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RESEARCH ARTICLE

ROLE OF UNDERUTILIZED AND NEGLECTED PLANT SPECIES TO ASSURE FOOD SECURITY IN CHEPANG COMMUNITY

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ABSTRACT

Underutilized and neglected plant species have high nutritional value, but those in higher demand have overshadowed them; their role in achieving food security is not adequately understood. Food security is a critical issue in the context of the Chepang community that possesses immense knowledge on underutilized and neglected plant species and has been exploiting these crops traditionally from the very beginning. The survey was conducted with the objective of studying and investigating the use of these plant species in that community and accessing the role of them in assuring their food security. Siddhi VDC in Chitwan district was purposively selected as the study site. A total of 32 households were randomly chosen for the household survey conducted using a semi-structured interview structure. Relevant information was also collected through key informants' interview. It was found that the food was unavailable for 3.2 months. Out of the total population, 75% of people exploit underutilized and neglected plant species to cope with the problem of food scarcity when the stored food grains are depleted, and new harvests are not available. Among them, 25% entirely depends on underutilized and neglected plant species, whereas remaining cope with the situation either by buying the food supplies from the market or by exchanging following barter system. The data obtained show that 84.4% of people depend on the thicket as a significant source of underutilized and neglected plant species. These plant species can play a vital role to transcend the unsecured food world into a secure world. Thus, there is a need to exploit the potential of these plant species to complement the staple crops so that the food security of the Chepang community can be improved.

KEYWORDS

under-utilized, plant species, Chepang, food security.

1. INTRODUCTION

Traditional and indigenous food sources constitute the bedrock of diversity in the traditional and indigenous food system of communication in developing the country (Durst and Bayasgalanbat, 2014). Underutilized and neglected plant species are the domesticated plant species that have been used for centuries or even millennia for their food, fiber, fodder, oil, or medicinal properties. Still, they have reduced in importance over time owing to particular supply and use constraints (Dahanayake, 2015). Underutilized is commonly applied to refer to species whose potential has not been fully realized (IPGRI, 1999). It may be about concerning geographical distribution or socio-economic or time factor. For instance, chickpea is considered as underutilized and neglected plant species by many Italian scientists, but it is the main pulse crop in countries in West Asia (Padulosi et al., 1987).

Underutilized and neglected plant species have a relatively high significance. In essence, they have high nutritional value, are readily available and free of cost, can turn into a better source of income, especially to the marginalized people (Azetsop and Joy, 2013). These can serve as an alternative food supply to those places where cultivation on the staple cereal crops is least feasible, thereby contributing to alleviating food insufficiency problem (Tyagi et al., 2017).

The world today relies on a small number of crop species for food, mainly major cereals (wheat, rice, and maize), leaving an abundance of genetic resources and potentially beneficial traits neglected (Joshi et al., 2017). Exploiting the vast reservoir of minor and underutilized crop plants would provide a more diversified agricultural system and food sources necessary to address food and nutrition security concerns in the face of climate change (Massawe et al., 2015). Despite its high importance for food and nutrition security, this crop is still neglected and underutilized due to lack of market opportunities, consumers' demand and policy focus (Adhikari et al.,2017).

Chepangs are marginalized and disadvantaged groups in terms of health care and different other resources as a result of extreme poverty (Sharma, 2011). Hence, the government has designated them as those, most in need of food security- a condition in which people have availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life and public health attention (FAO, 2006). They are compelled to live a life full of problems, difficulties, and have to struggle for every minute thing. Chitwan, though, having been occupied by developed areas inhabited by rich people, there are undeveloped areas too, where Chepangs reside over. They have come initially to the present day by living on hilly cum mountain areas and hunting animals with the help of their dog and bows.

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A very miserable condition on every facet of life is a newer challenge to every morning-cum-evening (Piya et al., 2011). They adopt multi-pronged livelihood strategies like wage labor, collection of forest products, rearing small livestock, selling bamboo handicrafts, and selling agriculture and forest products (Aryal, 2013). Likewise, most of them consume underutilized and neglected plant species like pidalu, vyakur, sisnoo, etc. in the form of fruits, vegetables, and medicines which form their staple during the period of food shortages. These plant species contribute to the sustainable livelihoods through household food security by widening the food basket, adding nutrients to the diet (Mayes et al., 2012). Coordinated approaches on the local, regional and international level have to be integrated to exploit the potential of these plant species that consequently demand the involvement of numerous multi-stakeholders (Baldermann et al., 2016). Hence, this paper aims to study and investigate the use of underutilized and neglected plant species in Chepang community and access the role of these crops in assuring their food security.

2. Materials and Methods

2.1 Study site and sample

The study was conducted in Sidhhi VDC (27.71° N to 84.65° E) of Chitwan district, Narayani Zone (Encyclopedia, 2008). Chitwan, being one of the developed cities of Nepal, consists of parts with famine and unavailability, unavailability in terms of basic needs, basic infrastructures. Out of total households in Chepang community of Siddhi VDC, only 32 households were selected for questionnaire schedule entertainment and data generation due to less population, scattered households, and no accessible motorable roads to the VDC.

2.2 Survey design and data collection

Data were collected from both primary and secondary sources. Field surveys were carried out during the month of January-March 2018 to document the information on various aspects of underutilized plant species, including local names of plant species and shared use as well. Structured and semi-structured questionnaires were used for the community survey. Pre-testing was done to test the validity and effectiveness of the interview schedule. Key informant interview was conducted with the local critical persons like the school's principal and lead farmers. FGD was also conducted to cross-check the information obtained through the interview schedule. Further, secondary data was collected from the literature review and internet browsing.

2.3 Methods and techniques of data analysis

Quantitative and qualitative data obtained from the survey were coded, entered, and analyzed by using SPSS and Ms-Excel software. Data were analyzed by using statistical tools like descriptive statistics, frequency count, percentage, and charts.

3. Results and Discussion

The study area is rich in underutilized and neglected plant species. A large number of domesticated or semi-domesticated underutilized and neglected plants cultivated by the Chepang people not only influence their food habits and way of life but also contribute to food security at the times of food shortage.

3.1 Type and size of holdings

Each chepang family possesses pakho bari (upland) and khet bari (lowland). The following table shows the descriptive statistics regarding the type of land and size of the holding.

Table 1: Descriptive statistics for types of land

S.N.	Type of land	No. of respondent	Mean
1	Pakho bari	32	7.2031
2	Khet land	32	1.6875

Source: Field survey, 2018

The above table reveals the type and size of holdings. The maximum size of the pakho bari is 30 kattha per household, and khet is 15 kattha per household, while the minimum size for respective categories is 0 kattha. The average size of holding for pakho is 7.2031, for khet is 1.6875. Similarly, the total land that Chepangs possess is further categorized as own land, lease land (land with land ownership certificate), and ailani (land without land ownership certificate).

Table 2: Descriptive statistics for types of land on the basis of land ownership

S.N.	Type of land	No. of respondent	Mean
1	Own land	32	3.8750
2	Lease land	32	0.00
3	Ailani land	32	5.4215

Source: Field survey, 2018

The maximum size of own land is 3.8750 kattha per household, and aailani land is 5.4215 kattha per household.

3.2 Types and quantity of crops grown

Chepangs mainly grow cereal crops like maize, buckwheat (phapar), finger millet (Kodo), rice, and wheat. Generally, rice and wheat are grown in khet land. As pakho bari faces the problem of sound irrigation, crops like maize, finger millet- which can thrive even in low water supplement- are grown over there. These crops are grown on rain-fed conditions while cereal crops like buckwheat are grown in khet and pakho bari as well.

Table 3: Descriptive statistics for area and production

Description	Mean Area	Mean Production
Maize	6.52	444.03
Buckwheat (Phapar)	1.97	55.91
Finger millet(Kodo)	3.27	109.44
Rice	1.66	188
Wheat	0.81	23.25

Source: Field survey, 2018

The above table reveals that maize is cultivated in the most extensive area as compared to that of rice and wheat because maize can thrive even in pakho bari where irrigation is a significant constraint, but rice and wheat cannot. It is found that the production of maize was high as compared to that of other major staple cereals because the area for cultivation was high as it didn't require much irrigation. Further, people consume maize, the most, as 'lette' because of its high production

3.3 Food insufficient months

Chepangs have still not been able to uplift them from poverty line and are compelled to live a tragic life full of famine and unavailability. There is a saying in Nepali' 6 mahina sakal ani 6 mahina anikal' meaning that these people have enough food to eat for six months, and the rest six months, they live in famine. The land that they have is not enough to meet their needs, and lack of irrigation has further aggravated the situation. They work day and night as a lumper, constructors, labors, or they move to the jungles in search of food to cope with the condition. Little improvement has occurred in terms of lifestyle and economic status in the past few years, yet the problem of food insufficiency is still extant.

Table 4: Descriptive statistics for food insufficient months

S.N.	No. of food insufficient months	% of household
1	1	25
2	2	12.5
3	2.2	6.25
4	3	9.375
5	4	25
6	5	6.25
7	6	12.5
8	7	3.125

Source: Field survey, 2018

The table above reveals that on average food is unavailable for 3.2 months. It is lucid that for about eight months, they are supported by the crops they grow in their land.

3.4 Coping strategies during food shortage

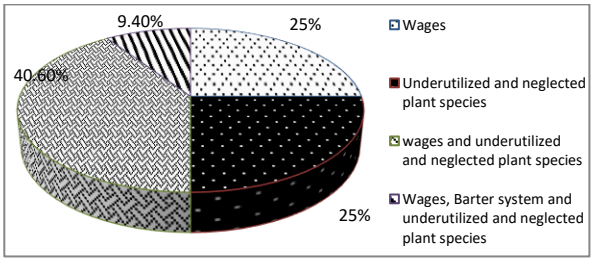

Figure 1: Proportion of coping strategies during food shortage periods

Source: Field survey, 2018

Chepangs have been using underutilized and neglected plant species as the best coping strategies during the times of food shortages. The above pie-chart reveals that out of the total population surveyed, 75% of people exploit these plant species for feeding their families when the stored food grains are depleted, and the new harvest is not available. Among them, 25% entirely depends on them, and the rest cope with the situation by buying food supplies from the market or by exchanging following barter system while 25% of the total population work as labor. This reveals that underutilized and neglected plant species contribute to the highest % to cope with the situation. It has been found that for about 84.4% of Chepangs, the primary source of these plant species is a thicket, about 3.1% collect them from nearby surroundings, about 3.1 % collect them from the kitchen garden, and remaining 9.4% collect them from both thicket and nearby surrounding.

Table 5: Underutilized and neglected plant species found in Siddhi VDC with their local use

S.N.	Common name	Scientific name	Family	Parts used	Mode of use
1	Sisno	Urtica dioica	Urticaceae	Whole parts	Used as vegetable and medicine
2	Pidalu/ Gaba	Colocasia esculenta	Araceae	Leaves and tuber	Used as vegetable
3	Phapar	Fagopyrum esculentum	Polygonaceae	Seeds	Used as pancake, fodder
4	Kodo	Eleusine corocana	Gramineae	Seeds	Used as pancake, fodder, beverages
5	Tanki	Bauhinia purpurea	Fabaceae	Leaf, twigs, pod	Used as vegetable and fodder
6	Ghar tarul	Dioscorea alata	Dioscoreaceae	Root/tuber	Used as vegetable
7	Gittha/Vyakur	Dioscorea bulbifera	Dioscoreaceae	Root/tuber	Used as vegetable
8	Chuiri	Aesandra butyraceae	Sapotaceae	Fruit	Used as fruit
9	Niuro	Dryopteris cocheleata	Aspidiaceae	Stem	Used as vegetable
10	Tama	Bambusa spp	Gramineae	Immature buds	Used as vegetable
11	Khaniya	Ficus cunia	Moraceae	Fruit	Used as fruit
12	Bethe	Chenopodium album	Chenopodiaceae	Leaves, seeds	Used as vegetables, pickles
13	Latte	Amaranthus viridae	Amaranthaceae	Leaves	Used as vegetables
14	Bel	Aegle marmelous	Rutaceae	Fruit and leaves	Used as fruit and in religious purposes
15	Sakhar khanda	Ipomea batata	Convolulaceae	Tuber	Eaten after boiling, used in religious occasions
16	koiralo	Bauhinia variegata	Fabaceae	Flowers, leaves	Used to make pickles
17	Gahat	Macrotyloma uniflorum	Leguminosae	seeds	Used as pulses, fodder
18	Skush	Sechium edule	Cucurbitaceae	Twigs, fruits and roots	Used as vegetables
19	Kubindo	Benincas hispida	Cucurbitaceae	fruits	Used as vegetables, pickles
20	Kaguno	Setaria italic	Gramineae	Seeds	Used as pancake, beverages
21	Silam	Perilla frutescens	Lamiaceae	Seeds	Used to make pickles
22	Til	Sesamum orientale	Pedaliaceae	Seeds	Used to make pickle and used in religious occasions
23	Masyang	Vigna umbellata	Leguminosae	Seeds	Used as pulse
24	Rayo	Brassica nigra	Cruciferae	Leaves	Used as vegetables
25	Kurilo	Asparagus racemosus	Liliaceae	Twigs and stem	Used as medicine and in religious purposes
26	Bhang	Cannabis sativa	Cannabaceae	Seed	Used to make pickle
27	Jau	Hordeum vulgare	Gramineae	Seeds	Used as beverages and in religious puroses
28	Dhaniya	Coriandrum sativum	Umbellifereae	Leaves and seeds	Used as spice
29	Andeer	Ricinus communis	Euphorbiaceae	Fruit	Used as fruit
30	Kaphal	Myrica esculenta	Myricaceae	Fruit	Used as fruit

Source: Field survey, 2018

During the present study, information was collected on 30 plant species belonging to 24 families. Among the crops mentioned above, the most frequently used crops are Buckwheat, Finger millet, Pidalu, Sisnu, and Vyakur. Parts of the said plant species on the table; seed, fruit, tuber, leaf, stem, twigs, and root are mainly used for consumption. The study reveals that most of the underutilized and neglected plant species recorded in the study area is used for multipurpose like food, fruit, religious purpose, vegetable and pickle. According to the respondents, some of the plants like 'varlyang' should be properly cooked before consumption, which would otherwise result toxic if not adequately prepared.

The study further reveals that Chepangs frequently visit the thicket for the collection of underutilized and neglected plant species, mostly during the time of food shortages. The visit is found to be dependent upon the number of food unavailable months, the distance of thicket from the settlement areas, and their preference for consumption. It is found that 34.4% of people make a regular visit, 50% sometimes visit while 15.6% rarely visit the thicket.

3.5 Nutritional content of staple crops and under-utilized and neglected plant species

Table 6: Nutritional content comparison between staple crops and under-utilized and neglected plant species

Nutrition	Energy (kcal)	Protein (g)	Fat (g)
Staple crops			
Rice	345	6.8	0.4
Maize	342	11.1	3.6
Wheat	346	12.1	1.7
Potato	110	3	0
Underutilized and neglected plant species			
Finger millet	328	7.3	1.3
Buckwheat	323	10.3	2.4
Colocasia	112	1.5	0.20
Dioscorea	108	1.52	0.17
Urtica	42	2.7	0.1

Various studies have concluded that the nutritional content of underutilized and neglected plant species are comparable to that of staple crops i.e., underutilized and neglected plant species provide more or less equal nutrient on consumption as provided by staple crops. For instance, finger millet supplies 328 kcal of energy, and rice supplies 345 kcal of energy. The protein provided by finger millet is 7.3 g, while that provided by rice is 6.8 g.

Also, colocasia- used as a vegetable- supplies nutrient that is comparable to potato. Though these have high nutritional value, most people are unaware of their importance. So, most of them use those as the source of food only while very few of them know about their medicinal value and use them for medicinal purposes. For instance, Sisnu has high vitamin content and is also used to treat fever, and gittha is used to treat diarrhea.

4. Conclusion

Underutilized and neglected plant species are under-researched crops. The above plant species have been an integral part of the food basket of chepang households for hundreds of years. Hence, promoting these plant species is an alternative for the conservation of agrobiodiversity, and this will contribute to the improvement of food sufficiency and economic well-being of Chepangs in the mid-hills of Nepal, such as Sidhhi. The cultivation and consumption of these crops, however, have decreased over time despite their nutritional value. Deterioration of the local food system, changing food habits, perception of these foods as inferior food items, lack of knowledge about their cultivation, and lack of awareness of the use and nutritional value of these crops are the primary reasons behind this.

If these plant species are integrated into local food systems, there would be an increase in the food supply, thereby contributing to food security. This can improve the diversity of available food, which further enhances the variety of food intake, thereby improving the absorption of micronutrients, conducive to better health. This can reduce the prevalence of micronutrient deficiencies and anemia in children and women. Also, underutilized and neglected plant species require fewer chemical fertilizers and pesticides. This reduces chemical-induced health hazards. Integrating these into the food system, most importantly, will reduce the climatic and economic risks associated with advanced cereals and cash crops. Since these plant species are highly climate-resilient, there is no risk of supply being cut due to natural hazards and economic factors.

Thus, it can be concluded that incorporating underutilized and neglected plant species into the local food system strengthens food security and health. They have great potential to alleviate hunger directly, through increasing food production in challenging environments where major crops are severely limited, through nutritional enhancement to diets focused on staples, and through providing the poor with purchasing power, helping them buy the food that is available (Hermann, 2012). But their role in the nutrition security on Chepangs is not fully understood, and they haven't been mainstreamed in the policies and program for agriculture, food security, and nutrition. Hence, there is an imperative need to mainstream these plant species into government programs and policies, ensure the availability of germplasm for them, provide incentives to farmers to cultivate them, create nutritional mechanisms and raise awareness about the nutritional value of underutilized and neglected plant species to assure food security.

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