



TRAGEDY OF THE UNDERUTILIZED CROPS AND PEOPLE WITH CHANGING CLIMATE: A CASE FROM CHEPANG TRIBAL COMMUNITIES OF NEPAL

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Abstract: Food security is critical issue in context of marginalized communities depending upon natural resources for their livelihoods and chepangs are one among the marginalized. Chepangs are one among the ethnic groups in Nepal living mostly in the fragile ecosystems of mahabharat range. Chepang community possesses immense knowledge on forest products and crop landraces and utilizes the various plants for food, medicine to cope with changing environments. The study was conducted in multi-stage random sampling of 15 households each from Shaktikhor, Kaule and Siddi VDC of Chitwan district. The underutilized species were used by the local people in different forms (food, vegetables, medicine, and for cultural and economical reasons). The uses of 46 underutilized plant species were documented; including 25 species with multiple functions as food, vegetables, and medicines. The overall contribution was about 2.7 months a year, with a significant difference between Siddhi(3.8months), Shaktikhor(2.4 months) and Kaule(1.9 months).

Keywords: *Livelihoods, Food Security, Underutilized Species, Chepang Community, Ethnic Minorities.*

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INTRODUCTION AND BACKGROUND

Nepal is a least developed country and ranks 142 out of 177 countries on the Human Development Index (UNDP, 2009). Nepal's poverty is the result of many factors among which, low agricultural productivity is one that has great impact being 2/3rd of population of Nepal is dependent upon agriculture for their livelihood security. Food security is of great concern and is an over burning issue in context of recent increase in world food prices and impacts of climate change on smallholders agriculture. Nepal is rich in genetic biodiversity due to its extreme variation in altitude, ecology, farming system and varied socio cultural settings. Nepal comprised only 0.09% of global land areas; the country possesses a large diversity of flora and fauna at the genetic, species and ecosystem level (NBS, 2002). Plant species used in food and agriculture can play a crucial role in the national economy of agro based country Nepal. This fact lures the attention of the research community to the conservation and sustainable use of Nepal's biological diversity. During the past three decades, however, government or non government sectors focus in

raising livelihood status and food security are focused on exotic technologies and inputs, which are high external input based. These development efforts centered not in analyzing local opportunities of livelihood based on local crop species rather orienting the farmers as if high input agriculture system is inevitable for uplifting their livelihoods. Due to extensive range of climatic variability, varying from tropical to alpine temperatures, thousands of indigenous varieties of cereals, fruits and vegetables are found growing wild in Nepal. Some of these were identified and selected by local people for growing in kitchen garden or even as a main crop. Many are still growing in the wild such as Fern (*Diplazium stoliczkae*), wild edible yam (*Dioscoreas spp.*), nettle vine (*Urtica dioica*) and so on. The local people collect them for home consumption only if other alternatives sources of vegetable do not available and rarely sales to market.

Chepangs are the socially and economically marginalized communities, living on a marginal resource base, and in isolated condition. Chepangs are in Nepal living mostly in the Mahabharat mountain ranges of Makwanpur, Chitwan, Gorkha, Tanahu and

Dhading districts characterized by high mortality rate, low literacy percentage and poor entrepreneurship skill. Their total population is about 40 thousand (SEACOW and SNV, 1996). Very few of these hunting tribal people started deriving subsistence from agriculture. Otherwise hunting, wood collection etc have been their foremost living subsistence. Though they are economically backward, the rich biological diversity of area has enriched them and only the way of food security. But these rich biological diversities are still under explored and processed. Chepang community possesses an immense knowledge on forest products and crop landraces and utilizes the various plants for food, medicine to cope with environments.

STATEMENT OF THE PROBLEM

Food security issues in Nepal are bound up with the fact of extreme topographical variation and poor connectivity despite wide ecological, agricultural and economic diversity. Rural dwellers of 16 hill districts of Nepal are facing recurring food insecurity despite ample opportunities to meet food security in their context. Efforts are centered not to identify local solution to combat

food insecurity problem rather to orient farmers in providing high external input agriculture (HEIA) options for increasing productivity, where latter is not feasible as rate of adoption of technology and investing power of farmers is quite low. Chepang communities are living in extreme food insecurity where their collection and/or production is sufficient only to less than 4 months a year and in rest of the months, they are either compelled to reduce the meal specially by women or forced to hard labor. The increases in the population of Chepang, made underutilized species in the vulnerable existence. The living conditions of Chepangs are aggravated by food deficit, poor health, malnutrition, wide spread ignorance and illiteracy. They have been living in or near by forest since ages and exploit plant resources to fulfill their basic needs. They possess an immense knowledge on forest products and utilization of various underutilized plant species for food, medicine and to cope with environments.

JUSTIFICATION OF THE STUDY

Mountains and hills of Nepal are facing chronic food insecurity as a trend rather than shocks since last decade. Approximately 27%

of rural households are food insecure as defined by their very poor or poor food consumption patterns. 16% of rural households have very poor food consumption patterns. Development intervention related to agriculture, in most cases focused on introduction of modern technologies that are high input based, thus are not sustainable and adoptable by rural poor. Besides, heavy emphasis was laid since 4 decades in distributing the foods which are lifted by air with government subsidies @ 10kg/ family / month. The supported rice is not only sufficient enough to two days for hungry family but also changes attitudes of farmers to search for local alternatives. Numerous underutilized and under explored species are there in midhills of Chitwan district that can be explored for income generation, family nutrition availability and long-term sustainability. All development initiatives centered in providing rice in insufficient amount and which ultimately make farmers as if rice is inevitable for life. That, as side effects of development, introduces a mentality of neglecting local alternatives of rice like potato and Taro, Colocasia etc. that are grown since long with special adaptation to that ecosystem. As

traditional crops that are primarily undervalued and underutilized have come into existence down the ages through vigorous natural selection process, they are adaptable to the native agro ecological conditions and have natural resistance to many disease, pests and adverse climatic conditions. Such food crops are also low input crops and can produce desirable yields by adjusting the appropriate low input technology, specifically with reference to irrigation, fertilizers and plant protection chemicals, which are the main constraints in the hilly mountain areas. Underutilized food species can therefore play an important role in remote areas where improved inputs cannot be accessed due to lack of road networks, low purchasing power and unsuitable climate and sloppy hills with low soil productivity. In context of poor road connection, priorities of research and development should be shifted for exploring the local opportunities and identify constraints for exploiting the undervalued species through social and economic analysis. Social analysis is required to identify social barrier that hinders the exploration of such species while economic analysis is required to assess the public vs.

private value, observed vs. potential value and temporal and spatial dimension of undervalued species.

NATURE, SCOPE AND OBJECTIVES OF THE RESEARCH: -

NATURE AND SCOPE:-

The research is based on the survey of the rural Chepang communities living in the midhills of Chitwan district who are presently facing the problem of recurrent food insecurity. This will help to know the current scope and status of livelihood of Chepang communities of midhills of Chitwan. This research project has very wide scope because most of the hills and mountains are facing food deficit problems and is relevant to devise a viable local resource based food security options for rural poor of Nepal.

BROAD OBJECTIVES

To explore the underutilized species that may have significant contribution to food security among Chepang community of Chitwan.

SPECIFIC OBJECTIVES

- To document underutilized

species (vegetables, cereals, fruits, non timber forest products) prevalent in the region

- To know the role of underutilized species in household food security of the Chepang community.
- To assess the social barriers to exploitation of the underutilized species.
- To analyse the relationship between use of uncultivated foods and food security

LITERATURE REVIEW

Nepal is a geographically diversified nation with varied climate, topography and ecology. There is increasing interest in neglected and underutilized crop species both for export and for the domestic market. Such interest stems from a variety of factors including their contribution of agriculture diversification and better use of land, their economic potential and the opportunities they provide for dietary diversification. Most importantly, local population for centuries frequently views underutilized crop species as new species although they have been in use. Traditional food crops offer many benefits

to farmers practicing the various farming system. They provide food for home consumption, make productive use of marginal land and also play crucial role in food security of the rural households residing in countryside. The increased production and consumption of some selected under exploited food plants in Nepal can substitute in part for cereal food requirements and thus assist in solving the food deficit problem. These species persist because they are still useful to local people, occupying special niches in the agro ecology and semi subsistence production system. Some demonstrate an agronomic advantage in terms of adaptability to low input agriculture and marginal lands (Padulosi *et al.*, 2002), environmental services or restoration of degraded lands (De Groot and Haq , 1995). Recent publications have underscored their importance in the livelihoods of the poor though ethnobotanists and anthropologists have long recognized their role in rural life. Some species are gathered as a source of food or cash, especially during lean periods in the agricultural cycle. Others supply diversity, essential nutrients, vitamins or mineral in diets that would otherwise consist

primarily of carbohydrates (John 2004, Johns and Sthapit, 2004). Often, they reflect cultural values too (Johns and Eyzaguirre, 2002). Traditional knowledge is typically associated with the use of these species, while scientific knowledge is emerging, but limited. Since the beginning of the 20th century, people have relied increasingly on a few selected plants for their food supply, with about half of the worlds calorie intake coming from just three crops rice wheat and maize (Prescott Allen and Prescott Allen, 1990, Gruere *et al.*, 2006). For many centuries, farmers in Nepal had been growing several species of food plants including many varieties of millet, barley and buckwheat. During the past three decades, however, the public sector sponsored agricultural programs has been promoting the use of improved exotic varieties of major cereal crops, which is forcing the landraces and underutilized crops out of the picture. In marginal environments of developing agricultural economies, ethno botanic surveys have documented that many less well known species continue to be grown, managed and collected (IPGRI, 2002, Gruere *et al.* , 2006). Research studies were focused on identifying role of home

gardens and their roles in domestication of wild or uncultivated species and linking dietary diversity to biodiversity conservation. Wild or uncultivated plants provide a 'green social security' to hundreds of millions of people in the form of food, materials for clothes and shelter throughout the world (Cunningham 2001). These plants add diversity to local food systems, reinforce culture and contribute with diversity to farming systems, and traditions and are important for household food security, health, and nutrition and income generation (Machakaire 2001, Warinwaa 1995). Between 60% and 70% of populations in developing countries dwell in the interface between agriculture and forest land areas collect various parts of uncultivated plants like roots, leaves, fruits, and nuts (FAO 1992, Hladik *et al.* 1993).

METHODOLOGY

The main objective of this study was to assess the richness of underutilized food species, their status and contribution in the livelihoods of farmers in Nepal. Therefore, the participation of farmers in the study was recognized as of vital importance. The farmer's participation in this

study was ensured through participatory research methods, including group discussions (GD) and other Participatory Rural Appraisal (PRA) tools. In addition, methods like, field observations, household interviews and consultation with experts were used in this study.

STUDY POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUES

The selection of study areas was based on settlement or political division i.e. VDCs, which is the smallest local authority for planning of rural development activities. The study was conducted in multi-stage random sampling of 15 households each from Shaktikhor, Kaule and Siddi VDC of Chitwan district. District based agencies, institutions and individuals were consulted for the identification of potential sites for the study. District forest Offices (DFO) and District Agriculture Development Offices (DADO) (particularly from Chitwan), Nepal Chepang Sangh were consulted for identification of potential sites for the study. A visit was made to both of sites in early March 2009. The purpose of the visit was to brief the community

people about the proposed study. Discussions were held with the community members and farmers suggested villages in the VDC suitable for data collection. The same meeting identified local motivators from the community people that later were involved in the study. They were mainly responsible for arrangement of meetings and identification of individual households during the survey.

SURVEY DESIGN AND METHODS OF DATA COLLECTIONS

Surveys of individual households, key informant interviews of community members as well as personnel from relevant institutions/ organizations, group discussions, field observations, were all employed as methods of data collection.

KEY INFORMANTS SURVEY AND GROUP DISCUSSION

Household survey questionnaires were not sufficient for collecting the required information, so key informant interviews and group discussions were carried out in those sites. Key informants were selected from the farmer's level (2 from each site). Key informants were interviewed about their

perceptions, experience and their opinion about the role of underutilized foods in conservation and sustainable livelihood for the benefit of the local people. During repeated visits to each site further group discussions were held with old aged key informants. A checklist was used for key informants survey and general discussion points for group discussion.

THE HOUSEHOLD SURVEY

The household survey (a questionnaire used during an interview) was designed to get data on existing farming practices, livelihood dependency, use of underutilized plants and their management, role of gender in decision making as well as personal demographic features. The questionnaire consisted of demographic and socioeconomic information from the household, including variables such as sex, age, education, household size, major occupation, food sufficiency, and household income. Furthermore it was devoted to information regarding the shifting cultivation farming practices, underutilized plant species. Finally information regarding the conservation and management of underutilized plant species were dealt with.

FIELD OBSERVATION

Areas where the respondents collected the underutilized species were visited with the local motivators, and some key informants, to see the species and their habitat. During the visit the team also noted the availability of uncultivated species found in that particular season. During the visit, harvesting methods, parts used, harvest quantity as well as treatment and storage of different species for future use was discussed.

DATA ANALYSIS

Both qualitative and quantitative data were collected from primary and secondary sources. The primary data was collected in the study areas, while secondary data was derived from available statistics in District Development Committees (DDC), Nepal Census Indicators 2001 and Trends, Central Bureau of Statistics (CBS). Also other relevant governmental and non-governmental institutions were consulted and visited for collection of information for this study. The qualitative data were obtained from Group Discussions (GD), Participatory Rural Appraisal (PRA) and Key Informants Surveys (KIS). The quantitative data were mainly obtained from household

surveys was analysed using SPSS computer software package.

RESULT AND DISCUSSION

SOCIOECONOMIC STATUS

Farmers' in the selected areas live under different socio-economic conditions in terms of education, income sources, food sufficiency levels, family size, age and occupation. Overall the number of interviewed respondent, only women (5.4%) and men (94.6%) were household head. There was a great significant difference in terms of sex as household head among three different VDC. The mean age of all respondents was 51 years, and 42, 53 and 54 in Siddhi, Shaktikhor and Kaule respectively. 68 % of the respondents were between 15-59 years, 32% were more than 59 years and no any respondent were of age <15 years because older members of the household were selected for the household survey, due to expected knowledge about underutilized species.

The average household size (number of people) in Siddhi(5.933), Shaktikhor(5.80), and Kaule (6.06) which shows Kaule has higher population density. In general the level of literacy in the study sites was low.

Table I. Socio-economic features of the respondents (number of respondents) in the three study areas (Siddhi, Shaktikhor and Kaule). Proportions in different categories are presented within brackets.

Categories

Sex

| | Siddhi | Shaktikhor | Kaule |
|--------|----------|------------|----------|
| Male | 13(28.9) | 11(24.4) | 10(22.2) |
| Female | 2(4.4) | 4(8.9) | 5(11.1) |

Age group

| | Siddhi | Shaktikhor | Kaule |
|-------|----------|------------|----------|
| 15-59 | 13(28.9) | 10(22.2) | 12(26.7) |
| >59 | 2(4.4) | 5(11.1) | 3(6.7) |

Education group

| | Siddhi | Shaktikhor | Kaule |
|-----------------|----------|------------|----------|
| Non educated | 10(22.2) | 10(22.2) | 13(28.9) |
| Primary | 2(4.4) | 3(6.7) | 2(4.4) |
| Lower secondary | 3(6.7) | 1(2.2) | 0 |
| graduate | 0 | 1(2.2) | 0 |

Average household size

| Siddhi | Shaktikhor | Kaule |
|--------|------------|-------|
| 5.933 | 5.80 | 6.06 |

Respondents with graduation in the study site are only one which shows the region is beyond of higher education. More than 75% of the total respondents were illiterate. Comparatively, illiterate respondents were more common in Kaule (28.9%) than in Siddhi and Shaktikhor (22.2%).

LIVELIHOOD FEATURES

OCCUPATION AND INCOME

Agriculture was the main source of livelihood for majority of the households in the study areas. Overall, 95% of the total respondents were found engaged in agriculture as their major occupation. However, agriculture was not sufficient to sustain their livelihood throughout the year, and about 90% of the respondents in Kaule, 87% in Siddhi and Shaktikhor ranked wage labour as the second most important occupation.

Selling of homemade liquor, handicrafts, vegetables etc. (local business) was a source for cash income for 60% of the households although its contribution to overall income was very low.

FOOD SUFFICIENCY LEVELS

In all the study sites, food surplus was negligible and most of the people had to purchase food. Only 20% respondents' households in Shaktikhor and 13.33% in Kaule were enjoying food sufficiency from their own production. However no respondent's household in Siddhi were found enjoying food sufficiency for more than 10 months a year. For 66.6% of the households in Siddhi, 46.66% in Shaktikhor and Kaule their own production was sufficient for less than 6 months a year. (Appendix 1)

During the food deficit months, these households adopted different strategies to meet their food demands (Table 2). Wage labour, share cropping, selling of livestock, collection of wild foods, exchange and selling of products were major strategies adopted by the people in order to survive food scarcity periods. A majority of the households in Siddhi(40.6%), Shaktikhor(37.5%) and Kaule (21.9%) depended heavily on wage labour to earn living. Over 38.7% of the household in Siddhi and shaktikhor were engaged in collecting wild and uncultivated foods to supplement their food during food deficit months, which was a significantly higher proportion than the 22.6% in Kaule.

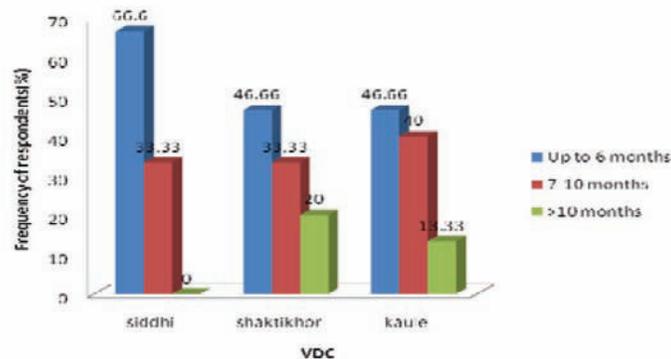


Figure 3: Food sufficiency levels (no. of months) of the households in Siddhi, Shaktikhor and Kaule

Table 2. Frequency of different strategies (and proportion of respondents within brackets) adopted during food deficit months in Siddhi, Shaktikhor and Kaule.

Strategies adopted by them

| VDC | Wage labour | Collection in forests | Share cropping | exchange | buying |
|------------|-------------|-----------------------|----------------|----------|----------|
| Siddhi | 13(40.6) | 12(38.7) | 0 | 11(30.6) | 11(30.6) |
| Shaktikhor | 12(37.5) | 12(38.7) | 0 | 11(30.6) | 11(30.6) |
| Kaule | 7(21.9) | 7(22.6) | 0 | 14(38.9) | 14(38.9) |

ABUNDANCE OF UNDERUTILIZED SPECIES AND THEIR STATUS

A total of 46 underutilized plant species have been documented. The greatest richness of the

underutilized species was found from the forest environments. These resources have been used by chepang ethnic groups for various purposes provided their multi functionality in the study sites.

Table 3. List of Underutilized Species that has been documented

| SN | Nepali name | Chepang name | English name | Scientific name | Growth Habit |
|----|-------------|--------------|--------------|------------------------------------------------------|--------------|
| 1 | Ainselu | Lyang sai | Raspberry | <i>Rubus ellipticus</i> Sm. Rosaceae | P |
| 2 | Amaro | Pakmaru | Golden apple | <i>Spondias cytherea</i> Sonn. Anacardiaceae | P |
| 3 | Amrisho | Phek | Broom grass | <i>Thysanolaena maxima</i> (Roxb.) Kuntze Poaceae | P |
| 4 | Ban kera | Ban maisai | Banana | <i>Musa balbisiana</i> Colla. Musaceae | P |
| 5 | Ban tarul | Brangoi | Wild yam | <i>Dioscorea bulbifera</i> L. Dioscoreaceae | P |
| 6 | Bankakri | Banaisai | - | <i>Solena heterophylla</i> Lour. Cucurbitaceae | A |
| 7 | Bans | Chyas | Bamboo | <i>Bambusa nepalensis</i> Stapleton Poaceae | P |
| 8 | Bel | Bel | Wood apple | <i>Aegle marmelos</i> (L.) Corrêa Rutaceae | A |

| | | | | | |
|----|---------------|-----------|----------------------|----------------------------------------------------------------|-----|
| 9 | Bethe sag | Bethu | Lamb's quarter | <i>Chenopodium album</i> L. Chenopodiaceae | A |
| 10 | Bhakyamlo | Rusai | Nepalese sumac | <i>Rhus javanica</i> L. Anacardiaceae | P |
| 11 | Bhimsen pati | Goihomro | Butterfly bush | <i>Buddleja asiatica</i> Lour. Scrophulariaceae | P |
| 12 | Bhorla | Maklo | Camel's foot climber | <i>Bauhinia vahlii</i> Wight & Am. Fabaceae | A |
| 13 | Bhyakur | Pass | Cush-cush yam | <i>Dioscorea deltoidea</i> Wall. ex Griseb. Dioscoreaceae | A P |
| 14 | Camuna | Camuna | - | <i>Syzygium cerasoides</i> (Roxb.) Raizada Myrtaceae | P |
| 15 | Chilaune | Kyangsi | Needle wood | <i>Schima wallichii</i> (DC.) Korth. Theaceae | P |
| 16 | Chiuri | Yosai | Butter tree | <i>Diploknema butyracea</i> (Roxb.) H.J. Lam Sapotaceae | P |
| 17 | Dumri | Dumri | Cluster fig | <i>Ficus racemosa</i> L. Moraceae | P |
| 18 | Githa | Lak | Air potato | <i>Dioscorea bulbifera</i> L. Dioscoreaceae | A |
| 19 | Jaluko | Fyaksa | - | <i>Remusatia vivipara</i> (Roxb.) Schott Araceae | A |
| 20 | Jamun | - | Black plum | <i>Eugenia formosa</i> Wall. Myrtaceae. | P |
| 21 | Jangali aanp | Bantaksai | Wild mango | <i>Mangifera indica</i> L. Anacardiaceae | P |
| 22 | Jaringo | - | Poker weed | <i>Phytolacca acinosa</i> Roxb. Phytolaccaceae | A P |
| 23 | Kabro | Kabra | Elephant fig | <i>Ficus lacor</i> Buch.-Ham. Moraceae | P |
| 24 | Kaphal | Kaphal | Box myrtle | <i>Myrica esculenta</i> Buch.- Ham. ex D. Don Myrtaceae | A |
| 25 | Katus | Ekai | Chestnut | <i>Castanopsis indica</i> (Roxb. ex Lindl.) A. DC. Fagaceae | P |
| 26 | Khaniyo (Rai) | Koksai | - | <i>Ficus semicordata</i> Buch.- Ham. ex Sm. Moraceae | P |
| 27 | Khole sag | Simsag | Brooklime | <i>Veronica beccabunga</i> L. Scrophulariaceae | A |

| | | | | | |
|----|-----------|-----------|------------------|-----------------------------------------------------------------|-----|
| 28 | Koiralo | Rimsi | - | <i>Bauhinia purpurea</i> L. Fabaceae | P |
| 29 | Kurilo | Jyordum | Wild asparagus | <i>Asparagus racemosus</i> Willd. Asparagaceae | A P |
| 30 | Kutilkosa | Nakatisai | Clover vetch | <i>Vicia angustifolia</i> L. ex Reichard Fabaceae | A |
| 31 | Latte sag | Dakhinsag | Amaranth | <i>Amaranthus spinosus</i> L. Amaranthaceae | A |
| 32 | Lunde | Armulya | Pigweed | <i>Amaranthus viridis</i> L. Amaranthaceae | A |
| 33 | Nigalo | Monyanro | Himalayan bamboo | <i>Arundinaria falcata</i> Nees Poaceae | P |
| 34 | Nimaro | Nemsi | Eve's | <i>Ficus auriculata</i> Lour. | P |
| 35 | Niuro | Niuro | Edible fern | <i>Dryopteris cochleata</i> (D. Don) C. Chr. Dryopteridaceae | A |
| 36 | Pakhanbed | Pakhanbed | Rock foil | <i>Bergenia ciliata</i> (Haw.) Stemb. Saxifragaceae | P |
| 37 | Pandel | Yausi | - | <i>Ziziphus incurva</i> Roxb. Rhamnaceae | P |
| 38 | Raikhanyu | Koksi | Nepal fodder fig | <i>Ficus semicordata</i> Buch.- Ham. ex Sm. Moraceae | P |
| 39 | Shiplican | Dyoyaisag | Garlic pear | <i>Crataeva unilocularis</i> Buch.- Ham. Capparaceae | P |
| 40 | Simali | Glausigoi | Orange jasmine | <i>Murraya paniculata</i> (L.) Jack Rutaceae | P |
| 41 | Sisno | Nelau | Nettle | <i>Urtica dioica</i> L. Urticaceae | P |
| 42 | Siundi | Kituki | - | <i>Euphorbia</i> sp. Euphorbiaceae | P |
| 43 | Tanki | Saga | Pink bauhinia | <i>Bauhinia purpurea</i> L. Fabaceae | P |
| 44 | Timoor | Umpur | Nepal pepper | <i>Zanthoxylum armatum</i> DC. Rutaceae | P |
| 45 | Tindu | Tindu | Tindu | <i>Diospyros malabarica</i> (Desr.) Kostel. Ebenaceae | A |
| 46 | Tyaguna | - | - | <i>Dioscorea pentaphylla</i> L. Dioscoreaceae | A |

A=annual, P= perennial

CONCLUSION AND RECOMMENDATIONS

This study has revealed that underutilized plant species are used for consumption at times of food shortage, which has the potential to become valuable staple foods and important alternatives to the usual food crops cultivated by farmers. The option to improve food production through exploiting the potential of underutilized food plants might be a sustainable, cheap and local alternative for decreasing the food shortage problem. At the same time, development of use of underutilized food plants might contribute to biodiversity. There is a need of integrated research and development programmes for forest dwelling communities like Chepang, Tharu, Darai, Bote, Majhi in Nepal (with food sufficiency problems), where underutilized foods provide key supplements to the main diet and are of great medicinal and cultural importance. Without the understanding of the importance of both staple crop foods and underutilized foods, agricultural planning will have no major focus and exclude the diverse and important underutilized food resources with major focus on few staple food crops. The contribution of underutilized plants

needs to be taken into account in planning and investment in the development of these resources will make a major contribution to the alleviation of poverty. However, additional investigations on the use and availability of underutilized plants in different regions and countries are needed. One of the greatest difficulties for including underutilized plant species in agricultural research and development is because of lack of basic information regarding the underutilized species. So there is little appreciation by planners, policy makers and developers. Emphasis must therefore be placed on national and local actions to develop a standardized inventory of use values of these resources. The underutilized plants are important sources of food and nutritional security to the thousands of people especially in the rural areas, so there is a need of integrated research and development activities. A number species are being gradually eroded so, conservation of these resources should be initiated by the government and research institutions with participation of local community people. In the same time, the traditional knowledge, skills regarding utilization and management of underutilized resources should be documented and protected.

BIOGRAPHY

Mr. Bed Prasad Khatiwada obtained his Masters in Agriculture Science from Nepal in 2004 and involved in food security and livelihood projects. He worked for design and implementation of project and capacity building of rural leader farmers and focused on sustainable agriculture and low external input technologies. He has published dozen of books, booklets on food, nutrition security related issues and has researched on neglected and underutilized species (NUS) and contribution to food and nutrition security and seed banks. Mr. Khatiwada introduced the concept of “Rural Plant Clinics” for smallholders in Nepal. Mr. Khatiwada had visited Netherlands, Germany and Bangladesh for trainings while published his papers on different journals, international magazine and newspapers. Mr. Khatiwada had worked with Food and Agriculture Organization of the United Nations and World Vision. Currently he is working as Theme Leader of Right to Food and Land in ActionAid International Nepal and providing strategic direction.

Mr. Bhim Chaulagain graduated in Agricultural science

(Bachelor). Currently working as Sericulture Development officer in sericulture development division, Nepal after two years working as Researcher in SECARD, Nepal. During the period, Mr. Chaulagain had worked for food security, sustainable agriculture and other social mobilization issues. So far he acquired experience on research works related to Agriculture and Natural Resource Management, Working with all levels of rural community, training for local capacity building, income generation for poverty reduction, social mobilization, gender equity & sustainable development. Mr. Chaulagain also worked as a lecturer in Institute of Agriculture and Animal Sciences, Rampur and taught various courses in Plant pathology He has published several articles and two books related to the agricultural science, community development and social mobilization.

Surendra Osti is independent researcher in natural resource management with his focus on food and livelihood security. After completion of his undergraduate degree on 2010, he has been involved with SECARD Nepal as a researcher and involved in “neglected and underutilized crops and its contribution to food and

nutrition security in three different tribal communities of Nepal". Mr. Osti is gaining his expertise in publication for farmers and involved in regular writing through local and national newspapers, booklets and information leaflets to farmers, all featuring sustainable agriculture technologies relevant to rural farming system. Mr. Osti also participated in training on how to become a plant doctor ? organized by Global Plant Clinic, UK and after then involved as Plant Doctor in various "Rural Plant Clinics" operated by SECARD Nepal in different areas of Nepal. His focus is on management of vegetable diseases and stress on eco-friendly management options to protect diversity and environment.

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