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Uncovering the Potential of Coffea Arabica Farming in Kaski, Nepal

Narayan Prasad Sigdel[1], *Rajeev Upadhyay[2]
Department of Geography, Tribhuvan University, Prithvi Narayan Campus, Pokhara
*Corresponding E-mail: rajeev@pncampus.edu.np

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Abstract

Coffea arabica farming in Kaski, Nepal has become one of the preferred ways of earning a living, yet its long-term sustainability is at risk due to market challenges, pest and diseases. This study attempt to assess the current situation of production and farmers experience, emphasizing the varietal of coffee, issues, and production trends in Kaski district. The research utilized quantitative as well as qualitative data methods including the secondary data on green beans production from 2014 to 2024, further forecasts using Microsoft Excel, and qualitative data were gathered in the form of Focus Group Discussions (FGDs) in three coffee farm location namely Adhikaridanda, Begnas, and Nirmalpokhari with the local coffee growers. The findings indicate a fluctuating and a decline trend in coffee production with predictions showing that the trend may continue to decrease. In addition, farmers preferred Caturra (Yellow and Red), Catimor, Bourbon, Tekisic, Pacas, Selection-10, and Typica varietal to plant in the field. The key constraints were identified through farmers that included pest and diseases outbreaks (notably stem borer and leaf rust), selection of strong diseases resistance strain was not appropriate and lack of knowledge and technical back-up. The commonly used measures was traditional eco-friendly pesticide called Bordeaux mixture (Nilotootho and Chuna), and animal urine are the popular methods to control diseases. In spite of challenges, the farmers expressed optimism about the coffee farming, depending on increasing support of co-operatives, I/NGOs, and government agencies. The study concludes, Coffea arabica farming has significant potential in Kaski, but it requires an initiation to coordinate with research, improving the market access, and access to resistant varietal of coffee seedling.

Keywords: *Coffea arabica, Kaski, Bordeaux mixture, varietal, stem borer, confidence bound*

Background

Coffea Arabica dominate the 70 % of global coffee market and primarily cultivated by smallholder farmers, making it as one of the important cash crops in tropical region (Trading Economics, 2025). More importantly, it serves as the main

source for supporting the livelihoods of countless families (Samper & Quiñones Ruiz, 2017). In the context of Nepal, agriculture sector adds up the 21.2% in the gross domestic products of Nepal, particularly subsistence farming coffee production being one of it (World Bank, 2023). National Tea and Coffee Development Board [NTCDB] (2023) has set the minimum price of Rs. 100 per kg for fresh cherry, attracting the more farmers in this sector as the productions' dominance sited in the mid-hill region having the soil, and ecological conditions more favorable for farming (Pokhrel, 2009). Although, the production cost is higher for Arabica, it has double price than robustas (*Coffea canephora)* in the global market (International Coffee Organization, 2014; Wintgens, 2004).

Coffea Arabica has originated around 100,000 years ago through hybridization with *Coffea eugenioides* and *Coffea canephora* (Lashermes et al., 2016). Historically, it is believed to spread from Ethopia to Yemen in 6th century which was cultivated for centuries before reaching to other coffee growing regions (Van der Vossen et al., 2015; Waller et al., 2007). In context of Nepal, coffee seeds were first introduced by hermit named Hira Giri way back 1938 A.D. in *Aanpchaur*, Gulmi which was brought from Myanmar (formerly Burma). Gradually, the coffee gained its popularity around 1970s among farmers and started to expand in other districts. However, there is no clear evidence on who introduced the coffee seedlings first, but the credit is given to Surya Prasad Adhikari (*Dandathar*, Begnas) who worked as paramedical technician for leprosy in Gulmi from where he collected the seedling and planted in Kaski.

The subsistence-level farming practices by smallholder farmers and inadequacy to attract the investor for largescale farming and commercializing have resulted into failing to fulfill the market demand in national and international market. While several studies have focused on coffee cultivation in other parts of Nepal, mostly in Gulmi regions, Lalitpur, and hilly part of Lumbini addressing the production, and effect of altitude and shade, value chain analysis (Paudel et al., 2020; Y. K. Karki et al., 2018; Khatri et al., 2023). On the other hand, few studies have focused the coffee farm of Kaski with concentrating on financial appraisal of farmers and affecting factors for certification (Poudel et al., 2021; Poudel et al., 2019), whilst, there is no reliable studies that addresses the production of coffee beans in Kaski district and farmers experiences in coffee farming. In addition, without the insights from local people, it is difficult to develop a strategy to support and encourage the famers in sustainability practices of farming and increasing the production in Kaski.

With this research gap, the study seeks to evaluate the coffee production from the fiscal year 2013/14 to 2023/24 and experiences of farmers in this sector. Using quantitative and qualitative insights from focus group discussions and NTCDB, the research aims to provide an evident understanding in uncovering the potentiality of

coffee arabica farming in Kaski. Furthermore, the findings of the study will eventually benefit the farmers, stakeholders, planners of agricultural sectors, local authorities, and policymakers aimed at promoting the coffee farming in the hilly regions of Nepal.

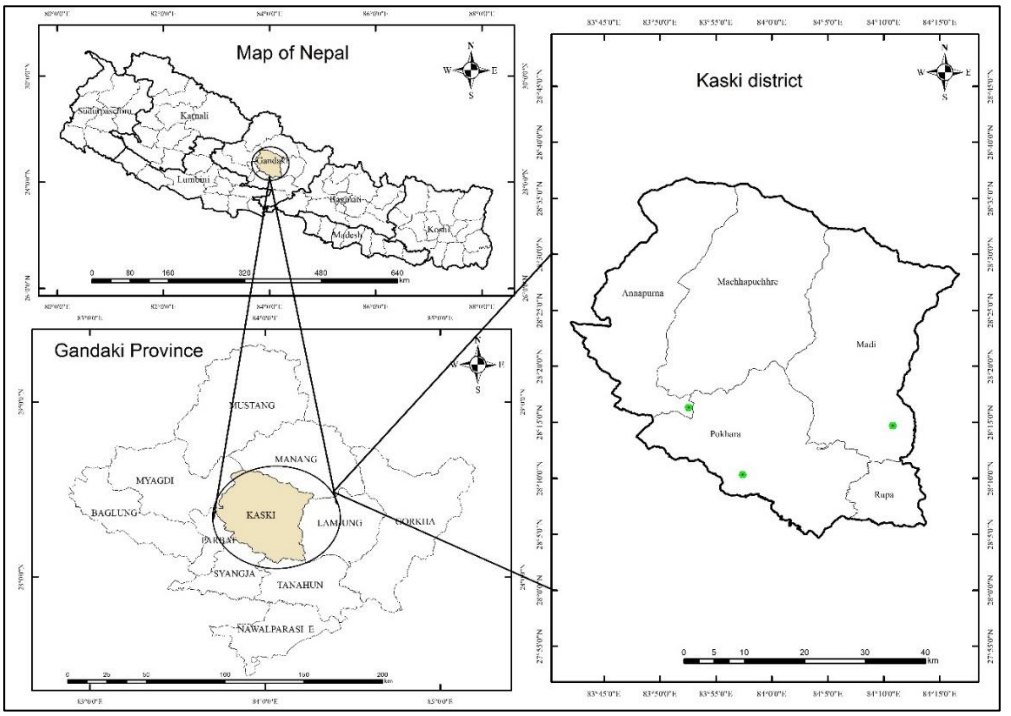
Material and methods

Study area

Kaski, a centroid part of Nepal, located in the southern part of Annapurna Mountain range, encompassing from lowland valley of Seti Gandaki River (450 meters above sea level) to Mount Annapurna (8091 m asl) creating a complex microclimatic variation with the physiographic diversity positioning from 28° 18′19″ North latitudes and 84° 04′37″ East longitudes with the area coverage of 2017 square kilometers. The district accounted 600,051 individuals (Figure 1; Table 1) with the density of 298 persons per square kilometer, having annual growth rate of 1.9% (NSO, 2021).

Figure 1

Location map of study area



Source: Topographical Maps (1998, 2017), Government of Nepal

Table 1

Administrative division with population distribution

Local level	Wards	Area (km^2)	Population
Pokhara Metropolitan City	33	464.2	513504
Annapurna Rural Municipality	11	350.37	22099
Machhapuchchhre Rural Municipality	9	544.58	22898
Madi Rural Municipality	12	563	16142
Rupa Rural Municipality	7	94.81	14891
Institutional*	-	-	10517
Total	72	2017	600051

Source: District Profile Kaski, 2024 and National Statistics Office (NSO), 2021

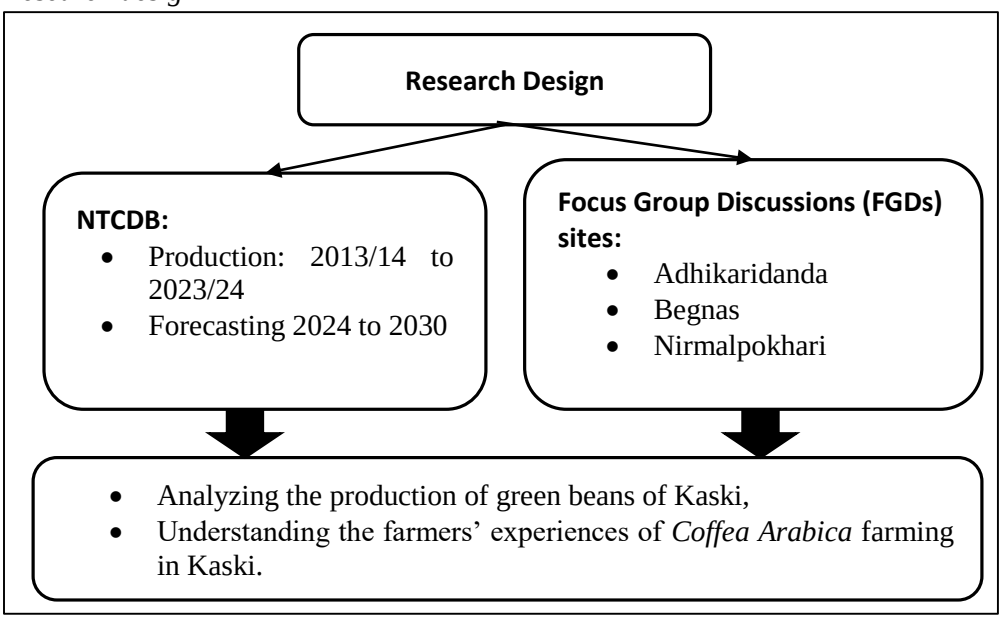
Note: * represent the record of institutional population

Methods of data collection

The research uses both primary and secondary data employing mixed-method (quantitative and qualitative) approach of data collection. The primary data were gathered from Focus Group Discussions (FGDs) conducted at three coffee farming area namely Adhikari dana, Begnas, and Nirmalpokhari. This FGDs provides the insights about the local farmers experiences in coffee farming. Furthermore, the secondary data were obtained from NTCDB website for gaining knowledge on green beans production of Kaski.

Figure 2

Research design



Methods of data analysis

The study used mixed-method approach for understanding the *Coffea Arabica* farming in Kaski. Quantitative data on production of green beans obtained from Nepal Tea and Coffee Development Board (NTCDB) were processed using Microsoft Excel to produce figures that visualize the trends, further the projection of the future outcome was generated using time-series forecasting tools in Microsoft Excel including the confidence interval prediction for the reliability and uncertainty of values with the confidence interval of 95% by default generated in MS Excel which was based on the actual production data of past production ignoring the factors of plantation of new coffee seedling. Similarly, qualitative data obtained from Focus Group Discussions (FGDs) was reviewed to identify the points related to farming pattern, typology, problems, and challenges of coffee farming in Kaski district.

Results and discussions

Coffee production of Kaski

The data was published by NTCDB and the green beans production of coffee from the fiscal year 2013/14 to 2023/24 was used (Table 2). At the beginning, the production rose high and gradually it falling with a fluctuation in the mid-period. *Coffea Arabica* is the only types that farmer has cultivated in Kaski district. From 2013/14 to 2018/19, the plantation area was 122 hectares producing 28 metric tons (mt.) of green beans to 145 hectares producing 36 metric tons, a period of stability in production, indicating the engagement of more farmers towards the coffee farming. On the other hand, the production shows a downward movement from 2019/20, whereas, the plantation area has increased to 197 hectares in 2023/24. It indicates to the fact that coffee plant being aging, limited knowledge on pests and diseases control, and coffee plant managements.

Table 2

Data sheet of plantation area and green beans production in Kaski district

Fiscal Year	Plantation Area (ha.)	Production (Mt.)
2013/2014	122	28
2014/2015	146	30
2015/2016	146	26
2016/2017	146	28
2017/2018	149	35
2018/2019	159	36
2019/2020	145	18
2020/2021	161	19
2021/2022	169	21
2022/2023	197	19

2023/2024	197	22

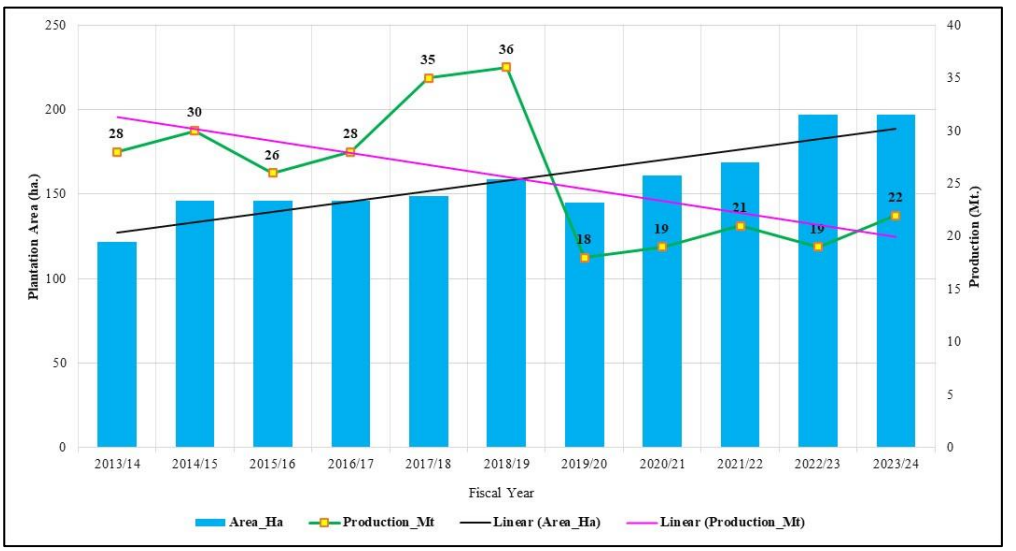
Source: NTCDB, 2025

Relationship between production and area of cultivation

However, the cultivated area of Coffea Arabica has slowly increased from 122 hectares in 2013/14 to 197 hectares in 2023/24, the trend does not align with growing area to increase production. In early phase (2013/14 to 2018/19), there has been proportional pattern in production trend, indicating a positive relationship. Nevertheless, after the fiscal year 2019/20, a contradiction emerges in production with area. Figure 3, displays the upward rising of area of plantation and downward trend in production of green beans, denoting the inverse relationship. In addition, the data depicts that, increasing only the area of plantation or number of seedlings, does not guarantee higher output in coffee production, while the focus should be concentrated into improving the farming practices.

Figure 3

Relation between production and area



Predictability of coffee production

Table 3 and figure 4, displays the future projection of the data from 2025 to 2030 and the data of actual production from 2013 to 2024. The projection indicates the steady decline in production, reaching as low as 12.6 metric tons by 2030 showing a lot of inconsistencies. The computation is processed with the current actual production, ignoring the factors that of plantation of new seedling and increasing the area. Adding on that, for providing the likeable true value in future, the upper confidence bound is presented which increases over a time signifying the thriving

uncertainty in the future productions. It is forecasted that the production of year 2025 will be 18.2 metric tons with upper confidence bound of 29.1 metric tons and lower confidence bound of 7.3 metric tons, proposing an actual production to be fall 95% of the time within this range.

Table 3

Future projection of coffee production

Fiscal Year	Production (mt.)	Forecast (Production mt.)	Lower Confidence Bound (Production mt.)	Upper Confidence Bound (Production mt.)
2014	28	-	-	-
2015	30	-	-	-
2016	26	-	-	-
2017	28	-	-	-
2018	35	-	-	-
2019	36	-	-	-
2020	18	-	-	-
2021	19	-	-	-
2022	21	-	-	-
2023	19	-	-	-
2024	22	22	22.0	22.0
2025	-	18.2	7.3	29.1
2026	-	17.1	6.1	28.0
2027	-	16.0	4.9	27.0
2028	-	14.8	3.7	26.0
2029	-	13.7	2.5	25.0
2030	-	12.6	1.3	24.0
Total	282	114.4	47.8	181.1

Figure 4

Future projection of coffee production

By 2030, the projected data depicts that the production around 12.6 metric tons, while the actual production could be as high as 24 metric tons or as low as 1.3 metric tons, indicating a wide range in upper and lower confidence bound pointing that we are less sure about the future which can affect the results. The results become more uncertainty when we try to predict farther into the future.

Analysis based on Focus Group Discussions (FGDs)

Base on the information gathered through FGDs, revealed the insights of coffee farming practices in Kaski. The farmers are familiar with the coffee plantation. However, most of the participants were small farm holder and the coffee farming act as the secondary source of income. The coffee farming system is dominate by co-operative farming model in Kaski, consisting total 1053 individual member of District Coffee Co-operative Association Limited, Kaski (DCCoALtd.). Most of the participants especially of Adhikaridanda and Begnas are member of coffee producer co-operative so the cherry produced in their farm are sold to co-operative at the price of Rs. 110 per kg for fresh cherry. However, some of the farmer runs their product directly into market by collecting the cherries from neighboring farmer to fulfill the demand at Rs. 100 per kg of fresh "A" grade cherries. We came to know that, the farmers heavily rely on the local co-operatives. They often face challenges in fulfilling the demand for arabica coffee having limited access to updated and technical knowledge, and the equipment required. One farmer from Begnas area noted, "*We grow coffee plant, everyone was planting which was provided by organization in*

subsidies, but we don't have knowledge to manage the plants. We got the training, but it was long ago, so we just do what other are doing."

Coffee varietal grown in Kaski

The farming is totally of *Coffea Arabica* varieties, particularly of improved strain like *Caturra* (Yellow and Red), Catimor, Bourbon, *Tekisic*, *Pacas*, Selection-10, and *Typica*. Couple of farmers grow Kaski local, improved strain within the district. The varieties of coffee plants were introduced by the I/NGOs like HELVATAS, Beautiful Coffee Nepal, NTCDB, coffee co-operatives and Agriculture Knowledge Center, etc. mostly provided in subsidies. Most participants opted for *Caturra* (Red) because of its good cup quality and resistance to disease. At the same time, several farmers are unaware about the varietal selection that are suitable for their farm soil and environment conditions.

"*We just planted the seedling as instructed by the co-operative, but we don't have adequate knowledge for the feasibility in our land*." - Farmer from *Nirmapokhari*.

Pests and diseases problems

All the sites mentioned the major challenges is to control from pests and diseases with the concept of keeping it sustainable farming. There is high dominance of stem borer (*Gabaro*) and leaf rust (*Sindhure*), apart from it, drying of plant tip, mealy bugs are common issues. Sometimes the pests go unnoticed until the plants began to dry.

> *"We have seen the healthy plants that suppose to produce more goes drying. At that time, we don't know the causes for it."* - Farmer from *Begnas.*

Solutions and practices applied

The solutions that most of the farmer applied is traditional methods; mixture of cattle urine with water worked as organic pesticides and trimming of infected branches. Recently, from the training provided by co-operatives and organization, farmers reported of using Bordeaux mixture which is combination of lime and copper sulfate, also an effective traditional method that control the fungal disease.

> "*We prepare the mixture of Nilotootho and Chuna (Bordeaux mixture) and spray within the 24 hours, mostly before rainy season."* – Farmer from *Adhikaridanda.*

A few farmers reported that, coffee co-operatives, I/NGOs, and government offices provide the training for pest and disease control, but the equipment required for the farm is limited and they are inaccessible to such modern equipment making them to rely on traditional methods lowering their productivity.

Overall, most of the farmers shows positive attitudes towards coffee farming as the demand is increasing day by day, while the issues remain to increase the productivity.

Conclusion

This study addressed the current status of production, potential production in future, and challenges of *Coffea arabica* farming in Kaski district, using FGDs with farmers and production data, the research revealed that coffee cultivation has emerged as the key factors for livelihood, however, threatened by the poor markets, pests and diseases.

The production data revealed inconsistencies, while projected data shows a decline output in the future for several years, indicating a concern for the sustainability in this sector. The issues like inadequate technical equipment, pests and diseases mainly stem borers and leaf rust, limiting the production. Coffee farming in this area highly depends on coffee co-operatives from the initial to production phase. Having said that, farmers demonstrate positive attitude towards coffee farming, coffee co-operative boosting their motivation by providing a fair pricing and subsidies in seedlings, also support its members for marketing. Farmers have promoted the eco-friendly solutions for the pest and diseases with use of Bordeaux mixture.

In conclusion, *Coffea arabica* farming in Kaski indicates a promising opportunity for farmers, mainly for those who are engaged in coffee co-operatives, while the future success depends on the policies, government agencies, I/NGOs, co-operatives, and researchers.

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