BJNRD

BJNRD (2026), 13(1): 14-36

Bhutan Journal of Natural Resources & Development

COLLEGE OF NATURAL RESOURCES

Research Article

www.bjnrd.org

Open Access

ISSN 2409–2797 (Print)
ISSN 2409–5273 (Online)

DOI: https://doi.org/10.17102/cnr.2026.111

Wild Edible and Medicinal Plants: A Case Study of Community Perceptions, Gendered Roles, and Pathways for Sustainable Management in Yagang and Gengu Villages, Darla Gewog, Chhukha

Karma Orong[1] *, Sangay Dorjee[2], Wangdi[3]

Abstract

Wild edible and medicinal plants (WEMPs) play a critical role in the livelihoods of forest-adjacent communities, yet integrated village-level evidence from Bhutan remains limited. This study examined WEMP diversity, household dependence, gendered roles, knowledge transmission, and perceived threats in Yagang and Gengu villages, Darla Gewog, Chhukha District. Data were collected through semi-structured interviews and field-based plant-use records, yielding 58 valid respondent records and 101 plant records. A total of 101 species were documented, including 48 medicinal-only, 38 edible-only, and 15 dual-use species. Household reliance on WEMPs was nearly universal (98.3%), primarily for medicine (96.5%), food (80.7%), and nutrition (80.7%), with minimal contribution to income (1.8%). Knowledge was transmitted predominantly through grandparents (98.2%), indicating strong intergenerational continuity. Gendered roles were evident, with men more frequently involved in plant collection and women primarily. Responsible for preparation and storage. Most respondents (94.1%) perceived a decline in WEMP populations, attributing this trend to multiple interrelated pressures, including cattle grazing, unsustainable harvesting, and land-use change. Despite these perceived declines, respondents expressed strong support for the domestication of WEMPs and their integration into agroforestry systems. These findings are based on respondents' perception rather than direct ecological measurements and are therefore specific to the two villages. The results highlight the importance of localized, gender-responsive, and agroforestry-based strategies for sustaining WEMP systems while maintaining their ecological and socio-cultural function.

Keywords: Agroforestry, ethnobotany, gender roles, medicinal plants, wild edible plants

[1]Ugyen Wangchuck Institute for Forestry Research and Training, Department of Forests and Park Services, Bhutan
[2] Forest Resources Planning and Management Division, Department of Forests and Park Services, Bhutan

*Corresponding email: : sangayjee12@gmail.com
Received: October 10, 2025
Accepted: October 10, 2025
Published Online: June 30, 2026
Editor: Tulsi Gurung

Introduction

Wild edible and medicinal plants (WEMPs) are integral to rural livelihood systems, contributing to nutrition, primary healthcare, cultural practices, and seasonal income (Howard, 2003; Turner et al., 2011; Leakey, 2012; Zehra et al., 2022). In forest-adjacent and agroforestry landscapes, WEMPs function as routine foods, household remedies, and safety nets during periods of shortage, illness, or market instability. Their role is therefore both ecological and social, linking biodiversity, household resilience, and indigenous knowledge systems. This multifunctional importance is increasingly recognized in global assessments, which highlight wild and forest-derived foods as critical to resilient food systems and human well-being (Ickowitz et al., 2014; Powell et al., 2015; IPBES, 2019). Agroforestry systems further strengthen these linkages by enhancing soil fertility and ecosystem resilience through processes such as litter decomposition and nutrient cycling, which regulate long-term productivity in forest–farm landscapes (Dorjee & Orong, 2026).Across the Himalayas and similar rural contexts, WEMPs are shaped by forest access, customary practices, gendered labour, and intergenerational knowledge transfer (Howard, 2003; Turner et al., 2011; Bussmann et al., 2018; Zehra et al., 2022). Gender-specific roles influence plant collection, processing, storage, and commercialization, affecting both knowledge distribution and conservation outcomes (Howard, 2003; Alqethami et al., 2020). Cross-cultural evidence confirms that such gendered systems are central to biodiversity management and knowledge continuity (Pfeiffer & Butz, 2005; Chao et al., 2025). However, WEMPs face increasing pressures from land-use change, overharvesting, commercialization, and climate variability, threatening both species availability and traditional knowledge (Kala, 2012; Bussmann et al., 2018).

In Bhutan, institutions such as the National Biodiversity Center (NBC) and the Department of Forests and Park Services (DoFPS) emphasize plant conservation and sustainable forest management (NBC, 2009; DoFPS, 2022). However, these frameworks provide limited village-level evidence on WEMP use, knowledge transmission, and community perceptions of threats and management. Existing studies largely remain regional or global in scope, with few grounded case studies from Bhutan. This knowledge gap reflects broader global trends, where cultural change, land-use intensification, and declining reliance on wild resources contribute to the erosion of ethnobotanical knowledge (Aswani et al., 2018; Schulp et al., 2014).

The literature highlights four key dimensions: WEMPs support food security and dietary diversity under seasonal or unreliable production (Turner et al., 2011; Leakey, 2012); medicinal uses address gaps in formal healthcare access (Kala, 2012; Bussmann et al., 2018); gendered labour structures knowledge systems and conservation outcomes (Howard, 2003; Alqethami et al., 2020); and sustainable management increasingly integrates WEMPs into agroforestry, domestication, and community-based conservation approaches (Leakey, 2012; Zehra et al., 2022). No single study in Bhutan has yet integrated species diversity, household roles, gendered labour, knowledge transmission, perceived threats, and management options at the village level. Without such evidence, policy and extension remain generalized and insufficiently grounded. Addressing this knowledge gap requires linking local empirical data with broader sustainability and food-system frameworks that connect biodiversity conservation with rural livelihoods (IPBES, 2019; Jamnadass et al., 2013). This study examines Yagang and Gengu as a context-specific case, providing grounded insights without overgeneralization. The main objectives of this study were to document the diversity and principal use categories of WEMPs, to assess household dependence on WEMPs for food, nutrition, medicine, income, and related livelihood functions, to examine gendered household roles and indigenous knowledge transmission in relation to WEMP collection, preparation, processing, and domestication, and to analyse community perceptions of availability, population change, threats, and opportunities for sustainable management.

Materials and Methods

Study area

The study was conducted in Yagang and Gengu villages under Darla Gewog in Chhukha District, Bhutan (Figure 1). The two villages lie between 26°49′14.32″ and 26°50′14.70″ N, and between 89° 33′ 33.33″ and 89° 34′ 54.3″ E, at elevations ranging from 776 to 1,516 m above sea level. The area falls within Bhutan's humid subtropical agroecological zone and is dominated by subtropical broadleaved forest interspersed with agricultural land and community-managed forest patches (NBC, 2009; DoFPS, 2022).

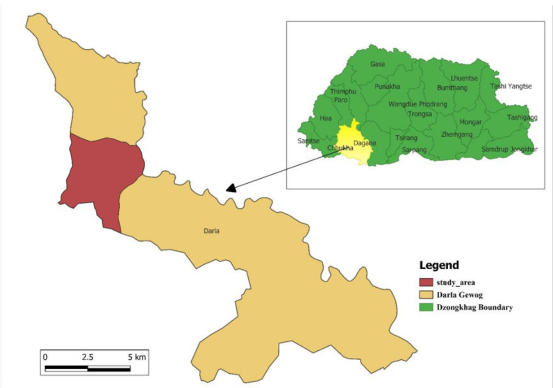

Figure 1: Map of the study area showing Yagang and Gengu villages under Darla Gewog, Chhukha District, Bhutan. Village locations are indicated relative to district and gewog boundaries. Coordinate system: WGS 84.

Both villages were selected because they combine forest access, farming livelihoods, and ongoing reliance on local plant resources for food and health. Households from Ngalop, Gurung, Chhetri, Sanyasi, Bhujel, and Monger communities are represented, making the area a useful context for examining how ecological access and social organization together shape the utilization and management of WEMPs

Research design and case-study framing

A descriptive, exploratory mixed-method case-study design was used (Lehmann, 2010; Bernard, 2017). Semi-structured interviews provided quantitative data on respondent backgrounds, household use patterns, and management preferences, while open-ended questions and field notes added interpretive depth. Given the purposive, two-village sampling frame, the findings speak to conditions in Yagang and Gengu rather than to rural Bhutan more broadly. The archived data covers reported practices and perceptions; it contains neither direct ecological measurements nor market-survey data.

Sampling and participants

Respondents were selected purposively; only adults with direct experience of identifying, collecting, consuming, processing, or managing WEMPs were enrolled. All participants were permanent residents of Yagang or Gengu and were engaged in farming or other livelihoods connected to local forest resources.

Of the 58 respondents, 32 were from Gengu and 26 from Yagang. Men accounted for 39 respondents (67.2%) and women 19 (32.8%). The sample was concentrated in the 31–40 years (29.3%), 51–60 years (36.2%), and above 60 years (24.1%) age groups. Most respondents (86.2%) reported no formal education, and farming was the main source of income for 36 respondents (62.1%), while 22 respondents (37.9%) reported off-farm income.

Data collection

Field data were collected in May 2023 using a semi-structured questionnaire grounded in established ethnobotanical interviewing methods (Martin, 1995; Cotton, 1996; Alexiades, 1996; Fakchich & Elachouri, 2023). The questionnaire covered four domains: (i) respondent familiarity with WEMPs and plant-use records, (ii) household dependence on WEMPs for food, nutrition, medicine, and income, (iii) knowledge transmission and household responsibilities by gender, and (iv) community perceptions of availability, threats, propagation, and domestication.

All interviews were conducted in the local dialect to minimize misunderstanding and allow respondents to describe plant uses in their own terms. Plant names given by respondents were checked against available volumes of the *Flora of Bhutan* and confirmed through field observations. For each species, the plant parts used, preparation or processing methods, mode of administration, and dietary or medicinal properties were recorded. The complete species inventory, including plant parts, preparation methods, and associated ethnobotanical uses, is provided in Supplementary Table S1. No herbarium specimens were collected or deposited, and no independent taxonomic verification was carried out; the species list reflects field-based identifications rather than a formally verified floristic inventory. Ethical practice followed guidelines set by the American Anthropological Association (2012) and the International Society of Ethnobiology (2006). Data were collected by the lead author with the assistance of trained field assistants. All enumerators were briefed on the questionnaire, interview protocols, and ethical considerations prior to fieldwork.

Variable construction and analysis

The archived social and plant files were cleaned before analysis to standardize categorical labels, remove coded prefixes from response values, harmonize multi-response items, and rebuild the plant inventory with a proper header structure. The cleaned datasets were then saved as analysis-ready CSV files and used for all tables and figures in the revised manuscript.

The plant inventory was summarized by use group (edible only, medicinal only, or dual use), plant parts used, preparation/processing methods, and route of administration. Household survey variables were summarized using counts and percentages. For multi-response items such as knowledge sources, dependence reasons, and propagation methods, frequencies were calculated across the number of respondents who answered the item. Figures were generated from the cleaned datasets in Python using pandas and matplotlib.

Perception items on threats and management options were treated as five-point agreement responses ranging from “strongly agree” to “strongly disagree”. Because some of these items had non-response, valid sample sizes are reported for each analysis. Fisher's exact tests were used for selected 2 x 2 comparisons where cell counts were small: village versus reported utilization decrease, village versus male-led collection, income source versus female-led preparation, income source versus female-led processing and storage, and income source versus male-led planting/domestication. Open-ended responses were reviewed thematically and used to interpret the survey patterns, especially for knowledge transmission, perceived decline, and management opportunities.

The archived dataset does not preserve respondent-by-species citation frequencies, ailment-specific use reports, or repeated use-report structure in a form suitable for quantitative ethnobotanical indices. Accordingly, indices such as use value (UV), relative frequency of citation (RFC), cultural importance (CI), and informant consensus factor (ICF) were not calculated. These indices would require, at minimum, respondent-level species citation matrices and, for ICF, ailment-category use reports for each cited species.

Results and Discussion

Respondent profile and diversity of WEMPs

Table 1 and Figure 2 summarize the profile of the respondents. The sample included respondents from both villages and both genders across a broad age range, but it was dominated by middle-aged and older individuals with strong experience in farming and forest-based livelihoods. No respondents fell in the 41–50 age category, which explains the absence of this class in the frequency summary. The inventory recorded 101 WEMP species, and a full species-level breakdown is provided in Supplementary Table S1.

Of the total WEM species recorded, 47.5% had medicinal uses only, 38 species (37.6%) were edible only, and 15 species (14.9%) served both purposes. When dual-use taxa are counted in both categories, this results in a total of 63 medicinal and 53 edible species. Medicinal-only taxa therefore constituted the largest use category. Shoots were the most frequently cited plant part (23 records), followed by fruits (17), seeds (15), and leaves (13), after harmonizing synonymous labels in the archived plant da-

Table 1: Socio-demographic profile of respondents in Yagang and Gengu villages (n = 58).

Variable	Category	n	%
Village	Gengu	32	55.2
Village	Yagang	26	44.8
Gender	Male	39	67.2
Gender	Female	19	32.8
Age group	Below 20	3	5.2
Age group	21-30	3	5.2
Age group	31-40	17	29.3
Age group	51-60	21	36.2
Age group	More than 60	14	24.1
Education level	No formal education	50	86.2
Education level	Up to class 6	6	10.3
Education level	Up to class 10	2	3.4
Primary income source	Farming	36	62.1
Primary income source	Off-farm	22	37.9

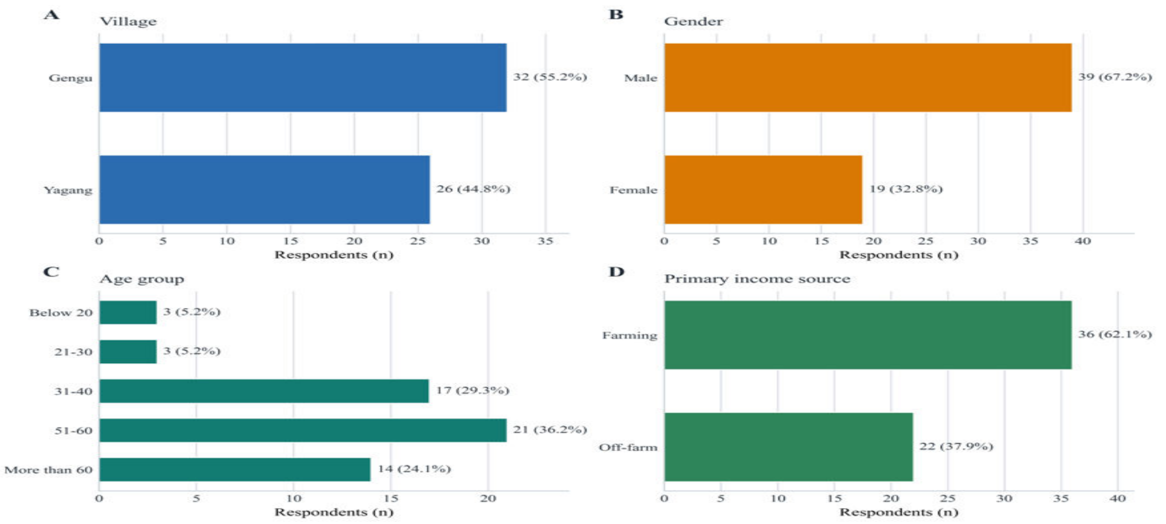

Figure 2: Socio-demographic distribution of respondents in the analytic sample (n = 58). Panel A: respondents by village (Gengu, n = 32; Yagang, n = 26). Panel B: respondents by gender (male, n = 39; female, n = 19). Panel C: respondents by age group (years); no respondents were recorded in the 41-50-year category. Panel D: respondents by primary income source (farming vs. off-farm).

taset. Oral administration was reported for 77 species (76.2%); oral-and-topical use for 11 species (10.9%), topical use for 10 (9.9%), and inhalation-based use for three species (3.0%).

Figure 3 illustrates the distribution across use groups and plant parts. The profile points to a repertoire built around direct consumption, herbal drinks, and home-prepared remedies rather than specialized clinical treatment. It

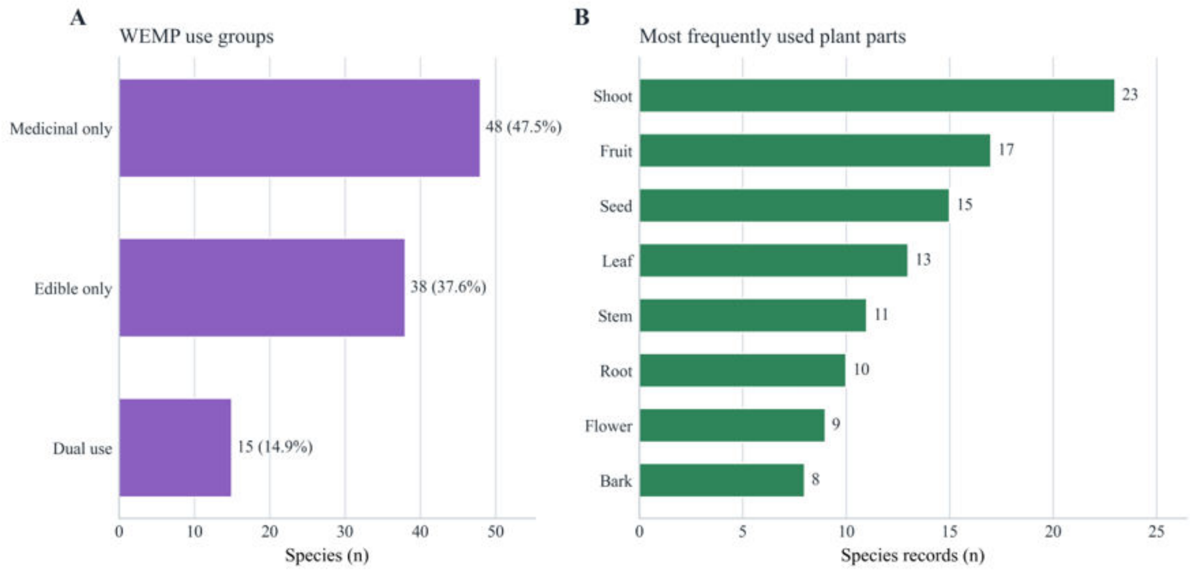

Figure 3: Composition of the documented wild edible and medicinal plant (WEMP) flora (n = 101 species). Panel A: species classified by use group (medicinal only, n = 48; edible only, n = 38; dual use, n = 15). Panel B: the eight most frequently recorded plant parts in the species inventory after harmonization of synonymous labels; shoots were the most commonly recorded part.

Table 2: Indicators of household dependence and socio-economic functions of WEMPs.

Indicator	Category	n	%
Household dependence on WEMPs	Yes	57	98.3
Household dependence on WEMPs	No	1	1.7
Frequency of use	Sometimes	52	89.7
Frequency of use	Monthly	5	8.6
Frequency of use	Never	1	1.7
Dependence reason (multi-response, valid n = 57)	Medicine	55	96.5
Dependence reason (multi-response, valid n = 57)	Food	46	80.7
Dependence reason (multi-response, valid n = 57)	Nutrients	46	80.7
Dependence reason (multi-response, valid n = 57)	Food and nutrients	1	1.8
Dependence reason (multi-response, valid n = 57)	Income generation	1	1.8
Families depend on WEMPs	Agree or strongly agree	57	98.3
WEMPs are a source of nutrients	Agree or strongly agree	57	98.3
WEMPs are a source of income	Agree or strongly agree	55	94.8
WEMPs are only for poorer households	Disagree or strongly disagree	46	79.3

also means the inventory includes both relatively low-impact plant parts such as fruits and leaves, and more extractive ones like roots and bark, a distinction worth keeping in mind when considering harvest sustainability.

Socio-economic importance of WEMPs

Household dependence on WEMPs was near-universal (Table 2). Fifty-eight respondents (98.3%) reported that their household relied on WEMPs. Most WEMPs were used occasionally rather than daily (89.7% reported "sometimes"), reflecting seasonal availability and opportunistic harvesting patterns. Medici-

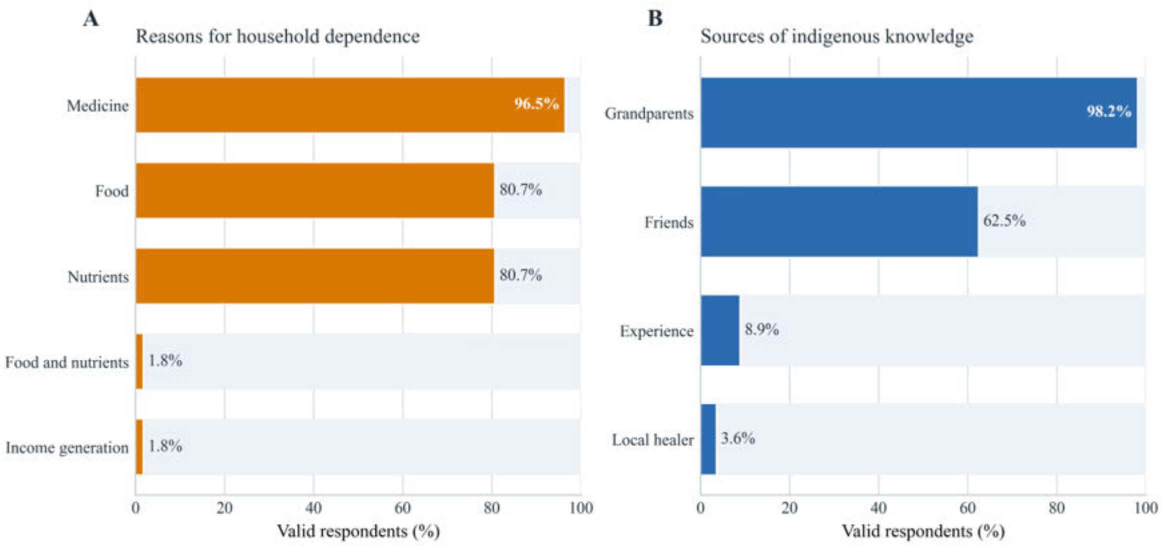

Figure 4: Stated reasons for household dependence on wild edible and medicinal plants (WEMPs) and reported sources of indigenous knowledge. Panel A: frequency of each stated reason for WEMP dependence among respondents who answered the multi-response item (valid n = 57); percentages may sum to more than 100% because multiple reasons could be selected. Panel B: reported sources of WEMP knowledge among respondents who answered the multi-source item (valid n = 56); grandparents were the most frequently cited source.

nal use stood out as the primary reason, cited by 55 of 57 respondents who answered this item (96.5%), followed by food and nutrition, each mentioned by 46 respondents (80.7%). Income generation was reported by only one respondent (1.8%). Figure 4 shows the dominance of medicinal, food, and nutritional uses as key livelihood functions. Within this dataset, WEMPs primarily functioned as subsistence and health resources, with cash income not being a significant driver for most households. Similar patterns have been documented globally, where wild foods contribute significantly to dietary diversity but remain underrepresented in formal economic systems (Powell et al., 2015; Ickowitz et al., 2014).

The agreement items told the same story. Nearly all respondents agreed or strongly agreed that families depended on WEMPs (98.3%) and that they contributed to household nutrition (98.3%). Most also agreed WEMPs could provide income (94.8%), yet explicit income dependence was rare in the stated-use responses. Three-quarters of respondents (79.3%) rejected the idea that WEMPs were only for poorer households. The gap between confidence in income potential and near-absence of income as a stated current reason for use suggests respondents recognized commercial possibility but did not yet rely on it as a primary function of these plants.

Gendered roles and indigenous knowledge

WEMP knowledge was transmitted mainly within families. Among the 56 respondents who answered the multi-source question, 55 (98.2%) identified grandparents as a source of knowledge; friends were cited second (35 respondents; 62.5%), followed by personal experience (5; 8.9%), and local healers (2; 3.6%). When asked who held WEMP knowledge within the household, 37 respondents (63.8%) identified men, 13 (22.4%) reported both genders, and eight (13.8%) identified women. Figure 5 presents the task-based division of labour and the perceived household knowledge holders.

Task responsibilities were not evenly distributed (Table 3). Collection was most

Table 3: Sources of indigenous knowledge and gendered household responsibilities for WEMP

Indicator	**Category**	**n**	**%**
Household dependence on WEMPs	Yes	57	98.3
Household dependence on WEMPs	No	1	1.7
Frequency of use	Sometimes	52	89.7
Frequency of use	Monthly	5	8.6
Frequency of use	Never	1	1.7
Dependence reason (multi-response, valid n = 57)	Medicine	55	96.5
Dependence reason (multi-response, valid n = 57)	Food	46	80.7
Dependence reason (multi-response, valid n = 57)	Nutrients	46	80.7
Dependence reason (multi-response, valid n = 57)	Food and nutrients	1	1.8
Dependence reason (multi-response, valid n = 57)	Income generation	1	1.8
Families depend on WEMPs	Agree or strongly agree	57	98.3
WEMPs are a source of nutrients	Agree or strongly agree	57	98.3
WEMPs are a source of income	Agree or strongly agree	55	94.8
WEMPs are only for poorer households	Disagree or strongly disagree	46	79.3

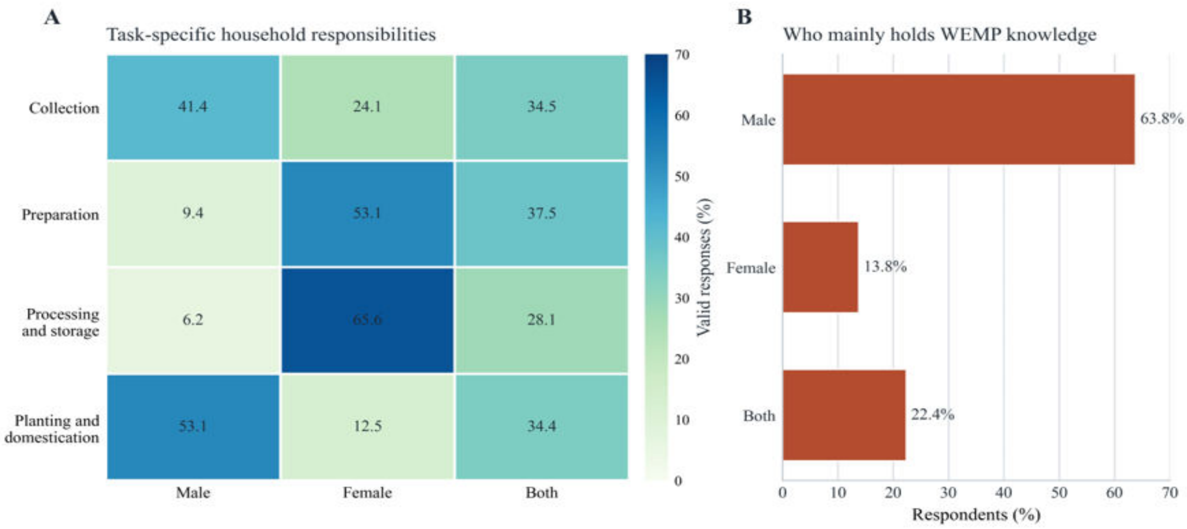

Figure 5: Gendered household responsibilities for wild edible and medicinal plant (WEMP) management tasks and perceived household knowledge holder. Panel A: proportion of respondents reporting each task as male-led, female-led, or shared; collection module valid n = 58, all other task modules valid n = 32. Panel B: proportion of respondents identifying men, women, or both genders as the primary holder of WEMP knowledge within the household (n = 58).

often male-led (41.4%) or shared (34.5%), with female-led collection reported by 24.1%. Among the 32 respondents who answered questions on preparation, processing, and storage, the pattern shifted: 53.1% reported female-led preparation and 65.6% reported that processing and storage were female-led. Planting and domestication were male-led in 53.1% of valid responses, while 34.4% describing these activities as shared.

The village comparison was notable. In Gengu, 21 of 32 respondents (65.6%) reported that collection was male-led, compared to 3 of 26 respondents (11.5%) in Yagang, a difference well beyong chance (Fisher's exact test, $p < .001$); $n = 58$). Among farming house-

Table 4: Respondent perceptions of availability, perceived decline, and perceived threats to WEMPs.

Indicator	Category	n	%
Local availability	Moderate	56	96.6
Local availability	Abundant	1	1.7
Local availability	Rare	1	1.7
Utilisation has decreased	Yes	48	82.8
Utilisation has decreased	No	10	17.2
Population of WEMPs has decreased (valid n = 51)	Agree or strongly agree	48	94.1
Threats can be identified locally (valid n = 51)	Agree or strongly agree	43	84.3
Neglect of traditional uses (valid n = 51)	Agree or strongly agree	31	60.8
Lifestyle change reduces use (valid n = 51)	Agree or strongly agree	33	64.7
Decrease in population (valid n = 46)	Agree or strongly agree	39	84.8
Cattle grazing (valid n = 46)	Agree or strongly agree	39	84.8
Unsustainable harvesting (valid n = 46)	Agree or strongly agree	38	82.6
Increased harvesting pressure (valid n = 46)	Agree or strongly agree	38	82.6
Loss of diversity (valid n = 46)	Agree or strongly agree	37	80.4
Tree felling (valid n = 46)	Agree or strongly agree	35	76.1
Land-use change (valid n = 46)	Agree or strongly agree	34	73.9
Pests and diseases (valid n = 46)	Agree or strongly agree	29	63.0
Climate change (valid n = 46)	Agree or strongly agree	29	63.0
Market access (valid n = 46)	Agree or strongly agree	22	47.8
Rising demand (valid n = 46)	Agree or strongly agree	18	39.1

holds, female-led preparation and storage were far more common than among off-farm households (preparation: 14/18, 77.8% vs 3/14, 21.4%, Fisher's exact p = 0.0036; processing and storage: 16/18, 88.9% vs 5/14, 35.7%, Fisher's exact p = 0.0028). Off-farm households showed stronger male-led planting and domestication (12/14, 85.7% vs 5/18, 27.8%, Fisher's exact p = 0.0016). These represent associations within a small purposive sample and should not be read as causal effects; however, they indicate that WEMP task roles varied with both village location and livelihood type.

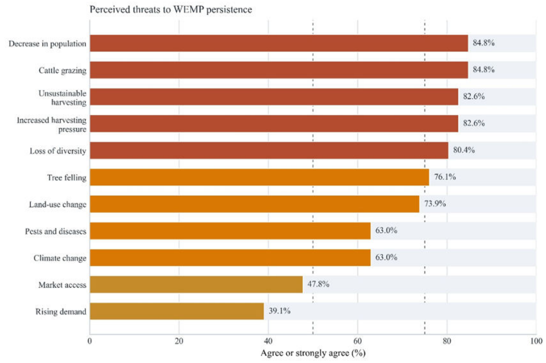

Figure 6: Proportion of respondents agreeing or strongly agreeing with each perceived threat to wild edible and medicinal plant (WEMP) persistence in Yagang and Gengu villages (valid n = 46 for the threat module). Threat items were derived from a five-point Likert-type agreement scale; non-response reduced the valid sample below 58 for this module.

Availability, population trend, and perceived threats

Respondents described current local WEMP availability as moderate in nearly all cases (56 of 58; 96.6%), with one respondent each describing stocks as abundant or rare. However, 48 respondents (82.8%) reported that utilization had decreased. Among those who answered the population-trend item (n = 51), 48 (94.1%) agreed or strongly agreed that WEMP populations had declined. Community members also felt able to identify the causes of these changes: 43 of 51 respondents (84.3%) agreed or strongly agreed that local threats were identifiable. Neglect of traditional uses (60.8%) and changing lifestyles (64.7%) were each associated with declining use. Overall, the findings suggest that WEMP species are still present but are perceived as less used and less secure than in the past.

Among the 46 respondents who completed the threat scale, population decline and cattle grazing were tied for the highest agreement

Table 5: Reported propagation methods and management opportunities for sustainable WEMP

Indicator	Category	n	%
Knows propagation methods	Yes	57	98.3
Sees domestication opportunities	Yes	57	98.3
Propagation method (multi-response, valid n = 57)	Seeds	49	86.0
Propagation method (multi-response, valid n = 57)	Air layering	39	68.4
Propagation method (multi-response, valid n = 57)	Vegetative propagation	20	35.1
Propagation method (multi-response, valid n = 57)	Other	1	1.8
Suitable for household consumption (valid n = 57)	Agree or strongly agree	57	100.0
Suitable for consumption and sale (valid n = 57)	Agree or strongly agree	55	96.5
Can be integrated as shade trees (valid n = 57)	Agree or strongly agree	57	100.0
Can be maintained as medicinal plants in agroforestry (valid n = 57)	Agree or strongly agree	56	98.2
Provides aesthetic value (valid n = 57)	Agree or strongly agree	57	100.0

(84.8% each), followed by unsustainable harvesting and increasing harvesting pressure (82.6% each), loss of diversity (80.4%), tree felling (76.1%), and land-use change (73.9%). Pests, diseases and climate change were each identified by 63.0% of respondents. Market access (47.8%) and rising demand (39.1%) received comparatively lower levels of concern (Table 4). Respondents did not perceive threats as isolated issues; Figure 6 shows harvesting pressure, grazing, tree felling, and land-use change are interconnected within a broader pattern of decline. These findings reflect respondents' perceptions rather than outcomes of ecological surveys, as abundance, regeneration rates, and harvest intensity were not measured in this study. Perceptions of declining use differed by village. All 32 respondents in Gengu reported decreased utilization, compared with 16 of 26 respondents in Yagang (61.5%), and this difference was statistically significant (Fisher's exact $p < 0.001$; $n = 58$). Perceived changes in WEMP populations were based on respondents' personal observations over time; no fixed recall period was applied.

Opportunities for sustainable management

Support for domestication and agroforestry was near-unanimous (Table 5). This preference aligns with evidence that agroforestry systems enhance soil fertility and ecosystem resilience through gradual nutrient release from decomposing litter, thereby supporting long-term productivity in Bhutanese landscapes (Dorjee & Orong, 2026). Fifty-seven respondents (98.3%) were familiar with at least one propagation method, and the same proportion identified opportunities for domestication. Among these 57 respondents, seeds were the most frequently cited propagation method (49; 86.0%), followed by air-layering (39; 68.4%) and vegetative propagation (20; 35.1%), with one response classified as "other". Figure 7 shows how these preferences are linked to broader openness towards integrating WEMPs into consumption, sale, shade, and medicinal use within farming systems. Seeds and air-layering dominated because both can be practiced at the household level without specialized equipment (Table 5).

Support for on-farm integration was consistent across all items. All 57 valid respondents agreed or strongly agreed that WEMPs were suitable for household consumption and shade-tree use. Fifty-five (96.5%) agreed that WEMPs could support both consumption and sale, 56 (98.2%) agreed that they could be maintained as medicinal plants within agroforestry systems, and all respondents agreed that they had aesthetic value. Respondents did not perceive conservation and continued use as opposing priorities; instead, domestication and agroforestry were viewed as practical strategies for maintaining access while reducing pressure on wild populations. Tree domestication and agroforestry integration have been widely proposed as effective strategies for enhancing food security while conserving biodiversity (Jamnadass et al., 2013). However, this dataset contains no information on quantities sold, no price data, or household income shares from WEMP trade. Willingness to sell should therefore not be interpreted as evidence of an established market chain.

Species-use structure, livelihood roles, and policy relevance

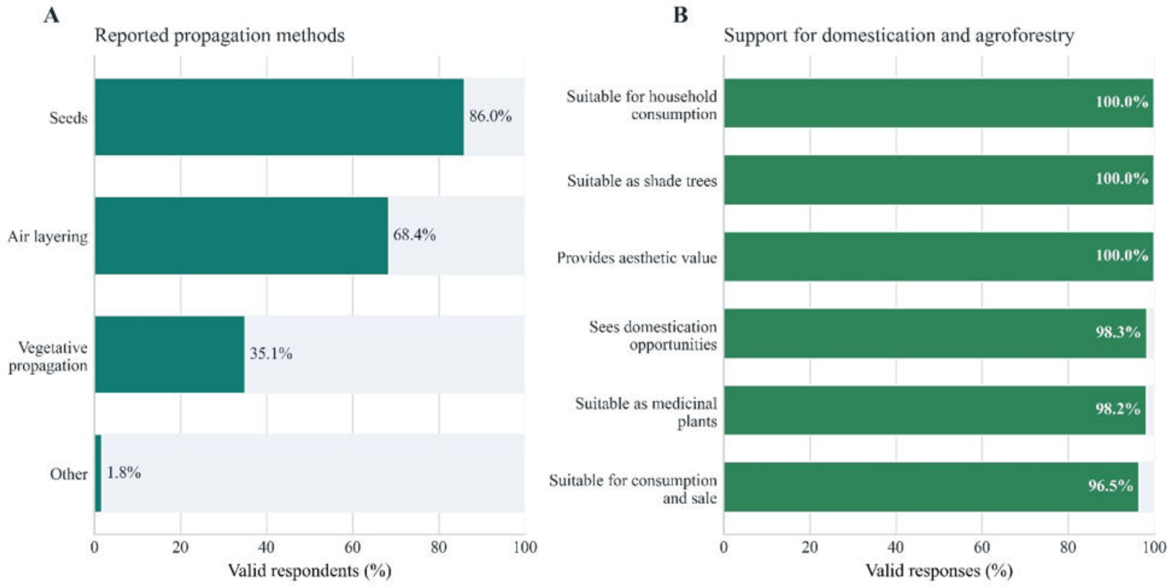

Figure 7: Reported propagation methods and expressed support for domestication and agroforestry integration of wild edible and medicinal plants (WEMPs). Panel A: frequency of each reported propagation method among respondents who answered the multi-response item (valid n = 57); percentages may sum to more than 100% because multiple methods could be selected. Panel B: proportion of respondents agreeing or strongly agreeing with each statement about potential on-farm integration of WEMPs (valid n = 57).

The 101-species inventory indicates that WEMP use in these two villages extends well beyond occasional foraging. With 63 medicinal and 53 edible species when dual-use taxa are counted in both categories, the dataset reflects an active and embedded local practice. Medicinal-only species outnumbered edible-only species, suggesting that these plants function not only as dietary supplements but also as an important household health resource. Oral administration was the dominant mode of use, and the most frequently used plant parts were shoots, fruits, seeds, and leaves. Overall, this profile reflects a repertoire centred on everyday foods, herbal preparations, and home-based remedies rather than specialised therapeutic treatmens.

The dataset has clear limitations. Because the archived files do not preserve respondent-level citation frequencies, the inventory can describe the overall structure of use categories, plant parts, and administration routes but cannot rank species by citation frequency or determine their cultural resilience in medicinal use. The part-use breakdown remains informative for management, as it indicated that some species involve more extractive organs such as roots and bark, even though leaves, fruits, shoots, and seeds account for most records overall.

The socio-economic picture requires cautious interpretation. Medicine, food, and nutrition dominate the stated reasons for use, while cash income is rarely mentioned. High agreement that WEMPs can generate income coexists with near absence of income as a current reason for use. This gap suggests that respondents recognise potential commercial value, possibly through occasional sales in local markets, but do not yet depend on it as a livelihood source. Within this dataset, WEMPs function primarily as subsistence and health resources, with cash income appearing marginal and irregular rather than a primary livelihood function.

These findings align with Bhutan's existing resource management frameworks. The NBC (2009) and DoFPS (2022) both emphasize sustainable use over extraction without replenishment. The evidence from this study suggests that potential for village-level domestication of priority species, on-farm integration, and harvesting guidelines grounded in local practice. For Darla Gewog specifically, the more immediate need is alignment between household use patterns, propagation support, and community-based management of forest-adjacent plants, rather than large-scale commercial expansion.

Gender, knowledge, and perceived decline

The gender findings resist simple summarisation. No single gender dominates WEMP management across all tasks. Collection was more often male-led or shared, preparation and storage were more strongly female-led, and planting and domestication were more often male-led or shared among respondents who answered those questions. This pattern aligns with broader literature showing that gendered biodiversity roles vary according to task type, labour availability, and livelihood context rather than following a single universal rule (Howard, 2003; Alqethami et al., 2020). Ethnobiological research similarly demonstrates that gendered divisions of labour are context-specific and shape both resource use and knowledge transmission (Pfeiffer & Butz, 2005; Chao et al., 2025). The Fisher's exact results by village and income type further refine this picture: household task patterns varied across a small geographic area and between farming and off-farm contexts, with implications for the design of extension programmes.

WEMP knowledge still passes through families. Grandparents were named as a source by 98.2% of respondents, confirming that elder-based transmission is the main channel; friends were cited by 62.5%, suggesting lateral diffusion without replacing family learning. Yet the same respondents widely perceived declining use, linking it to neglect of traditional practices and changing lifestyles. The knowledge chain may remain intact even as the practical occasions to use that knowledge shrink; a pattern consistent with findings on local ecological knowledge under economic and social change (Howard, 2003; Bussmann et al., 2018). Similar dynamics have been observed globally, where knowledge persists within communities even as practical engagement declines (Aswani et al., 2018; Chao et al., 2025).

The threat data requires careful interpretation. Respondents linked WEMP decline to population decrease, harvesting pressure, cattle grazing, tree felling, land-use change, and loss of diversity. Knowing which pressures communities consider most serious is useful for initiating management discussions. But it does not indicate which threats are ecologically most damaging. No plot measurements, abundance counts, regeneration records, or harvest data underpin these responses. The ecological magnitude of each threat and whether perceived decline tracks actual population change cannot be determined from this dataset alone. However, perceived declines often parallel documented global trends where cultural change and reduced reliance on traditional practices lead to measurable knowledge erosion (Aswani et al., 2018).

The propagation and management findings were consistently positive. Nearly all respondents knew at least one technique and expressed willingness to integrate WEMPs into their farming systems, with seeds and air layering preferred as accessible, low-equipment methods. This supports wider arguments that WEMPs can contribute to more resilient land-use systems when conservation is connected to household practice rather than separated from it (Leakey, 2012; Turner et al., 2011; Zehra et al., 2022). One qualification: the survey records attitude, not adoption. Actual planting rates, seedling survival, and any income outcomes are unknown, so the results should be read as evidence of openness to management change rather than change already achieved.

Limitations and future research

Several limitations define the analytical reach of the study. First, the research was a purposive two-village case study and should not be generalized to all rural Bhutan. Second, non-response reduced valid sample sizes for some modules, particularly the threat items and the task-allocation items, so these results should be interpreted cautiously. Third, the archived dataset does not preserve respondent-by-species citation matrices, ailment-specific use reports, or repeated use-report structure in a form that would support stronger ethnobotanical indices such as UV, RFC, CI, or ICF. UV, RFC, and CI would require each respondent's citation pattern for each species, while ICF would additionally require therapeutic-use reports grouped by ailment category.

Plant identification used vernacular names checked against available *Flora of Bhutan* volumes and field notes. No herbarium specimens were deposited, and no independent taxonomic verification was conducted; the species list should be treated as a field-based record rather than a voucher-verified floristic inventory. Fifth, the study contains no direct ecological data. There is no harvest monitoring, no price series, and no household income accounting. Perceived decline and commercial potential are analytically real but remain unverified ecologically and economically. Future research should combine multi-site ecological field measurements with voucher-verified plant identifications, respondent-level species citation matrices, and household income analysis to move beyond what perception-based surveys alone can show.

Conclusion

WEMPs in Yagang and Gengu are household resources used primarily for health and food, supported by intergenerational knowledge systems and broadly accepted for future domestication. Evidence from agroforestry systems in Bhutan indicated that such integration can improve soil fertility and sustain nutrient cycling through gradual litter decomposition, reinforcing the ecological basis for these management strategies (Dorjee & Orong, 2026). Nearly all households depended on WEMPs; knowledge was passed predominantly through grandparents, and respondents widely supported propagation and agroforestry integration. These patterns coexists with a clear and widespread perception that WEMP populations have declined, attributed to harvesting pressure, cattle grazing, land-use change, and related local pressures. Collectively, these findings reinforce global evidence that sustaining wild plant systems requires aligning biodiversity conservation with local food systems, knowledge systems, and livelihood strategies (Powell et al., 2015; IPBES, 2019).

The gender findings add specificity that is important for intervention design. Collection, preparation, storage, and domestication were associated with different household members, with patterns varying by village and by farming versus off-farm livelihood contexts. Programmes that treat the household as a single undifferentiated unit are therefore likely to overlook key actors. Village-specific approaches that support intergenerational learning, strengthen on-farm propagation, and link conservation to tangible livelihood benefits are more likely to effective in this setting.

This was a two-village case study rather than a national survey, and the findings should not be generalised to all of rural Bhutan. Within existing biodiversity and forest-resource frameworks, the evidence supports village-level conservation and management tailored to the conditions of Darla Gewog. Broader conclusions about national trends in ecological change, market value, or species distribution will require multi-site studies incorporating plot-based ecological measurements, voucher-verified plant identifications, respondent-level citation data, and household income accounting.

Acknowledgement

The authors would like to thank the Department of Forests and Park Services, Ministry of Energy and Natural Resources, for allowing this research to be conducted on an important topic. The authors also thank the laboratory personnel who assisted in the smooth conduct of laboratory work.

References

Alexiades, M.N. (1996). Collecting ethnobotanical data: An introduction to basic concepts and techniques. *Advances in Economic Botany*, 10:53–94.

Alqethami, A., Aldhebiani, A.Y. and Teixidor-Toneu, I. (2020). Medicinal plants used in Jeddah, Saudi Arabia: A gender perspective. *Journal of Ethnopharmacology*, 257:112899.

American Anthropological Association. (2012). Statement on ethics: Principles of responsibility. Available at: <http://www.aaanet.org/profdev/ethics/>. Accessed 15 April 2026.

Aswani, S., Lemahieu, A. and Sauer, W.H.H. (2018). Global trends of local ecological knowledge and future implications. *PLOS ONE,* 13(4):e0195440. https://doi.org/10.1371/journal.pone.0195440.

Bernard, H.R. (2017). Research methods in anthropology: Qualitative and quantitative approaches. Bloomsbury, London.

Bussmann, R.W., Swartzinsky, P., Worede, A. and Evangelista, P. (2018). Plant use in Odo-Bulu and Demaro, Bale region, Ethiopia. *Journal of Ethnobiology and Ethnomedicine*, 14:1–25.

Chao, O., Reyes-García, V., Molnár, Z. and Li, X. (2025). Living knowledge: Persistence and adaptation of traditional ecological knowledge in East Ujimchin, Inner Mongolia, China. *Ecology and Society*, 30(4):39. https://doi.org/10.5751/ES-16447-300439

Cotton, C.M. (1996). *Ethnobotany: Principles and applications*. John Wiley & Sons, Chichester.

Department of Forests and Park Services (DoFPS). (2022). *Forest types of Bhutan*. Forest Resources Management Division, Royal Government of Bhutan, Thimphu.

Dorjee, S. and Orong, K. (2026). Decomposition dynamics of Magnolia and Machilus leaf litter in agroforestry systems in Bhutan. *International Journal of Forestry Research*, 2026:3992541. https://doi.org/10.1155/ijfr/3992541

Fakchich, J. and Elachouri, M. (2023). Ethnobotanical methods used for the study of medicinal plants: Approaches for sampling and collecting ethnobotanical data (Part I). *Journal of Materials and Environmental Science*, 14:1253–1265.

Howard, P.L. (2003). *Women and plants: Gender relations in biodiversity management and conservation*. Zed Books, London.

Ickowitz, A., Powell, B., Salim, M.A. and Sunderland, T.C.H. (2014). Dietary quality and tree cover in Africa. *Global Environmental Change*, 24:287–294. https://doi.org/10.1016/j.gloenvcha.2013.12.001

International Society of Ethnobiology. (2006). International Society of Ethnobiology code of ethics (with 2008 additions). Available at: <https://www.ethnobiology.net/code-of-ethics>. Accessed 15 April 2026.

IPBES. (2019). *Global assessment report on biodiversity and ecosystem services.* Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn.

Jamnadass, R., Place, F., Torquebiau, E., Malézieux, E., Iiyama, M., Sileshi, G.W., Kehlenbeck, K., Masters, E., McMullin, S. and Dawson, I.K. (2013). Agroforestry for food and nutritional security. *Unasylva*, 64(241):23–29.

Kala, C.P. (2012). Traditional ecological knowledge, sacred groves, and conservation of biodiversity in the Pachmarhi Biosphere Reserve of India. *Journal of Environmental Protection*, 3:1381–1397.

Leakey, R.R.B. (2012). *Living with the trees of life: Towards the transformation of tropical agriculture*. CABI, Wallingford.

Lehmann, H. (2010). Research method: Grounded theory for descriptive and exploratory case studies. In Yoong, P. and Huff, S. (eds.), *The dynamics of international information systems*, pp.53–65. Springer, New York.

Martin, G.J. (1995). *Ethnobotany: A methods manual*. Chapman & Hall, London.

National Biodiversity Center (NBC). (2009). *Biodiversity action plan*. Ministry of Agriculture and Forests, Royal Government of Bhutan, Thimphu.

Pfeiffer, J.M. and Butz, R.J. (2005). Assessing cultural and ecological variation in ethnobiological research: The importance of gender. *Journal of Ethnobiology*, 25(2):240–278.

Powell, B., Thilsted, S.H., Ickowitz, A., Termote, C., Sunderland, T. and Herforth, A. (2015). Improving diets with wild and cultivated biodiversity. *Food Security*, 7:535–554. https://doi.org/10.1007/s12571-015-0466-5

Schulp, C.J.E., Thuiller, W. and Verburg, P.H. (2014). Wild food in Europe: A synthesis of knowledge and data. *Ecological Economics*, 105:292–305. https://doi.org/10.1016/j.ecolecon.2014.06.018

Turner, N.J., Łuczaj, Ł., Migliorini, P., Pieroni, A., Dreon, A.L., Sacchetti, L.E. and Paoletti, M.G. (2011). Edible and tended wild plants, traditional ecological knowledge, and agroecology. *Critical Reviews in Plant Sciences*, 30:198–225.

Zehra, U., Khan, N.F., Shah, M.A. and Reshi, Z.A. (2022). Cultural and socio-economic perspective of some promising edible plants from Uttarakhand Himalaya. In *Edible plants in health and diseases*, pp.209–233. Springer Nature, Singapore.

Appendix I

Supplementary Table

S_1: Ethnobotanical uses of wild edible and medicinal plants, including plant parts utilized, modes of preparation, and associated traditional values.

Sl. No.	Scientific Name	Parts Used	Preparation/Processing	Mode of Admin-istration	Ethnomedicinal/ Dietary Use
1	*Achyranthes bi-dentata*	Stem	Processed to Extract Juice and Consumed	Oral	Treatment of Mumps, Sore Throat, Fever, Jaundice, and Body Pain
2	*Aconogonon molle*	Shoot	Consumed as Food	Oral	Consumed as Salad
3	*Acorus calamus*	Root, Leaf & Stem	Processed to Extract Juice (Root) and Pound into Paste (Leaf/Stem)	Oral and Topical	Treatment of Weak-ness (Juice) and Sca-bies, Heat Rashes and Cuts. Leaf/Stem Boiled in Water Used for Bathing Infants
4	*Actinidia callosa*	Fruit	Consumed Ripened	Oral	Consumed as Food
5	*Allium hookeri*	Leaf	Cooked and consumed	Oral	Consumed as Food
6	*Alpinia nigra*	Shoot	Cooked and consumed	Oral	Consumed as Food
7	*Alsophila spinulosa*	Shoot	Cooked and consumed	Oral	Consumed as Food
8	*Amorphophallus*	Shoot	Cooked and consumed	Oral	Consumed as Food
9	*Ampelocalamus*	Shoot	Cooked and consumed	Oral	Consumed as Food
10	*Angiopteris helferi-ana*	Root	Boiled to Extract Juice	Oral	Treatment of Weak-ness
11	*Astilbe rivularis*	Root	Pound to Paste and Pro-cessed to Extract Juice	Topical (Paste) and Oral (Juice)	Treatment of Bleed-ing, Fever, Jaundice, Bone Fracture, and Body Pain
12	*Baccaurea ramiflo-ra*	Fruit	Consumed Ripe Fruit	Oral	Consumed as Food
13	*Bauhinia purpurea*	Flower	Cooked and consumed	Oral	Consumed as Food and Treatment of Blood Pressure
14	*Bauhinia variegata*	Flower	Cooked and consumed	Oral	Consumed as Food and Treatment of Hypertension

15	*Bergenia ciliata*	Leaf & Root	Dry and Brew (Leaf), Pound into Paste, and Process to Extract Juice	Oral and Topical	Treatment of Bone Fractures (Root). Leaf Consumed as Herbal Tea
16	*Betula alnoides*	Root & Bark	Pound into a Paste (Root), and Make Shampoo (Bark + Lemon + Egg)	Topical	Treatment of Bone Fractures and Cuts, and Used as Shampoo for Cleansing Hair/Scalp
17	*Calamus acanthospathus*	Shoot	Cooked and consumed	Oral	Consumed as Food
18	*Calamus erectus*	Shoot & Stem	Cooked and Consumed and Boiled to Extract Juice	Oral	Consumed as Food and Treatment of Cough and Cold
19	*Calamus latifolius*	Stem	Processed to Extract Juice	Oral	Treatment of Urinary Tract Infections (UTIs)
20	*Callicarpa vestita*	Bark	Processed to Extract Juice	Oral	Treatment of Constipation
21	*Cannabis sativa*	Leaf	Mixed with Fodder/ Feed	Oral	Treatment of Gastrointestinal Discomfort
22	*Cassia fistula*	Leaf & Fruit	Processed to Extract Juice (Leaf), and Consumed Raw (Fruit)	Oral	Treatment of Fever (Leaf) and Gastritis (Fruit)
23	*Chenopodium album*	Shoot	Cooked and Consumed	Oral	Consumed as Food
24	*Choerospondias axillaris*	Fruit & Seed	Consumed Directly (Fruit), and Seed Processed into Powder and Mixed with Water	Oral	Consumed as Food
25	*Cinnamomum glaucescens*	Bark & Seed	Pound into Paste (Bark) and Powder (Seed)	Topical and Oral	Treatment of Bone Fractures, Wounds, and Cough and Cold
26	*Citrus medica*	Fruit	Cut and Squeezed to Extract Juice	Oral	Treatment of Diarrhoea and Gastrointestinal Discomfort
27	*Colocasia esculenta*	Fruit	Processed to Extract Juice	Oral	Treatment of Diarrhoea
28	*Costus lacerus*	Stem	Consumed Raw/Juice	Oral	Treatment of Urinary Tract Infections and Gastrointestinal Discomfort

29	*Crateva religiosa*	Shoot & Root	Cooked and Consumed (Shoot) and Pound into Paste (Root)	Oral and Topical	Consumed as Food and Treatment of Bone Fractures and Wounds
30	*Cymbidium spp.*	Flower	Pound into Paste	Topical	Treatment of Bone Fractures
31	*Datura metel*	Fruit & Seed	Processed into Powder and Smoke, and Apply on Infected Part (Seed)	Inhale Smoke and Topical	Treatment of Toothache
32	*Dendrocalamus hamiltonii*	Shoot	Cooked and Consumed and Processed into Pickle	Oral	Consumed as Food and Pickle
33	*Dioscorea belophylla*	Tuber	Cooked and consumed	Oral	Consumed as Food
34	*Dioscorea bulbifera*	Tuber	Cooked and consumed	Oral	Consumed as Food
35	*Diplazium esculentum*	Shoot	Cooked and consumed	Oral	Consumed as Food
36	*Diplazium himalayense*	Shoot	Cooked and consumed	Oral	Consumed as Food
37	*Diploknema butyracea*	Fruit	Consumed Raw	Oral	Consumed as Food
38	*Docynia indica*	Fruit	Consumed Raw and Processed to Extract Juice	Oral	Treatment of Diarrhea and Gastrointestinal Discomfort
39	*Edgeworthia gardneri*	Root	Processed to Extract Juice	Oral	Treatment of Food Poisoning
40	*Elatostema lineolatum*	Shoot	Cooked and Consumed	Oral	Consumed as Food
41	*Engelhardia spicata*	Bark	Pound into Paste	Topical	Treatment of Mumps, Boils, and Bone Fractures
42	*Entada rheedii*	Seed	Processed into Paste	Topical	Treatment of Bone Fractures and Mumps

43	*Exbuck-landia populnea*	Bark	Processed into Paste	Topical	Treatment of Bone Fractures
44	*Fraxinus floribunda*	Bark	Processed into Paste	Topical	Treatment of Bone Fractures
45	*Girardinia diversifolia*	Flower	Cooked and Consumed	Oral	Consumed as Food and Treatment of Hypertension
46	*Gmelina arborea*	Bark	Cooked and Consumed (Flower), Processed to Extract Paste and Juice (Bark)	Oral (Juice) and Topical (Paste)	Treatment of Bone Fracture, Wounds, Cuts, Fever, and Weakness, and Consumed as Food
47	*Gynocardia odorata*	Seed	Cook Processed Oil and Consumed	Oral	Consumed as Cooking Oil
48	*Hedyotis scandens*	Root	Processed to Extract Juice	Oral	Treatment of Fever
49	*Himala-yacalamus brevinodus*	Shoot	Cooked and Consumed	Oral	Consumed as Food
50	*Jatropha curcas*	Seed	Consumed Raw	Oral	Treatment of Food Poisoning
51	*Juglans regia*	Kernel	Consumed Raw	Oral	Consumed as Food
52	*Justicia adhatoda*	Flower	Cooked and Consumed	Oral	Consumed as Food
53	*Kaempferia rotunda*	Root, Seed & Stem	Pound into Paste	Topical	Treatment of Bone Fractures and Cuts
54	*Laportea bulbifera*	Leaf	Cooked and consumed	Oral	Consumed as Food and Treatment of Blood Pressure
55	*Litsea cubeba*	Seed	Processed to Extract Oil	Oral and Topical	Treatment of Cough, Fever, Tonsillitis, and Joint Pain
56	*Machilus edulis*	Fruit	Consumed Raw	Oral	Consumed as Food
57	*Macropanax dispermus*	Shoot	Cooked and consumed	Oral	Consumed as Food

58	*Mangifera sylvatica*	Fruit	Consumed Raw	Oral	Consumed as Food
59	*Mentha spicata*	Leaf	Consumed Raw	Oral	Treatment of Gastric and Joint Pain
60	*Microlepia caudigera*	Shoot	Cooked and consumed	Oral	Consumed as Food
61	*Mimosa pudica*	All Parts	Processed into Powder	Oral	Treatment of Constipation
62	*Morus australis*	Root	Processed to Extract Juice	Oral	Treatment of Diabetes, Dysentery, Sore Throat, Tonsillitis, Fever, and Pneumonia
63	*Musa balbisiana*	Flower	Cooked and consumed	Oral	Consumed as Food
64	*Myrica esculenta*	Bark	Burn Powder and Inhale	Inhale Smoke	Treatment of Sinusitis
65	*Nasturtium officinale*	Shoot	Cooked and consumed	Oral	Consumed as Food
66	*Nephrolepis cordifolia*	Tuber	Consumed Raw	Oral	Treatment of Urinary Tract Infections, Diabetes, and Gastrointestinal Discomfort
67	*Oroxylum indicum*	Flower	Cooked and consumed, and Burn into Ash	Topical and Oral	Consumed as Food and Treatment of Hypertension, Burns, Wounds, and Cuts
68	*Paederia foeta*	Leaf/ Stem	Cooked and Consumed (Leaf) and Pound into Paste	Oral and Topical (Tie Around the Injury)	Treatment of Gastritis and Relieve Pain
69	*Phlogacanthus thyrsiformis*	Flower & Leaf	Cooked and Consumed (Flower), and Boiled to Extract Juice and Consumed (Leaf)	Oral	Treatment of Blood Pressure, Headache, and Roundworms
70	*Phyllanthus emblica*	Fruit	Consumed Raw	Oral	Treatment of Pneumonia and Gastritis
71	*Phytolacca acinosa*	Leaf	Cooked and Consumed	Oral	Consumed as Food and Treatment of Blood Pressure and Food Poisoning

72	*Piper betle-oides*	Leaf	Consumed Raw with Betel Nut	Oral	Chewed as Betel Nut (Doma)
73	*Piper hamilto-nii*	Whole Plant	Consumed Raw	Oral	Treatment of Cough and Cold
74	*Piper longum*	Seed	Consumed Raw	Oral	Treatment of Blood Pressure, Cough and Cold
75	*Piper pee-puloides*	Fruit & Seed	Consumed Raw	Oral	Treatment of Cough and Cold
76	*Plantago de-pressa*	Leaf and Stem	Pound into Paste	Topical	Treatment for Sprained Legs to Relieve Pain
77	*Plectocomia himalayana*	Shoot	Cooked and con-sumed	Oral	Consumed as Food
78	*Pogostemon amaranthoides*	Shoot	Cooked and con-sumed	Oral	Consumed as Food
79	*Poranopsis paniculata*	Stem	Processed to Ex-tract Juice	Topical or Oral	Treatment of Fractured Bones and Cuts
80	*Pouzolzia hirta*	Whole Plant	Pound into Paste	Topical	Treatment of Bone Fractures and Wounds
81	*Rhus chinensis*	Seed	Boiled to Extract Juice	Oral	Treatment of Gastrointestinal Discomfort and Food Poisoning
82	*Rubus biflorus*	Fruit	Consumed Raw	Oral	Consumed as Food
83	*Rubus ellipti-cus*	Fruit	Consumed Raw	Oral	Consumed as Food
84	*Rubus nepa-lensis*	Fruit	Consumed Raw	Oral	Consumed as Food
85	*Rumex nepa-lensis*	Whole Plant	Processed to Ex-tract Juice	Oral	Treatment of Jaundice and Ringworms
86	*Smilax aspera*	Shoot	Cooked and Con-sumed and Pound into Paste	Oral and Top-ical	Consumed as Food and Treat-ment of Toothache
87	*Solanum khasi-anum*	Seed	Processed into Powder and Smoke	Inhale Smoke	Traditionally Used for Treat-ment of Toothache

88	*Spatholobus parviflorus*	Stem	Soaked in Water and Consumed	Oral	Treatment of Diabetes
89	*Spondias pinnata*	Seed	Consumed Raw (Fruit) and Processed into Powder and Mixed with Water (Seed)	Oral	Consumed as Food and Treatment of Cough and Cold
90	*Stephania glabra*	Shoot & Tuber	Cooked and Consumed (Shoot) and Processed to Extract Juice and Consumed (Tuber)	Oral	Treatment of Blood Pressure for Humans; Diarrhoea and Haematuria for Animals
91	*Swertia chirayita*	Whole Plant	Boiled to Extract Juice	Oral	Treatment of Fever, Headache, and Joint Pain
92	*Terminalia chebula*	Seed	Consumed Raw	Oral	Treatment of Sore Throat
93	*Thysanolaena latifolia*	Shoot	Pound into Paste	Topical	Treatment of Boils
94	*Tinospora cordifolia*	Stem	Pound into Paste	Oral	Treatment of Blood Pressure
95	*Toddalia asiatica*	Fruit	Consumed Raw	Oral	Consumed as Food
96	*Trichosanthes tricuspidata*	Shoot	Cooked and Consumed	Oral	Consumed as Food
97	*Tupistra nutans*	Flower	Consumed Raw/ Cooked	Oral	Consumed as Food
98	*Uncaria scandens*	Stem	Soaked in Water Overnight and Consumed Water (Stem), and Processed to Extract Juice (Root)	Oral	Treatment of Hypertension
99	*Viscum articulatum*	Leaf	Boiled to Extract Juice	Oral	Treatment of Fractured Bones and Body Pain
100	*Wendlandia puberula*	Leaf	Processed into Tea Leaves	Oral	Consumed as Traditional Beverage
101	*Zanthoxylum armatum*	Seed	Boiled to Extract Juice	Oral	Treatment of Headache and Gastric