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Review Article

NEGLECTED VEGETABLES OF NEPAL: STATUS AND NEED FOR FURTHER RESEARCH AND UTILIZATION

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ABSTRACT
Nepal, being highly potential country in terms of wild vegetables, is facing a serious nutritional as well as calorific deficiency among the rural communities. Nature has provided a vast number of plants with high nutritional values that can be consumed as vegetables at different elevations and parts of the country (east to west and south to north). The vegetables that were in consumption since a long time have been replaced by improved varieties leading to food habit change and deficiency in micronutrients. Negligence, introduction of new varieties and climate and habitat change are leading those potential species towards the risk of extinction. Hence, there is a serious need in exploration, documentation, nutrient evaluation, cultivation, conservation, motivation, commercialization, education and further research on such well adapted species for economic as well as nutritional gain of the pro poor communities of Nepal.

Keywords: *Nepal, Neglected Vegetables, Climate Change, Cultivation, Nutrition, Research*

INTRODUCTION
Nepal being a biologically, especially floristically rich country possibly due to a wide variation of climatic zones and topography; holds lots of potential vegetable crops. From the time immemorial our ancestors have been using these vegetables as major food (dietary) supplements. Even today, many of these plants are consumed in different ways in different parts of the country by different communities. Probably after late 20th century, the farmers of rural Nepal got acquainted with the new, improved and imported varieties of vegetables. Soon after the introduction of those imported varieties they became popular among the rural as well as urban communities (Joshi *et al.*, 2007). The traditional vegetables then after were neglected completely (Aryal *et al.*, 2009) although many of them still have high economic as well as cultural values and are traded in large volumes (Subhrendu and Sills, 2001). None of the academic institutions' curricula of Nepal include these species in their teaching and research priorities. So, the knowledge transfer is another serious problem which further is supporting rejection of such species. A very few research articles are available on those species mainly concerning the documentation of the species that are consumed either by the ethnic groups or a small community of a particular area (Thapa *et al.*, 2014; Joshi and Siwakoti, 2012; Uprety *et al.*, 2012; Acharya and Acharya, 2010; Joshi *et al.*, 2007 etc.). Hence, there is a serious gap in a complete list of species from the country as a whole, their nutritional values, cultivation techniques and proper commercialization.
These days climate change has become an inevitable problem which is drawing attention of the world's scientists as well as leaders. In the poor countries like Nepal where most of the population depend on agriculture for their livelihood and still are always in food deficit and will have more serious problems from the changing climate and land use pattern (Vinceti *et al.*, 2013). Different strategies have been developed to cope with changed climatic conditions but due to lack of proper local strategies in the specific sites the problem becomes more serious. Draught, landslides, flood, outburst of pathogens, abrupt rise and fall of temperature decreases the productivity of plants and most of the crop plants are highly susceptible to these changes because they have been introduced in Nepal without proper testing mechanisms. This has also led the change in food habit and has not been fully successful in combating food and nutrition security of the rural Nepal, which is another serious problem for the locals and burden for the government (Shrestha, 2013). Besides this, the farm vegetables are highly susceptible to pathogens and require large amount of pesticides and fertilizers for better production which ultimately creates health hazards not only to the consumers but also to the soil health and increases cost of production. Government

in Nepal, instead of promoting local cultivars and wild varieties which are well adapted to the area and are resistant to most of the above mentioned effects of climate change and pathogen, provides the locals subsidy in buying seeds of improved varieties. Promotion of locally adapted wild varieties of different crops which are tolerant to most of the threats can reduce the risk of food security. If the locals are made aware of the nutritional values of those wild crops they can easily be encouraged to consume and cultivate such varieties (Shava, 2005). If through different media the values of such crops be brought in public, this will raise the demand and ultimately through commercial farming the locals can get economic benefit. Hence, identifying, improving, analyzing and adopting some wild varieties of potential edible plants that are naturally resistant to most of the effects of climate change can be one of the best options for the present situation. Conservation of such important species is another big issue because they are collected from the wild in large volumes and their cultivation is negligible which may lead to their extinction (Shava, 2005). Some of the workers like Shrestha and Dhillion, (2006) recommend the development of collective co-operative strategies based on assessments of the biology, size of harvestable population, sustainable harvesting techniques, and marketing value and demand of promising species. They also recommended encouraging domestication potential of wild food species through incentive and policy interventions. Here, I am attempting to highlight the importance of wild and neglected varieties of vegetables for their conservation, research and utilization for nutritional as well as economic gain among the remote communities of Nepal.

Methodology

Present article is based on literature review, market observations, and informal talks with consumers and sellers of different vegetable markets of Kathmandu and author's personal experience at Agriculture colleges.

DISCUSSION

The global population is expected to reach 9 billion people by 2050 (Vinceti *et al.,* 2013) and feeding this huge number from a limited arable land seems very difficult. According to FAO (2010) report, food value from the forests was estimated to be equal to US$ 8614 million throughout the world and in Asia alone it is equal to US$ 67 million in the year 2005. But some workers like Pimentel *et al.,* (1997) claim that the value of the trade of NTFPs harvested from the wild for nutrition and income is much higher, reaching around US$ 90 billion/year. The contribution of the developing countries like Nepal is much higher in comparison to the developed nations.

From the different data collected by various workers in different parts of the country among different tribes, it is obvious that approximately 300 species of 58 genera from 40 families of flowering plants (more than 5% of the total flowering plants recorded so far in Nepal) and non flowering (mostly ptridophytes) are consumed as vegetables traditionally (Shrestha, 2013). This number may rise if the study is conducted throughout the country among all the tribes residing within the boundary because most of the previous researches are confined to very small areas and within one community and Nepal is very diverse both in terms of ethnic as well as biological diversity. A majority of the area and population is still out of the cover of such investigations and hence a detailed enumeration of wild vegetables is a primary need for further researches. Among all the plants recorded as vegetables, belong mostly from the groups angiosperms (>90%), pteridophytes (>5%), and fungi (>3%). They are form small herbs to large trees and from aquatic to terrestrial in habitats and almost all parts of plants like leaves, shoots, flowers, fruits, seeds, roots and tubers are consumed as vegetables, pickles, juice, or eaten raw Thapa *et al.,* (2014). Different tribes in different parts of the country have their own traditional ways of utilizing the plant species. Although, these species could not draw attention of the researchers and policy makers, a vast number of them are widely preferred by the local consumers and are sold for a very good price in the markets (Joshi and Siwakoti, 2012; Uprety *et al.,* 2012). Some of the commercially important wild vegetables include: *Amaranthus lividu* L., *Amaranthus viridis* L., *Bambusa tulda* Nees, *Chenopodium album* L., *Dendocalamus hamiltonii* Nees Arn. ex Munro, *Diplazium esculentum* (Retz.) Sw., *Dryopteris cochleata (*Ham. ex D. Don) C. Chr., *Ipomoea aquatica* Forssk, *Macropanax dispermus* (Blume) Kuntze,

Phytolcca acinosa Roxb, *Tectaria coadunate* (Wall. ex J. Sm.) C. Chr., *Urtica dioica* L. Joshi and Siwakoti, (2012). Besides these there are several other varieties that are cultivated and have high market potential but largely neglected include: *Colocasia* sps., different *Dioscorea* sps., wild *Asparagus* sps., cassava sps., different wild edible mushroom sps., etc.

Although, there is high potential of such species, the younger generations are not interested in the traditional knowledge concerning utilization and conservation of such important plant species. Hence, the knowledge is dying with the older generation which must be conserved for future generations (Acharya and Acharya, 2010). These plants and knowledge should be conserved and sustainably utilized (Brush, 1995) not only for future generation (Malla and Chhetri, 2009) but also for the present generation because these plants are actually fulfilling a greater percentage of the total calorie as well as nutritional requirement (Jaenicke and Hoschle-Zeledon, 2006) of many rural communities of Nepal. Wild vegetables have recently drawn attention of the urban communities because of the massive application of pesticides in commercial farm vegetables and health hazards in consumption of such produces. This indicates a vast possibility and importance of research (Acharya and Acharya, 2010) in the areas like, conservation, improvement, utilization, domestication and marketing of these wild resources for the economic upliftment as well as the local calorie requirements. Value addition (Will, 2008) of these vegetables after researches like, nutrient content, toxicity (Acharya and Acharya, 2010), local recipe and modern recipe formulation may popularize them in the local as well as international markets. Being such important species, they are not paid proper attention and are threatened (Joshi and Siwakoti, 2012) due to various reasons like negligence, climate change, habitat loss, forest fires, grazing, over harvesting etc (Uprety *et al*., 2012). Hence, the governmental and non-governmental conservation programs as well as the agencies concerned on agricultural production and human nutrition should pay special attention on such species. Above all, different universities and research stations should include them in their curricula at different levels and encourage in conducting researches on them which may increase the interest of younger generation.

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