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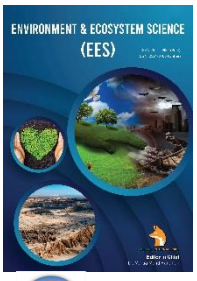

REVIEW ARTICLE

CHANGING APPROACH TO FOOD SELF-SUFFICIENCY ON THE SCENARIO OF THE PANDEMIC "COVID 19"

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ABSTRACT

Food self-sufficiency is being able to produce its food (mainly staples) to meet consumption needs without buying or importing by an individual or a country. This paper was prepared based on interviews, questionnaires, discussions, reviews in different printed materials, books, research papers, reports of different organizations like the Department of Agriculture, LI-Bird, Forest and Soil Conservation Department, and related different websites. The economy of Nepal is predominated by agriculture where 60% of the total population is engaged in agriculture (14^{th}-year plan) and agriculture contributes 27.6% of Gross Domestic Product (GDP). The pandemic of COVID-19 has led people to realize the importance of food self-sufficiency. The import of food and agricultural inputs has become difficult due to the lockdown in the boarders and transportation problems. Being rich in biodiversity it is an opportunity for Nepal to focus more on the under-exploited fruits and vegetables to make them globally recognized by commercial cultivation. In this paper, we have emphasized the techniques for the country to be food self-sufficient at this time of crisis.

KEYWORDS

Food self-sufficiency, food self-sufficiency ratio, Food Security, under-exploited fruits.

1. INTRODUCTION

Food and Agriculture Organization of the United Nations (FAO) has asserted, "The concept of food self-sufficiency is generally taken to mean the extent to which a country can satisfy its food needs from the production of its own country." (FAO, 1999). Food security and food sufficiency sound similar but they have a different meaning. As we know, "food security" means to have access physically, socially, and economically to safe, healthy, and nutritious food for their daily needs while "Food Self Sufficiency" is the point where food is available but is not necessarily linked to cost-effectiveness because most likely it is produced by the same person. In a developing country like Nepal, food self-sufficiency is very important.

Nepal is a small landlocked country located in the South Asian region sharing borders with two nations India (east, west, and south) and China in the north. Nepal has a wide scope of food production but to date still lacks food self-sufficiency and is in trade deficit condition. Nepal, having a great range of climates and varieties of topography (Tropical, subtropical, Taiga, Tundra, and microclimates) helps to produce numbers of different vegetables, staple foods, fruits in different season throughout the year (Gautam and Bhattarai, 2006). However, there are still numbers of indigenous foods, fruits, crops under-exploited although they are potential in nutritional as well as commercial value. Such plants are also often called underexploited fruits. Ainselu (Golden Himalayan raspberry), kaphal (Box myrtle), lapsi (Nepali Hog plum), chutro (Tree turmeric), ber (Jujube), Jamun (Black Plum), Bel (Wood apple) are some examples of indigenous and underexploited fruits. These underexploited fruits and vegetables when commercialized can have a huge benefit both for the consumers and producers as they are readily available, have a good market value, and have a high nutritional value and numerous benefits. According to the FAO, food self-sufficiency can be expressed in a simpler, and practical way by expressing the percentage of foods consumed regarding how much it is produced domestically and it is known as the self-sufficiency ratio (SSR) and is defined as:

$$SSR = \frac{Production\ X\ 100}{\text{Production} + \text{Imports} - \text{Exports}}$$

The production and consumption can be also expressed either in terms of dietary needs or in terms of monetary value. From an economic and policy point of view, the monetary needs are more important while it is considered that a country to be self-sufficient dietary (calories and nutrients) is the most important factor. This study focuses on the importance of food self-sufficiency and documentation of important indigenous and under-exploited fruits and vegetables as an alternative to changing approach on food self-sufficiency in the time of the pandemic of COVID 19. Also, innovative techniques to achieve food self-sufficiency are presented in the paper.

2. OBJECTIVES

1. To study different approaches to food self-sufficiency in Nepal in the scenario of COVID 19.
2. To study about the utilization of underexploited and indigenous food as the new approach to food self-sufficiency in Nepal.

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3. Problem Statement

COVID 19 has caused a global economic crisis. This pandemic is expected to take most countries into recession in 2020, with per capita contracting in the largest fractions of the countries since 1870 (The World Bank, 2020). The condition of Nepal is no different. As per the analysis by the Asian Development Bank, the outbreak of this deadly disease will hit almost every sector of the Nepali economy, shaving up to 0.13 percent off the gross domestic product and rendering up to 15,880 people jobless. There is a high need for the country to be food self-sufficient during this time. Import of foods and the old traditional ways of agriculture aids only a little to obtain the food self-sufficiency in Nepal. Henceforth, for the benefit of all the people, changing the approach to food self-sufficiency for a better life is a must. This is a crucial topic and an urgent need for Nepal. The topic was selected to address the newly arriving food problems due to the pandemic and also to study for an alternative to handle the problems and take Nepal towards food self-sufficiency.

4. Methodology

This paper mostly uses secondary sources of information. Pieces of information were collected from different printed materials, books, research papers, reports of different organizations like the Department of Agriculture, LI-Bird, Forest and Soil Conservation Department of Nepal, and other relevant websites. Major reports were studied and findings were summarized. Throughout writing this article, discussions were made with the professors of the Institute of Agriculture and Animal Sciences (IAAS). Technicians involved in vegetable development programs, indigenous communities, and farmers involved in the cultivation and export of these commodities were also contacted for some information.

5. Findings

During food scarcity periods, people from urban and rural communities heavily depend on gathering fruits, vegetables, medicinal plants, spices, etc. from their natural habitats. Indigenous vegetables are considered valuably attributable to their ability to suit into year-round production systems, their nutritional value, and therefore the danger of their extinction. Besides that, they could contribute to world food production because they are well adapted to adverse environmental conditions and generally resistant to pests and diseases. Furthermore, they have been a traditional part of cropping systems, especially home gardens. In the Chepang community of Nepal, Some indigenous vegetables such as *Dioscorea* species were reported to be stored for future use (Aryal et al., 2009). They play a highly significant role in the food security of the underprivileged in both urban and rural settings. They are also valuable sources of energy and micronutrients in the diets of isolated communities. As the lockdown from the pandemic of COVID-19 has kept all the services in halt, during this time utilization of underexploited vegetables, fruits, medicinal plants, spices is the best alternative option to ensure food sufficiency. Here are some indigenous and under-exploited medicinal plants, vegetables and spices and condiments in Nepal:

5.1 Indigenous and underexploited vegetables in Nepal

Some vegetables are locally adapted, widely consumed in the specific parts of the country as a part of the traditional diet but are yet to attain global recognition as major vegetables. These vegetables have a wide range of benefits but are still not commercialized or grown on a large scale. Some indigenous and under-exploited vegetables of Nepal are: i) Asparagus ii) Purple yam iii) Elephant footed yam iv) Drumstick v) Colocasia vi) Chayote

5.2 Indigenous Spices and Condiments in Nepal

The different parts of the indigenous plants such as seed, fruit, bark, root, or other plant component are used for flavoring, coloring, or preservation of food. Some indigenous spices and condiments in Nepal are: i) Ginger ii) Garlic iii) Cumin iv) Szechuan pepper v) Asafoetida vi) Turmeric vii) Thyme seeds.

5.3 Indigenous Plants with Multiple Uses

Every part of some indigenous plants are used for multiple purposes. Some indigenous plants with multiple uses are: i) Indian gooseberry ii) Cinnamon iii) Asparagus iv) Sweet flag v) Sacred basil vi) Bamboo vii) Cluster fig viii) Malabar nut.

6. Discussion

The economy of Nepal is predominated by agriculture where 60% of the total population is engaged in agriculture (14th-year plan) and agriculture contributes 27.6% of Gross Domestic Product (GDP) as per budget speech of fiscal year 2077/78. This being said, we are unable to produce an adequate amount of food required for the country to be self-sufficient. It is found that most of the food products are being imported from neighboring countries including India, China, Bangladesh, Bhutan, etc. The import of food and agricultural inputs has become difficult due to the lockdown in the boarders and transportation problems. The export and import situation of fruits in Nepal is the given below:

Table 1: Export and Import situation of fruits in Nepal

Year	Export (Rs)	Import (Rs)
2009/10	486355.19	4714767.57
2010/11	1033272.74	3634912.74
2011/12	468181.59	4034503.11
2012/13	33139.63	6374313.41
2013/14	4161032.79	12118640.44
2014/15	2850404.04	10529638.75

Source: FDD, 2017

Table 2: Export and import situation of vegetables in Nepal

Vegetables	Export (Rs)	Import (Rs)
Fresh Vegetable	182120.62	4065783.94
Dried Vegetables	60696.95	3311806.44
Potatoes	39945.43	5127904.38
Total	282763.0	12505494.76

Source: SINA, 2015

In the current times, people have been seen focusing more on growing the local foods which are easily available in the locality. The indigenous fruits and vegetables have been given more priority as they are locally available, hardy, and can be grown even in adverse environmental conditions throughout the year. The list of different indigenous fruits, vegetables, spices, and condiments with their uses are given below:

Table 3: Indigenous and underexploited Vegetables in Nepal

S.N.	Common Name	English Name	Family	Scientific Name	Parts Used
1.	Kurilo	Asparagus	Asparagaceae	*Asparagus racemosus*	Stem
2.	Elephant foot yam		Araceae	*Amorphophallus paeoniifolius*	Leaves and root
3.	Rato latte	Mexican Tea	Chenopodiaceae	*Chenopodium ambrosioides*	Leaves and seeds
4.	Ghar tarul	Purple yam	Dioscoreaceae	*Dioscorea alata*	Root
5.	Ban phapar	Perennial buckwheat	Polygonaceae	*Fagopyrum dibotrys*	Leaves and seeds
6.	Lekali shisnu	Nilghiri nettle	Urticaceae	*Girardiana diversifolia*	Leaves and flower
7.	Ban lasun	Lily of Nepal	Liliacea	*Lilium nepalense*	Bulb
8.	Laphe sag	Cluster mallow	Malvaceae	*Malva verticillata*	Leaves
9.	Sajiwan	Drumstick	Moringaceae	*Moringa oleifera*	Seed pods and leaves
10.	Tarul	Yam	Dioscoreaceae	Dioscorea sps.	Tuber
11.	Pidalu	Colocasia	Araceae	*Colocasia sps.*	Tuber and leaves
12.	Iskus	Chayote	Cucurbitaceae	*Sechium edule*	Fruit, leaves, and tuber

Note. Data for indigenous and underexploited vegetables in Nepal from Plants For A Future (n.d.), and Wikipedia (n .d.)

Table 4: Indigenous Spices and Condiments In Nepal

S.N	Common Name	English Name	Family	Scientific Name	Parts Used
1.	Aduwa	Ginger	Zingiberaceae	*Zingiber officinale*	Rhizome
2.	Lasun	Garlic	Amaryllidaceae	*Allium sativum*	Bulb
3.	Besar	Turmeric	Zingiberaceae	*Curcuma longa*	Rhizome
4.	Methi	Fenugreek			
5.	Dhaniya	Coriander	Apiaceae	*Coriandrum sativum*	whole plant and seeds
6.	Jeera	Cumin	Apiaceae	*Cuminum cyminum*	seed
7.	Timur	Szechuan pepper	Rutaceae	*Zanthoxylum piperitum*	Dried fruit
8.	Hing	Asafoetida	Apiaceae	*Ferula foetida*	Leaves
9.	Khursani	Green chilies	Solanaceae	*Capsicum annum*	pods and seeds
10.	Simal	Kapok tree	Malvaceae	*Bombax ceiba*	The inner bark, oil
11.	Jwano	Thyme seeds	Lamiaceae	*Thymus serpyllum*	Leaves and seeds
12.	Curry paat	Curry leaves	Rutaceae	*Murraya koenigii*	Leaves
13.	Pyaaj	Onion	Amaryllidaceae	*Allium cepa*	Bulb

Note. Data for indigenous Spices and condiments in Nepal from Plants For A Future (n.d.), and Wikipedia (n .d.)

Table 5: Indigenous Plants with Multiple Uses

S.N	Common Name	English Name	Family	Scientific Name	Purpose of Use
1.	Amala	Indian gooseberry	Euphorbiaceae	*Phyllanthus emblica*	Fruit and medicine
2.	Chirayito	Chiretta	Gentianaceae	*Swertia chirayita*	Medicine
3.	Dalchini	Cinnamon	Lauraceae	*Cinnamomum zeylancium*	Spices and medicine
4.	Timur	Szechuan pepper	Rutaceae	*Zanthoxylum armatum*	Spices and medicine
5.	Kurilo	Asparagus	Asparagaceae	*Asparagus racemosus*	Vegetables and medicine
6.	Chyau	Mushroom	Agaricaceae	*Agaricus sps.*	food and Medicine
7.	Tejpatra	Indian Bay leaf	Lauraceae	*Cinnamomum tamala*	Condiments
8.	Barro	Beleric myrobalan	Combretaceae	*Terminalia bellirica*	Medicine and dye
9.	Bojho	Sweet flag	Araceae	*Acorus calamus*	Medicine and condiment
10.	Saturo	Herb paris	Trilliaceae	*Paris polyphylla*	Medicine
11.	Bhojpatra	Indian paper birch	Betulaceae	*Betula utilis*	Medicinal and aromatic
12.	Tite sag	Field milk thistle	Asteraceae	*Sonchus arvensis*	Medicine
13.	Asuro	Malabar Nut	Acanthaceae	*Justicia adhatoda*	Medicine
14.	Tulasi	Sacred basil	Lamiaceae	*Ocimum sanctum*	Medicine
15.	Baas	Bamboo	Poaceae	*Bambusa blumeana*	Fodder, food, fuel, tool
16.	Dumri	Cluster fig	Moraceae	*Ficus racemose*	Fodder

Note. Data for Indigenous plants with multiple uses in Nepal from Plants For A Future (n.d.), and from Wikipedia (n .d.)

This time of the pandemic has led people to realize the importance of food self-sufficiency. Food self-sufficiency can be started from the individual level, local level, and then extended to the national level. The farmer can contribute most to food self-sufficiency by adopting innovation techniques in the farm like mechanized agriculture, climate-resilient agriculture, permaculture, intercropping, multi-tire cropping, practice of seasonal crop rotation, integrated pest management practices increasing the production. Sustainable and organic agriculture for good production in a long run is a must to maintain food security. The proper water and nutrient management are required for maximum crop production. This could be achieved by the use of a proper irrigation system like drip irrigation and rainwater harvesting in places where water is scarce. In the urban areas where there is a shortage of land, terrace farming, rooftop farming, vertical farming, container farming, and soil-less agriculture like hydroponics (agriculture is done in nutrient solution), aeroponics (agriculture done in the air without soil) can be done to be self-sufficient in food production. Focusing on crop varieties that are available locally and cultivating of the under-exploited food species will help lead the country towards self-sufficiency. The underexploited fruits and vegetables have a wide range of benefits and can be exported outside the country as well. Some of the Nepalese herbs being exported are: i) Ginger ii) Indian Gooseberry iii) Lemongrass iv) Aloe Vera v) Asparagus vi) Sweet flag vii) Jatamasi/Spikenard viii) Green coffee beans ix) Neem x) Stevia xi) Soap nuts/Reetha xii) Nettle leaf (Sisnu)

7. Conclusion

The COVID19 pandemic is a global issue and it has exposed the underlying food security of Nepal. In the absence of abundant imports of food and agricultural input, it is a high time that country moves towards being self-sufficient in food production by the cultivation of locally available food crops. The supply chain has been hit the hardest so the cultivation of locally available seeds and marketing of the products in local areas would be an easy alternative to fight the lack of transportation facilities. Each individual can contribute to local and national food sufficiency by various forms of innovative agriculture mentioned in the paper. The indigenous fruits, vegetables, spice, and condiments have good export potential and they should be prioritized for large scale production. It is an opportunity for Nepal to focus more on the underexploited fruits and vegetables to make them globally recognized by commercial cultivation. These plants have a high medicinal value as well making them easily preferable to the costumers. This paper emphasizes on the techniques for the country to change the approach to a food self-sufficient in this time of crisis. It is a great challenge for Nepal to be food self-sufficient in the time of crisis and it will only possible if the youths, farmers, and the government all follow safe food practices and use the innovative techniques for food production.

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