

DOMESTICATION OF SOME NUTRITIONALLY IMPORTANT WILD EDIBLE PLANTS OF MANDI HIMACHAL PRADESH, NORTH WESTERN HIMALAYAS FOR BOOSTING HEALTH, IMMUNITY, RURAL PROSPERITY AND FOOD SECURITY

TARA DEVI SEN

*Assistant Professor. Department of Botany, Sardar Vallabhbhai Patel. Cluster University, Mandi, HP, India.
E-mail: stara1982@gmail.com*

Abstract: The food security of different communities at present is based on biodiversity in and around fields and forests. According to the US National Academy of Sciences, there are about 20,000 plants worldwide on our mother earth, which can contribute towards human health by yielding some edible plant parts. But out of these 20,000 plants, only 3000 are exploited by man for food till now and only 150 plants are being cultivated on commercial scale. Rest of the plants still need to be domesticated and brought under domestication. From last few decades, we have seen an increasingly double burden of malnutrition worldwide, encompassing shortage of calories (hunger) at one end and excess (obesity) at the other. Which challenges contemporary agriculturist, horticulturist and food scientist of all over the world to seek alternative pathways for diversification, domestication and utilization of vast untapped wild edible plants (WEPs) as a solution to feed day by day growing population with shrinking of agricultural land. Unlocking of WEPs as a future possible food crop will thus support sustainable agriculture at one end and ensure food security, immunity and rural prosperity at other. Present study has been undertaken to know the floral elements of Mandi District of Himachal Pradesh India, which can be domesticated between an altitudinal range of 500-4034 m. Thirty-two (Herb= 20; Shrub=3; Tree=8) WEPs have been documented in present study belonging to 23 families and 26 genera. Family Dioscoreaceae was found dominant represented by 4 spp. followed by family Asteraceae and Cucurbitaceae represented by 3 spp each. Among genus *Dioscorea* was found dominant represented by 4 member followed by *Amaranthus* and *Momordica* represented by 2 spp. each. WEPs listed in present study were harvested from wild as a source of food, medicine and materials for either personal or commercial uses. Thus, contribute to boost immunity, health and prosperity for local community. Ten WEPs accessed in present study were multipurpose type and used as source of income, fodder, fuel, medicine, agricultural tool and materials due to their rich ornamental, religious, medicinal and economic values. So, also exploited unsustainably without ensuring their future propagation. As unsustainable practice of their harvesting mainly for commercial uses has threatened existence of many of these floral elements. Therefore, these are strongly recommended to bring in cultivation for boosting health, immunity, rural prosperity, food security and conservation.

Keywords: Domestication, conservation, immunity, rural prosperity.

INTRODUCTION

Wild edible plants (WEPs) are source of fruits, vegetables and food supplements which are neither cultivated nor domesticated and are available free in their wild natural habitat. From

time immemorial the WEPs have been a source of 'hidden harvest' which had supplemented the community with food and income [1][2]. Throughout the ages WEPs have played a significant role in the development of human

civilization round the globe. It is estimated that on the Earth there are between 300,000 and 500,000 species of higher plants, of which approximately 3, 69,000 have been identified or described [3]. Many species are still unknown to science, while perhaps a third is at the risk of extinction [4]. Our social, cultural and religious belief are incomplete without the mention of these useful floral elements. The number of plant species used for food by pre-agricultural men is estimated to be around 7,000 and till now only a small fraction of the WEPs diversity of the plant kingdom has been domesticated for human welfare. Our present knowledge of WEPs domestication largely reflects our experience of a relatively small number of living domesticated plants adapted to recent surroundings. This has narrowed our unlimited source of nutrients and thus necessitates to look for alternatives sources which can provide variety to our current limited food choices. To popularize the WEPs they need to be compared with major or widely used cultivated plants for their rich nutritional value and other health benefits. However, nutritional superiority of some of WEPs has been reported over the cultivated ones [5]. Domestication of WEPs will be helpful to increase their use and availability to urban population, ensure income for rural community and further help to conserve them as well. Approximately, 2,500 species have been undergone some degree of domestication and 250 species are considered to be fully domesticated means their full lifecycle has become dependent on human cultivation [6] [7] [8]. Thus, we can say that humanity at present relies on a small collection of crop plants such as corn, rice, wheat, soybean, and potato constituting the majority of our dietary intake. Only 10 to 50 plant species together provide about 95% of the world's caloric intake. This dependency of human beings on limited plant resources for most of the present food system is a key element of the vulnerability for the world food supply and has further prone the current food system to the impact of climate change and outbreak of major new human and non-human diseases. Some of WEPs which are the wild relatives of cultivated crops remains the largest reservoir of genetic diversity for crop

improvement. These have been successfully utilized for crop improvement programmes for many useful cultivars which shows significant aversion to major gene diseases, resistance to insect and pest and tolerance to abiotic stresses as well [8][9][10][11][12][13][14].

However, crop wild relatives have been successfully utilized for improvement of a few plant species only and there remains a large set of WEPs which have favorable traits for improvement of cultivars that have not been domesticated so far. As we have been gaining knowledge on the genomic and biological background of domestication processes, we can apply more effective selection to domesticate more WEPs. Many wild taxa along with their multiple uses are known to have rich in nutrient value and locally adapted to particular habitats. Some of them show significant genetic diversity, which might help us to create novel crops and to achieve sustainable resilient agriculture, livelihood opportunities and to face challenges of food crisis, climate change, disease outbreak etc. Studies on domestication of plants for a particular climate, altitudinal range, region, district or state will be very beneficial to list up the WEPs suitable for domestication at a particular locality. Such type of studies has not been attempted in district Mandi Himachal Pradesh, North Western Himalayas till now. So, present study has been attempted with following main objectives:

1. To know the diversity, distribution and nativity of WEPs of Mandi which can be domesticated.
2. To know the indigenous uses and potential of proposed domesticated plants to boost immunity, health and sustainable agriculture.
3. To know and access the need of domestication and commercialization of WEPs for rural prosperity.
4. Conclusion and future prospectus.

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

Survey and sampling (Rapid) of useful WEPs has been done at different altitudinal zone of study area lying between alms 500-4034 m. Information on altitudinal range, habit, habitat (s) and utilization pattern of useful WEPs was gathered by interviewing knowledgeable persons involved in harvesting, processing and marketing of WEPs through a questionnaire. Identification of samples was done with the help of local and regional floras [15][16][17][18].

To know the multiple uses of plants, criteria for data collection and analysis was (0= not used, 1=least used, 2=less, 3=good, 4=very good, 5=best).

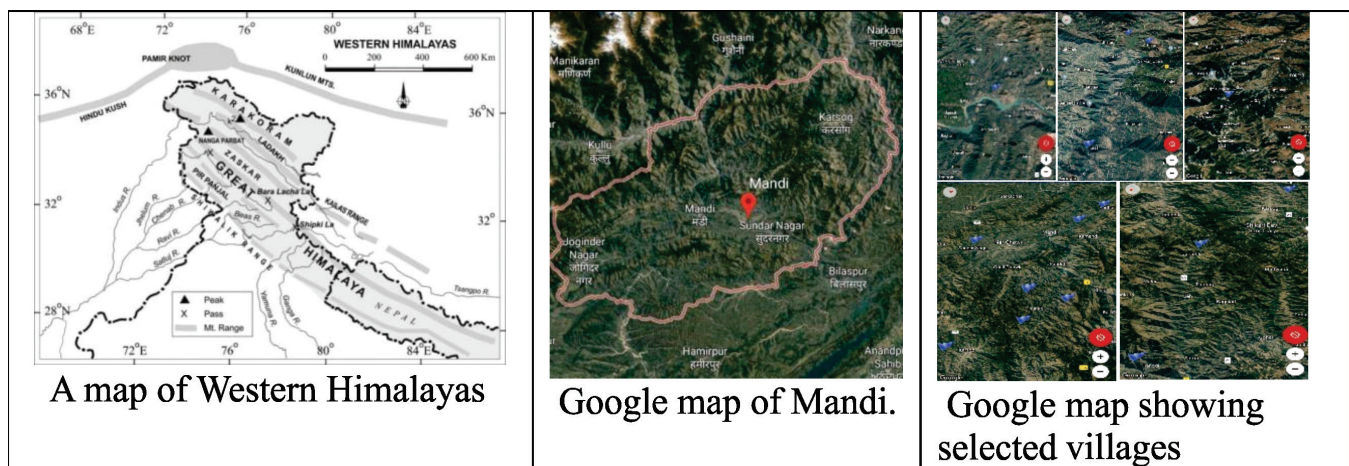


Figure 1. Map of study area

RESULT & ANALYSIS

1. Diversity, distribution and nativity of WEPs of Mandi which can be domesticated:

Thirty-two WEPs (Herb= 20; Shrub=3; Tree=8) have been documented in present study belonging to 23 families and 26 genera. Family Dioscoreaceae has been found dominant represented by 4 spp, followed by family Asteraceae and Cucurbitaceae represented by 3 spp each. Among genera Dioscorea has been found dominant represented by 4 member followed by genus *Amaranthus* and *Momordica* each represented by 2 spp. These plants are harvested from wild as a source of food, medicine and materials for either personal or commercial uses as a source of income. Various plant parts like leaves, fruits, tubers, seeds, flowers, roots

and tender shoots are utilized. Among plant parts used fruits (19) are maximum utilized followed by leaves (16) and tubers (15). 9 spp from the documented plants were native while rest of 23 were non-native (Table; 1 & Fig; 2, 3 & 4)

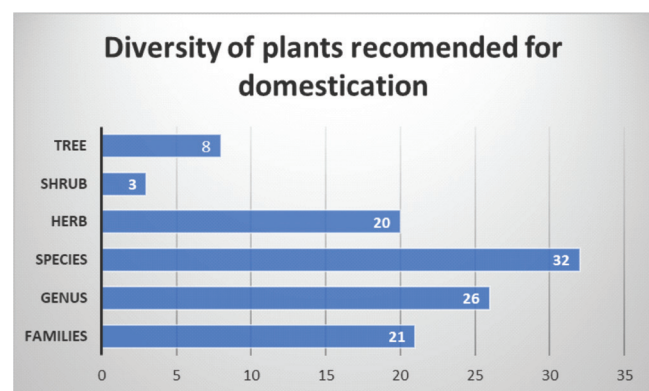


Figure 2

Table 1: Diversity, distribution, nativity and utilization pattern of WEPs recommended for domestication

Family/ Botanical Name/ common Name/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md); Fuel (Fl); Fodder (Fd), Agriculture tools(At); Timber (T); Religious ®; Other uses (O)	Market rate (Rs) Local (L) & National or International (N/I)
Agaricaceae							
<i>Morchella esculenta</i> / Honey combed mushroom/ <i>Guichchitsee</i>	Veg. Veg curry, Pickle.	Fruiting body. (Fr) Autumn-Rainy season	1500 to 3000.		Energy-31Kcal, carbohydrate-5.10g, Protein-3.12g, Total fat-0.57g, Dietary Fibre-2.8g, Vitamins; Folate- 9 µg, Niacin-2.252mg, Pantothenic acid- 0.440mg, VitB6-0.136mg, Riboflavin-0.205mg, Thiamin-0.069mg, VitaD-206 IU mg. (USDA National Nutrient Database)	Md; (Tonic, anti-tumour, immunity booster, highly valued for increasing body strength.)	L 10,000/kg N&I=15,000 to 35,000/kg
Alliaceae							
<i>Allium ampeloprasum</i> / Wild Leek Elephant Garlic/ <i>Luhan</i>	Veg. siddu, Chutney	Bu, Lf, & Fl Late autumn to the rainy season/	1500- 3000 m (H)	Mediterranean seas	Energy-35Kcal, Protein-1.9g, Total fat-0.4g, Carbohydrate-5.9g, Dietary fibre-3.3g, Ash-1 g, Dry matter-14, Total available sugars- 5.9g, Na-9mg, K-310mg, Ca-63mg, Mg-10mg, Mn-188 µg, Fe-1.1mg, Zn-0.4mg, Cu-0.1mg, P-43mg, VitA-8 µg, VitE-0.92mg, Thiamin-0.1mg, Riboflavin-0.05mg, Niacin-0.6mg, VitB6-0.25mg, VitC-18mg, Total Folate-86mg. [19]	Md (Boost oxygen distribution in the body, increases energy levels, and supports healthy immune function)	
Amaranthaceae							
<i>Amaranthus tricolor</i> / Chinese Spinach/ <i>Chaulai</i>	Saag, Upmma, Rehdoon, Kheer	Lf & pre-summer - rainy season. Sd summer -autumn	2000 m (H)	Reg. Trop	Lf contain about 3.5% protein, 0.25% fat, 6.6% carbohydrate, 3.1% ash, 24mg Fe per 100g, 464mg Ca per 100g, they are rich in vitamin A & have a fair content of vitamins B1 & C. On a zero-moisture basis 100g of the Lf contains up to 2441mg Ca, 1008 mg P, 51mg Fe, 34mg Na, 4475mg K, 37.623 mg beta-carotene equivalent, 0.68mg B1, 2.37mg B2, 11.48mg B3 & 730mg C [20].	Md: (Astringent, diuretic, appetizing, digestive & a wholesome diet. Decoction is useful in dysentery & haemoptysis. Lf are antidote to poison. Rt- paste, mixed with warm water, when given internally, induces vomiting & thereby removes out toxic matter from the bowel).	L(Lf) = 20-40.kg N/I(Sd) = 140-399/kg

Family/ Botanical Name/ common Wild amaranth/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T); Rilligious @; Other uses (O)	Market rate (Rs) Local (L) & National or International (N/I)
<i>Amaranthus viridis</i> / Wild amaranth/ <i>Chaulayee</i>	Saag, Kachru	Lf summer - rainy season.Sd late summer - autumn	1200 m (H)	Reg. Trop	100 g fresh Lf contains 87.9 per cent moisture; 2.11 g crude protein, 1.93 g crude fibre, 7.76 g carbohydrates, 0.47 g; fat and 1.85 g of total minerals. The calorific value has been found to be 43.35 kcal. [21]	Md: (Useful against cough, fever, blood diseases, burning sensation, hallucination, leprosy, bronchitis, rat-bite, piles, leucorrhoea laxative, diuretic, stomachic, improve the appetite; antipyretic , The Rt is heating, expectorant; lessens the menstrual flow; useful in leucorrhoea and lepros, Sd considered as an anthelmintic and in powdered form used to cure eye diseases, vision problem and eyesight weakness).	L (Lf)=Rs20-40/ kg N/I(Sd)=Rs85-468/ kg
Apiaceae <i>Angelica glauca</i> / Smooth Angelica/ <i>Chora</i>	alcoholic drink	Rt round the year, & Sd summer end - pre-winters	2500 to 3000m (H)	Reg. Himal	N/A	Md (Rt are pungent, aromatic, stomachic, tonic, stimulant, carminative, diaphoretic, and diuretic. It increases appetite and combined with tonic, it is given in typhoid conditions, bronchitis, flatulence, colic and pain in the stomach)	L&N (Rt oil)=299/10ml Dried powder= 422/ kg
Asteraceae <i>Achillea millefolium</i> / Yarrow/ <i>Losar</i>	Saag, Herbal Tea & Kachru	Lf & Fl Summer - rainy season	1800- 3500 m (H)	California	N/A	Md (People chew Lf & Rt to relieve toothache for immediate effect. Wp is used in homeopathic medicines as a carminative, tonic, stimulant and diuretic. It expels kidney stones and is useful in fever, nasal congestion and stomach diseases Decoction from Lf & Fl heads is employed as a carminative, tonic and aromatic stimulant.	N(Sd)=749/ kg N(Fl extract)= 57,384/L Tea (Lf)=8,920/ kg

Family/ Botanical Name/ common Name/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T); Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International (N/I)
<i>Tagetes minuta</i> / Wild marigold/ <i>Jangali-genda</i>	beverage	AP pre -winter	3000 m (H)	South America	N/A	Md (The ethanolic extracts of the entire herb show anti-viral activity against ranikhet - disease virus. The roots show nematocidal activity & hence, the plant is grown in the tobacco fields. The plant has strong larvicidal effect & is also a slow repellent. It is suspected of poisoning cows & taints milk & butter. The juice of the herb causes diaphoretic.	L & N(Oil)= 40,000 /L N(Sd)=Rs25,000 /kg Essential oil(Fl)=14,309/L
<i>Taraxacum officinale</i> / Dandelion/ <i>Laung</i>	<i>Saag</i> , <i>Kachru</i> , Root Tea	Lf, St, Rt & Flleaves, roo all year round and flowers during spring season	300- 5500 m (H)	Reg Himal Border Et Aust.	100 gm. of dry material was: Protein 15.48 gm. ; ash 14.55 gm. ; and total dietary fiber: 47.80 gm. ; Ca : 695 mg and P value was 700 mg. unsaturated fatty acids in that 50.74 % corresponds to Linolenic acid. [22]	Plant is tonic, blood purifier, laxative with strong antioxidant capabilities that can prevent aging and certain diseases, help to reduce weight and boost immune system.Plant is remedies for fever, boils, eye problems, diabetes, cancer and diarrhoea. Rt and Lf are used to treat liver problems. kidney disease, swelling, skin problems, heartburn, and upset stomach. Plant extract treat stomach problems, appendicitis, and breast problems, such as inflammation or lack of milk flow.	Rt (powder)= Rs2,975/ kg Lf(Tea)= Rs797/ kg Rt(Dry)= Rs1600/kg
Asparagaceae							

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<i>Asparagus ascendens</i> / Shatawari/ <i>Sansarpali</i>	<i>Kachru</i> , Shoot veg, Butter milk	, Bu & cladodes & Rt round the year	1800 m (Sh)	Reg. Himal Afgan	100gm of Rt contains, Energy 20kcal; carbohydrates 3.38gm; protein 2.20 gm; total fat 0.12gm; dietary fibre 2.1gm; vit. E 1.13mg; vit. C 5.6mg; niacin 0.97mg; Na, 2mg; K, 202 mg; Ca, 24 mg; Mg, 14 mg; P, 52mg; Zn, 0.54mg & small amounts of alpha-carotene and beta-carotene. [23]	Rt are demulcent, used as tonic & useful in diarrhoea, galactagogue, dysentery, and general debility. These are Antispasmodic, appetizer and have cooling effect on body. Rt known to increase sperm count and maintaining hormonal balance, thus increase fertility both in man and women. Plant also possess antioxidant properties and is a perfect rejuvenative tonic for those people suffering from fatigue problems. Mg present in asparagus energizes cells and helps in relieving health disorders like fatigue, depression anxiety and headache. Rt powder is taken to regulate blood pressure, blood sugar and improving immune system.	Rt (powder)= Rs870/ kg
<i>Polygonatum verticillatum</i> / Whorled solomon's seal/ Salam mishri	<i>parantha</i> , <i>kachru</i> , <i>pakorras</i> , <i>sambar</i>	Lf, Rt & St Summer -autumn Season	1800-3200 m (H)	Europe, Asia	100g of Rt contains: Moisture, 84.53 ±4.69; Proteins, 20 ±1.61g; Fat, 0.46 ±0.06 g; Fibre, 12.33 ±0.57g; Carbohydrates, 17.07 ±0.06g; Ash, 7.45 ±0.79; Energy, 108.23 ±9.73Kcal/100g. Mineral content is P, 100±0.13mg; K, 33 ±0.39mg; Na, 37.82 ±2.19mg; Ca, 1338.3 ±3.83mg; Mg, 90.1 ±0.80mg; Fe, 23.64 ±0.88mg; Cu, 0.21 ±0.01mg; Mn, 28.64 ±0.3 mg [24]	Md (Rt) is sweet, cooling, emollient, diuretic, aphrodisiac, galactagogue, appetizing and tonic. It is useful in vitiated conditions of <i>Pitta</i> and <i>vata</i> , burning sensation, fever, strangury, seminal weakness, anorexia and general debility)	N&I(Rt)Dried= 2,184.30/kg (Sd)=60,000/kg (Lf)dried=37,500/kg
Boraginaceae							

Family/Botanical Name/common Name/Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T); Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International. (N/I)
<i>Cordia oblique/ Clammy Cherry/ Lasura</i>	Patrodu, Pickle, lassura veg.	Fr	1500 m (T)	Reg. Trop	Fd: Lassura fruit contains moisture, 75 g; acidity, 0.2 g; total sugars, 3.55 g; reducing sugars, 3.41 g; non-reducing sugars, 0.08 g, and pectin, 4.5 g; all per 100 g of the edible portion. The total soluble solids of the fruit pulp constitute 10.2 per cent. Fr also contains, protein 2.06 g; ash, 2.132 g; P, 0.091 g; K, 1.066 g; Ca, 0.062 g; Mg, 0.067 g; and Fe 0.005 g per 100 g of the edible portion [25]	Md (Fr) sweetish; slightly cooling; anthelmintic, used as an expectorant and astringent; valuable in all diseases of lungs, coughs, the diseases of the chest, spleen and chronic fever. Raw Fr contain a gum which can be used beneficially in gonorrhea, with Bk used as mild tonic. The kernels are a good remedy in ring worm. Lf are useful as an application to ulcers and in headache, every part of plant is recommended for the treatment of sneak bite and scorpion sting but)	L (Fr)=80/kg or 200/kg Pickle(Fr)=800/kg N(Sd)=1500/kg
Cactaceae							
<i>Opuntia dillenii / Drabhad chhoonh</i>	Veg, Ripe Fr eaten raw	Lf like (Pads), round the year. Fr: spring - summer.	1500 (Sh)	Northern And Southern Mexico	100 g of prickly pears contain 41 calories of energy, 0.5 g fat, 0.7 g protein, 0.1 mg riboflavin, 0.5 mg niacin, 0.1 mg vitamin B6, 0.3 mg Fe and 0.1 mg Zn [26].	Md (Lf are very tasty, stomachic; cure Inflammation, ascites, tumours, pains etc. The Fr is considered as a refrigerant & anti-tumorous), ornamental, hedge	L (Fr)=400/kg N& I (Fr)=1000/kg
Cucurbitaceae							
<i>Coccinia grandis/ Ivy gourd/ Kandiyari</i>	Lf and Ts Lf round the year and Fr from pre rainy to winter	Lf round the year and frui from pre rainy to winter	1000 m (H)	Africa-Asia	N/A	Rt are cooling and aphrodisiac and are useful in vomiting, burning sensation and uterine discharge. The juice of the Rt and Lf is considered to be a useful treatment for diabetes.	N(Fr)=40/kg Pickle=540/kg
<i>Momordica balsamina/ Balsam Pear/ Van Krela</i>	Fr & Lf summer end to winter and pre winter	Lf and Fr from summer end to pre winter	1500 m (H)	Trop. Reg	Lf on dry weight basis contain (%) moisture, 71.00 ± 0.95; ash, 18.00 ± 0.56; crude protein, 11.29 ± 0.07; crude lipid, 2.66 ± 0.13; crude fiber, 29.00 ± 1.23; carbohydrate, 39.05 ± 2.01; calorific value, (kcal / 100 g) 189.22; P; 1,320.00; Na, 122.49; Ca, 941; Mg, 220; P, 130.46; Mn, 11.6; Fe, 60.3; Cu, 5.44; Zn, 3.18; K/Na, 10.78; Ca/P 7.21 [27]	.Deseeded Fr are infused in olive or almond oil and used against burns and hemorrhoid's and the mashed fruits are used as a poultice.	N(Sd)=850/kg (Fr)powder=1,284/kg

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<i>Momordica dioica</i> / <i>Jangli Karela</i>	Fr	Fr	1200 m (H)	Reg. Trop.	One 100g unripe Fr contains 84.1g moisture, 7.7 g carbohydrates, 3.1 g protein, 3.1 g fat, 1.1 g minerals & small quantities of essential vitamins like Vit A, B1, B2 & B3. [28]	The Rt are used with benefit in head troubles, urinary calculi; as an erthine in jaundice. The Lf are aphrodisiac, anthelmintic; cure "tridosha", fever, consumption, asthma, bronchitis, hiccough, piles.	N(Fr)powder = =1,225/kg (Sd)=1,280/kg
Dioscoreaceae							
<i>Dioscorea belophylla</i> / <i>Ruiding/ Tardi</i>	Veg, Veg curry, Bhalle, Pickle, Dahin Bhalle, Kachuri, Parantha, Tardi Badiyan	Tu winter	1800 m (H)	Reg Bor Temp	N/A	Md (Tu) juice with hot water is given to treat fever, malaria, headache, and dysentery) Rl (Tu) are cooked as <i>phalahar</i> during Shivratri festival for worshipping Lord Shiva & served)	L(Tu)=800/kg Pickle=1200/kg N(Tu) powder=Rs2,600/kg
<i>Dioscorea bulbifera</i> / Air potato/Pahadi Tardi	Veg, veg curry	Tu autumn - spring season	700- 1400 m (H)	Reg Bor Temp	Tu containd moisture, 68.7%; carbohydrates, 77.4 %; total minerals, 2.4%; crude protein, 4.4%; crude fibre, 4.4%; crude fats, 3.5%; energy value, 1521 KJ/100 g [29]	Md (Tu) are used externally to treat wounds, sores, boils and inflammations. These are applied as dressings for treating dermal parasitic and fungal infections. These are crushed and mixed with palm oil, and massaged onto areas of rheumatism, and for troubles of the breasts. Dried and pounded tubers are used as an application for ulcers and they are used in piles, dysentery and syphilis) Rl (Tu) are cooked as <i>phalahar</i> during Shivratri festival for worshipping Lord Shiva & served)	L(tTu)=950/kg Pickle=1300/kg N(Tu)=1,476/kg Churna=400/kg
<i>Dioscorea deltoidea</i> / Nepal Yam/ Singali- mingali	Veg curry, Bhalle, Kachuri, Parantha & Pickle	Tu autumn - spring season	1500- 3000 m (H)	Reg. Himal	Crude protein-2.13%, carbohydrates-27.15%, Crude fibre-7.50%, Ash content-7.50%, Minerals; Ca-0.78mg, Mg-0.92mg, K-0.80mg, P-0.43mg. [30].	Md (Tu) are considered as good source of 'diosgenin' a steroidal sapogenin, used as contraceptives and in the treatment of various disorders of the genitry organs as well as in a host of other diseases such as asthma and arthritis.	N&t(Rz)=1,022.61/kg (Tu)=8,750/kg

Family/ Botanical Name/ common Name/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T): Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International. (N/I)
<i>Dioscorea pentaphylla</i> / Buck Yam/ <i>Dareghal</i>	Bhalle, Veg, Dahin Bhalle, Kachru Kachuri & Parantha	/lbils, Lf & Tu Pre-winter -spring season	1500 m (H)	Trop. Reg	Moisture- 90.1-93.1%, Crude protein- 6.48-9.18%, Crude fat- 4.01-6.24%, Crude fibre- 5.14-7.24%, Ash-3.36-4.64%, Starch- NR [31][32][33].	Md (Tu) used as tonic to improve body immunity, stomach pain and rheumatic swellings)	L(Tu)=250-500/kg N(Tu)=1456/kg
Fabaceae							
<i>Senna tora</i> / Sickle enna/ <i>Yelo</i>	Chutney, Veg	Pd & Sd autumn-winters	1550 m (H)	Trop. Asia and Austr	N/ A	Md (Sd) tastes bitter and little salty but help to boost eyesight. It is also consumed to reduce excess of heat or intensive heat from the liver. It helps to cool down intestine, makes the bowel movement flexible and reduce weight)	L(Fr)=50/kg N(Sd)=5,500/kg (Lf)Dried=750/kg (Lf) powder=1000/kg
Lamiaceae							
<i>Origanum vulgare</i> / Wild Marjoran/ Bantulsi	Chutney, Kachru & Masala Tea	Lf Spring to summer	1000- 3000 m (H)	Europe As et Afr Trop.	Energy,306kcal; Carbohydrate, 64.43g; Protein, 11g; Total Fat, 10.25g; Dietary Fibre, 42.8g; Foliates, 274ug; Niacin, 6.22g; Pantothenic acid, 0.921mg; Thiamine, 0.341mg; VitA,6903IU; VitC, 50mg; VitE,18.86mg; VitK, 621.7ug; Na,15mg; K,1669mg; Ca,1576mg; Cu, 0.943mg; Fe,44mg; mg;270mg;Zn4.43mg.(USDA)	Md (Ap parts stimulates the flow of bile. Strongly antiseptic, it may be taken to treat respiratory conditions such as coughs, tonsillitis, bronchitis and asthma. Volatile oil obtained from plant is aromatic, stimulant, rubifacient and tonic; useful in colic, diarrhoea, hysteria, rheumatism and toothache. The diluted oil can applied to toothache or painful joints. Locally, the tablet made from leaves is administered orally in bone fractures. The paste of the Lf is applied in fire burns, eczematous skin, boils, cuts and wounds.	Lf(dried)= Rs3600/kg Wp (Liq extract)= Rs4130/kg Ess.oil= Rs 12490/L
Lauraceae							

Family/Botanical Name/Common Name/Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T): Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International (N/I)
<i>Cinnamomum tamala</i> / Indian Cassia/ <i>Mecetha patra</i>	Masala Tea	Lf & Bk round the year	2400 m (T)	Reg Trop	Ash content (9.6±1.12)%, moisture (50.50±1.0)%, carbohydrate (9.5±0.5)%, crude fibre (30.5±0.6)%, crude fat (6.0±0.5)%, protein (8.5±0.18)% and nutritive value 143.5±0.53 Kcal/100g. [34]	Md (Lf decoction is good for headache headache. leaf extract intake effective against nose bleeding and cough. Useful in treatment of ailments such as anorexia, bladder disorders, diarrhoea, diabetes, nausea and spermatorea)	L(Lf)dried=350/kg N(Lf)=650/kg (Lf)powder=1400/kg (Lf)extract=9,950/L
Lythraceae <i>Punica granatum</i> / Pomegranate/ <i>Daadu</i>	chutney	Fr rainy -winters	2500 (Sh)	Mediterranean Basin	Moisture-10.44-12.86%, Sugar-N/A, Crude oil- 10.89-13.24%, Crude protein-6.71-8.11%, Crude ash- 1.61-2.29%, Fibre-17.33-27.84%, Pectin- N/A [35][36]	Local people make paste of fruits rind and apply on food heel to cure cracks. A decoction of the seed is used to treat syphilis. Juice of the fruits is used to treat jaundice and diarrhoea. The rind of the fruits is ground in waters and drunk every morning by diabetics. The fruit together with the juice of <i>Cynodon dactylon</i> leaves is used for runny noses and olds. The juice of the flowers is used to treat nose bleeds. The fruits pulp and the seed are a stomachic. The root and the stem bark have astringent and anthelmintic properties. Seeds juice considered useful as a cardiac tonic. Powdered bark used to expel worms from the body; 1 teaspoon once every morning for 3 days .	L(Fr)=100/kg N(Fr)chilka=320/kg (Sd)=650/kg (Sd)dried=1000/kg (Fl)=800/kg (Fr)oil=39,300/L
Malvaceae							

Family/Botanical Name/common Name/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T); Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International. (N/I)
24. <i>Sida rhombifolia</i> Broom Jute/ Dridh	Puddings, Rehdoo, Laddu, Kheer & Tonic Tea of dridh leaves	Lf & Sd Autumn	1200 m (H)	Reg Himal	N/A	Md (Lf & Sd used as tonic The Rt & Lf are bitter, sweet, emollient, cooling, aphrodisiac, unctuous, and vigour strengthening and promote sexual vigour and vital factor. Considered good for rheumatism, flatulence, colic, haemothermia, and emaciation, vitiated conditions of tridosa, seminal weakness, arthritis and diarrhoea.	L (Sd)=300/kg
Moraceae							
25 <i>Ficus palmate</i> / Wild fig/ Fegra	Veg	Fr Spring	1550 m (T)	Reg. Himal	100g of Fr contains moisture, 80.5% ; protein, 1.72g; total soluble sugar, 12.5 g; pectin, 0.21g; vit. C, 3.35 mg; ash, 0.92g; mineral, Ca 0.01g; Mg, 0.076 g. [21][25]	Md (Fr act as demulcent and laxative. They are mostly used as diet in case of constipation and in diseases of the lungs and bladder),	L(Fr)=50/kg N(Fr,Sd)=1000/kg
<i>Ficus racemosa</i> / Cluster fig tree/ Umre	Veg, Parantha, Kachuri & Pickle	Fr Summer-rainy season	1200 m (T)	Reg. Himal	Moisture content-80.20%, Crude protein-1.475gm, Total lipid-7.58%, Ascorbic acid-0.0053%, Carotenoids-0.2gm, Total phenols-1.025gm, Total carbohydrate-15.84gm, Starch-0.146gm. Ctude fat-1.079gm, Crude fibre-3-0.544gm, Mineral content- 2.632gm.[37]	Md (Rt used for the treatment of hydrophobia & Bk for gynaecological disorders. Fr are active against leprosy, menorrhagia, leucorrhoea, and blood disorders, burns, intestinal worms, dry cough, and urinary tract infections. Bronchitis, bowel syndrome, and piles. Lf buds are effective against skin infection, and a decoction of the Lf is used in wound washing and healing. A decoction of the Bk is given for the treatment of piles, ulcerative colitis, diarrhoea, and dysentery. It is also given in the treatment of diabetes and asthma.) Rl, Fd, Fl, Stabilizer in land sliding zone.	L(Fr)=60/kg N(Sd)=1800/kg
Moringaceae							

Family/Botanical Name/common Name/Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md): Fuel (Fl): Fodder (Fd), Agriculture tools(At); Timber (T); Religious @; Other uses (O)	Market rate (Rs) Local (L) & National or International (N/I)
<i>Moringa oleifera</i> . / Drumstick / Sootani/	Veg, Chutney, Kachri, Rayata, Shambar	Fl, Sd, Rt, Fr, Fl	1000 (T)	Reg. Trop	100 g of raw leaf contain, energy, 64 kcal; carbohydrate, 8.28 g; dietary fiber, 2.0 g; fat 1.40 g; protein, 9.40 g; vit. A, 378 µg; B1, 0.0530 mg; B2, 0.660 mg; B3, 0.60 mg; B5, 0.125 mg; Vit B6, 1.200 mg; B9, 51.7 mg; Vit, 51.7 mg. 100 g of raw pods contains, Energy, 37 kcal; carbohydrates, 8.53 g; dietary fibre, 3.2 g; Fat, 0.20 g; protein, 2.10 g; vitamin A, 4 µg; B1, 0.257 mg; B2, 0.074mg;B3, 0.620 mg; B5, 0.794 mg; Vit B6, 1.120 mg; B9, 141 mg; Ca, 30mg; Fe:036mg;Mg, 45mg; Mn, 0.259 mg; P, 50; K, 46.1;Na, 42; Zn,0.45 mg [38]	Act as a cardiac/circulatory tonic, used as a laxative, abortifacient, treating rheumatism, inflammations, articular pains, lower back or kidney pain and constipation, Purgative, applied as poultice to sores, rubbed on the temples for headaches, used for piles, fevers, sore throat, bronchitis, eye and ear infections, scurvy and catarrah; leaf juice is believed to control glucose levels, applied to reduce glandular swelling Rubefacient, vesicant and used to cure eye diseases and for the treatment of delirious patients, prevent enlargement of the spleen and formation of tuberculous glands of the neck, to destroy tumours and to heal ulcers.	Lf(powder)= Rs1520/kg kg Sd =Rs3000/kg Lf (dried)= Rs255/kg Sd (oil)= Rs4130/L
Myrtaceae 28 <i>Syzygium cumini</i> / Indian Blackberry / Jaamun	Jam, Jaamun vinegar	Fr summer end to rainy season	1200 m (T)	Eastern Austr.	Energy 251 kcal; water 84.75 g; fat 0.23g; Na, 28mg; K, 55 mg; carbohydrate 14 gm; dietary fibres 0.6 gm; sugar 57 gm; protein 0.995 gm; thiamine 0.01 mg; vit. C 11.85 mg; vit. B6 0.03 mg; Ca, 11.65 mg; Fe, 1.41mg; Mg, 35 mg; P, 15.6 mg. & Na, 26.2 mg per 100 g of the fruit pulp [23]	Md (Fr, Sd and Bk is used to treat diabetes. Lf are antibacterial and are used for strengthening the teeth and gums. Lf are used in diabetes, diarrhea. Powdered one for headache; Decoction of Bk is good for removing kidney stones. Bk is astringent, sweet, sour, acrid, refrigerant, carminative, diuretic, digestive, anthelmintic, febrifuge, constipating, curing fever and dermatopathy. Fr have some of the highest levels of natural folic acid and recommended for pregnant women.) Fd, Fl, At.	L(Fr)=150-200/kg N(Sd)=1,590/kg (Sd)powder=1000/kg (Fr)churna=700/kg
Poaceae							

Family/Botanical Name/common Name/ Local name	Cuisine	Parts Used (Ed) & Availability	Altitudinal Range (m) & Habit	Nativity	Food Value (Fd)	Indigenous Uses. /Medicinal (Md); Fuel (Fl); Fodder (Fd), Agriculture tools(At); Timber (T); Riligious @; Other uses (O)	Market rate (Rs) Local (L) & National or International. (N/I)
29 <i>Bambusa arundinacea</i> / Bamboo/ Banis	Veg curry & Pickle	Bd Rainy saeson	1250 m (T)	America	100 g buds contains; moisture, 88.8; protein, 3.9; fat, 0.5; carbohy drates, 5.7; & total minerals, 1.1 g; Ca, 20.0; P, 65.0; Fe, 0.1; Mg, 32.0; Na, 91.0; Cu, 0.19; Cl, 76.0; B1, 0.08; B2, 0.19; B3, 0.2; vitamin C, 5.0; choline, 8.0; & oxalic acid, 2.0 mg; & energy, 43 kcal [39]	Md (St & Lf are sour, acrid, bitter; cooling, laxative; useful in "Kapha", burning sensations, diseases of blood, biliousness, inflammations, wounds, piles. The sprouts are pungent, acrid; laxative; cause burning sensation & increase cough. Sd are acrid, sweet; fattening, aphrodisiac; useful in biliousness, urinary discharge.) Rl, T, At, Hosehold, Decoration.	L(Pickle)= Rs200-250 / Kg N(Sd)=Rs2,330/kg (St)powder=Rs1,050/kg
Polygonaceae							
30 <i>Fagopyrum esculentum</i> / Buckwheat/ Phaphra	Saag, Veg, Chuntey, Babru or gulgule Kachru, & Tea	Lf & Sd spring to summer/	2000- 3000 m (H)	Reg Himal China	Nutrient Value- Energy -323 Kcal; Protein -10.3 g; Fat -2.4 g; Crude Fibre- 8.6 g; Vitamins -Thiamine- 0.90 mg; Riboflavin -0.34 mg ;Niacin -4.4 mg; Electrolytes: Na -16.2 mg; K -362 mg; Minerals Ca- 64 mg; Cu- 0.17 mg; Fe- 15.5 mg; Mg -227 mg; P- 355 mg; Amino Acids Mg per gm Lysine- 300; Methonine- 100; tryptophan- 080 [40]	Md (Ap are specific treatment for haemorrhage, high blood pressure, liver diseases Lf & St are acrid, astringent and vasodilator. It is used internally in the treatment of high blood pressure, gout, radiation damage etc. A poultice made from the Sd has been used for restoring the flow of milk in nursing mothers. An infusion of the herb has been used in the treatment of erysipelas (an acute infectious skin disease).	L(Lf)=40/kg N(Sd)=8,750/kg
Rosaceae							
<i>Fragaria vesca</i> / Woods strawberry/ Bhoomphal	Veg, Dessert, Kachru & Refreshing Summer Drink	Fr, Rt & LfLf from spring season to winters and edible Fr from rainy season to autumn	1000- 3500 m (H)	Reg Temp & Trop	The fruits contain water, 87-88; sugars 3.0-4.5; free acids, 1.33-1.65; and ash0.6-0.7 per cent [25]	Fr are an excellent food to take when feverish Effective in treating rheumatic gout.	SBL (Dilution)= Rs200/L Fr(powder)= Rs5,990/kg
<i>Prunus mira</i> / Smoothpit Peach./ Behmi, Chulli	Fr, Sd used in TR Sd, Oil & pickle	Fr Rainy to autumn	1500-4500 (T)	Reg Himal	N/A	Md (A massage of Sd oil is useful for patients suffering from joints. Disorders) T, At.	L (Sd oil) =1000/kg

Abbreviation: Fl= Flower, Bu= Bulb, Bl= Bulbils, Sd= Seeds, Te= Tender, Sh= Shoot, St= Stem, Lf= Leaf, Rt= Root, Bd= Bulb, Tu= Tuber, Po= Pods, Rh= Rhozome, H= Herb, Sh= Shrub, T= Tree. L= Local, N= National. I= International. Md=Medicinal, Fd=Fodder, Fl=Fuel, Rl= Riligious, F=Fibre, At= Agriculture tools.

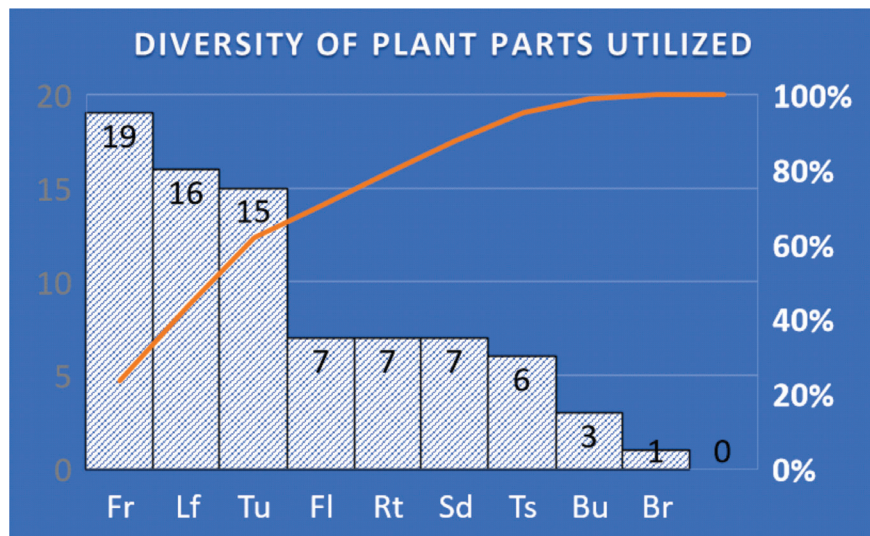


Figure 3



Morchella esculenta



Allium ampeloprasum



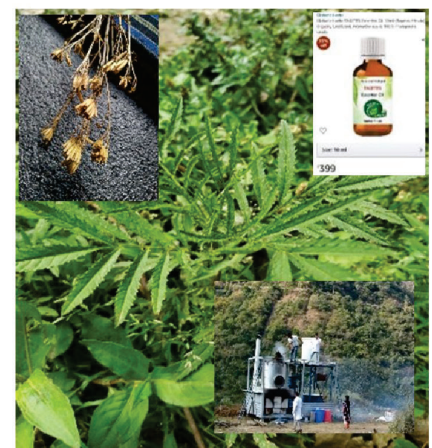
Amaranthus viridis



Amaranthus tricolor



Angelica glauca



Tagetes minuta



Polygonatum verticillatum



Cordia oblique



Opuntia dillenii



Coccinia grandis



Momordica balamina



Momordica dioica



Dioscorea bellophyla



Dioscorea pentaphylla



Dioscorea deltoidea



Dioscorea pentaphylla



Senna tora



Origanum vulgare



Cinnamomum tamala



Punica granatum



Sida rhombifolia



Ficus palmate



Ficus racemose



Moringa oleifera



Syzygium cumini



Bambusa arundinaceae



Fagopyrum esculenta



Fragaria vesca



Prunus mira

Figure 4: Photographs of plants recommended for domestication

2. To know the role of proposed plants in boosting immunity, health, rural prosperity and sustainable agriculture.

WEPs documented in present study for domestication are rich in medicinal and nutritive values so, utilized by local community to cure a wide range of ailments and also eaten as fruits, vegetables and food supplement to boost health and immunity. WEPs such as *Fagopyrum esculentum*, *Origanum vulgare*, *Dioscorea deltoidea*, *Cordia obliqua*, *Polygonatum verticillatum*, *Allium ampeloprasum* are rich in food values and immunity booster nutrients like Zn, Mn, Mg, Vitamin A and C. Plants like *Morchella esculenta*, *Cinnamomum tamala*, *Dioscorea bellophylla*, *Angelica glauca*, *Cordia obliqua*, *Polygonatum verticillatum*, *Dioscorea deltoidea*, *Dioscorea pentaphylla*, *Senna*

tora, *Punica grantatum*, *Syzygium cumini* and *Bambusa arundinacea* are rich in market value and also sold in local, national and international markets, so are heavenly harvested unsustainably for commercial uses. High DMR score of *Ficus racemosa*=29; *Bambusa arundinacea*=28; *Ficus palmata*=25; *Syzygium cumini* =22; *Cordia oblique*=20; *Origanum vulgare*=20; *Dioscorea bellophylla*=18 shows their high use value, high demand and high risk of extinction. Therefore, these WEPs urgently needed to be domesticated for conservation and regular supply of commercially useful plant parts. 10 species having 5 or more than 5 uses are considered multiple plants. So, except food their domestication will provide other important basic commodities for local people. (Table 1&2. Fig. 3).

Table 2: DMR () score of WEPs commended for domestication

S.No.	Botanical name	Ed	Fd	Fl	Md	Rl	Ou	Ev	Rank
	<i>Morchella esculenta</i>	5	0	0	5	0	0	5	15
	<i>Cinnamomum tamala</i>	3	2	1	0	0	0	5	11
	<i>Dioscorea bellophylla</i>	5	0	0	3	5	0	5	18
	<i>Allium ampeloprasum</i>	3	0	0	3	0	0	0	06
	<i>Amaranthus tricolor</i>	3	4	0	3	0	0	3	13
	<i>Amaranthus viridis</i>	3	4	0	3	0	0	3	13
	<i>Angelica glauca</i>	5	0	0	2	0	0	5	12
	<i>Achillea millefolium</i>	3	0	0	3	0	0	3	09
	<i>Tagetes minuta</i>	3	3	0	3	0	0	2	11
	<i>Taraxacum officinale</i>	3	3	0	4	0	4	0	14
	<i>Asparagus adscendens</i>	2	0	0	4	5	3	0	14
	<i>Cordia oblique</i>	5	4	3	3	0	2	5	22
	<i>Polygonatum verticillatum</i>	3	0	0	5	0	0	5	13
	<i>Opuntia dillenii</i>	2	0	0	3	0	3	2	10
	<i>Momordica balsamina</i>	3	0	0	3	0	0	2	08
	<i>Coccinia grandis</i>	4	0	0	3	0	0	4	11
	<i>Momordica dioica</i>	4	0	0	2	0	0	4	10
	<i>Dioscorea bellophylla</i>	3	0	0	3	0	3	3	12
	<i>Prunus mira</i>	4	0	2	3	0	4	2	15
	<i>Dioscorea deltoidea</i>	2	0	0	5	0	0	5	12
	<i>Dioscorea pentaphylla</i>	5	0	0	3	0	0	5	13
	<i>Senna tora</i>	4	2	0	4	0	2	5	17
	<i>Origanum vulgare</i>	4	2	0	5	0	5	4	20
	<i>Punica grantatum</i>	5	0	0	5	3	0	5	18
	<i>Sida rhombifolia</i>	3	1	0	4	3	0	3	14
	<i>Ficus palmata</i>	4	4	4	5	0	4	4	25
	<i>Ficus racemosa</i>	3	4	5	4	5	4	4	29
	<i>Moringa oleifera</i>	2	3	2	5	0	4	1	17
	<i>Syzygium cumini</i>	5	3	3	4	0	4	5	22
	<i>Bambusa arundinacea</i>	2	3	5	3	5	5	5	28
	<i>Fagopyrum esculentum</i>	5	5	0	4	0	1	4	19
	<i>Fragaria vesca</i>	5	2	0	2	0	1	2	12

Abbreviation: Ed= Edible; Md=Medicinal, Fd=Fodder, Fl=Fuel, Rl= Religious, Ou=Other Uses, Ev= Economic Value

NEED OF DOMESTICATION

In order to achieve the Millennium Development Goals for improving the overall living conditions, health and immunity of regional and global communities, WEPs rich in food, medicinal and economic value are needed to be brought under human cultivation or domestication. Further research need to be initiated to determine the nutritional composition of WEPs whose nutrient analysis has not been attempted so far, so that they can be compared with widely cultivated major food crops. Use of these WEPs has immense potential to uplift socio-economic status of local community and through selective conservation and domestication, they can also contribute to the restoration of plant biodiversity. As the process of crop domestication was based on selection driven by human cultivation practices and agricultural environments unique to a particular region. For this home gardens/ Kitchen gardens can be used as the laboratory to carry on experiment for domestication of various WEPs which are good source of food, medicines or materials. Along with domestication there is also a great need of distinguishing /recognizing WEPs and their value-added products as healthy, chemical free. pesticides free product in the local, national or international market. For this region wise specificity of chemical and nutrient composition of edible plant parts, their processing/packing and labeling is urgently required. Food items obtained from WEPs serve as 'buffer food/ emergency food' rescuing lives during food shortages and famines [41][42][43][44]. Further vulnerability towards hunger and malfunctioned ecosystem services lead people to rely for food and other products more on intensive agriculture [45]. Studies strongly indicate that the WEPs can significantly substantiate the global food basket in today's era of food vulnerability and climate instability [46][47]. These vulnerabilities have developed a greater understanding among the scientists, policy makers, national governments and international institutions for a strong linkage between nutritional security and biodiversity for formulating policy support to promote sustainable use, value addition, domestication and conservation of WEPs [48][49]. High DMR score of 10 plants documented

in present studies shows their multipurpose uses except food. Therefore, there is an urgent need of their domestication to ensure their conservation and continuous market supply of their produce for income generation. High market value of 20 documented WEPs (Table. 1&2: Fig .4) recommended for domestication will also help to utilize these plants as a mean of livelihood generation. Some of medicinal, edible or commercially valuable plants like *Asparagus adscendens*, *Opuntia dillenii*, *Taraxacum officinale* which are sold in high rate in national and international market, are of limited or no use for local people due to ignorance. These plants can also be grown commercially as a source of food, medicine and income in the form of mixed/ ground/hedge by mass awareness. For example, *Taraxacum officinale* a high valued medicinal plant with high market value can be cultivated as a mixed or ground crops in apple/ plum orchards (Table 1 &2; Fig;4)

CONCLUSION

Since biodiversity is the foundation of the life on planet and fulfil all the basic needs of men from past to present. It has been seen that there is significant change in lifestyle and life supporting system of people around the world after industrialization, resulting into pollution, habitat destruction and over harvesting of plant produce for continuous supply of raw materials. All this has threatened nonhuman resources of mother earth at large and now we are facing continuous loss of biodiversity. Therefore, there is an urgent need to develop the protocol for mass multiplication and domestication of useful WEPs for optimum reach of these even to those who live in remote corners. This will ensure successful domestication and conservation of useful WEPs at one end and will further reduce pressure on the existing forest floral elements at other. Further promotion and domestication of WEPs will not only improve the livelihood opportunism, uplift nutritional status, boost health and immunity for the local communities but also maintain well-being of environment, human and other non-human resources as well. Major challenge at present is to provide healthy food to growing population with shrinking of

agricultural land. Therefore, it is need of hour to domesticate, conserve, and sustainably utilize the WEPs for boosting health, immunity, rural prosperity and food security for present and future generation.

FUTURE RECOMMENDATION

1. Mass awareness for rich medicinal, nutritional and economic value of WEPs selected for domestication.
2. Awareness programmes for rural communities regarding value addition, processing, packing and labelling of wild food items by providing latest processing techniques.
3. Distributing seedlings and plantlets for mass cultivation.
4. Provision for in-situ and ex-situ conservation by developing nursery for rare and endangered plants.
5. Developing facilities for research and development like establishing lab for nutrient and chemical analysis, tissue culturing for mass propagation, gene bank and seed bank for germplasm conservation.
6. Promotion of raw and processed food items of documented plants by selling online and offline.

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