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Analyzing the factors influencing the promotion of *Cinnamomum tamala* and its economic contribution

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Abstract
Cinnamomum tamala has been cultivated and protected in the Udayapur district for commercial purposes and is getting high value among the local farmers. In this context, this study explored the actual contribution of C. tamala in the household economy and factors that encourage farmers to adopt this farming practice. For this, both qualitative and quantitative methods of data collection were used. The study was carried out in the three-pocket areas covering the entire potential cinnamon production area of the district. In each pocket area total of fifty households were randomly selected and a questionnaire survey was deployed. Similarly, focus group discussion among the farmers and forest officials was also carried out. Overall agriculture is found as the highest source of income followed by C. tamala. The cinnamon shares 21.89% of total income. The level of its promotion in the Hardeni pocket area is found as weak in comparison to others pocket areas. The percentage income shares of cinnamon in the Hardeni, Nepaltar and Khanbu pocket area are 7.95, 31.60, and 25.17 respectively. The analysis shows promotion and development of C. tamala has a significant association with the support from district forest office, market access, transportation facilities, and landholding sizes whereas household's size, gender of the household head, total livestock units, total income, and abroad migration were found to be insignificant. This study is one of the very few studies to bring the substantive data on NTFPs promotion and contribution that will be very helpful for policymakers and implementers to replicate in other districts.

Keywords: cinnamon, landholding size, market access

Introduction

Cinnamomum tamala (Buch. - Ham.) Nees and Eberm under the family Lauraceae locally called Tejpat, Dalchini, Sinkauli in Nepali, is a moderate-sized evergreen tree species. It is distributed in tropical and subtropical Himalayas and grown between 500 m to 2000 m in Nepal [1, 2]. It grows on varieties of soils. However, it prefers well-drained moist soils. Tejpat is generally harvested in dry and mild weather from October to December [3]. Tejpat leaves are 10-15 cm long, opposite with three veins running from the base to the apex and lanceolate with short blunt points. Harvesting is done at the age of 8 – 10 years. It coppices well and coppices are ready to harvest in a shorter period. In Nepal, out of its seventy-five districts, Cinnamon leaf is commercially harvested from thirty-three districts covering all development regions and is found in the forests and farmlands in the Chure and MidHill [4]. It blooms during May-June and is usually pollinated by small insects such as honey bees. Ripen fruits are dark purple and contain a single seed; the fruits are ellipsoidal drupe and require approximately one year in attaining maturity [5]. Tejpat trees are extensively managed for leaf and bark production in Nepal. Bark and leaves are used as spices and medicine; wood as fuelwood, agricultural implements, and in some instances, as furniture and roofing material. Tejpat contains ethereal oil in the leaves and cortex of cells that enrich the plant with aromatic flavor thereby making bark and leaves suitable for spices and medicine [6]. *C. tamala* is one of the major non-timber forest product species in Gulmi, Arghakhanchi, and Palpa districts. The bark has an aromatic odor and possesses aromatic, carminative, and stimulating properties [7]. Its bark and leaves are sold easily at high prices. The oil of the bark is a powerful germicide and fungicide usually used as a valuable flavoring ingredient [8]. Its bark is harvested from March to mid-May [9]. Leaves are used in colic, diarrhea, rheumatism, and found beneficial for cough and cold, diabetic patients and to reduce blood sugar level [10]. The leaves possess anti-diarrheal and anti-ulcer properties [11, 12]. It has been used in traditional medicines as astringent, stimulant, and carminative. Leaves of this plant were lopped just for fodder and making green manures. Nowadays both wild and domesticated Cinnamon leaves fulfill the subsistence requirements of many ethnic groups. Products play a significant role in earning foreign exchange and valuable for most of the developing countries like Nepal. About 900 tons of bay leaves are produced in the Udayapur district only and Nepal exports about 2100 tons of bay leaves to India each year [13]. Exports of these products to neighboring countries have continued to increase for the last two decades, indicating that the species has great potential for income generation for poor and disadvantaged people [14, 15]. It is listed among 30 medicinal plants prioritized for research and development by the Government of Nepal [16]. *C. tamala*, is an NTFPS has been cultivated in Udayapur and Palpa districts for commercial purpose and is getting high value among the farmers There are several factors (Transportation, market access, supportive role of district forest office, willingness of cultivators and involvement of private sectors) collectively influencing the promotion of Tejpat. The district forest office has been

engaging in the promotion of *C. tamala* under National Trade Integrated Strategy Program and doing several activities like production and distribution of its quality seedlings to the farmers and community forest users' group at free of cost, Identification and Selection of Phenotypically and Genetically superior trees as the mother tree for better seed sources taking their GPS co-ordinates with maintaining the database properly.

Despite, the increase in the cultivation of *C. tamala*, the evidence on how it contributes to household economy and livelihood, the factors that are playing a significant role in its increasing value among the local communities and stakeholders are not yet explored and analyzed which will be very helpful for policymakers and implementers to replicate in other districts. The objective of this study is to enhance the understanding of factors influencing the promotion of *Cinnamomum tamala* and evaluates its economic contributions.

Materials and Methods

Study Area: The study was carried out in the Udayapur District, which is one of 14 districts of Province No. 1 of eastern Nepal with headquarter situated in Gaighat. The district lies in between N 26º 39′ to N 27º 11′ latitude and E 86º 09′ to E 87º 01′ longitude and covers an area of 2,063 km². The elevation of the District varies from 360 m to 2310m from mean sea level which includes Mahabharat hills, Churia hills, and Inner Terai regions. As per the formal discussion with DFO staff, Hardeni, Nepaltar, and Khanbu were selected as major pocket areas purposively and the study was carried out in these three areas representing the three Ilaka Ban karyalaya of the district.

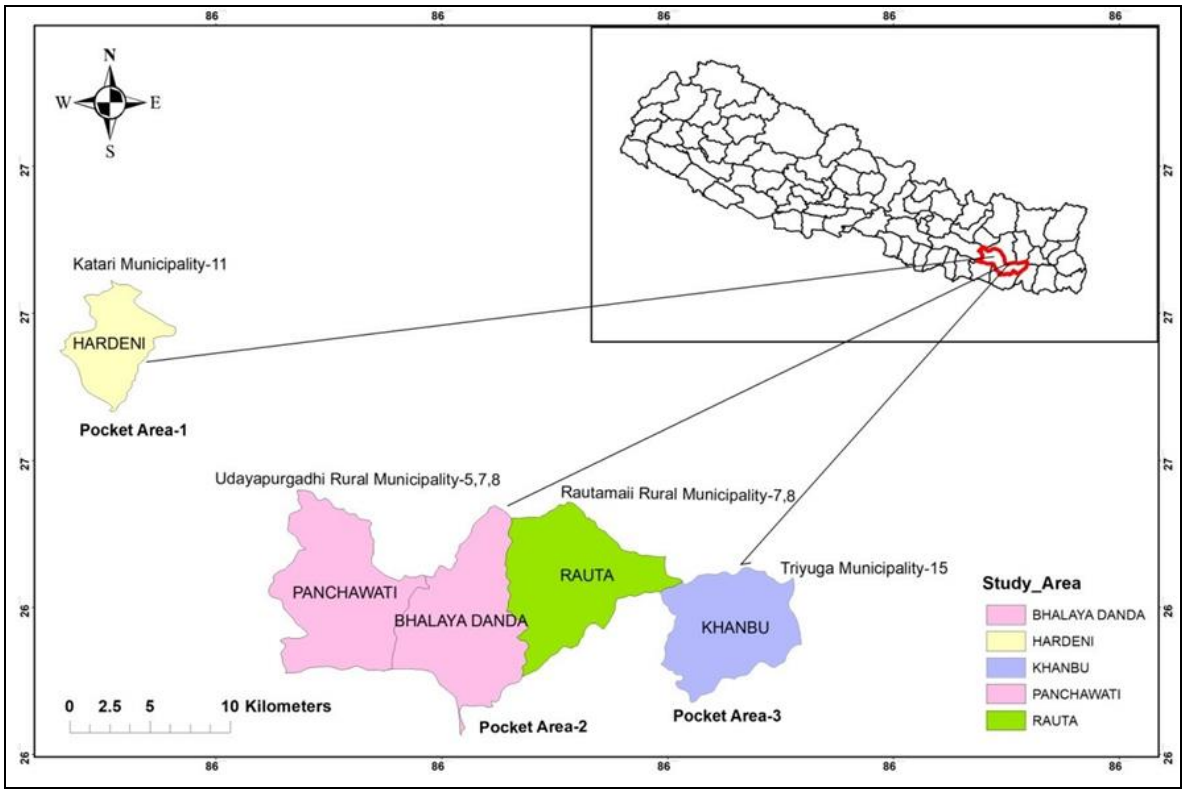

Fig 1: Maps showing the study area

The research was substantially based on a primary data source with series of discussions among all the stakeholders including local farmers and users involving in *C. tamala* farming in the study area. The data was regularly verified and triangulated among the stakeholders to increase its reliability and was documented properly at each discussion. Approximately, 700 farmers are involved in the production and sale of Tejpat in the district. Total 150 HHs were selected randomly, 50 HHs in each pocket area maintaining at least 20 % sample intensity, and primary level of data was collected by following tools. Transect Walk, Observation and Finalization of Research Site, Questioners Surveys, Focus Group Discussion (FGD), and Key Informant Interview (KII). Secondary Data was collected from the records of District forest office Udayapur by consulting its staff and an Intensive review of other related pieces of literature, documents, records, policies, and strategies were done. Documentations and Data Analysis was done by inputs of data on software like SPSS and Excel in the appropriate format. The descriptive statistical analysis was done to show the economic contribution of *C. tamala* on households. It was shown by different charts and figures. Similarly, the factors which influence its promotion were analyzed by regression and Chi-Square statistical tool and found out their significance. The average income generated from the sale Tejpat in three fiscal years was calculated without considering the time rate of money and its distribution among different HHs with different socio-economic status i.e., rich, medium, and poor were analyzed by using analysis of variances one way ANOVA and further analyzed by LSD (Multiple comparisons) to determine its significance.

Result and Discussions

Out of the total population of the study area, 49.20 % of people have agriculture as a major occupation and 21.89% are involved in the farming of *C. tamala* for their livelihood, and 17% of people have major occupations other than

agriculture. Another source of income is depicted in Figure 2.

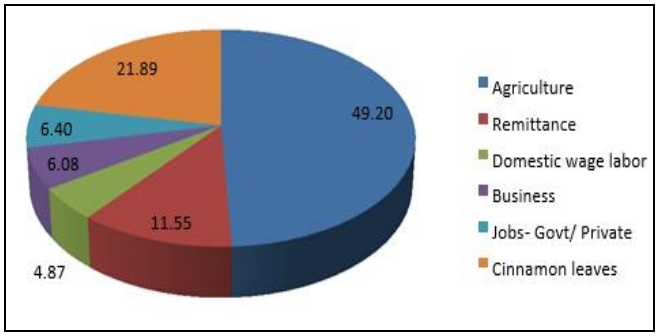

Fig 2: Sources of Income of HHs of the Study Area (In %, N=150)

The total annual income of the households of the study area was found to be NRs 66726400.00 and the average annual income per household was NRs 444842.67 in the fiscal year 2074/075. The highest average annual income sources per household were agriculture - NRs 218860.00 followed by Tejpat (Cinnamon leaves) – NRs 97373.33 and the lowest was occupied by domestic wage labor – NRs 21666.67. The range of average annual income generated in the fiscal year 2074/ o75 from the sale of its leaves was found to be NRs 5000.0 to NRs 700000.0

Hence, the contribution of *C. tamala* to the household's economy was found to be significant.

Poudel, [2007] suggested that the Cinnamon leaf from mid-hill is identified as a very remunerative plant species for a commercial promotion involving private party investors and contributed significantly to HHs economy also favor the findings of this study[17].

According to DOF [2016], and Subedi & Sharma [2012], *C. tamala* is one of the highly traded medicinal plant species of Nepal and has received a priority for research and management as this species forms a major part of the NTFPs trade both by volume and economic value and supported significantly on the HouseHolds(HHs) economy of the farmers also support the findings of this study [18, 19].

From the analysis of secondary information, it was found that the average amount of cinnamon leaves transacted from the national forest was 177.9558 metric tons per year and the average royalty collected from it was Nrs 482280.18 per year in the Udayapur district.

The number of cinnamon leaves produced and transacted from the farmland during four fiscal years in the district was presented in Figure 3.

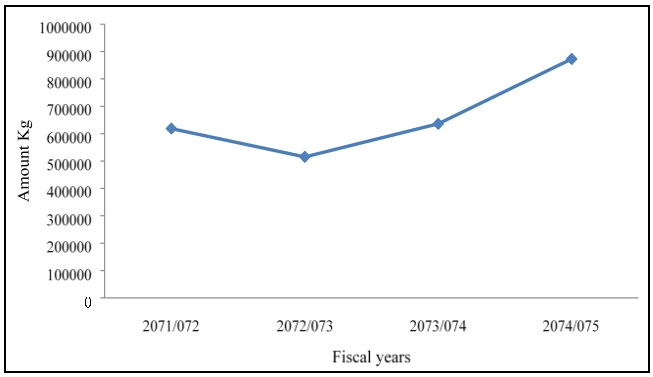

Fig 3: Transaction of Cinnamon leaves through DFO, Udayapur produced in Farmland.

The average amount of Tejpat transacted from the farmland of the district was found to be 660.578 metric tons per year. It was found to be an increasing trend in its production and will continue to increase in the future due to its high commercial cultivation in the district. Choudhary *et al.*, [2011] suggested that Nepal exports about 2100 tons of bay leaves to India each year and out of which about 900 tons of bay leaves are produced in the Udayapur district only and it also supports the findings of this study [20]. From the comparative study and analysis of the data collected from the selected three-pocket areas of the study site it was found that the highest total average annual income per households in the Nepaltar pocket area was found to be NRs 495220.0, followed by Hardeni pocket area was NRs 439300.0 and the lowest in the Khanbu pocket area was NRs 400008.0 only. The lowest total average annual economic contribution of the Cinnamon in the Hardeni pocket area is the only 7.95percent, followed by the Khanbu pocket area – 25.17 percentage and the highest in the Nepaltar pocket area – 31.60 percentages. Factors like transportation, access to the market, landholding size, large-scale production, and distance from the District forest office and its support led to price, total annual income as well as the level of its level of promotion as shown by the result of Nepaltar pocket area.

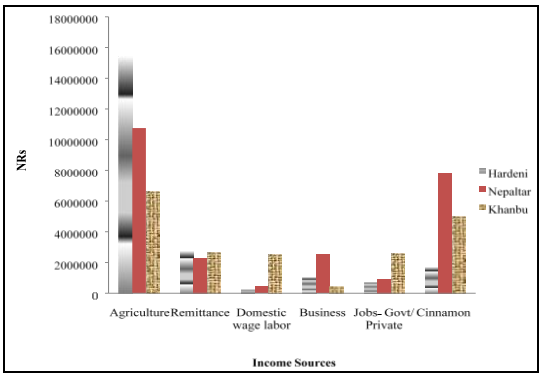

Fig 4: Source of the total annual income of the HHs of the pocket areas of the study.

The distribution of average income generated from the sale of Tejpat in 3 fiscal years among the HHs with different socio-economic statuses such as rich, medium, and poor was analyzed by using analysis of variances one way (ANOVA). By taking a natural log for the average income of the HHs generated from the sale of Tejpat to make the collected data normal.

Table 1: Multiple comparisons, Least Square Difference (LSD)

Variables (A)	Variable categories (B)	Mean Difference (A - B)	P - Value
Rich	Medium	0.53140*	0.011
	poor	0.50038*	0.042
Medium	Rich	-0.53140*	0.011
	poor	-0.03102	0.882
poor	Rich	-0.50038*	0.042
	Medium	0.03102	0.882

*. The mean difference is significant at the 0.05 level.

The average income generated from the sale of cinnamon leaves was significantly different among the households with different wellbeing statuses. From the analysis of variances through multiple comparisons, it was found to be significantly different between rich and medium and rich and poor but it was similar between medium and poor.

Several independent socio-economic variables were identified; defined and categorized into binary and continuous to determine the factors which significantly influence the promotion of the *C. tamala* in the study area. The definitions and description of independent variables are presented in Table 2. Table 3 shows the association between categorical variables promotion level of *C. tamala.*

Table 2: Definitions and Descriptions of Independent Variables.

Variable name	Variable description Variable	Type
TLA	Total land area owned by a household (Ropani)	C
TLSU	Total livestock units owned by a household	C
Tin come	Total income of HHs generated from the (Agriculture, Domestic Wage Labor, Remittance, Business, Sell of Cinnamon Leaves and Jobs government/ private) NRs	C
HH gender	Gender of household's head (1= Female)	B
Redu	Respondent education level (0 = no formal education)	B
Hhsize	Household size (number of family member)	C
Tranfacility	Transportation facility to the HHs for the sale of Cinnamon leaves (1 = Yes and 0 = No)	B
HH mig	Migration of households abroad	B
Mark access	Access of the households to the nearby market for the sale Cinnamon leaves (1 = market access and 2 = no market access)	B
Mark Time	Time taken to reach the nearby market	C
Dfosupport	Support provided by the District Forest Office to the households for Cinnamon promotion (0 = no support, 1 = support)	B

C = Continuous; B = Binary. 20 Ropani = 1 ha.

Table 3: Associations between categorical variables and level of promotion of *C. Tamala*

Variables	Categories	Level of Promotion L M H			χ2 - Value	P- Value
Redu	Illiterate	20	24 66	10		
	Literate	15		15	10.367*	0.006
Tranfacility	No	19	5	7	37.482*	0.000
	Yes	16	85	18		
HH Mig	No	25	74	19	1.877 Ns	0.391
	Yes	10	16	6		
Mark Access	No	24	14	9	33.224*	0.000
	Yes	11	76	16		
DFO support	No	20	10	8	28.934*	0.000
Yes 15 80 17						

*Significant at 5%, Ns = Insignificant

The level of promotion of *C. tamala* is associated with the education level which is statistically significant at $\chi 2$, 0.05, 2 is equal to 10.367 and $P < 0.05$ (Table 3). Chi-square tests showed a strong degree of association between the education level of respondents and cinnamon promotion, whereas regression results did not show any significant influence on its promotion and education level of respondents. Similarly, the market access, transportation facility, and support provided by the district forest office are strongly associated with the promotion of *C. tamala* and are statistically significant at a 5 % level of significance with 2 degrees of freedom. Their $\chi 2$ values are equal to 33.224, 37.482, and 28.934 respectively and $P < 0.05$.

Availability of easy transportation facility reduces the cost, market access ensures the sale of the products and support provided by district forest office encourage the farmers for commercial production, legal and technical advice enhance the quality and quantity of production and ultimately its promotion. There is no association existed between the promotion of C. tamala and abroad migration of household members because it is not statistically significant at a 5 % level of significance with 2 degrees of freedom where $\chi 2$ is equal to 1.877 and $P > 0.05$ i.e., 0.391.

Conclusion

C. tamala is one of the major NTFPs, cultivated and protected on a commercial scale in the study area. It was found to be one of the major sources of household income the level of its promotion varies in different pocket areas. As in the Hardeni pocket area, It was weak in comparison to others pocket areas. The amount production of cinnamon leaves was found to be increased gradually and it will continue to increase per year due to its increasing commercial cultivation and production. It was found that almost the total amount of its leaves produced in the district has been traded in the Indian market. If any types of extra taxes will be included, it affects and reduces its market price, and ultimately farmers of the district who produced it will get fewer prices, which may be the challenges for its sustainability. Farmers should be facilitated by providing technical, legal, and financial support for large-scale commercial production. The local level government should take ownership of the promotion of cinnamon in the district. DFO support should be increased in the Hardeni pocket area as well as other potential sites of the district for its promotion Other potential markets should be identified and maintained the balanced business relationship by both of the countries India and Nepal for the sustainability of the promotion and production of cinnamon. Product diversification is essential to exist in the market.

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