Journal of Scientific Research in Medical and Biological Sciences
Website : http://bcsdjournals.com/index.php/jsrmbs
ISSN 2709-0159 (Print) and **2709-1511 (Online)**
Vol 2, Issue 3, 2021
DOI: https://doi.org/10.47631/jsrmbs.v2i3.309

Some Ethnomedicinal Plants of Western Himalayas Useful in Making Local Alcoholic Drinks

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Article Info

Article history:
Received:18 June 2021
Revised: 10 August 2021
Accepted:11 August 2021

Keywords:
Aromatic,
Ethnomedicinal,
Sustainable,
Herbal-ingredients,
Socio-economic

Paper Type :

Research Article

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Abstract

Purpose: *The study aims to document use value analysis of some ethnomedicinal plants in LADs preparation.*

Subject & Methods: *Field data was collected through semi-structured interviews from knowledgeable people. The relative importance of each LADs & plant species useful in making of LADs was assessed by calculating a general Use Value Index (UV general), a current UV (UV current) and a past UV (UV past).Status of cultivation, occurrence and DMR score was also assessed to show additional uses of plants besides their use in LADs preparation.*

Results: *Fifty-four plant (H=23, Sh=11, T= 20) species were recorded in present study. Out of which 30 (Herbs=11, Shrubs =7, Trees=12) belonging to 17 families and 25 genera (Cultivated=5;Wild=16;Both=9) were mainly used in making of LHDs. while 24 (Herbs=12, Shrubs=4, Trees=8) belonging to 20 families and 24 genera were used as herbal ingredients according to their availability and preference of local people. LADs were categorized into 7 main types. Among LADs aromatic drinks showed maximum (UVgeneral = 0.8) UVcurrent & effective value (0.4 each). DMR value was highest for Terminalia chebula (26) followed by Bauhinia variegata (25) and Prunus cerasoides (24).*

Conclusions: *LADs proved to occupy a pivotal role in the traditional culture and social life of indigenous people in past, but traditional knowledge related to processing and utilization of LADs is on sharp decline and is further merge among young generation due to increased literacy, strict law against their production for commercial uses and easy availability of commercial alcoholic drinks even in villages. Some plant and ingredients useful in making LADs have potential nutraceutical and medicinal relevance that are well known by local people. These properties could constitute and contribute an additional socio-economic value for LAD's commercialization, which in turn could promote the local rural economy boost immunity and culinary tourism.*

1. Introduction

Local alcoholic drinks (LADs) are homemade and informal preparations produced at local or family level for their nutraceutical, medicinal and socio-economic values. The World Health Organization (WHO, 2014) includes these alcoholic drinks in the so-called "unrecorded alcohol," highlighting their cultural, social and economic importance around the world. It has been estimated that almost one-quarter (24.8 %) of all the alcohol consumed worldwide is drunk in the form of unrecorded alcohol (WHO, 2014). In some countries, this unrecorded alcohol consumption goes up more than 50 % of total alcohol consumption (WHO, 2014).The preparation and consumption of many LADs emerged mainly due to the climatic conditions

and discovering the use and importance of surrounding natural resources (Roy *et al*., 2004). A wide range of LADs can be found in different corners of the globe and quite often the social context in which these drinks are produced and consumed is also of great interest (WHO, 2014). LADs have been a distinctive component of many cultures of the world including India for thousands of years (Egea *et al*.,2016, Thakur, 2021). Indian most valued religious scripts like "Ramayana" also mentions the consumption of alcohol millions of years ago by "Asuras" (Abhijit Das. 2016). LADs are still an important part of the traditional knowledge in many human communities (Śliwińska et *al*., 2017) and plays a significant role in the socio- economic and cultural life of the tribal or rural people.

Consumption of LADs has been found to be associated with many occasions, social gatherings and ritual like festivals, marriages birth or even death ceremonies (Saikia *et al*., 2007) in many communities around the globe, traces of these traditional customs originating from village societies and tribes still persist and also being utilized for medical purposes too (Tardío *et al*.,2006; Lejeune *et al*.,2003; Madej ,Pirożnikow *et al*.,2014; Austin,1985; Deka & Sarma 2010). For example it is used to be a common practice to take LADs by woman after giving birth in villages and even still practiced in remote areas. In those human communities where alcohol was traditionally consumed, production of LADs commonly occurred on a small scale as a household or artisanal activity, particularly where or when the agricultural surpluses were available (WHO, 2014). In past local community is largely involved in production and commercial selling of such type of liquors but with strict law against production for commercial uses, this practice is limited to very few communities specially those residing in temperate hilly areas where it is consumed to keep body warm in extreme winters. People of these areas prepare LADs for their local personal use or sometime sell it illegely to nearby villages (Thakur, 2021). They also add many herbal ingredients, which are well known for their rich medicinal and nutraceutical values to these drinks for better health and to boost immunity, but with the passage of time, this practice of making homemade LADs is losing ground and need to be revitalize (Sen, 2021).

Some destination of study area were famous for production and selling of aromatic and medicinal drinks. These places are favorite tourist destination for the tourist of culinary tourism industry and source of income for locals involved illegely in production and selling of LADs. Further with advancement in society, increased literacy rate and urbanization there is sharp decline in indigenous knowledge related to processing of LADs. Also LADs have only received marginal attention from researchers and ethnobotanists round the world. As a result focused studies on production and consumption pattern of LADs has not been attempted so far specially in Mandi area of Himachal Pradesh, North Western Himalayas.

2. Material & Methods

Study area

Study was done in Mandi region (31°42' 29.4" N latitudes and 76° 55' 52.92" E longitudes) of Himachal Pradesh, North West Himalaya (Fig.1). It covers approximately 3,950 km2 area comprising 469 panchayats and 3374 villages with 2, 19, 145 households. The total human populations of study area is 9, 99,777 and livestock population is 67355.Altitudinal

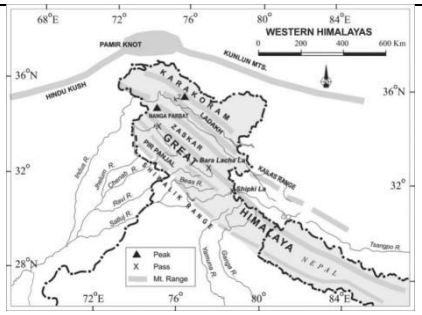
range of study area varies from 500-4034 m. It supports diverse habitats, species, communities and Ecosystems. The vegetation mainly is of sub- tropical and temperate types and mostly dominated by broad leaved deciduous and evergreen and coniferous types. (District Economic and Statistical Department, Mandi, H.P).

Method

For survey and sampling (Rapid) of plants used in making LADs 10 villages were selected at different altitudinal zone of study area lying between alms 500-4034 m. Information on altitudinal range, habit, habitat (s) and utilization pattern of plants useful in making of LADs was gathered by interviewing knowledgeable persons involved in production and consumption of LADs through a questionnaire. Identification of samples was done with the help of local and regional floras (Chowdhary & Wadhwa, 1984: Collett,1902, Dhaliwal & Sharma,1999; Singh, 1918). The relative importance of each type of LADs & plant species used to prepare LADs was assessed by calculating a general Use Value Index (UVgeneral), a current UV (UVcurrent) and a past UV (UVpast) following (Rossato et al. 1999). DMR score was also assessed for 30 plants species showing their additional uses besides LADs preparation. (Table 1,2, 5 & 6; Fig .1)

Table 1: Ten Villages included to gather information

S.No.	Village name	Latitude	Longitude	Altitude (in m)
1.	Dehar	31°42'48.1"N	76°81'48.6"E	546m
2.	kasan	31°79'90.1"N	76°85'27.6"E	893m
3.	Hanogi	31°69'15.6"N	77°12'96.0"W	953m
4.	Kusmal	31°76'11.2"N	76°86'18.2"E	1129m
5.	Karsog	31°34'05.5"N	77°19'94.1"W	1362m
6.	Tryambal	31°78'18.9"N	76°95'19.1"E	1383m
7.	Padhar	31°92'98.3"N	76°94'33.3"E	1731m
8.	Janjheli	31°50'65.5"N	77°21'32.9"W	2157m
9.	Bagachanogi	31°61'73.4"N	77°20'19.0"W	2442m
10.	Bhalwar	31°51'53.6"N	77°26'55.7"W	3071m



A map of Western Himalayas

Google map of Mandi.

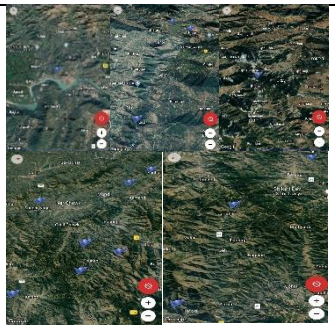

Google map showing selected villages

Figure 1: Map of study area

Table 2: Gender, age classes, literacy level, and occupation of people interviewed

Gender	**Density**	**%Contribution**
Male	19	63.33
Female	11	36.66
Age classes		
25-30	2	6.66
31-35	1	3.33

36-40	2	6.66
41-45	3	10
46-50	4	13.33
51-55	6	20
56-60	4	13.33
61-65	4	13.33
66-70	3	10
71-75	1	3.33
Literacy level		
Illiterate	9	30
Middle	5	16.66
Secondary	10	33.33
Higher Seocndary	6	20
Graduate	-	-
Professional level		
House wives	8	20
Teacher	3	10
Shopkeepers	4	13.33
Farmers	8	33.33
Labors	3	10
Hakeem & nomads	4	13.33

Data Collection

10 Villages of study area located in different altitude were selected and 30 informants were interviewed about preference of plant they used for making LADs, availability of useful plant parts and percentage of consumption. Data collected on LADs was organized in a simple database using Microsoft Excel. Each row (elementary record) represents a citation, defined as a single use reported for a single plant by a single informant (Signorini *et.al.*2009). Distinct citations based on available literature were considered for those differing from one another in at least one of the following data: species, informant and the category of use (i.e., distillates, un-distillates, aromatic, Hard -cider, Lugadi, Whiskey, Medicinal).

Citations differing in minor aspects, such as the part of the plant used, were combined into a single citation. The number of uses was obtained by considering as distinct uses for each species those differing in category of use. In the columns of the table, the following attributes are reported for each citation: as botanical names, family, local name/s, informant name, category of use, used plant part and all the other information concerning plant use collected in the interviews. Data was organized and sorted using the program EB tools (Signorini and Ongaro, unpubl.), a collection of scripts in Visual Basic for Applications in Microsoft Excel that performs advanced sorting, filtering, and counting of data based on specific user requirements.

Use Value index (UV) proposed by (Rossato *et al*. 1999) was used to assess the relative importance of each LADs & plant species used in the preparation of LADs. Different types of UV was calculated : a General Use Value (UV general), based on citations of any LADs of that species recorded in the interviews; a Current Use Value (UVcurrent), based only on the citations of plants reported by the informants for uses still practiced at the present time; a Past Use Value (UVpast), based on the citations of plants reported by the informants as used only in the past. Personal experience of use was also assessed by calculating an Effective Use Value

(UVeffective), based on citations of uses directly experienced by the informants, and a Potential Use Value (UVpotential)based on uses known, but never practiced by them.To access DMR value to know the multiple uses of plants beside their use in LADs criteria for data collection and analysis was (0= not used, 1=least used, 2=less, 3=good, 4=very good, 5=best).

3. Result & Discussion

Diversity, distribution, status and plant parts useful in making LADs

Fifty-four plant (H=23, Sh=11, T= 20) species were recorded in present study out of which 30 (Herbs =11, Shrubs =7, Trees =12) belonging to 17 families and 25 genera were mainly used in making of LHDs. Family Rosaceae was found dominant represented by 8 spp followed by family Poaceae 4 spp.), Rosaceae (3 spp) and Fabaceae or Araceae (represented by 2 spp. each). Most useful plant part useful in making LADS is Fr (8) followed by Rt (6) and Br (5) (Table.4; Fig.2 & 4).Twenty four plant species (Herbs =12, Shrubs = 4, Trees = 8) belonging to 20 families and 24 genera were used as herbal ingredients or flavouring agent in LADs according to their availability and preference of local people. Family Rutaceae was found dominant represented by 4 species followed by family Rosaceae represented by 2 spp. Most important plant part used as herbal ingredient is leaf (10) followed by fruits (9) (Table.5 ; Fig. 3 & 5). Out of 30 plant species documented for making LADs, 22 were abundantly present while 8 species were found rare and 3 of them namely *Angelica glauca. Berberis lycium* & *Dioscorea deltoidea* were already listed in endangered IUCN Red List Category. But according to their past status they were also abundant in environment and there decrease in no. is due to fragmentation of habitat and change in climatic condition. So, these plants need sustainable harvesting, cultivation and utilization.

Among 30 plants documented for making LADs 5 spp. were found cultivated, 16 spp were wild and 9 were both wild and cultivated (Table.4; Fig. 6 & 7).

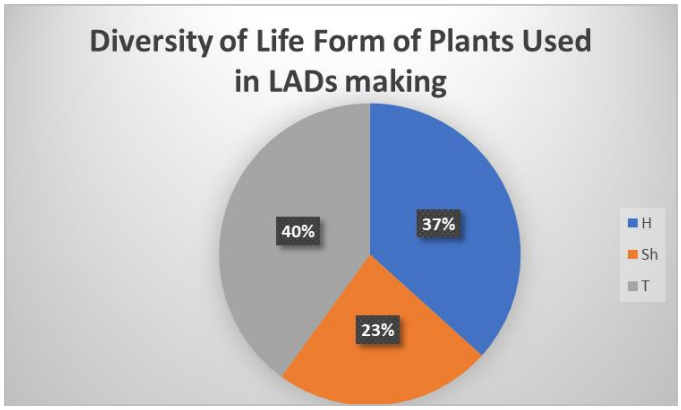


Figure 2: Diversity of plants useful in prepartion of LADs.

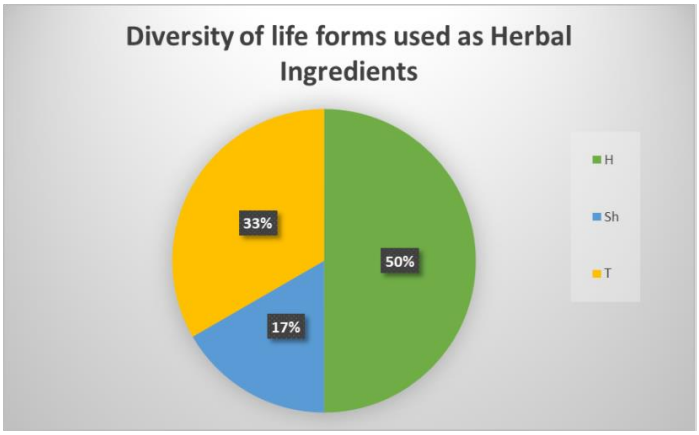


Figure 3: Diversity of plants used as herbal ingredients in LADs.

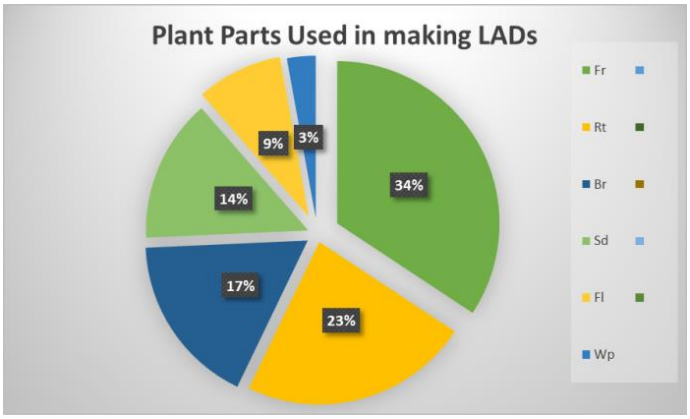


Figure 4: Diversity of plant parts useful in LADs

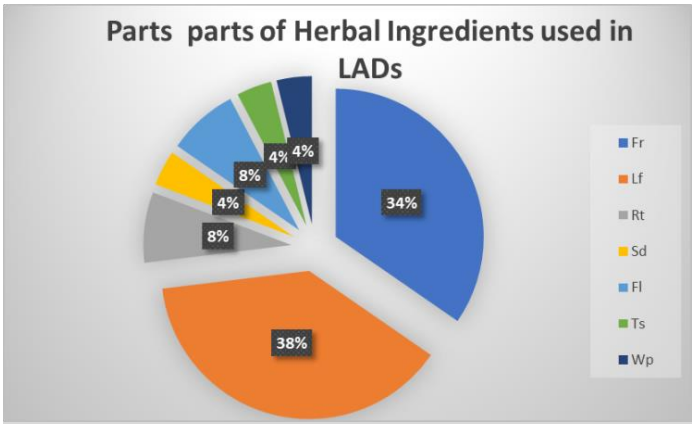


Figure 5: Diversity of plant parts of herbal ingredients useful in LADs

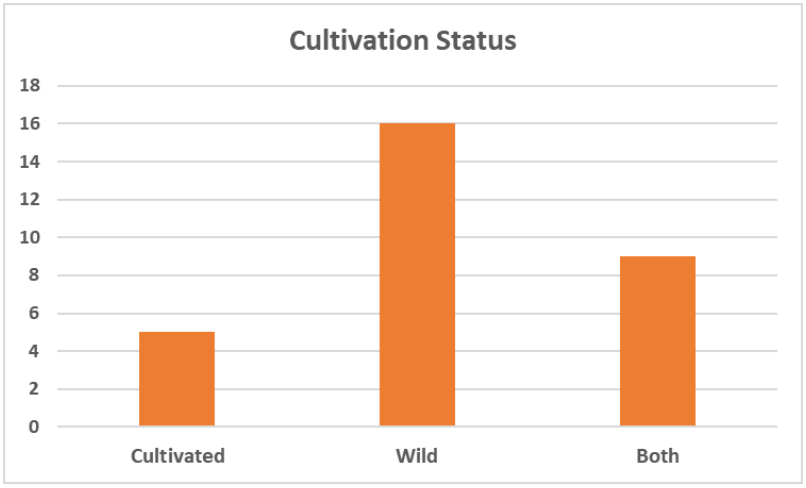


Figure 6: Cultivation status of LADs

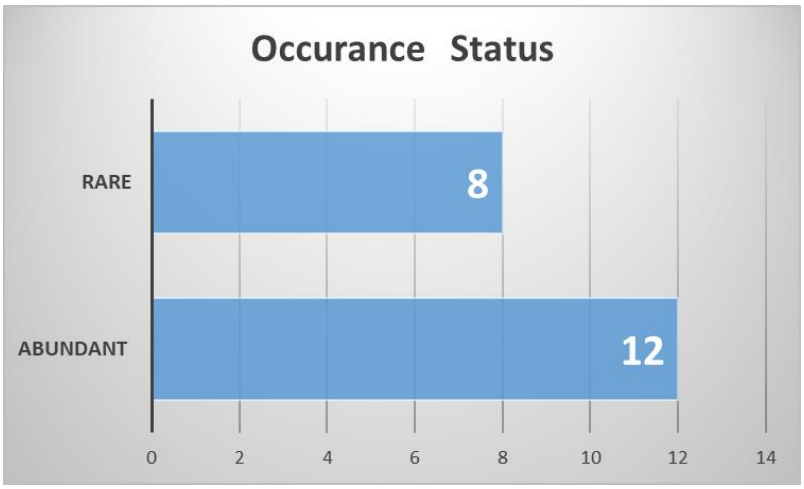


Figure 7: Occurrence Status of LADs

Table 3: Diversity, distribution, status, plant parts used,method of preparation medicinal & nutraceutical importance of LADs.

S. No.	Family Botanical name/ Common name/Local name.	Altitude in (m) & Life Form	Name of Alcohol	Status		Parts used	Ingredients	Process	Medicinal& nutraceutical importance
				Abundant (Ab)/ Rare (R)	Wild (W)/ Cultivated (C)/Both (B)				
	Amranthaceae								
1.	*Celosia argentea/Bithu*	1600 m(H)	*Bithu ki Shraab/ Darru*	(R)	(B)	Sd	Jg,Sd of plant	Step1. Wash 1 kg *Celosia* sd properly & keep it in water for 7-8 h. Step2. Now drain the water and dry the *Celosia* sd for another 7-8 h.	**Md:** Sd are useful in the treatment of bloody stool, haemorrhoid & uterine bleeding, leucorrhoea, dysentery, diarrhoea, bloodshot eyes, blurring of vision, cataracts and hypertension. These are

								Step 3 Repeat the process to convert starch into sugar, make sure that Sd are sprouted. Step 4. keep sd in paper bags for 1-2 weeks. Step 5 Now we can use them to make alcohol through distillation process.	widely used by locals for the treatment of diabetes mellitus.
	Anacardaceae								
2.	*Mangifera indica /mango/Aam*	1200 m (T)	Aam ki desi Daaru/wine	(Ab)	(B)	Fr	Fr, Jg/sugar Yeast	Step1 Take 1 kg *Mangifera, C*ut into small piece & add jaggery Step 2. Mesh pieces manually and add about 750 ml water to it. Mix well till the jaggery get dissolved. Step 3. Add 1-2 spoon of yeast and mix well .and pour into bottle. Step 4. leave it for 15 days and after that open the cap and drain into another container. Step 5 Add more Jg/sugar make sure it is dissolved well. Step 6 Again store it in bottle and leave it for 15 days. After that it is ready to serve.	**Md:** The Rt and Br are usdful in vitiated conditions of pitta, metrorrhagia, colonorrhagia, pneumorrhagia, lucorrhoea, syphilis, wounds, ulcers, vomiting, uteritis, diarrhoea, dysentery, diphtheria and rheumatism. **Nc:** Water-78.9-82.8g; Ashes-0.34-0.52G; Total lipid-0.30-0.53g; Total protein-0.36-0.40g; Total carbohydrate-16.20-17.18g; Total dietary fibres-0.85-1.06;Energy (kcal)- (Tharanathan *et al*., 2006).
	Apiaceae								
3.	*Angelica glauca*/ Smooth Angelica/ *Chora*	2500-3000 m(H)	*Chora Ki shraab/ Darru*	(R)	(W)	Rt	Jg, Rt of plant	Step1. Take 2kg thoroughly washed Rt of *Angelica*/ Step2. Soak Rt & jaggery for 1-2 weeks.in air tight container. Step3. Strain the liquid into boiling pot and turn on the stove. Step 4 Through fermentation /distillation process we can pour drink	**Md:**The Rt is considered pungent, aromatic, stomachic, tonic, stimulant, carminative, diphoretic, and diuretic. These are helpful to increases appetite and combined with tonic are given in typhoid conditions, bronchitis, flatulence, colic and in stomach pain.
	Araceae								
4.	*Arisaema jacquemontii* Cobra lily/ *Chichyda*	2000-4000 m(H)	*Chichyda ki shraab/ Darru*	(R)	(W)	Rt	Jg, Rt of plant	Same as *Angelica glauca*	**Md:** Tu are considered anti-insect, antimalarial and anti-cancer. Rt are antioxidant, antifungal and antibacterial. Underground parts are ground with edible oil to form a paste, which is used for massage purposes in order to regain the muscular strength and in skin problems. Nc:Rt (chloroform) contain phenol, flavonoid, Terpenes, saponins and glycoside (Tanveer et al.(2014)
5.	*Arisaema tortuosum*/	800-	*Cobra chali ki*	(R)	(W)	Rt	Jg, Rt of plant	Same as *Angelica glauca*	**Md:**Tu are useful to cure various ailments related to

	Cobra Fl/ *Kadae ki chhali*	3000 m(H)	*shraab /Darru*						digestive tract like constipation, indigestion, abdominal pain, dysentery, bone fracture . Corm boiled with tamarind taken internally to cure piles.
	Arecaceae								
6.	*Phoenix sylvestris*/ Wild Date Plum/ *Khajara*	Up to 2200 m(Sh)	*Khajrae ki shraab/ Darru*	(Ab)	(B)	Rt	Jg, Rt of plant	Same as *Angelica glauca*	**Md**:Mature Rt are used by local for scouring teeth. Ft are useful in the treatment of diarrhea, dysentery, gonorrhea, gum trouble, toothache, menstrual complaints, venereal disease, and as an edible, tonic and cooling beverage. **Nc:** Fresh unfermented sap contains protein 0.37, total sugar 11.01, and reducing sugars 0.97, mineral matter 0.54, phosphorus 0.10%, calcium trace, iron 0.04%, nicotinic acid, hydrazide and organic acids [1]. (Anonymous (1969)
	Asteraceae								
7.	*Arctium lappa/Great Burdock/ Jangali kuth*	700-3500 m(Sh)	*Jangali kuth ki shraab*	(R)	(W)	Rt	Rt, Jg, Cinnamon,	Step1 Cut *Arctium* Rt in small pieces and boil. Step2 Put it in a big jar , Add some herbs of your choice like *cannabis*, *Centella* , cloves black pepper & yeast in it. Step3 Add water and mix well. Step4 Keep it in rest for 3 weeks. Fermentation process takes place. Step 5 After 3 weeks drain out water in another boiling pot. Step6 Put container on stove and through distillation process we can collect fresh apple *daaru*. (Throw away first 10 ml)	**Md**:Rt are effective in curing infection, diseases, burns, bruises, boils etc The dried Rt of one year old plants is the official herb, but the leaves and Frs can also be used.
	Berberidaceae								
8.	*Berberis lycium/* Indian Lycium/ *kasmalae*	Up to 2500 m(Sh)	*Kasmale ki shraab/ Darru*	(Ab)	(W)	Rt	Jg, Rt of plant	Step.1 Take a big container and keep the jaggery and .*Berberis* Rt in water for 1 week. If we are taking 2 kg of jaggery and Rt then put it in 10 lit. of water. Step. 2 After a week drain water into boiling pot and let the Rt remain in it.(Spices & herbs like cloves, cardamom, *cannabis*, *Centella* can be added) Step. 3. Put these containers on stove and through	**Md:** Rt decoction "Rasaunt" is used to cure eye infections. These are also used in splenic troubles; tonic, febrifuge; intestinal astringent; good for cough, chest and throat troubles, eye sores and itching of the eyes; piles, menorrhagia; useful in chronic diarrhea. **Nc:** Rt. possess dry matter, 61.2%; moisture, 20.5%; protein, 4.5%;fat,

								distillation process you will get fresh desi darru	2.6%; sugar, 3.5%; fibre, 2.5%; and Vit, C, 0.3%. Berberine and palmitine are found in Rt in concentration of 4.5 and 3.1%, respectively. (Gulfraz et al., 2004)
	Combertaceae								
9.	*Terminalia chebula* /Black Myrobalan/ *Harad*	1500 m (T)	*Harad ki shraab/ Tharda/ Darru*	(Ab)	(B)	fr	Jg, Fr of plant	Step 1. *Terminalia* Fr are crushed in pestle and mortar, mixed with jaggery and yeast and placed inside a airtight container for fermentation. Step 2. After 7-15 days this fermented product is ready for distillation. *(*Distillation is usually performed in a special setup made up of two container or vessel plus outlet for distillate collection. Bottom vessel is meant for fermented mixture and top vessel or covering for vapours collection.) Step3- Covering vessel is usually sealed with dough to avoid any leakage. Step4- Distillate(alcoholic drink) is collected in glass bottles through outlet.	**Md:**Fr are laxative and digestive, and constitute one of the 'Triphala' of Ayurveda. Fr are astringent, sweet, acrid, bitter, sour, thermogenic, anodyne, anti-inflammatory, vulnerary, alterant, stomachic, and laxative, purgative, carminative, digestive, anthelmintic, cardiotonic, aphrodisiac, antiseptic, febrifuge, depurative and tonic. Thus helpful to cure a wide range of diseases. **Nc:** Chebulin from flowers. Palmitic, oleic, linoleic, arachidic stearic and behenic acids from fruit kernels[1]. Fruits contain about 30% of an astringent substance; astringency is due to the characteristic principle chebulic acid. Also contain tannic acid 20-40%, Gallic acid, resin etc. and a purgative glycoside of anthraquinone derivative. Chebulin exhibited antispasmodic action on smooth muscle similar to papaverine [1].(Purohit et al. (2009)
	Dioscoreaceae								

Abbreviations used: *H=Herb; T=Tree; Sh=Shrub; St=Stem; Fr=Fruit;Bk=Bark; Rh= Rhizome; Sd=Seed; Ts=Tender shoot; Bd=Buds Tu= tuber; Ap= Aerial Part; Lf=Leaf; Fl= Flower; Ab=Abundant; R= Rare; W=Wild; C=Cultivated; B=Both;Jg=Jeggery:Md-Medicinal:.Nc=Nutraceutical,*

10.	*Dioscorea deltoidea/Nepal yam/Singali-Mingali*	1500-3000 m(H)	*Singali-mingali ki shraab*	(Ab)	(W)	Wp	Jg, Wp, Barley flour, *Arisaema tortuosum tubers, Arisaema jacquemontii tubers, Angelica glauca, Selinum vaginatum, Millet, Cannabis*	Step1- Take 10-12 kg barley flour (*Hordeum vulgare*) and mix to it finally chopped whole *Dioscorea* plant and some other medicinal herbs of rainy season like *A. tortuosum , A. jacquemontii tubers, Angelica glauca, Selinum vaginatum etc*. Step2- Mix all well and prepare dough. Now make small bread spread from this dough and place inside wooden blocks. Step3. Collect *Cannabis sativa* green foliage and spread on floor of a dark room as a mat. Put all the wooden blocks containing bread spread over the *Cannabis* mat and also cover the bread spread with C*annabis* leaves. Step 4. Keep this setup for 12-15 days. Take out dry bread spread for further fermentation. (Bread spread prepared like this can be used as small fragments for further fermentation and preserved for rest of the year.) Step5. Now for fermentation take a large piece of bread spread, mix it with koda millet flour (*Paspalum scrobiculatum*) and water then place in a clay vessel. Step 6. Air tight this setup and again place in dark room. After 30-45 days alcoholic beverage is ready to drink it can be used upto next six to eight months.	**Md**: Tu are highly valued as contraceptives and in the treatment of various disorders of the genitary organs and other diseases such as asthma and arthritis . The juice of the root tuber is taken in the evening in the treatment of roundworm **Nc**: Water-70gm;Protein-1.5gm;Fat0.17gm; Carbohydrates-28gm; Fiber- 4.1gm; Sugar-0.5gm. (Wanasundera and Ravindran, 1994).

	Fabaceae								
11.	*Acacia nilotica/Gum Arabic tree/Babool*	Up to 600 m(T)	*Kikkare ki Desi shraab /Tharda /Darru*	(Ab)	(W)	Br	Jg, Br of plant,	Same as *Berberis lycium.*	**Md**: The Rt are used against cancers tuberculosis and indurations of liver and spleen. Plant is antimutagenic, anti bacterial, anticancer, astringent & shows anti-microbial activity **Nc:** Astringent, emollient, liver tonic, antipyretic and antiasthmatic.(Kalaivani and Mathew, 2010 Kalaivani and Mathew, 2010; Shittu, 2010;(Baravkar et al., 2008)
12.	*Bauhinia variegate/ Orchid tree/Kachnar*	Up to 1700 m (T)	*Karyale ki shraab/ Tharda/ Darru*	(Ab)	(W)	Br, Fl	Jg,Br and Fl of plant, cinnamon, cardamom, cloves	Step1 Take out 1kg of *Bauhinia* Fl and Br & wash properly. Step2 Dip them into water & add *Cinnamon* sticks, cloves, cardamom and leave it for 10-12 h . Step3 Boil this with 1kg jaggery in 1 lit water. Wait till it cools down. Step 4. Take a bowl, add some sugar solution & 2 spoon of yeast. Leave it for 30 min Step 5. Add sugar solution & yeast in the jar. Step6 After few hours fermenting will starts and alcohol is ready to collect.	**Md:**The Br of this plant is considered acrid, sweet, appetising, cooling, astringent to the bowels. It is helpful to cures biliousness, "Kapha", leukoderma, anal troubles, tuberculous glands, cough, asthma, diseases of the blood, ulcers, vaginal discharges; anthelmintic; used in strangury, thirst, burning sensation. decoction of Rt is given in dyspepsia and flatulency. The dried buds are used in piles and dysentery. They are considered cool and astringent, and are useful in diarrhoea and worms. **Nc**:100 g Fl buds contains ; moisture, 78.9 g; protein, 1.8 g; fat, 0.2g; fibre, 1.3; carbohydrates, 17.8; total minerals ash, 1.3g; Ca, 70.1 mg; P, 74.2 mg & Fe, 6.1mg. (Anonymous, 1988)
	Hypericaceae								
13.	*Hypericum perforatum*/ St. John's Wort/*Basanti*	2000-3200 m(Sh)	*Basanti ki shraab/ Darru*	(Ab)	(W)	Fl	Jg,Fl of plant	Same as *Berberis lycium.*	**Md:** Fl are considered antidepressant, antispasmodic, stimulates bile flow, astringent, sedative & antiviral. An infusion of the Fl in olive oil is applied externally to wounds, sores, ulcers, swellings, rheumatism etc. This plant is helpful in treating a wide range of disorders, including pulmonary complaints,

									bladder problems, diarrhoea and nervous depression.
	Lythraceae								
14.	*Woodfordia fruticosa*/ Fire-Flame bush/ *Dhave*	Up to 1800 m(T)	*Dhave ki Desi Shraab/ Darru*	(Ab)	(W)	Br	Jg, Br of plant	Step1, Cut *Woodfordia* Br in small pieces. Step2. Put it in a big jar & add some, cloves black pepper, yeast in it. Step 3. Add some water and mix it well. Step 4. Keep it in rest for about 3 weeks for fermentation. Step 5. After 3 weeks drain out water in another container. Step 6. Put container on stove and through distillation process we can collect fresh *daaru*.(throw away first 10 ml)	**Md:** Almost all the parts of dhave plant viz Fls, Frs, Rt, leaves & buds mixed with pedicels & thinner twigs possess valuable medicinal properties like regulate liver disorder, manage gynological disorder & poultice applied on forehead relieves headache
	Myricaceae								
15.	*Myrica esculenta/Kafal*	900-1800 m(T)	*Kafal ki shraab/ Darru*	(Ab)	(W)	Br	Jg, Br of plant	Same as *Arisaema tortuosum.*	**Md:** Powered Sd & Fr are useful against stomach disorders. Br is astringent, stimulant, carminative, tonic and resolvent, used in fever, asthma, diarrhea, chronic bronchitis, dysentery and diuresis. **Nc:** Fr contains crude proteins -1.3%, Carbohydrates-16.13%, Crude fibres-3.4% and ash content-1.25% . Minerals as Ca, Mg, K, and P 1.0, 8.4, 1.98 and 0.24mg/gm respectively
	Poaceae								
16.	*Hordeum vulgare/Barley/ jau*	4500 m(T)	*Jau ki shraab /Desi Daaru*	(Ab)	(C)	Sd	Jau Sd, Jg	Step1 Firstly wash 1 kg barley properly and after that keep it in water for 8hrs. Step2 Now drain the water and dry the barley sds for 8hrs. Step3 Again do in the same way soak in water and dry the sds properly. (In this process starch converted into sugar) make sure they are sprouted. Step-4 keep sd in paper bags for 1-2weeks. Step-5 Now we can use them to make alcohol through fermentation process.	**Md:** Sd are digestive, emollient, nutritive, febrifuge and stomachic. The germinating Sd has a hypoglycaemic, anti-tumorous & helpful in weight management. **Nc:** Whole grain consists of about 65 - 68% starch, 10 - 17% protein, 2 - 3% free lipids, 4 - 9% β-glucans and 1.5 - 2.5% minerals Madhusweta et al. (2016)
17.	*Oryza sativa*/ rice/chawal	2500 m (H)	*Chawal ki shraab/ Lugadi*	(Ab)	(C)	Sd	Phaaph (mixture of barley	Step1 cook 5 cups of rice, add 25gms of Phaaph or yeast and mix it well. Step2 Transfer mixed rice to a air tight container.	**Md:** Sd are nutritive, soothing, tonic & diuretic, helpful to reduces lactation, urinary dysfunction & improves

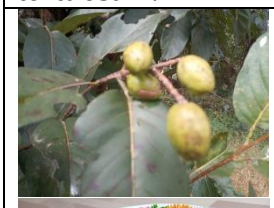
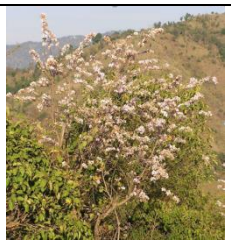
							and rice) ,yeast	Step3 Store in a closed place for 6 days. Step4 Now add 2lit. of water again mix it properly. Step5 Store it for 2 days in a closed place. Step6 Strain rice water and ready too use .	digestion and controls sweating. **Nc:** The amount fat, soluble vitamins A and D in rice is negligible. But vitamin E content of whole rice is considerable Husked rice has a high content of vitamin B, at least 1/10 thof dried feast. The riboflavin content is low and vitamin C is absent. (Sotelo et. al 1990)
18.	*Paspalum scorbiculatum/ Kodra*	Up to 1300 m(H)	*Kodre ki Desi shraab/ Tharda/ Darru*	(R)	(C)	Sd	Jg, Sd of plant	Same as *Hordeum vulgare.*	**Md**: Sd are considered Anti-cholesterol and anti-hypertension. These are helpful in weight, cholesterol & sugar management. **Nc:** 100g grain contains carbohydrate, moisture, fiber, protein and fat is 64.3g, 11.2%, 8.3g, 8.1g and 1.3g respectively, minerals like P, Ca and Fe is 16mg, 32mg and 0.5mg respectively ((Muragod *et al*., 2019)
19.	*Zea mays /Maize/chali/ Makki*	Up to 300 m(H)	*Makki ki shraab/ Darru*	(Ab)	(C)	Sd	Jg, Sd of the plant	Step1 Corn is soaked in water for 12hrs. and then waited till corn is sprouted and after that it is dried , grind and boiled in water. Step2 Now put grinded paste in container along with water add 1lit. water. Step3 Cook it in moderate temp and then in high(90-95^{0}c) Step4 Now drain water in another container, and do not throw remaining corn. Step5 You can add some more sugar. Step6 Fill little amount of corn in bottle and after that pour that drained water. And it is ready to use	**Md**:Sd are diuretic and a mild stimulan & considered good emollient poultice for ulcers, swellings and rheumatic pains[. Sd are widely used in the treatment of cancer, tumours and warts. **Nc:** !00 g grain contains vitamin C, E, K, B_1, B_2 , B_3, B_5, B_6, folic acid, selenium, N-p-coumaroyl tryptamine, and N-ferrulyl tryptamine. Potassium is a major nutrient present (Kumar & Jhariya, 2013).
	Rhamnaceae								
20.	*Ziziphus mauritiana*/ Indian Jujube/ *Baer*	1800 m(Sh)	*Buraadi /Tharda / Desi Darru*	(Ab)	(W)	Br, Rt and Fr	Jg, Br, Fr and Rt of the plant	Step-1 Add Jg and jangli baer , Rt and Br in water for 1 -2 week. If we are taking 3kg of Jg then put it in 15lit. of water. Step-2 After a week drain, that water into another container and let the plant extract remain in it.(other herbs can be added) Step-3 Put these containers on stove make sure it is air tighten and through fermentation	**Md**: Rt is bitter & considered cooling anodyne & tonic. These are useful in vitiated conditions of pitta, fever, wounds & ulcers. The Br is astringent, constipating, tonic & is useful for dysentery, diarrhea, gingivitis & boils. Fr are sweet, cooling, anodyne purgative, mucilaginous,

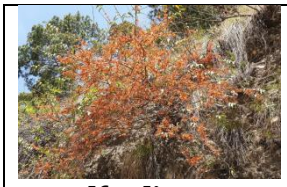
								process you will get fresh desi daru .	pectoral, styptic, aphrodisiac, invigorating, depurative, appetizer & tonic. **Nc:**Moisture-81.6-83.0g; Protein-0.8g; fat-0.07g; Fiber-0.60g; Carbohydrate-17.0g; Total sugar-5.4-10.5g; Reducing sugar1.4-6.2g; Non-reducing sugar-3.2-8.0g; calcium-25.6mg; P-26.8mg; iron-0.76-1.8mg; Carotene-0.021mg; Thiamine-0.02-0.024mg; Niacin-0.7-0.873mg;Acorbic acid-65.8-76.0mg; Fluoride-0.1-0.2ppm;pectin-2.2-3.4%.(Morton,1987; Pareek and Dhaka,2008;Pareek. *et.al* .2009)
	Rosaceae								
21.	*Fragaria vesca /Jangali strawberry/ Bhoomphal*	1000-3500 m (H)	*Bhoomphal ki shraab*	(Ab)	(W)	Fr	Fr, Cinnamon, Mentha, brahmi	Same as *Malus domestica*	**Md**: The Fr are considered beneficial in the treatment of liver and kidney complaints, as well as in the treatment of rheumatism and gout. **Nc:** Fr contains water, 87-88; sugars 3.0-4.5; free acids, 1.33-1.65; and ash 0.6-0.7 per cent [2]. (Parmar e*t al*. (1982)
22.	*Malus domestica/ Apple/Seb*	1200-3500 m(T)	*Seb ki shraab/ Desi Daaru*	(Ab)	(C)	Fr	Fr, grapes, wheat, cinnamon, cloves, black pepper, yeast	Step1 cut the apple in small pieces and boil them and grind it Step2 Put it in a big jar , you can also add some grapes ,cinnamon, wheat, cloves black pepper, yeast in it. Step3 Add water and mix it well. Step4 Keep it in rest for 3weeks.Fermentation process takes place. Step5 After 3 weeks drain out water in another container. Step6 Put container on stove and through distillation process we can collect fresh apple daaru.(throw away first 10 ml)	**Md:** Fr considered astringent and laxative. A ripe raw apple is good for stomach & helpful in digestion. The apple juice will reduce the acidity of the stomach, **Nc:**100 g Apple contains multiple vitamins including vitamin C, E, β-carotene and essential mineral elements such as Ca,Fe, K, Mn, Zn, Mg, Cu & S . Vitamin C is 5.7 mg . The mineral content are K (107.25), Ca (5.80), P (10.87), Mg (5.07), Na (0.72), Fe (0.123), Zn (0.043), Cu (0.027), and Mn (0.035) mg/100g . Boyer *et al.* 2004, Richardson e*t al.* 2020, Nour *et al.* 2010

23.	*Prunus armeniaca/ Apricot/Khumani /Khubani*	3500 m (T)	*Khumani ki desi Daaru*	(Ab)	(B)	Fr	Jg, fr, cinnamon, cloves and cardamom	Step1 Take out 1kg of apricot wash them properly. Step2 Mesh the Frs completely and then add cinnamon sticks, cloves, cardamom and leave it for 12hrs. Step3 Boil 1kg sugar in 1lit. water. then wait till it cools down. Step4 take a bowl and add some sugar solution and 2 spoon of yeast and leave it for 30 min Step5 Now add sugar solution as well as yeast that we already mixed in the first jar. Step6 Observe few hours later you can see fermenting/ distillation starts and we can collect alcohol.	**Md:** Fr are nutritious, cleansing and mildly laxativ & are a valuable addition to the diet working gently to improve overall health. **Nc:** Carbohydrate 11-13% and provides 50 kcals of energy per 100g . Dietary fibre1.5-2.4g/100g The major elements are K, P, Ca, Mg, Fe &Se while Na, Mn, Zn & Cu are also present in small amounts. vitamins found in apricot are pro- vitamin A, vitamins C, K, E, thiamin (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), folic acid (B9) and pantothenic acid. Apricot contains organic acids i.e. malic acid (500-900mg/100g) and citric (30-50mg/100g) (Leccese *et al.* 2007; Ali *et al.* 2011; Munzuroglu et al., 2003; Ali *et al.*,2011; Lichou *et al.*, 2003; USDA, 2010) Gurrieri et al. 2001
24.	*Prunus cerasoides*/ Himalayan wild cherry/Bird cherry/Pajja	3000 m (T)	*Pajje ki shraab*	(Ab)	(B)	Br	Br of plant, Jg, cloves, cardamom	Step1 Take a Br of plant and cut it in small pieces. (Add Jg) Step2 Now take a container put Br pieces and add about 750ml water(mix well till the Jg get dissolved) Step3 leave it for 15 days and after that open the cap and drain into another container. Step4 add more Jg/sugar make sure it is dissolved well. Step 5 Again store it in bottle and leave it for 15 days. After that it is ready to serve.	**Md**:Br is used to check fever and relieves stomachache. Heartwood of this plant is considered astringent, bitter, acrid anodyne, refrigerant, vulnerary, demulcent, digestive, constipating, diuretic, emmenagogue, depurative, antipyretics, and tonic. It is useful in vitiated conditions of pitta and many other diseases. **Nc:**Amygdalin, prunacetin, prunetin, sakuranetin, puddumetin, genkwain, padmakastin, and sauranin have been isolated from the stem bark .(Sood *et al.* 2004):
25.	*Prunus mira*/Smooth pit peach/ Aroo	Upto 4000 m (T)	*Aroo ki darru or tirul ki darru*	(Ab)	(B)	Fr	Jg, Fr of plant	Same as *Prunus armeniaca*	**Md:**A massage of aroo seed oil is recommended for patients suffering from disorders of joints. Fr improves digestion, respiration and gives a sense of wellbeing
26.	*Prunus persica /peach/Aaru*	Upto2500m (T)	*Aaru ki darru*	(Ab)	(B)	Fr	Jg,Fr of plant	Same as *Prunus armeniaca*	**Md**:A pinch of dried Fl taken as snuff to cure headache. Infusion of Lf & Rt is useful for cold, inflamed respiratory tract

									and body massages. Fr are antiemetic, antiscorbutic, ascaricide, demulcent, diuretic, purgative, stomachic. These are ffective against eczema, headache, scabies and whooping cough.
27.	*Rosa canina/Dog rose/*	Up to 2000 m(Sh)	*Van-gulab ki shraab*	(Ab)	(W)	Fr,Fl	Jg, Fl & fr	Same as *Bauhinia variegata*	**Md:** Fresh Fl provide vitamins and other nutrients in a form that is readily absorbed by the body. Ssyrup from Fr ia nourishing drink for young children. Hip are used against diarrhoea. The hips are madly diuretics. reduce thirst and alleviate gastric inflammation The petals, hips and galls are considered astringent, carminative, diuretic, laxative, ophthalmic and tonic . **Nc:**Water-598.66g; Energy- 162Kcal; carbohydrate-38.22g; Protein-1.6g; Total Fat-0.34g; Dietary Fibre-24.1g; sugar total—2.58g Vitamins: Lycopene-6800A µg; Niacin-1.3mg; Pantothenic acid-0.8mg; Riboflavin-0.166; Vitamin B6-0.076mg; Thiamin-0.016mg; Vitamin A-4345IU; Vitamin C-426mg; VitaminE-5.84mg; Vitamin K (phylloquinone)-25.9Aµg. Electrolytes: Na-4mg; K-597mg;Minerals: Ca-169mg; Cu-0.113mg; Fe-1.06mg; Mg-69mg; K-429mg; Mn-1.02mg; P-61mg; Zn-0.25mg; Phytonutrients: Crypto-xanthin-β- 483µg; Lutein-zeaxanthin-2001Aµg; Carotene beta-2350 A µg; Carotene alpha-31A µg1; (Özcan, 2002).
28.	*Rubus ellipticus/Yellow Himalayan rasberry/ aakhe/Hireka kanta*	Up to 2300 m(Sh)	*Aakhe ki Desi shraab/ Darru*	(Ab)	(W)	Rt	Jg, Rt of plant, cinnamon, cardamom etc	Same as *Berberis lycium*	**Md**: Decoction of Rt good for cough, fever, dysentery, malaria & stomach aliments Both the Rt & Ts are considered to be a good treatment for colic. Fr juice is used in the treatment of fever, colic,

									coughs and sore throat. The inner Br is used n renal tonic and antidiuretic, it is used in the treatment of weakening of the senses, vaginal/seminal discharge, polyuria and micturition during sleep. **Nc:** Fr contains about 10.9% sugars, 1.1% protein, 0.5% ash, 0.55 pectin [1]. The fruit is a good source of micronutrients such as anthocyanin's, phenols, flavonoids and vitamin C. They have a moderate to good antioxidant activity and make an excellent, healthful addition to the diet . (Karuppusamy et al.2011)
	Vitaceae								
29.	*Vitis flexuosa/wild grapes/Jangali angoor*	1000-2000 m (H)	*Angoori shraab/ Angoori Daaru*	(R)	(W)	Fr	Fr, cinnamon, cloves , cardamom and rose petals , sugar , yeast	Same as *Mangifera indica.*	**Md**:The Fr are restorative, strengthening and used as tonic. These are considered ant
30.	*Vitis vinifera/Grapewine/Pahadi angoor.*	450-2100 m (H)	*Angoori daaru*	(R)	(B)	Fr	Fr, cinnamon, cloves , cardamom and rose petals , sugar , yeast	Same as *Mangifera indica*	**Md:** Fr are considered vitamins, tonics, anticancer, hepatoprotective, promote hair growth and prevent ischemic processes. The Sd oil is Hypolipidemic & prevents the increase of vascular permeability. Fruit Proteins, fats, vitamin C, calcium, and boron phosphorus. Leaves Reducing and non-reducing sugars, lipids, vitamins, and minerals (K, Mg, Zn) (Mateo et al 2015), (Romero et al. 2010), (Arora et al. 2016).

 ***Celosia argentea***	 ***Mangifera indica***	 ***Angelica glauca***	  ***Arisaema jacquemontii***
  ***Arisaema tortuosum/***	 ***Phoenix sylvestris***	 **Arctium lappa**	 ***Berberis lycium***
  ***Terminalia chebula***	 ***Dioscorea deltoidea***	 ***Bauhinia variegate***	 ***Hypericum perforatum***



Woodfordia fruticosa

Myrica esculenta

Ziziphus mauritiana

***Prunus* cerasoides**

Prunus persica

Prunus mira

Rosa canina

Fragaria vesca

Rubus ellipticus

Vitis flexuosa

Vitis vinifera

Figure 8: Images showing plants useful in making LADs.

Table 4: Herbal Ingredients used to make drinks

Herbs	**Family**	**Parts used**	**Life forms**
Achyranthus aspera	Amranthaceae	Lf	H
Carissa spinarum	Apocynaceae	fr	Sh
Centella asiatica	Apiaceae	Wp	H
Cinnamomum tamala	Lauraceae	Lf	T
Citrus limon	Rutaceae	Fr	T
Citrus sinensis	Rutaceae	Fr	T
Cyclospermum leptophyllum	Apiaceae	Lf	H
Dactylorhiza hatagirea	Orchidaceae	Rt	H
Drymaria cordata	Caryophyllaceae	Young Lf	H
Eclipta prostrata	Asteraceae	Young Lf	H
Elettaria cardamomum	Zingiberaceae	Sd	H

Euphorbia hirta	Euphorbiaceae	Lf	H
Juglans regia	Juglandaceae	Fr	T
Mentha longifolia	Lamiaceae	Lf	H
Morchella esculenta	Agaricaceae	Fr(Mushroom)	H
Moringa oleifera	Moringaceae	Fr	T
Murraya koeingii	Rutaceae	Lf	H
Phyllanthus emblica	Phyllanthaceae	Fr	T
Rosa macrophylla	Rosaceae	Fl	Sh
Rubus niveus	Rosaceae	Fr	Sh
Rumex acetosa	Polygonaceae	Lf	H
Syzygium aromaticum	Myrtaceae	Fl buds	T
Selinum vaginatum	Apiaceae	Tu, Rt, Lf	H
Terminalia bellirica	Combertaceae	Fr	T
Zanthoxylum armatum	Rutaceae	Ts	Sh

Abbreviations used: *H=Herb; T=Tree; Sh=Shrub; St=Stem; Fr=Fruit;Bk=Bark; Rh= Rhizome; Sd=Seed; Bd=Buds Tu= tuber; Ap= Aerial Part; Lf=Leaf; Fl= Flower; Ts=Tender shoot.*

Types of LADs , their methods of their preparation & Use Value Index

LADs are categorized into 7 types as Distilled (5 spp),Un- distilled (3 spp) , Aromatic (10 spp), Hard -cider (1sp), Lugadi (1sp), Whiskey (3spp), Medicinal(7spp) on the basis of their method of preparation and plant parts used. Details of each is listed in table 5. The relative importance of each of these LADs was assessed by calculating a general Use Value Index. UVI of aromatic drinks score highest (UVgeneral = 0.8) followed by Whiskey (0.56) and Lugadi (0.56). UVcurrent was maximum (0.4) for aromatic drinks followed by Distilled (0.36) and Hard -cider (0.3) effective value was again maximum for aromatic drinks (0.4) followed by Distilled (0.36) and Hard -cider (0.3) (Table.5: Fig 9 & 10).

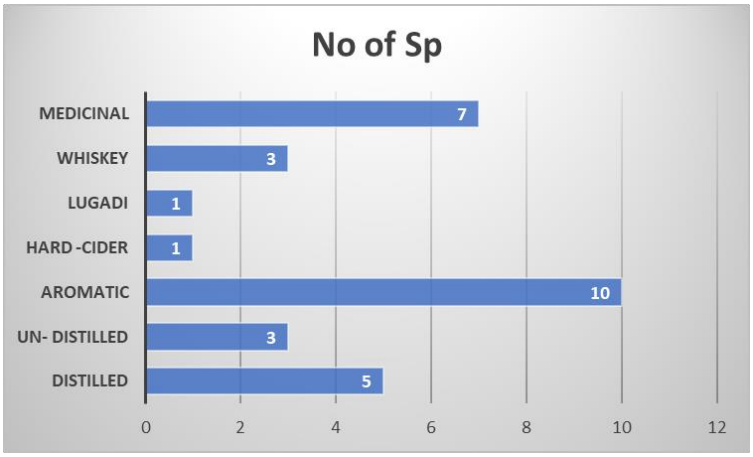


Figure 9: Types of local alcoholic drinks

Ziziphus mauritiana (Distilled drink)

Angelica glauca (Aromatic)

Acacia nilotica (Distilled drink)

Buraadi

(Kikkar)Tharda

Figure 10: Images showing preparation of different types of local alcoholic drinks preparation

Table 5: Types of LADs

S.No.	Type	No. of spp.	Citation (Informants mentioning the plant)	Uv (used value)				
				General	Current	Past	Effective	Potential
1.	**Distilled** *Phoenix sylvestris* *Arctium lappa* *Acacia nilotica* *Woodfordia fruticosa* *Ziziphus mauritiana*	5	11	0.36	0.36	0.18	0.36	0.18
2.	**Un- distilled** *Mangifera indica* *Vitis flexuosa* *Vitis vinifera*	3	8	0.26	0.26	0.00	0.13	0.13
3.	**Aromatic** *Celosia argentea* *Angelica glauca* *Bauhinia variegate* *Hypericum perforatum* *Prunus armeniaca* *Prunus cerasoidess* *Prunus persica* *Prunus mira* *Fragaria vesca* *Rosa canina*	10	12	0.8	0.4	0.2	0.4	0.2
4.	**Hard -cider** *Malus domestica*	1	9	0.3	0.3	0.15	0.3	0.00
5.	**Lugadi** *Oryza sativa*	1	15	0.5	0.25	0.00	0.25	0.00
6.	**Whiskey**	3	17	0.56	0.28	0.00	0.28	0.00

	Hordeum vulgare *Paspalum scorbiculatum* *Zea mays*							
7.	**Medicinal** *Arisaema jacquemontii* *Arisaema tortuosum* *Berberis lycium* *Terminalia chebula* *Dioscorea deltoidea* *Myrica esculenta* *Rubus ellipticus*	7	12	0.4	0.2	0.1	0.2	0.2

Use Value Index of plants species useful in LADs preparation:

The relative importance of each species used in making LADs was assessed by calculating UVI. According to calculations the most important species was *Prunus armeniaca*, *Dioscorea deltoidea* & *Rosa canina* (UVgeneral = 0.9 each) followed by *Myrica esculenta* (0.8), *Oryza sativa* (0.66), *Phoenix sylvestris*, Acacia nilotica & *Prunus cerasoides* (0.6 each) *Prunus persica* (0.46) and *Malus domestica* (0.43). Species with the highest UVcurrent were *Myrica esculenta*, *Arisaema jacquemontii* & *Arisaema tortuosum* (0. 8 each), *Ziziphus mauritiana* (0.52) and *Bauhinia variegata* (0.5). The highest UVeffective values were obtained by *Arisaema jacquemontii* & *Arisaema tortuosum* (0. 8 each), *Celosia argentea* (0.5), *Phoenix sylvestris*, *Terminalia chebula* & *Myrica esculenta* (0.4 each) and *Berberis lycium* (0.32).

Table 6: Used value (Uv) of plants species used in LADs preparation

S.no	Botanica name	Informants mentioning the plants	citation	Used value				
				General	Current	Past	Effective	Potential
1.	*Celosia argentea*	3	3	0.1	0.1	0.0	0.5	0.0
2.	*Mangifera indica*	8	9	0.39	0.26	0.13	0.26	0.13
3.	*Angelica glauca*	4	4	0.13	0.00	0.7	0.00	0.13
4.	*Arisaema jacquemontii*	4	5	0.16	0.8	0.00	0.8	0.00
5.	*Arisaema tortuosum*	4	5	0.16	0.8	0.0	0.8	0.0
6.	*Phoenix sylvestris*	6	5	0.6	0.2	0.2	0.4	0.4
7.	*Arctium lappa*	2	2	0.00	0.00	0.033	0.00	0.033
8.	*Terminalia chebula*	12	12	0.16	0.4	0.8	0.4	0.8
9.	*Dioscorea deltoidea*	9	9	0.9	0.3	0.0	0.1	0.6
10.	*Acacia nilotica*	6	5	0.6	0.2	0.1	0.2	0.4
11.	*Bauhinia variegata*	15	4	0.15	0.5	0.2	0.1	0.5
12.	*Hypericum perforatum*	12	11	0.8	0.4	0.2	0.1	0.4
13.	*Woodfordia fruticosa*	4	3	0.26	0.13	0.7	0.13	0.7
14.	*Myrica esculenta*	5	8	0.16	0.8	0.0	0.4	0.0
15.	*Hordeum vulgare*	6	7	0.4	0.2	0.0	0.2	0.4
16.	*Oryza sativa*	10	11	0.66	0.33	0.16	0.32	0.33
17.	*Paspalum scorbiculatum*	12	10	0.16	0.4	0.2	0.2	0.4
18.	*Zea mays*	10	9	0.33	0.00	0.00	0.00	0.33
19.	*Ziziphus mauritiana*	16	15	0.00	0.52	0.265	0.00	0.265
20.	*Malus domestica*	13	11	0.43	0.00	0.00	0.00	0.23
21.	*Prunus armeniaca*	9	8	0.9	0.3	0.1	0.3	0.3
22.	*Prunus cerasoides*	6	6	0.6	0.2	0.0	0.2	0.0

23.	*Prunus persica*	7	8	0.46	0.23	0.11	0.0	0.11
24.	*Rosa canina*	9	9	0.9	0.0	0.0	0.0	0.0
25.	*Berberis lycium*	11	10	0.36	0.34	0.18	0.34	0.18
26.	*Rubus ellipticus*	3	3	0.4	0.2	0.0	0.2	0.0
27.	*Prunus mira*	4	6	0.13	0.0	0.7	0.0	0.7
28.	*Fragaria vesca*	2	2	0.066	0.00	0.00	0.00	0.33
29.	*Vitis flexuosa*	4	5	0.133	0.133	0.00	0.133	0.00
30.	*Vitis vinifera*	2	3	0.00	0.033	0.033	0.00	0.00

DMR value and indigenous uses of plants useful in making of LADs

DMR value was calculated for each species to know the other indigenous uses of each plant species like fuel, fodder, food, medicine, construction of agricultural tools and religious uses beside their usefulness in making of LADs. DMR value was found highest for *Terminalia chebula* (26) followed by *Bauhinia variegata* (25) and *Prunus cerasoides* (24) showing their significant multiple uses for the local people. All the species were edible and used as food beside their use in making of LADs (DMR score 122) followed by their medicinal uses with DMR score 119 and their use to feed cattle with DMR score 81 for fodder

Table 7: DMR score for 30 plants species with additional uses besides their uses in LADs

Botanical name	Agricultural Tools	Fodder	Food	Fuel	Medicinal	Religious	Rank
Celosia argentea	0	2	4	0	5	3	14
Mangifera indica	4	2	5	2	5	5	23
Angelica glauca	0	3	4	0	5	0	12
Arisaema jacquemontii	0	1	1	0	4	0	6
Arisaema tortuosum	0	1	1	0	4	0	6
Phoenix sylvestris	4	4	4	0	4	5	21
Arctium lappa	0	3	3	0	5	0	11
Terminalia chebula	4	3	5	4	5	5	26
Dioscorea deltoidea	0	4	5	0	5	0	14
Acacia nilotica	2	4	4	3	4	0	17
Bauhinia variegata	4	5	5	5	4	2	25
Hypericum perforatum	0	3	2	0	4	2	11
Woodfordia fruticosa	1	3	2	1	4	1	12
Myrica esculenta	3	3	5	3	3	0	17
Hordeum vulgare	0	4	5	0	3	5	17
Oryza sativa	0	5	5	0	3	5	18
Paspalum scorbiculatum	0	3	5	0	4	0	12
Zea mays	0	5	5	2	3	5	20
Ziziphus mauritiana	1	2	5	1	4	0	13
Malus domestica	3	2	5	3	3	3	19
Prunus armeniaca	4	1	5	4	4	2	20
Prunus cerasoides	4	5	2	4	4	5	24
Prunus persica	4	1	5	4	4	4	22
Rosa canina	0	1	3	0	4	4	12

Berberis lycium	0	0	3	1	4	0	8
Rubus ellipticus	0	1	5	0	3	0	9
Prunus mira	4	1	5	4	4	4	22
Fragaria vesca	0	1	4	0	3	0	8
Vitis flexuosa	0	3	5	0	4	0	12
Vitis vinifera	0	3	5	0	4	0	12
Rank	42	81	122	41	119	60	

Criteria used for data collection and analysis (0= not used,1=least used,2=less,3=good,4=very good,5=best)

Medicinal & Nutraceutical effects of LADs

All the plants listed in this study are known to have some medicinal value and can cure a wide range of ailments (listed in Table.4), but with passage of time their use has been declined progressively and at present very few plants were actually being practiced for their medicinal purposes. Discussion with informants reveals a significant gap between documented and actual medicinal uses. Only 7 species out of 30 are chiefly used for their medicinal values in preparation of LADs. Maximum plants used in making LADs are rich in nutraceutical value (Table.4) and contribute to boost immunity and health with justified use of LADs.

4. Conclusion

Drinking alcohol was an occasional activity shared by people within the communities and their consumption chiefly associated with festivals, special occasions and other social gatherings In many cultures. (WHO, 2014). It was found an essential activity in almost all the communities of study area during marriages, festivals and other rituals sowing religious as well as socio-economic importance of alcoholic drinks, so these can have health or therapeutic benefits to communities at large if made of medicinal plants or by including herbal ingredients. But at present the consumption of the LADs has been gradually coming down and largely replaced by commercially available alcoholic drinks, because of advancement in literacy, urbanization, modernization, enforcement of the excise law and economic pressure.

Thus, a sharp decline has been noticed in the preparation and consumption of LADs. As a result their use and selling is in restricted manner and that too is mainly connected with festivals and ceremonies. Similar findings were shown by work done by other researchers also (Das A. 2016; Łuczaj *et al*. 2019). Still LADs occupy an important place in the traditional culture and social life of local people in this region of the world, specially in the life of the people residing in temperate region. Retrieving local knowledge of LADs could be regarded as a means not only of contributing to the conservation of local traditional knowledge, but also of reevaluating a possible source of socio-economic endogenous rural development and tourism growth. As large-scale production of LADs for commercial use is restricted in study area, so people usually prepare these drinks for local personal use or trade illegally to people of nearby villages. As local food, beverages, culture and scenic beauty of any tourist destination is the focal point in the travel plans of holiday makers while they choose any tourist destination (Devi & Sen, 2021). So, LADs specially aromatic & medicinal drinks are main tourism attraction in some of hilly tourist destinations of the study area and help in attracting visitor's interested in

local traditional food and beverages which are made with local natural resources. Thus LADs also play important role in boosting health, immunity & rural tourism. Medicinal and nutraceutical properties of herbal ingredients listed in this study further enhance the value and uniqueness of LADs prepared in the study area. So, LADs can be commercialized after proper lab testing.

As among 30 listed plant species useful in LADs preparation 18 species are wild, 9 of which are rare and 3 are already listed in endangered category of IUCN list of Threatened Species. So it is recommended to sustainably harvest essential plant parts of these plants like fruits, flowers or roots which are important means of future regeneration and propagation. These plants can be further cultivated or domesticated on large scale by mass awareness for ensuring their conservation and sustainable utilization.

Limitation of Study

The list of plants useful in making of LADs found in Western Himalayas is yet to be completed.

Conflict of Interest

None

Funding

DEST Himachal Pradesh

Acknowledgments

The author is highly indebted to the inhabitants of Himachal Pradesh for providing valuable information about wild food plants locally used as a tonic and helps to cure cold, fever, cough and bronchitis Sincere thanks also go to Dr S.S. Samant, Dr. Chiranjit Parmar, Dr, Sanjeet Singh, Dr. Neha Sen, Vijay Sen, Bhavana Bhardwaj, Manoj Kumar, Archana , Chetna Thakur. official of district statistical department, botany department of Sardar Vallabh bhai Cluster University Mandi for their encouragement, support and cooperation. The author is also highly thankful to DEST Himachal Pradesh for providing funds to carry on this research.

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