Prospect and Challenges of Spice Crops in Nepal

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Abstract

Natural products of plant origin, used primarily for flavoring, seasoning or adding pungency and flavor to foods and beverages are known as spice. Almost all countries produce one or more spices and herbs. Of the 109 spices listed by the ISO, India grows 52 spices and 27 spices in Nepal either in-situ or in cultivated conditions. Of the 67 spices producing countries Nepal stands 19th position in overall spices production with the monitory value of NRs 4423 million (USD 40.2 million). Nepal is by far the world's 4th largest ginger producer with the value of NRs 3905 million and 241 million respectively. Among the exported spices from Nepal cinnamon is the third important tree spice contributing export value of NRs 128.65 million. Spices contribute about 7.7% of the total national AGDP and 2.3% of national GDP. Two varieties of ginger and turmeric each, 1 variety of onion, 1 variety of chilly released so far. Eight cultivars of large cardamom and several varieties of onion and chilies officially registered and are under cultivation to meet the farmers demand. Despite of having diversified climate and ample scope of spices production, Nepal imports worth of NRs. 12032 million annually. In addition to large cardamom and ginger, Nepal must prioritize the highly feasible spice crops for their commercial production as of onion, garlic, coriander, turmeric, chilli (Akabare), fenugreek, cinnamon, saffron and xanthoxylem (Timbur) to substitute the import. This paper highlights on the brief description of plant, prospects and challenges of spices in Nepalese context.

Keywords: *cardamom, chilies, garlic, ginger, spices, turmeric*

1. Introduction

In a simple definition "Spices are natural products of plant origin, used primarily for flavoring, seasoning or adding pungency and flavor to foods and beverages (Ferrel, 1985). Onion is of dual purpose crop can be used as vegetable and spice, here listed as spice. Dry parts of aromatic plants such as root (sweet flag), bark & leaves (cinnamon), stem (ginger), leaf (bay leaf), shoot & leaves (coriander), flower bud (clove), stigma (saffron), fruit (chilies), seed (cumin) and resinous exudates (asafoetida) have been considered as spices in the international spice trade. Majority of spices are grown in tropical to sub-tropical and some (saffron, black cumin and *Jimmu*) are grown

in temperate region. Hence almost all countries produce one or more spices and herbs. Of the 109 spices listed by the ISO, India grows 52 spices (Rabindran, 2006) and about 30 spices are available at *in-situ* or under cultivated conditions in Nepal (Sharma, 2013, Sharma, *et al* 2017). However, at present only 27 types of spices have been found either cultivated, confined to kitchen garden or at wild stage. Major spices commercially grown in Nepal are large cardamom, ginger, garlic, turmeric, chilies, coriander, cinnamon and Timbur. Spices contribute about 7.7% of the total national AGDP and 2.3% of national GDP. Research and development activities have shown on development of varieties and adoption of technologies to achieve the present production level. Efforts made for the promotion of spices is quite inadequate to cope with fulfillment of increasing demand. On an average each year trade deficit on spices is reached around 7608 million Rupees.

Spice crops are the low volume high value crops. Volume wise, Nepalese use very low amount of spices in their daily foods which provides high calories and health care. Despite of high calorie and medicinal value cultivation of spices is very limited to 1.7% (MoAD, 2015) of the total cropped area in the country (Table 1). This paper briefly gives an introduction to the major spices that are found in Nepal, their present status and prospects and challenges of spices production, processing and trade.

Table 1. Share of spices to the total cropped area, production and productivity in FY 2014/15.

Crops	Area (ha)	Production (MT)	Productivity (kg/ha)	% area of total crops
Food crops	3377036	9266240	2.74	72.0
Pulses	326400	353500	1.08	7.0
Vegetables	463974	6166372	13.27	9.9
Fruits crops	110802	992703	8.96	2.4
Spice crops	81807	736489	7.98	1.7
Cash crops	310128	3287523	10.65	6.6
Tea & Coffee	21652	21858	1.30	0.5
Total	**4691799**	**20824685**	**46**	**100**

2. Spices Production in Nepal

Nepal has a diversified climate for growing several spice crops as per their climatic requirement. Saffron, Caraway (*Himali sounf*), black cumin (*Himali jeera*) and Jimmu are grown under temperate climate whereas all remaining spice crops are grown either under subtropical or tropical climates representing mid hills, terai and inner terai. Indian cassia, cinnamon and Nepal pepper (*Timbur*) are the tree spices naturally grown in the forest widely distributed in mid hills and terai. Cardamom, ginger, garlic, turmeric, onion, chilies, coriander being grown commercially whereas remaining spices are limited to kitchen garden or in-situ conditions (Table 2).

Table 2. List of Nepali spices commercially cultivated, limited to kitchen garden or *in situ* conditions

S.N.	English name	Nepali name	Botanical name	Parts used
1	Turmeric	Besar/Haledo	*Curcuma longa* L.	Rhizome

2	Chilies	Khursani	*Capsicum frutescence* L.	Fruit
3	Fenugreek	Methi	*Trogonella foenum graecum* L.	Seed
4	Garlic	Lasun	*Alliam sativum* L.	Leaf and bulb
5	Onion	Pyaj	*Allium cepa* L.	Leaf and bulb
6	Coriander	Dhaniya	*Coriandrum sativum* L.	Leaf and seed
7	Ginger	Aduwa	*Zingiber officinale* Rosc.	Rhizome
8	Cumin	Jeera	*Cuminum cyminum* L.	Seed
9	Black cumin	Himali jeera	*Bunium persicum* (Bioss.) B. Fedtsch.	Fruit
10	Black pepper	Marich	*Piper nigrum* L.	Berry
11	Indian cassia	Tejpat	*Cinamomum tamala* Nees & Eberm	Leaf and bark
12	Cinnamon	Dalchini	*Cinnamomum zeylanicum* Blume.	Bark
13	Cardamom (Large)	Alainchi	*Amomum sabulatum* Roxb.	Fruit and seed
14	Bishop's weed	Jwano	*Trachyspermum ammi* L.	Fruit
15	Aniseed	Sounf (masino)	*Pimpinella anisum* L.	Fruit
16	Dill	Nepali Sonf	*Anethum graveolens* (L.) CB Clarke.	Fruit
17	Caraway	Himali sonf	*Carum carvi* L.	Fruit
18	Fennel	Sounf (moto)	*Foeniculum vulgare* Mill.	Fruit
19	Black mustard	Kathe rayo	*Brassica nigra* (L.) Koch	Seed
20	Saffron	Kesar	*Crocus sativa* L.	Stigma
21	Mint	Pudina	*Mentha arvensis* L.	Leaf
22	Leek	Chhyapi	*Alliam ampeloprasum* var. *porrum*	Leaf and bulb
23	Shallot	Thulo Chyaapi	*Allium cepa var.aggregatem*	Leaf and Bulb
24	Nepal pepper	Timbur	*Zanthoxylum armatum* DC	Fruit
25	Nigela	Mungrelo	*Nigella sativa* L.	Seed
26	Jimmu	Jimmu	*Allium hypsistum* L.	Leaves
27	Parsley	Parsley	*Petroselinum crispum* L.	Leaves

Total area under spices is 79979 ha with a production of 695471 MT. Ginger occupies the highest area (22901 ha) followed by onion, cardamom and chilies. Likewise, the highest volume of production was from ginger (279504 MT) followed by onion, turmeric and cardamom. In spite of having no commercial cultivation of cinnamon, it is reported to be of the third potential export value of NRs. 128 million. Cinnamon and Timbur coming under forestry are traded as non-timber forestry product. Presently, five spices have attained a commercial production scale (Table 3) and few other spices such as coriander, fenugreek, black pepper, saffron, cinnamon and timbur needs

to be commercialized, since climates are most suitable for these crops. Bay leaf 'a tree spice' is one of the essential ingredients in vegetable preparation and also favored in south India (www.indianspice.com) whereas in Nepal 'Bay leaf' (*Karripatta*) abundantly fond in foothills of Nepal, still we do not have considered as spice in Nepal. It can be used and exported to India.

Table 3: Area, production and productivity of commercial spices in Nepal (MoAD 2018)

Spices	Productive Area (ha)	Production (MT)	Productivity (t/ha)
Cardamom	12508	6521	0.53
Ginger	22901	279504	11.72
Garlic	8116	56668	6.34
Turmeric	6777	65999	9.43
Chili	10077	49762	3.71
Onion	19600	237017	12.09
Total	**79979**	**695471**	**7.3**

3. Spices under Commercial Cultivation

Large Cardamom

Large cardamom is the world's third-most expensive after saffron and vanilla. This is mainly grown at the elevations of 600 to 2000 masl. Nepal is one of the major large cardamom producers in the world. Cultivation is extended to western 49 hill districts. However, more than74% percent of total national production still comes from Province no.1. There is productive area of 12508 ha and producing 6521 MT with low productivity 527 kg/ha (MoAD 2018). Out of 16 cultivars grown in the world, six cultivars namely Ramsai, Golsai, Chibesai, Dambarsai, Sawney, and Kantidar are grown in Nepal. Dambarsai and Sawney extensively grown in the eastern hills. Recently at Ilam, 'Salakpure' a new cultivar is being tested in farmer's field for three years (Anonymous 2015).

Ginger

In Nepal, ginger is cultivated in 22901 ha and produced 279504 MT with the average productivity of 11.72 t/ha (MoAD, 2018) which is very low as compared to other countries. It is the third most important exportable commodities after lentil, and large cardamom. Of the total production 60% is exported particularly to India in the form of unwashed fresh rhizomes, remaining quantity is used as domestic consumption and seed purpose (Anonymous, 2013). Two varieties *Kapurkot Aduwa*-1 and *Kapurkot Aduwa*-2 have been released for commercial production for their high yielding, good processing quality, rhizome rot tolerance with a moderate level of oil and oleoresin content. Rhizome rot and leaf spot diseases are the major problems of its cultivation. Province no.1 is the major ginger producer in the country. In spite of many constraints, Nepal ranks the 5th in area and the 4th in production and the 12th in productivity in the world (FAOStat, 2018). Unfortunately, Nepali ginger does not have own national trade mark to identify in the global spice market.

Turmeric

Turmeric rhizomes contain curcuminoids 2 to 6% (Pruthi, 2006), which is responsible for yellow pigments and comprises three types of curcumins. Two turmeric varieties *Kapurkot haledo*-1 and *Kapurkot haledo*-2 are released for commercial production with high yielding and high curcumin content. Area under turmeric is 6777 ha and production 61999 MT with low productivity 9.43 t/ha (MoAD, 2018). Kailali, Rautahat, Sindhuli, Saptari, Salyan, Dang, Kanchanpur, Ilam, Dailekh and Kaski are the major turmeric producing districts. Province-7 and Province-2 are the highest turmeric producing Provinces in the country.

Garlic

Garlic is cultivated from terai to high hills. The variety of garlic, cultivated at high altitudes, is generally called *'Bhote Lasun'*. It has tall plants and large leaves, corms resembles with Chinese garlic. None of the variety released so far for commercial production. However, local and few introduced varieties are being cultivated. Garlic contains several sulfur compounds; most important for taste is allicin (diallyl disulphide oxide). *'Terai lasun'* and *'Bhote lasun'* are common in Nepal. Garlic is being cultivated in 8,116 ha and produced 56,668 MT with the productivity of 6.37 t/ha. Kailali is the top garlic producer and Provice-7 is the highest garlic producer in the country.

Chilies

It is an annual herb, known as in different names hot pepper, red pepper, cayenne pepper, capsicum, etc. Chili imparts pungency and color to the dishes. Biting pungency is attributed by 'capsaicin' whereas; 'capsanthin' attributes red pigment (Zibokere, 1994). It is also a rich source of vitamin A, C and E, and assists in digestion and also prevents from heart diseases by dilating blood vessels. Chili particularly 'Akabare Khursani' grown in eastern hilly region is of best quality in containing 'Capsaicin' and has great market value, but it requires drying, cleaning and packaging technology to penetrate into international spice market.

Single variety ‘Pusa Jwala’ was released whereas 15 hybrid chili varieties are registered for commercial production. Chilies grow in almost all districts, but top ten commercially producing districts are Morang, Dang, Banke, Kabhre, Kapilvastu, Kailali, Panchthar, Kaski, Doti and Surkhet. When it comes to growing on commercial scale major chili producing districts lie in province- 1 and Province-5. Chilies are grown in 10,077 ha with the overall production of 49,762 MT and productivity of 3.71 t/ha in the country.

4. Research and Development on Spices

Nepal has, in all, four centers for research and development of spices are: (i) Ginger Research Program, Kapurkot, Salyan (ii) Spices Development Program, Khumaltar, (iii) Spices Development Center, Panchkhal and (iv) Cardamom Development Farm Fikkal, Ilam. For the promotion of ginger, several agricultural cooperatives and Nepal Ginger Producer's and Trader's Associations (NGPTA) are working in the country. CADP, PACT, HVAP and RISMFP have also supported on ginger production and processing during their respective project period. Government organizations, District Agriculture Development Office and recently Agriculture Knowledge Centers have been providing technical knowledge to farmers. Apart from governmental organization, NGOs and INGOs is leading projects, and also supporting developing entrepreneurship on spices sector.

Total area under spices is 60,816 ha with a productivity of 4, 58,391 MT, and ginger occupies the highest area and production followed by cardamom (MoAD, 2018).Presently, five spices have attained a commercial production scale. Spices particularly cumin, black cumin, bishop's weed, aniseed, black mustard, fennel, dill, caraway (Jwano), nigela, saffron, cinnamon and xanthoxylem (*Timbur*) are limited in backyard or *in-situ* conditions.

5. International Trade of Nepali Spices

Overall export of spices is equivalent to the value of NRs 4423 million against the import value of 12023 million Rupees in 2073/74. Large Cardamom and ginger share significantly in export value. India is the major importer sharing more than 95% of its trade. During the last ten years, some ginger cooperatives and entrepreneurs initiated to export value added forms as dried slices and powder from to Netherlands, Germany, Pakistan, Bangladesh, Japan and USA. Export of spices from Nepal is limited only on few commodities basically large cardamom, ginger and cinnamon with a value of Rs. 64.6 million to Japan, Germany, Singapore, Pakistan, Bangladesh, USA and Korea DPR. Of them, Pakistan is the largest importer of large cardamom in the recent years. Although Timur has been growing with little care naturally in 30 districts Achham, Dailekh, Jajarkot, Kalikot, Salyan, and Surkhet are more potential districts as comparing against rest of 24 districts. These districts export about 220 MT annually (Anonymous, 2011).

Large cardamom is the first spice commodity which shares 88% of export value followed by ginger (5.5%) and cinnamon (2.9%). Timur [Xanthoxylum] which has been exported in large volume and value usually does not come under MoAD statistics, but it is the most exportable spice commodity. Since Nepal became a member of WTO without addressing sanitary and phyto-sanitary (SPS), maintaining quality and cleanliness standard, product cannot enter the international spice markets. Spices exporter of Nepal should follow the specifications, quality and cleanliness standard of the American Spice Trade Association (ASTA), European Spice Association (ESA) and Bureau of Indian Standard (BIS).

Table 4. Import and export of spices in 2073/74

S.N.	Description	Import value (Rs.'000)	Export value (Rs.'000)	Trade balance (Export-Import) (NRs 000)
1	Large cardamom	452	3,905,034	3,904,582
2	Fennels and like seeds	70,654	0	70,654
3	Cinnamon	70,936	128,654	57,717
4	Cloves	161,556	0	161,556
5	Coriander	536,740	64	536,676
6	Cumin	1,239,107	130	1,238,977
7	Fenugreek	134,773	280	134,493
8	Garlic	768,026	584	767,442
9	Ginger	159,792	241,750	81,958
10	Leeks and other bulbs	22	113	91

11	Mace	6,590	0	6,590
12	Nutmeg	19,398	628	18,770
13	Onion	4,209,830	16,245	4,193,585
14	Pepper	2,299,874	1,381	2,298,492
15	Saffron	8,522	129	8,394
16	Spices mixture	260,768	115,085	145,684
17	Small cardamom	1,914,276	4,492	1,909,784
18	Turmeric	169,760	8,513	161,247
19	Vanilla	985		985
	Total	**12,032,060**	**4423081**	**7,608,979**

Source: MoAD, 2018

Of the 67 spices producing countries, Nepal stands 19th position in overall spices production with the monitory value of NRs 4423 million (USD 40.2 million). Nepal is by far the world's largest producer and exporter of large cardamom and 4th largest ginger producer with the value of NRs 3905 million and 241 million respectively. There is need of exploring value added spice products in the International market under our own Nepali trade mark.

6. Prospect of Spices in Nepal

Nature has given us enormous suitable climates and soil conditions to grow almost all types of spices. Nepal is fighting against food insecurity, and priority has been given to cereal production in each development plans. Nepal has not yet identified 'spices' as the best source of income and employment generation. Spices are used as raw materials for 27 cottage and small spice industries, which generate and provide employment opportunities to the rural and urban people. Most of the spices are shade loving that can be grown in between the rows of orchard or inter cropped with other vegetable crops, which increases the cropping intensity as well as reduces the risk of crop failure

The growing demands for organic crop products have led to the development of international trade for organic spices. Europe is the world leading market for organically produced spices. Spice export is always a significant part of total agricultural export of the country. Nepal has diversified climate from tropical to temperate where almost all spices can be grown successfully. Growers will get more returns from spice crops per unit area, time and inputs invested than cereals and other crops. In addition to cardamom, ginger, turmeric, garlic, onion, chilies and other seed spices like coriander, fenugreek, cumin, fennel, Bishop's weed, black mustard can be grown commercially in Terai and mid hills. Cassia and cinnamon can be promoted through adopting improved package of practices in the community forests that will help to reduce soil erosion and increases income of the community through Silvi-horti system. Many crop fields are reported to be prone to wild animals will have alternative spices crops like ginger, turmeric, cinnamon, xanthoxylem (*Timbur*). Temperate climate in the high mountain regions has provided special opportunities to grow saffron, Jimmu and Himali Jeera. Rejuvenation of unproductive fallow land for the scientific cultivation of suitable spice crops should be given high priority. Nepal Trade Integration strategy (NTIS, 2016) has continuously

taken as an exportable commodity to increase the production of cardamom (6500MT) and ginger (300,000MT) by 2020 (NTIS, 2016).

In the recent years, all over the world, there is a growing trend in the use of various spices in culinary preparations, due to changing lifestyle and food habits. Spices varieties, which have high production potential and better export demand, have to be identified for promotion of quality planting materials in large scale, adopting the latest technologies. All most all spices have high medicinal properties that could be used as Ayurvedic medicine without any side effects. Most household income in alpine regions of Nepal is from collection and trade in medicinal plants (Bhattarai, *et al*., 2010). ADS (2015) has also given due priorities on these spices

There is an urgent need of increasing production and productivity for export to earn foreign currency as well as to balance the trade. There is ample scope of establishing spices processing industries in each province.

7. Challenges

- Subsistence farming
- Develop high yielding and biotic stress resistant varieties
- Processing and value addition
- Quality and cleanliness standard of products
- 99% trade dependent on single country
- Physical Infrastructure for processing and value addition
- Dissemination of Technical knowhow to growers and processors
- Diseases and insect pests: Rhizome rot causing substantial yield loss ~30% but it may damage up to 100% (Sharma and Shrestha, 2002). Streak mosaic (Chhirke), Stunt mosaic (Furke) and 'Bushy dwarf virus' are the major viral diseases for cardamom production (Subba and Ghimire, 2009).
- Commercial approach in farming
- Availability of seed and planting materials
- Cleaning, drying and processing facilities
- Production of value added processed products
- Effective implementation of crop insurance
- Incidence of local taxes and charges are high
- Informal payments during exportation.
- Accredited plant quarantine and quality assurance labs and services
- Big storage house facilities should be provided for year round supply and price stabilization.

8. Way Forward

- Develop inventory of Nepali spices
- Conserve spices *in-situ* or *ex-situ* condition
- Assess quality of Nepali spices
- Ensure the availability of quality seed as per demand
- Establish processing and value addition industries

- Application of IT (TSM) on production and processing
- Promote commercial farming
- Focus on improving post harvest technology
- Declare minimum support price (MSP)
- Improve local storage facilities
- Apply single point taxation
- Harmonize, test methods, quality and cleanliness with BIS, ASTA & ESA
- Strictly follow SPS measures to maintain the quality and cleanliness
- Special courses should be taught in the agricultural universities.

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