Prospect and Challenges of Plantation Crops Production and Marketing in Nepal

R.B. KC*[1], B.K. Shrestha[2] and B. Paudel[3]

[1] Nepal Agricultural Research Council,

[2] HELVETAS Swiss Intercooperation,

[3] Coffee Development Center

*Corresponding email: rbkc05@gmail.com

Abstract

Coffee and tea are the major export potential commodities of Nepal. Coffee is produced in more than 70 countries in the world. In Nepal, coffee is grown in about 2,681 hectare area by 32,629 small holder farmers and produced 513 metric tons of green bean. Whereas, tea is produced in 62 countries but commercial grown in 35 countries. Nepal ranked 21st producer and produced 24409.3 ton from 28241 ha area in 2016/17. In coffee, small holder farmers are practicing organic and fair trade principles through cooperatives and traders have established market linkages at national and international level for specialty coffee. Nepal has enormous potential to produce specialty coffee. A study done in 2018 on "Habitat Suitability of Coffee (Coffea arabica) in Nepal" indicated 11,98,535 ha of area is potential for coffee plantation. Of which, 734,661 ha is moderately suitable, and 61,228 ha is highly suitable. Coffee and tea subsector is facing biotic and abiotic challenges in production and marketing. White stem borer, leaf rust, lack of high yielding cultivars, and identification of suitable shade species are the major biotic challenges on coffee production. Similarly stem canker, blister blight and thrips are the major problems in tea. Varietal evaluation and capacity building of the producers are the major areas to put effort to address the biotic/abiotic stresses. Similarly lack of qualified human resources working in coffee and tea research and development are the challenges to boost up this sector. Organized groups or cooperatives approach for production and marketing with organic and fair trade practices need to be encouraged to address the increasing demand of specialty coffee and tea which will help to minimize the trade deficit of the nation.

Keywords: *coffee, marketing, potential, production, tea*

1. Introduction

The principal plantation crops include coconut, arecanut, oil palm, cashew, rubber, tea and coffee. Among these crops, tea and coffee, are dominant and commercially grown in Nepal.

Coffee (*Coffea arabica*), from the rubiaceae family is one of the most popular beverages in the world and grown in more than 70 countries. Brazil, Vietnam, Columbia, Indonesia, Ethiopia and

India are the major countries for producing coffee in the world (Gairhe and Reddy 2012). It is one of the top commodities worldwide and also known as BROWN GOLD. After water and tea, coffee is the third most consumed beverage in the world. The demand of coffee beans are increasing all over the world in recent years. The world's second most traded commodity after petroleum oil is coffee and being consumed about half a trillion cups every year. (www.worldatlas.com/top coffee producing countries).

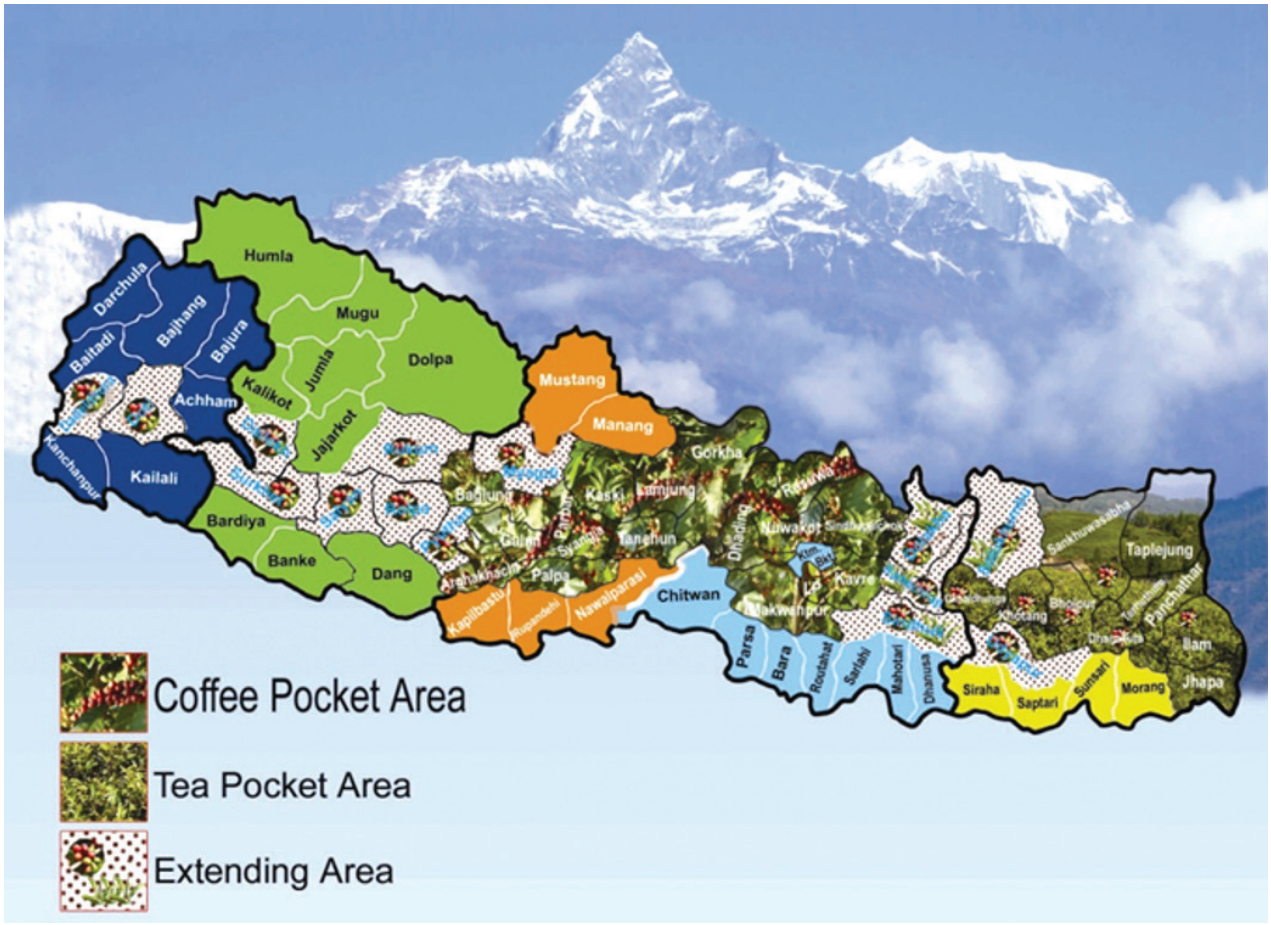

Figure 1: Major coffee and tea pocket areas in Nepal

It was first discovered in east African country Ethiopia in 9th century. Among many species Arabica (*Coffea arabica*) and Robusta (*Coffea canephora*) are two main commercially grown coffee. Arabica, accounts for 60-65% of the world's coffee, and the rest by other species. (www.worldatlas.com/). Arabica coffee is an evergreen shrub which performs best under the partial shade. Coffee in Nepal belongs to the Arabica species with two major varieties Bourbon and Typica. These varieties are associated with standard or high cup quality however, are susceptible to the major coffee diseases. World Coffee Research (WCR) estimates that more than 80% of Arabica coffee production worldwide derives from Typica and Bourbon related varieties (WCR, 2018).

Coffee, in Nepal was introduced by Hira Giri in 1939 AD, who brought some seeds of coffee from Sindu Province of Myanmar (previous Burma) hiding in his special stick and had planted in Aapchaur of Gulmi District. The crop remained unnoticed until 1970s. The major shift to commercial Coffee production took place in mid-eighties after the establishment of Nepal Coffee Company (NeCCo) in Manigram, Rupandehi district, in 1983.

Now coffee has been extended to more than 40 districts covering 2681-hectares and more than 32629 small holder farmers are involved and produced 513 metric tons of green bean but commercial production is limited to 23 districts (NTCDB, 2018). Small holder farmers are practicing organic and fair-trade principles through cooperatives and traders have established market linkage for coffee marketing.

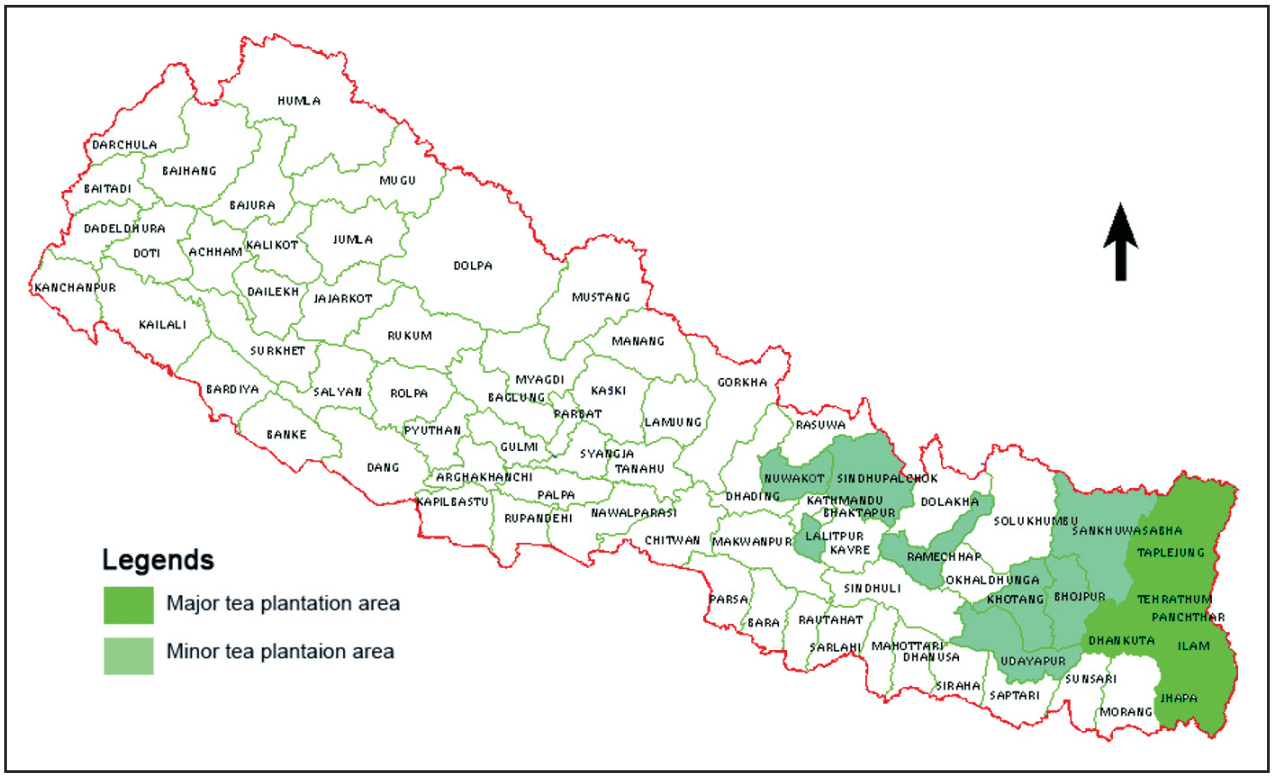

Figure 2: Major and minor tea plantation areas in Nepal.

While tea was brought in Nepal from China. It was a gift of Chinese Emperor to the Prime Minister Jung Bahadur Rana during Rana reign and cultivation initiated with the establishment of Ilam Tea Estate in the hills of Ilam district in 1863. Mr. Gajaraj Singh Thapa is the remarkable name in Nepali tea history who had planted tea for the first time in Ilam district. With better future prospects of the tea industry in Nepal, Soktim Tea Estate was set up in the plains of Jhapa district in 1965 as a second Tea estate in Nepal. During the same period Tea plantation had also started in Darjeeling.

Nepal Tea Development Corporation was established in 1966 by Government of Nepal to aid the development of tea industry. Originally tea leaves produced in Nepal were sold to factories in Darjeeling. Only in 1978 first factory was set up in Ilam for the processing of tea leaves and a few years later another factory was set up in Soktim, Jhapa district.

Government of Nepal had declared five districts Jhapa, Ilam, Panchthar, Dhankuta and Terhathum as tea zones of Nepal in 1982 and National Tea and Coffee Development Board was established in 1993.

Nepal grows mainly 3 types of Tea, i.e. *Camelia asamica* and *C. asamica* spp *lasiocalyx* for CTC and *Camellia sinesis* for orthodox tea. Nepali orthodox tea is somewhat similar to Darjeeling tea in its appearance, aroma and fruity taste. Total production of CTC and Orthodox tea was 24409.3 ton in 2016/07. Where the share of 142 estates was 144549.5 ton (59.23%) and 15103 small holder's 9949.8 ton (40.76%) (www.ntcdb.gov.np).

Orthodox and CTC (fiscal year 2073/074, 2016/017)							
SN	Type	Orthodox		CTC		Total	
		Plantation Area- ha	Production kg	Plantation Area- ha	Production kg	Plantation Area- ha	Production kg
1	Garden	7560	2674594	7725	11784907	15285	14459501
2	Small Farmers	9238	3187300	3718	6762525	12956	9949825
	Total	**16798**	**5861894**	**11443**	**18547432**	**28241**	**24409326**

Source: www.ntcdb.gov.np

2. Prospect in Nepal

A GIS study was carried out on "Habitat Suitability for Arabica (*Coffea arabica*) in Nepal" (NTCDB, 2018), suggested a total of 11,98,535 ha of area is suitable for coffee plantation in Nepal. Of which 7,34,661 ha is moderately suitable and 61,228 ha is highly suitable for Arabica coffee plantation. Twelve districts were found to have an area more than 2,000 ha highly suitable for plantation, which are Gulmi, Sindhupalchok, Baglung, Kathmandu, Nuwakot, Arghakhhanchi, Baitadi, Lalitpur, Kailai, Palpa, Darchula and Bajhang (in descending order). While fifteen districts were found not suitable for coffee as per the study. Among the 753 Palikas (municipalities/rural municipalities) of federal Nepal, 405 Palikas from 62 districts have some area suitable for coffee plantation.

Demand of organic coffee is increasing every year in national and international market. Its demand is said to be 6,000 MT in international market however, supply is limited to 513 MT green beans (NTCDB, 2018). Coffee plantation area expansion is increasing gradually and both public and private sector are actively engaged in coffee promotional activities.

The existing favorable climatic condition for quality tea cultivation is one the best opportunities for tea development in Nepal however, potential area has not been studied yet. The aroma, taste and color are another strong properties associated with Nepali tea and its connoisseurs have already appraised these qualities. So, there is good opportunity for Nepal in global market to increase its shares in existing markets.

Demand of Orthodox tea is increasing over the years and Nepal has suitable climate for its cultivation. Since it is a lucrative enterprise there is chance to tap benefit by hillside farmers. NTCDB predicted that; by 2022 orthodox tea exports will reach 27 million kg, however was only 3 million kg in 2012. This will provide employment opportunities to approximately 100000 people. Moreover; high quality product will reach to over-seas markets and earn foreign currency.

3. Challenges of Tea and Coffee Sub Sector in Nepal

Youth repulsion, migration inside and outside the country, fragmented land, low investment in infrastructure like; irrigation, marketing system and storage facilities, technical knowhow, and unavailability of the inputs on time are the major challenges in agriculture sector in Nepal. Besides these tea and coffee sub-sector facing some biotic and abiotic limitations as;

3.1 Biotic

Insects, diseases, identification of shade trees and suitable high yielding cultivars for different altitudes are the major biotic factors for this sub sector development.

Insects

The perennial and ever green nature of the coffee plant provides conducive environment for insects and mites to attack. Several insect pests like White stem borer (*Xylotrechus quadripes*), Mealy bug (*Plannococcus spp*); Green and brown scale insects (*Coccus spp.*), Red stem borer (*Zeuzera coffeae*) and Grasshopper (*Catantops pinguis*) are hindering coffee production (Giri and Aryal 2003;Twari 2016; Aryal 2019). Among these insects coffee white stem borer (WSB) is observed as the most devastating pest in Nepal (Bajracharya, 2015). Entomology Research Division (ERD) 2007, study found that coffee white stem borer infestation reduced yield up to 70 percent. This beetle species *Xylotrechus quadripes* (Coleoptera: Cerambycidae) develops brown fore wings with white bands. The larvae is the most destructive stage which eats for 9-10 months making the hole to enter in the main stem then closes the hole for its own protection (Aryal, 2018).

Similarly in case of tea, major insects are mosquito bug (Helopeltis theivora), which causes brown centred black lesions followed by holes in the leaves. Mites (Brevipalpus phoenicis Geijskes) which attacks tea flushes and leaves, makes corky area underside of the leaves and leaves dry up. Tea shoot hole borer *Xyleborus fornicatus* (Eichoff); Attacks stem and makes holes in stem.

Diseases of Tea and Coffee reported in Nepal

Till now about six different diseases of coffee are being reported in Nepal. Major Deseases reported are Cercospora leaf spot (*Cercospora coffeicola*), Anthracnose (*Colletotrichum gloeosporioides*), Coffee leaf rust (*Hemileia vastratix*) (PPD, 2017/18).

Among them coffee leaf rust (CLR) is most serious one. *Coffea arabica* is the most susceptible species to this fungus followed by *C. canephora* and *C. liberica*. (PPD, 2018). This disease was first noticed in farmer's field in Thuladurlung area of Lalitpur district in 2015 and Plant Pathology Division, NARC identified as coffee leaf rust. Later disease was also identified in Kaski, Syangja, Sindhupalchok, Kavreplanchok and Makwanpur (Baidya, 2015). Disease reaction was scored in some cultivars at Horticulture Research Station (HRS) Malepatan and cultivar like Sanroman, Catimor and Ketisic showed tolerant whereas the cultivar Selection-10 showed moderately resistant to coffee leaf rust.

Similarly major diseases of tea are reported as; Blister blight (*Exobasidium vexans*), Grey blight (*Pestalotiopsis theae*) and Red rust (*Cephaleurus parasiticus* Karst).

Lack of high yielding and pest resistant cultivars

At HRS Malepatan 23 coffee cultivars have been collected and characterized (KC 2014). Coffee Research Program, Gulmi has maintained 37 cultivars (14 are additional to Malepatan). It has provided wider choices of varietal selection option to the farmers. Till date, however, no single variety has been introduced and released through official process. To the most; these varieties are only recommended technically. Many of the local collected cultivars might have same genetic constituent even though they are collected from different places/districts and given the names accordingly. Introduction/development of high yielding coffee varieties with high yielding potentiality and pest resistant/tolerant attribute is urgently needed for different altitudes.

Identification of appropriate shade plants

Arabica coffee is shade loving plant and requires about 40 to 60% shade for better quality production. To protect young plants from frost; shade is compulsory in mid hills areas especially in winter (KC 2014). Immediate shades, temporary shades and permanent types of shades are in practice to protect coffee plants. High temperature with strong sunlight can also slow down photosynthesis by closing the plant's pores (called stomata) (Larcher, 2003). There is no universal guide for shade tree management, as this depends upon local conditions and the microclimate of the plantation (Muschler, 2009). Coffee farming under different types of shade trees with irrigation need to be studied which will help in reducing CLR problem (Acharya, 2016)

In HRS, Malepatan coffee performed nicely under the shade of Litchi (*Litci sinensis*) and Ipil ipil (*Lucanea leucocephala*). Shade not only conserves soil water, lower temperature by 2 degree centigrtae in hot regions but also protect against frost (Muschler, 2009). Defoliation of leaves of shade plants increases the organic matter content of the soil. Planting of leguminous trees, along with serrated leaves, preferably evergreen, fast growing nature is suitable for shade however, it should not work as the alternative host for coffee pests.

3.2 Abiotic Challenges

Policy Issues

National coffee policy 2003 was endorsed by Nepal government on June 17, 2004 with four objectives. It is mainly focused on import substitution and export promotion, poverty reduction through income generation, and employment and expansion of coffee area in sustainable manner. As we know, coffee is shade loving plant and Nepal is far behind in the area coverage of its habitat suitability; only 0.22 percent land is under coffee cultivation. To increase the area of cultivation, coffee plantation should be allowed to grow under community forest; then production will be substantially increased. After the establishment of Coffee Research Program at Baletakshar, Gulmi under NARC, research investment in coffee is being increased and it should focus to solve the burning problems of coffee.

The United States Department of International Development recommended that the productivity of tea cultivation can be increased in Nepal by updating the out of dated machineries that most of the processing factories are currently opting. Other interventions proposed include the introduction of motorized pruning devices to reduce labor and increase productivity with respect to time.

A more recent obstacle of small farmers is to achieve organic certification which is a costlier and time consuming process but highly remunerative. Small tea farmers have limited access to add value to their tea through processing and packaging. They must rely on outside agents to sell their bulk leaves. Tea farmers are also facing the challenges of low and fluctuating prices for the green leaf they sell, and lack of power in tea supply chain, which is dominated by large companies.

Qualified human resource/Technical know how

Technical knowhow and related information are the most powerful tool for a successful business. Coffee is being produced by smallholder farmers in rural areas with very little technical and managerial skills in production and post production activities. Basic research as well as adaptive research is at very infant stage in Nepal. Department of Agriculture, National Tea and Coffee Development Board, Coffee Research Program are the government t sectors and HELVETAS Swiss Inter-cooperation, Unnati, like INGO are involved in research and development work. However, qualified human resource is very limited and intensive research have not been started yet.

Market Issues

In case of coffee, low farm gate price, small scale with scattered production sites, inaccessibility to pulping centers, lack of clean water in pulping centers, insufficient market information, dominance of middle man are the major issues hindering in the promotion of farmers friendly market. In case of tea the gap between production and consumption is widening. Production in 2015 was estimated as 5,306 MT and consumption as 4,999 MT resulting in a 307 MT surplus. In 2014 the surplus was 351 MT. Five years ago (2010) the surplus was 127 MT and 10 years back surpluses were less than 100 MT.

It reveals that there is a big challenge to small holder farmers unless they go for specialty quality tea and coffee production for niche market.

4. Trade of Coffee in Nepal

Nepali coffee, popularly known in international market as highland specialty coffee, grown organically has been fetching premium price. According to TEPC, Nepal exported 94.60 MT of coffee worth Rs 8,45,00,000 in 2016/17, whereas import was worth of Rs 10,08,09,000 . Similarly, in 2017/18, 84.21 MT coffee worth of Rs 9, 37, 25,000 was exported and worth Rs 6,58,00,000 was imported. Export value is slightly higher than previous year. Internal consumption is also increasing every year. In general, Nepal imports instant coffee and exports green beans (Luitel, 2016).

During the last 5 years, area of coffee has been increased by about 53 % from 1,752 ha in 2010/11 to 2,680 ha in 2017/18 whereas the production (green beans) has been increased by about 27% from 402 MT in 2010/11 to 513 MT in 2017/18. It is a big challenge to meet the increasing demand of specialty coffee.

5. Way Forward

- Review remittance based economic policy, retention and employ every youth in agriculture development with market assurance.
- Explore possibilities to best use of the retired brain and muscles in the agricultural research and development
- Review land use policy, and bring all agricultural land to cultivation with mechanization.
- Implement market policy: to export only value-added products, no raw materials of any kind.
- Minimize import of chemical fertilizer and pesticides by bio and botanical products in the country.

6. Conclusion

Highland specialty tea and coffee with unique quality is valued product of Nepal. If Coffee is grown, only in highly suitable area (61,228 ha), it can compete in the global market for specialty coffee. Similarly, the specialty tea (Green tea, oolong Tea, White tea) with organic and fair-trade principle are the areas to increase production and productivity to achieve the target. However, maintaining quality consistency of coffee is a challenging task. Cooperation and co-ordination among public and private sector with good policy implementation to increase export is the prime concern of the nation. Coffee and tea export can definitely play significant role in reducing trade deficit for Nepal.

References

Acharya, U. K. and U. Pun. 2016. Analysis of Nepalese Coffee Industry: Production and post-Production Issue. Nepalese horticulture Vol. 11. Nepal Horticulture Society.

Aryal, L. and D. Paudel. 2018. Management of white stem borer on coffee (*Nepali version*). Nepal Agricultural Research Council, Horticulture Research Station, Malepatan.

Baidya, S., R. Timila, B.N. Mahato, C. Manandhar S. Manandhar and B. Panta. 2015. Coffee leaf rust disease and its management, booklet (*Nepali version*). Nepal Agricultural Research Council, Plant Pathology Division, Khumaltar, Lalitpur.

Bajraracharya, A.S.R., Y.P. Giri, S.Bista, Ram P. Mainali, 2015. Coffe promotion strategies focusing on white stem borer management in Nepal. A report of workshop cum training on coffee white stem borer management held at 17-22 December, 2014 RARS, Lumle Nepal. Nepal Agricultural Research Council, Entomology Division (NARC)

ERD. 2007. A review on white stem borer: problems in coffee cultivation in the context of Nepal. Entomology Research Division, Khumaltar.

Gairhe S and SV Reddy. 2012. Scenario of Coffee in India- An overview, Research Journal of Agricultural Sciences 3(1):259-261. http://doi.org/10.5281/zenodo.1175198

KC, R. B. 2014. *Bagbanika Unnat Prabidhiharu (Nepali version)*. Nepal Agricultural Research Council, Agriculture (Hort.) Research Station, Malepatan.

KC, R. B. BK Shrestha and S. Dhimal.2016. "Coffee as a niche crop for mid-hills of Nepal". Six decades of horticulture development in Nepal. Silver jubilee special. Nepal Horticultural Society.

Luitel, G. 2016. Value chain analysis of coffee production in central Nepal. Master Thesis. Institute of Agriculture and animal Science, Kritipur, Kathmandu.

Muschler, R. G. (2009). Shade management and its effect on coffee growth and quality. In J. N. Wintgens (Ed.), coffee: growing, processing, sustainable production 2nd ed., Weinheim: Wiley-VCH Verlag GmbH & Co. kGaA, Weinheim.

NTCDB. 2018. Analysis of national strategic and capacity development plan for coffee Sub-sector development 2018-2022. National Tea and Coffee Development Board, Kathmandu.

NTCDB. 2018. National strategic and capacity development plan for coffee sub-sector development 2018-2022. National Tea and Coffee Development Board, Kathmandu.

PPD. 2018. Annual Report 2074/75 (2017/18). Plant Pathology Division, NARC (S. Baidya, B. Panta, S. Manandhar, C. Manandhar and P. Sharma eds.), Khumaltar Lalitpur. Nepal.

Tiwari, S., Y. D. G. C., S. D. Sharma. 2016. Review existing problem and future strategies coffee insect pest of Nepal. Proceeding of workshop on review and strategy development of entomological research works in Nepal (4-6 March, 2012). Nepal Agricultural Research Council, Entomology Research Division, Khumaltar.