayratia trifolia</i> (Linn.) Domin.	Vitaceae	Used to treat bone fracture	Swarnkar and Katewa, 2008
<i>Coccinia grandis</i> (L.) Voigt.	Cucurbitaceae	Against skin diseases(Rhizome)	Bhuvaneswari <i>et al.</i> , 2015 and Present Study
<i>Colchicum cupanii</i> Guss.	Colchicaceae	Against Gout	Al-douri, 2000
<i>Coleus forskohlii</i> (Poir.) Briq.	Lamiaceae	Against cold, fever and cough	Ramanathan <i>et al.</i> , 2014
<i>Colocasia affinis</i> Schott	Araceae	To treat allergy and inflammation	Dev <i>et al.</i> , 2021; Edison <i>et al.</i> , 2006
<i>Colocasia esculenta</i> (L.) Schott	Araceae	Cooked tuber is rubbed for good hair growth; Against alopecia & congestion of the portal system	Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Colocasia fallax</i> Schott	Araceae	Analgesic activity	Edison <i>et al.</i> , 2006
<i>Colocasia gigantea</i> (Blume) Hook f.	Araceae	Good carbohydrate content & use and vegetable	Ramanathan <i>et al.</i> , 2014
<i>Corallocarpus epigaeus</i> Hoof. F	Cucurbitaceae	Against leprosy; Against complications of snake bite; Against tumour	Bhuvaneswari <i>et al.</i> , 2015; Shinde 2015; Ramanathan <i>et al.</i> , 2014
<i>Corydalis yanhusuo</i> (Y.H. Chou & Chun C.Hsu) W.T.Wang ex ZYSu & CYWu	Papaveraceae	Against gastric ulcer	Tsay and Agrawal, 2005
<i>Crinum asiaticum</i> L.	Amaryllidaceae	Against arthritis	Bhuvaneswari <i>et al.</i> , 2015
<i>Curculigo orchioides</i> Gaertner. effects	Hypoxidaceae	Against piles; Neuroprotective	Sharma and Ramawat 2016 and Present Study
<i>Curcuma aromatica</i> Salisb. Ln. Bon.	Zingiberaceae	To treat sprain & bone fracture	Shankar and Rawat, 2012, Present Study
<i>Curcuma amada</i> Roxb.	Zingiberaceae	Used to cure dropsy; to treat bone fracture in animals	Swarnkar and Katewa, 2008 and Present Study
<i>Curcuma caesia</i> Roxb. against asthma	Zingiberaceae	Used as a stimulant and	Edison <i>et al.</i> , 2006
<i>Curcuma longa</i> L.	Zingiberaceae	Against inflammation	Bhuvaneswari <i>et al.</i> , 2015 and Present Study
<i>Curcuma neilgherrensis</i> Wight	Zingiberaceae	Against cardiac diseases	Present study
<i>Curcuma pseudomontana</i> Grah. Cat.	Zingiberaceae	Against hepatitis	Shinde, 2015
<i>Curcuma zedoaria</i> (Christm.) Roscoe	Zingiberaceae	Against cold, cough and bronchitis	Edison <i>et al.</i> , 2006 and Present Study
<i>Cyanotis tuberosa</i> (Roxb.) Schult. & Schult.f.	Commelinaceae	Relieves vomiting	Present study
<i>Cyclea laxiflora</i> Miers	Menispermaceae	To treat headache	Batugal <i>et al.</i> , 2004
<i>Cyperus rotundus</i> L.	Cyperaceae	Against leprosy; Against stomach problems	Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Dactylicapnos scandens</i> (D.Don) Hutch.S	Papaveraceae	Against diabetes & high blood pressure	Temsutola <i>et al.</i> , 2019
<i>Dahlia coccinea</i> Cav.	Asteraceae	To heal wounds; Against kidney problems	Bhuvaneswari <i>et al.</i> , 2015; Ramanathan <i>et al.</i> , 2014

Table 1. Continued ...

Scientific name	Family	Medicinal Uses	References
<i>Dioscorea alata</i> L.	Dioscoreaceae	Used as laxatives; Against indigestion	Bhuvaneswari <i>et al.</i> , 2015; Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Dioscorea belophylla</i> Voigt.	Dioscoreaceae	Against ulcer	Present Study
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Against skin diseases; Against swellings	Shinde 2015; Sharma and Ramawat Present Study 2016
<i>Dioscorea deltoidea</i> Wall. ex Griseb	Dioscoreaceae	Antioxidant activity	
<i>Dioscorea esculenta</i> Burk.	Dioscoreaceae	To treat urinary infections; Against rheumatoid arthritis	Bhuvaneswari <i>et al.</i> , 2015; Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Dioscorea floribunda</i> M. Martens & Galeotti	Dioscoreaceae	Used as antifertility	Edison <i>et al.</i> , 2006
<i>Dioscorea hispida</i> Dennst.	Dioscoreaceae	Against piles;	Present Study
<i>Dioscorea oppositifolia</i> L.	Dioscoreaceae	Against skin irritation; Against kidney problems; Used as tonic	Bhuvaneswari <i>et al.</i> , 2015; Ramanathan <i>et al.</i> , 2014 and Present Study
<i>Dioscorea pentaphylla</i> L.	Dioscoreaceae	Used as tonic	Present Study
<i>Dioscorea tomentosa</i> Roxb.	Dioscoreaceae	Used as vegetables	Swarnkar & Katewa 2008 & Present Study
<i>Drynaria quercifolia</i> (L.) J. Smith.	Polypodiaceae	Used as anthelmintic; Against typhoid and Jaundice	Bhuvaneswari <i>et al.</i> , 2015; Ramanathan <i>et al.</i> , 2014
<i>Ensete superbum</i> Roxb.	Musaceae	Against urinary infection	Bhuvaneswari <i>et al.</i> , 2015
<i>Eulophia ochreatea</i> Lindl.	Orchidaceae	Against diarrhea	Swarnkar and Katewa, 2008
<i>Euphorbia fusiformis</i> Buch.-Ham. ex D. Don	Euphorbiaceae	Against rheumatic pain	Swarnkar & Katewa 2008
<i>Fritillaria imperialis</i> L.	Liliaceae	Against kidney stone	Present study
<i>Globba marantina</i> L.	Zingiberaceae	Against asthma	Swarnkar and Katewa, 2008 and Present Study
<i>Gloriosa superba</i> L. labour pain	Liliaceae	Against ulcer; Promote	Ramanathan <i>et al.</i> , 2014; Swarnkar and Katewa, 2008
<i>Glycyrrhiza glabra</i> L.	Fabaceae	Anticancer properties	Sharma and Ramawat, 2016
<i>Gymnadenia conopsea</i> (L.) R.Br.	Orchidaceae	Against respiratory problems	Shang <i>et al.</i> , 2017
<i>Gynura pseudochina</i> (L.) DC.	Asteraceae	Against inflammation	Panthang <i>et al.</i> , 1986
<i>Habenaria grandifloriformis</i> Blatt and McCann.	Orchidaceae	Used to increase body strength	Shinde, 2015
<i>Hedychium aurantiacum</i> Wall.	Zingiberaceae	Against Bronchitis	Devi <i>et al.</i> , 2015
<i>Hedychium marginatum</i> C.B. Clarke.	Zingiberaceae	Used as stimulant & tonic	Devi <i>et al.</i> , 2015
<i>Hedychium spicatum</i> Buch. Ham.	Zingiberaceae	Used for treatment of dyspepsia	Edison <i>et al.</i> 2006
<i>Hedychium coronarium</i> J. Koenig.	Zingiberaceae	Against swelling	Edison <i>et al.</i> 2006 and Present Study
<i>Helianthus tuberosus</i> L.	Asteraceae	Against diabetes	Edison <i>et al.</i> , 2006
<i>Hemidesmus indicus</i> (L.) R.Br.	Asclepiadaceae	Against skin diseases	Present study
<i>Holostemma ada-kodien</i> Schult.	Apocynaceae	Against diabetes	Sharma and Ramawat, 2016

Table 1. Continued ...

Scientific name	Family	Medicinal Uses	References
<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Used as purgative	Edison <i>et al.</i> , 2006 and Present Study
<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Reduces Blood pressure	Edison <i>et al.</i> , 2006
<i>Ipomoea digitata</i> L.	Convolvulaceae	Applied to reduce swelling joints	Edison <i>et al.</i> , 2006
<i>Ipomoea alba</i> L.	Convolvulaceae	Roots are purgative	Edison <i>et al.</i> 2006
<i>Jacquemontia paniculata</i> (Burm. f.) Hallier f.	Convolvulaceae	Increase lactation in nursing mothers	Edison <i>et al.</i> , 2006
<i>Kaempferia galanga</i> L.	Zingiberaceae	Against fever & muscle pain	Roosita <i>et al.</i> , 2008 and Present Study
<i>Kaempferia rotunda</i> L.	Zingiberaceae	Against sinusitis	Present study
<i>Lagenandra toxicaria</i> Dalz.	Araceae	Against tuberculosis	Swarnkar and Katewa 2008
<i>Lasia spinosa</i> (L.) Thwaites	Araceae	Against constipation	Maneenoon <i>et al.</i> 2015 & Present Study
<i>Leea indica</i> (Burm.f.) Merr.	Vitaceae	To cure allergy	Swarnkar and Katewa 2008
<i>Leea macrophylla</i> Roxb. Ex. Hornem.	Leeaceae	Against cancer	Swarnkar and Katewa, 2008 & Present Study
<i>Lophatherum gracile</i> Brongn	Poaceae	Increase semen in males	Batugal <i>et al.</i> , 2004
<i>Manihot esculenta</i> Crantz.	Euphorbiaceae	Against constipation	Present study
<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Against tumours	Ramanathan <i>et al.</i> , 2014
<i>Molineria capitulata</i> (Lour.) Herb.	Hypoxidaceae	To treat wounds	Anderson 1986
<i>Momordica balsamina</i> L.	Cucurbitaceae	Antiviral activity	Swarnkar and Katewa, 2008
<i>Morinda officinalis</i> F.C.How	Rubiaceae	Against kidney problems	Nguyen <i>et al.</i> 2019
<i>Nelumbo nucifera</i> Gaertner.	Nelumbonaceae	Against dysentery	Present study
<i>Nymphaea nouchali</i> Burman f.	Nymphaeaceae	Against diabetes	Ramanathan <i>et al.</i> 2014
<i>Ornithogalum umbellatum</i> L.	Asparagaceae	Against stomach pain	Bhuvanewari <i>et al.</i> 2015
<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Against gonorrhoea	Bhuvanewari <i>et al.</i> 2015
<i>Pueraria tuberosa</i> (Roxb ex Wild.) D.C.	Fabaceae	Against rheumatism & prostrate problems	Present Study
<i>Pueraria montana</i> var. <i>lobata</i> (Willd.) Sanjappa & Pradeep	Fabaceae	Against diarrhea	Lee <i>et al.</i> 2008
<i>Pueraria phaseoloides</i> (Roxb.) Benth.	Fabaceae	Against weakness	Sam <i>et al.</i> 2008
<i>Pupalia atropurpurea</i> Mog.	Amaranthaceae	Antinematodal	Swarnkar and Katewa 2008
<i>Ruellia tuberosa</i> L.	Acanthaceae	Against abdominal pain	Swarnkar and Katewa 2008 & Present Study
<i>Sagittaria sagittifolia</i> L.	Alismataceae	Used as discutient	Present study
<i>Sansevieria roxburghiana</i> Schult. f.	Draceneae	Against ear infection	Bhuvanewari <i>et al.</i> 2015
<i>Sauromatum venosum</i> (Ait.) Kunth snake bite	Araceae	To treat complications of	Swarnkar and Katewa, 2008
<i>Saussurea costus</i> (Falc.) Lipsch.	Asteraceae	Against toothache	Maikhuri <i>et al.</i> 2000
<i>Scripus kysoor</i> L.	Cyperaceae	Against vomiting	Edison <i>et al.</i> 2006
<i>Scirpus lacustris</i> L.	Cyperaceae	Used as astringent & diuretic	Edison <i>et al.</i> 2006
<i>Scirpus maritimus</i> L.	Cyperaceae	Used as astringent	Edison <i>et al.</i> 2006
<i>Schumannianthus dichotomus</i> Roxb. Gagnep	Marantaceae	Against skin diseases	Maneenoon <i>et al.</i> 2015
<i>Sinopodophyllum hexandrum</i> (Royle) T.S. Ying	Berberidaceae	Against tumour growth	Qazi <i>et al.</i> , 2011

Table 1. Continued ...

Scientific name	Family	Medicinal Uses	References
<i>Smallanthus sonchifolius</i> (Poepp. & Endl.) H. Rob.	Asteraceae	Against obesity	Sherub <i>et al.</i> , 2021
<i>Solena heterophylla</i> Lour.	Cucurbitaceae	Against cough & headache	AI <i>et al.</i> 2020
<i>Stemona tuberosa</i> Lour.	Stemonaceae	Against nervous disorder	Biswas <i>et al.</i> 2010 & Present Study
<i>Tacca leontopetaloides</i> L.	Dioscoreaceae	Against stomach pain; Cure	Shinde, 2015; Swarnkar and Katewa 2008 & Present Study
<i>Tacca integrifolia</i> Ker Gawl.	Dioscoreaceae	Against Leprosy	Edison <i>et al.</i> 2006
<i>Trapa natans</i> L.	Lythraceae	Antiulcer activity	Swarnkar and Katewa 2008
<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	To treat complications of snake bite	Swarnkar and Katewa, 2008
<i>Tulipa albanica</i> Kit Tan & Shuka	Liliaceae	To treat bone fracture	Bhuvanewari <i>et al.</i> 2015
<i>Typhonium roxburghii</i> Schott.	Araceae	Against skin diseases	Edison <i>et al.</i> 2006
<i>Typhonium trilobatum</i> (L.) Schott.	Araceae	Against diarrhea	Sharma and Ramawat 2016
<i>Urginea indica</i> (Roxb.) Kunth	Liliaceae	Against leucorrhoea & respiratory problems	Swarnkar & Katewa 2008 & Present Study
<i>Valeriana jatamansi</i> Jones.	Valerianaceae	Treat nervous disorders	Jugran <i>et al.</i> 2019
<i>Vigna vexillata</i> (L.) Rich.	Fabaceae	To reduce swellings	Present study
<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Against muscle related diseases & Constipation; Against rheumatism	Ramanathan <i>et al.</i> , 2014; Swarnkar & Katewa 2008
<i>Zanthoxylum myriacanthum</i> Wall. ex Hook. f.	Rutaceae	Against toothache	Present study
<i>Zingiber capitatum</i> Roxb.	Zingiberaceae	Against boils & burns	Present study
<i>Zingiber montanum</i> Roxb.	Zingiberaceae	Against irregular menstruation	Present study
<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Zingiberaceae	Against hypertension	Jadid <i>et al.</i> 2020

countries are home for a huge diversity of tuberous plants.

Results

Tuberous plants play an important role among the rural and tribal communities in Asian countries. They provide food as well as medicine. However, most of the tuberous plants are still unexplored. The present study highlights the medicinal value of 148 species of wild tuberous plants used against different diseases and disorders. Further, there is a need to explore them for future nutraceutical and drug development. Also, considering the nutraceutical properties, such plants can be an alternative food in places where food scarcity is prevalent and can be encouraged to meet the global food problems.

From the literature and field survey, about 139 species have been listed as most common wild me-

dicinal tuberous plants belonging to 51 families. Among them, Zingiberaceae, Araceae, and Dioscoreaceae show the highest number of species followed by Liliaceae, Cyperaceae, Convolvulaceae, Cucurbitaceae, Asparagaceae, Asteraceae, Asclepiadaceae, Orchidaceae, etc. although there are many other families that belong to the wild tuberous medicinal plants.

Discussion

The views of many researchers' concord with our study of medicinal tuberose plants. These plants show biological activities such as analgesic, antimicrobial, hypolipidemic to hepatoprotective and anticancer. Hence storage and propagation of these valuable genetic resources is very important. Recent review work of Sharma & Ramawat, 2016, focus on some tuberous medicinal plants of India. Mathew *et*

al., 2005 also has studied 10 tuberose plants with medicinal value, said that the underground portion of the plant is an officinal part. Collection is tedious in their natural collection. So, cultivation of those plants is necessary to conserve those genetic resources.

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Conflict of interest

Authors declare no conflict of interest.

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