



Research Article

Status of Ginger (*Gingiber officinale*), Large Cardamom (*Amomum subulatum*) and Tea (*Camellia sinensis*) in Koshi Province, Nepal

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Keywords: Area; Ginger; Large cardamom; Production; Productivity; Tea

Abstract

The study was conducted in Koshi Province in Nepal to review the status of ginger, large cardamom and tea through trend analysis and Strengths, Weakness, Opportunities and Threats (SWOT) analysis techniques. The area contribution of ginger in Koshi Province to the nation was found 34.32%, where the contribution on national production was found 36.61%. Productivity of ginger was found in the increasing trend until 2006/07, slightly decreased in 2007/08 and 2008/09, lowered in 2014/15 A.D. The area contribution of Large Cardamom in Koshi Province to the nation was found 90.9%, where the contribution on national production was found 90.8%. Productivity of Large cardamom was in the increasing trend until 2008/09, slightly decreased in 2009/10 and 2010/11, lowered in 2014/15 A.D. The area contribution of Tea in Koshi Province to the nation was found 90.26%, where the contribution on national production was found 96.73%. In 2003/04 productivity of Tea was in the increasing trend until 2013/14, slightly decreased for five consecutive years (2014/15 to 2018/19), lowered in 2016/17 A.D. All the parameters of production status (area, production, and productivity) of these commodities were found increasing in the national context. Results from study clearly revealed that, collection and auction market point establishment, fixation of minimum ceiling/ floor price, value chain alliance and financing strategy and plan development, effective insurance scheme and access to loan mechanism, post-harvest handling practices at the farm level need to be developed to increase the area, production and productivity of these high value commodities in Koshi Province of Nepal which have great prospects and significance in the global markets.

Introduction

Ginger, large cardamom and tea are the principal cash crops grown in Nepal (Sedain and Aryal, 2002). Ginger and large cardamom are major spices and exportable commodities in Nepal (GRP, 2009). They have major contribution in raising the social, cultural, economic status of the rural people (NSCDP, 2007). Ginger (*Gingiber officinale*) is a high value spices grown especially in mid hills of Nepal that has

a large production potential (ITC, 2007). Major ginger producing districts are Ilam, Salyan, Nawalparasi, Palpa, Morang, Kailali, Surkhet, Tanahu, and Kaski (ANSAB, 2011). The area, production and productivity of ginger in Nepal was 22441 ha, 287813 MT and 12.83 MT/ha respectively. The area, production and productivity of Ginger was 8047 ha, 112117 MT and 13.93 MT/ha respectively in Koshi province. The area, production and productivity of Ginger was 614 ha, 6790 MT and 1

1.06 MT/ha respectively in Madesh province. The area, production and productivity of Ginger was 3456 ha, 43058 MT and 12.46 MT/ha respectively in Bagmati province. The area, production and productivity of Ginger was 2782 ha, 32420 MT and 11.65 MT/ha respectively in Gandaki province. The area, production and productivity of Ginger was 3759 ha, 41896 MT and 11.15 MT/ha respectively in Lumbini province. The area, production and productivity of Ginger was 2507 ha, 35157 MT and 14.03 MT/ha respectively in Karnali province. The area, production and productivity of Ginger was 1277 ha, 16374 MT and 12.82 MT/ha respectively in Sudurpaschim province (MoALD, 2023). Large cardamom (*Amomum subulatum*) popularly known as Alainchi in Nepali and renowned as Black Gold, Queen of Spices which belongs to Zingiberaceae family is a perennial soft-stemmed low-volume, high-value crop (Avasthe, Singh, & Tomar, 2011). It is cultivated in marginal, sloppy, and degraded land under the shade of trees (Chapagain et al., 2014). According to MoAD (2017) Taplejung, Panchthar, Ilam, Sankhuwasabha, and Terathum are the major cardamom producing districts. Large cardamom is low volume high-value crop due to which, most of the farmers in this region have shifted to the large cardamom cultivation (SNV, 2010). The Agriculture Development Strategy (2015-2035) has identified and prioritized large cardamom and ginger as the 5th and 12th sub-sector respectively among fifteen identified sub-sectors for agribusiness development through the value chain approach in Nepal (MoAD, 2014). The area, production and productivity of Large cardamom in Nepal was 15975 ha, 8714 MT and 0.54 MT/ha respectively. The area, production and productivity of Large Cardamom was 13904 ha, 7644 MT and 0.51 MT/ha respectively in Koshi province. The area, production and productivity of Large Cardamom was 712 ha, 391 MT and 0.55 MT/ha respectively in Bagmati province. The area, production and productivity of Large Cardamom was 1054 ha, 541 MT and 0.51 MT/ha respectively in Gandaki province. The area,

production and productivity of Large Cardamom was 204 ha, 74 MT and 0.36 MT/ha respectively in Lumbini province. The area, production and productivity of Large Cardamom was 85 ha, 56 MT and 0.66 MT/ha respectively in Karnali province. The area, production and productivity of Large Cardamom was 16 ha, 8 MT and 0.50 MT/ha respectively in Sudurpaschim province (MoALD, 2023). Tea (*Camellia sinensis*) is a popular beverage all over the world (Ferruzzi, 2010). According to Poudel (2010), there are two types of tea: *Camellia assamica* for crush, tear and curl (CTC), and *Camellia sinensis* for orthodox tea. Orthodox tea is grown in high altitudes, whereas the CTC tea is grown in low altitudes or plain areas (NTCDB, 2019).

Major orthodox tea producing hill districts are Ilam, Panchthar, Dhankuta, Terathum, Solokhumbhu, Udayapur, Sankhuwasava, Bhojpur, Sindhupalchowk, Kavre, Makwanpur, Lalitpur, Ramechhap, and Kaski (ITC, 2017). The area, production and productivity of Tea in Nepal was 20237 ha, 26379 MT and 1.30 MT/ha respectively. The production of CTC Tea, Orthodox Tea, Green Tea and Other Tea production was 18902800 kg, 658787 kg, 732811 kg and 155960 kg respectively (MoALD, 2023). The main objective of this study is to review the status of ginger, large cardamom and tea in Koshi province through trend analysis and Strengths, Weakness, Opportunities and Threats (SWOT) analysis techniques.

Materials and Methods

Koshi province having 13 districts (3 Terai, 1 Inner Terai (Udayapur) and 9 Hills and Mountains) Nepal was chosen for study. The information used in this study was taken from several publications produced by the Ministry of Agriculture and Livestock Development, Singhadurbar, Kathmandu between 2002/03 and 2020/21. Utilizing Microsoft Excel 2013, the data thus gathered was analyzed and interpreted. Secondary data compiled and analysed using time series data published from MoALD as well as key concerned stakeholders' consultation (Fig. 1)



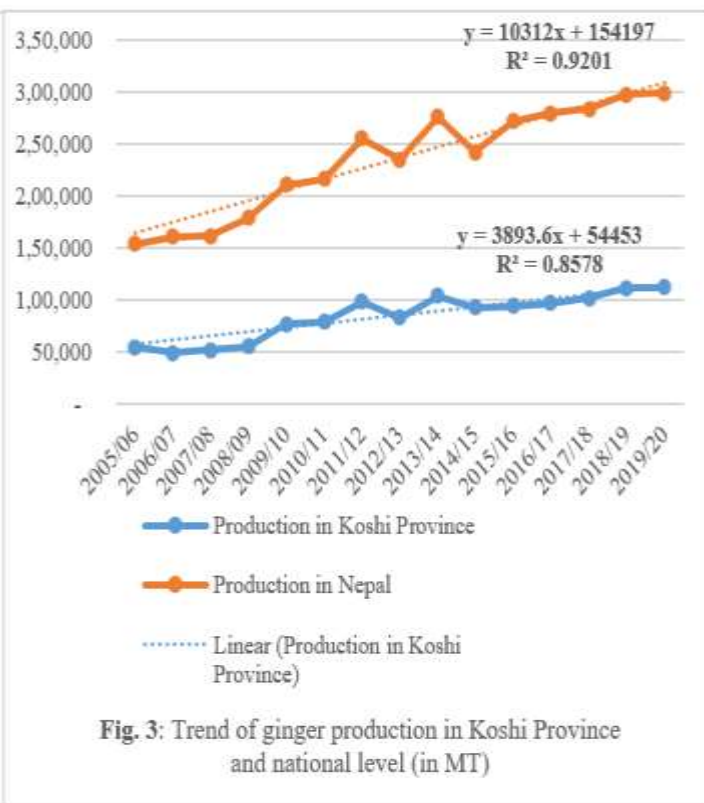
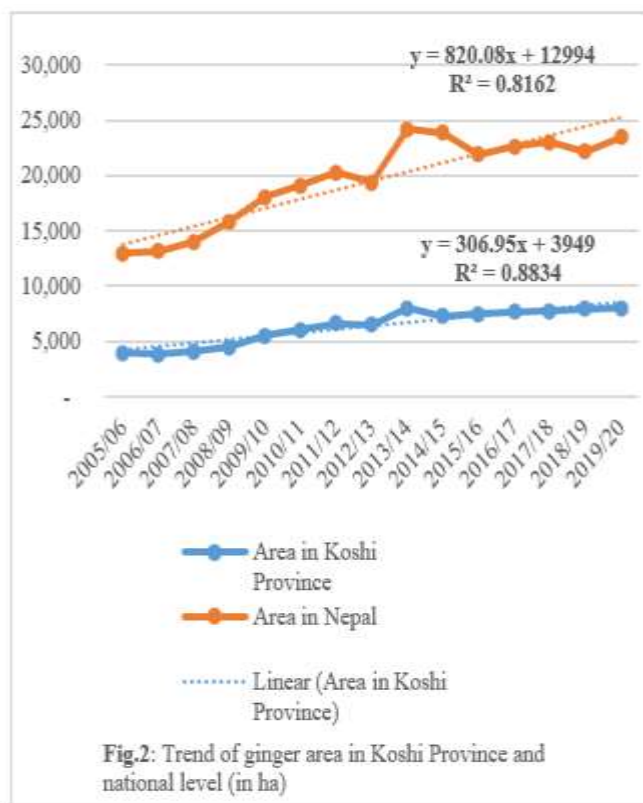
Fig. 1: Map showing study area of Koshi Province

Results and Discussion

Ginger

The area contribution of ginger in Koshi province to the nation is 34.32%, where the contribution on national production is 36.61%. All the parameters of production status (area, production, and productivity) are found increasing in the national context. In 2005/06 the area, production and productivity of ginger in Nepal was 12994 ha, 154197 MT and 11.87 MT/ha respectively whereas the area, production and productivity of ginger in Koshi province was 3949 ha, 54453 MT and 13.79 MT/ha, respectively. In 2005/06 Ilam was the largest producer (total area: 2151 ha; total production; 31571 MT and total productivity; 14.678 Mt/ha), followed by Morang (total area: 703 ha; total production; 8715 MT and total productivity; 12.397 Mt/ha), Taplejung (total area: 220 ha; total production; 2867 MT and total productivity; 13.032 Mt/ha), Sunsari (total area: 167 ha; total production; 2179 MT and total productivity; 13.048 Mt/ha) and Bhojpur (total area: 152 ha; total production; 2287 MT and total productivity; 15.046 Mt/ha). In 2005/06 potential districts of Ginger production were Ilam, Morang, Ilam, Taplejung, Sunsari and Bhojpur districts which is supported by ITC (2007). Productivity of ginger was in the increasing trend

until 2006/07. In 2007/08 and 2008/09 productivity of ginger slightly decreased. Productivity of ginger was also lower in 2014/15 A.D. In 2019/20 the area, production and productivity of ginger in Nepal was 23500 ha, 298945 MT and 12.721 MT/ha respectively whereas the area, production and productivity of ginger in Koshi province was 8066 ha, 112421 MT and 13.938 MT/ha respectively. In 2019/20 Ilam was the largest producer (total area: 3233 ha; total production; 47500 MT and total productivity; 14.692 Mt/ha), followed by Morang (total area: 977 ha; total production; 10766 MT and total productivity; 11.019 Mt/ha), Panchther (total area: 719 ha; total production; 9915 MT and total productivity; 13.790 Mt/ha), Sunsari (total area: 540 ha; total production; 5580 MT and total productivity; 10.333 Mt/ha), Udaypur (total area: 518 ha; total production; 9972 MT and total productivity; 19.251 Mt/ha), Bhojpur (total area: 365 ha; total production; 4380 MT and total productivity; 12.000 Mt/ha) and Taplejung (total area: 324 ha; total production; 5100 MT and total productivity; 15.741 Mt/ha). Potential districts of Ginger production in Nepal are Ilam, Morang, Ilam, Taplejung, Sunsari and Bhojpur districts which is inline with ANSAB (2011) (Fig. 2, 3 & 4)



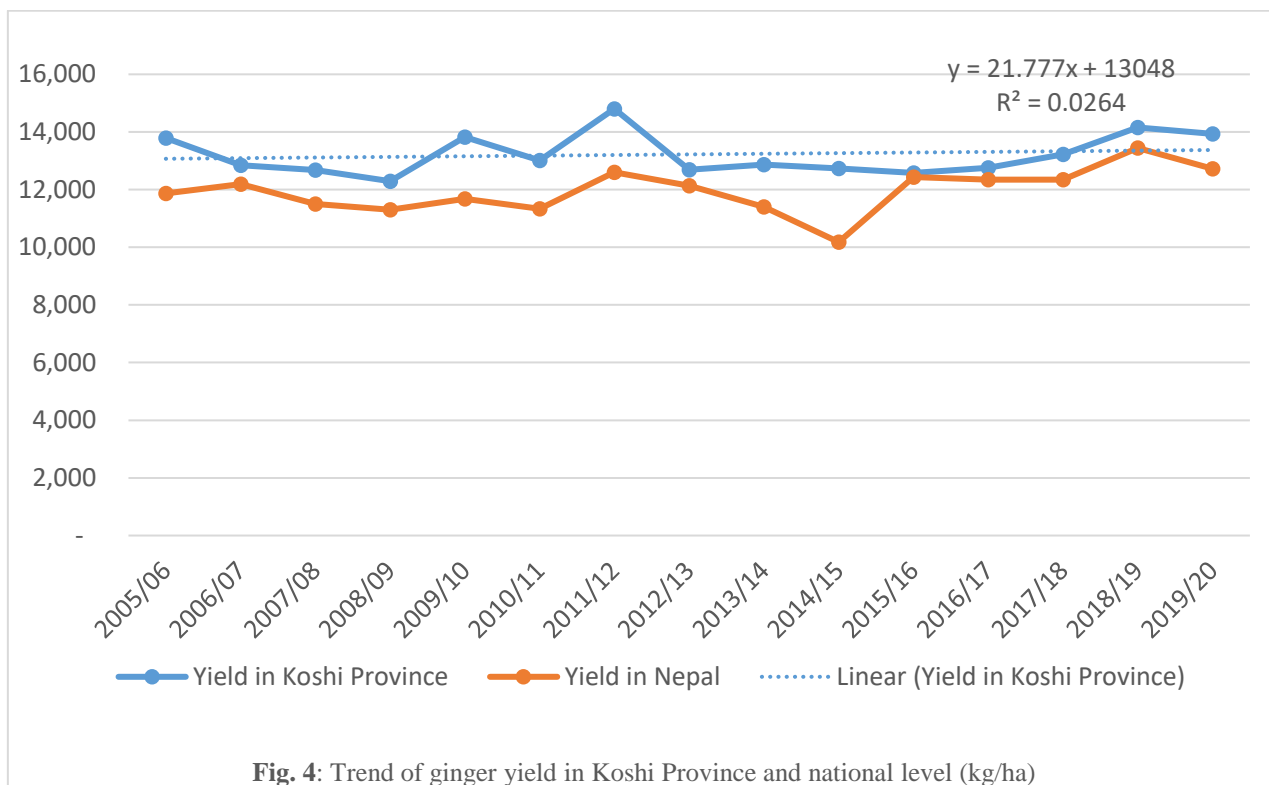


Fig. 4: Trend of ginger yield in Koshi Province and national level (kg/ha)

Large Cardamom

Large cardamom is an economically important low volume high-value crop due to which, most of the farmers in Koshi province have shifted to the large cardamom cultivation. Compared to the traditional crops, the income from large cardamom is three to four times higher (SNV, 2010) The International Centre for Integrated Mountain Development (ICIMOD, 2016) reported that, over 21960 households are engaged in Large cardamom farming in Nepal. At present, Nepal is the largest producer of large cardamom with a 68 percent share in the global market, followed by India (22%) and Bhutan (9%). The area contribution of Large Cardamom in Koshi Province to the nation is 90.9%, where the contribution on national production is 90.8%. Large cardamom has been a prioritized crop by Nepal Trade Integration Strategy (NTIS) and Agriculture Development Strategy (ADS, 2015-2035). All the parameters of production status (area, production, and productivity) are found increasing in the national context supported by ITC (2017). In 2005/06 the area, production and productivity of Large Cardamom in Nepal was 11498 ha, 6646 MT and 0.578 MT/ha respectively whereas the area, production and productivity of ginger in Koshi province was 11238 ha, 6505 MT and 0.579 MT/ha respectively. In 2005/06 Taplejung was the largest producer (total area: 2151 ha; total production; 31571 MT and total productivity; 0.637 ha, followed by Ilam (total area: 2785 ha; total production; 1587 MT and total productivity; 0.570 Mt/ha), Sankhuwasava (total area: 2187 ha; total production; 1221

MT and total productivity; 0.558 Mt/ha), Panchther (total area: 1576 ha; total production; 1016 MT and total productivity; 0.645 Mt/ha) and Terathum (total area: 605 ha; total production; 319 MT and total productivity; 0.527 Mt/ha). In 2005/06 potential districts of Large Cardamom production were Taplejung, Ilam, Sankhuwasava, Panchthar and Terathum districts. Productivity of Large cardamom was in the increasing trend until 2008/09. In 2009/10 and 2010/11 productivity of Large cardamom slightly decreased. Productivity of Large Cardamom was also lower in 2014/15 A.D. In 2020/21 the area, production and productivity of Large cardamom in Nepal was 16041 ha, 8386 MT and 620 MT/ha respectively whereas the area, production and productivity of Large cardamom in Koshi province was 14105 ha, 7475 MT and 0.619 MT/ha respectively. In 2020/21 Taplejung was the largest producer (total area: 4258 ha; total production; 2960 MT and total productivity; 0.695 Mt/ha), followed by Panchther (total area: 3232 ha; total production; 1196 MT and total productivity; 11.019 Mt/ha), Panchther (total area: 719 ha; total production; 9915 MT and total productivity; 0.370 Mt/ha), Sankhuwasava (total area: 2350 ha; total production; 917 MT and total productivity; 0.390 Mt/ha), Terathum (total area: 600 ha; total production; 304 MT and total productivity; 0.507 Mt/ha). In 2020/21 potential districts of Large cardamom production in Nepal are Taplejung, Panchther, Sankhuwasava, and Terathum districts (Fig. 5, 6 & 7).

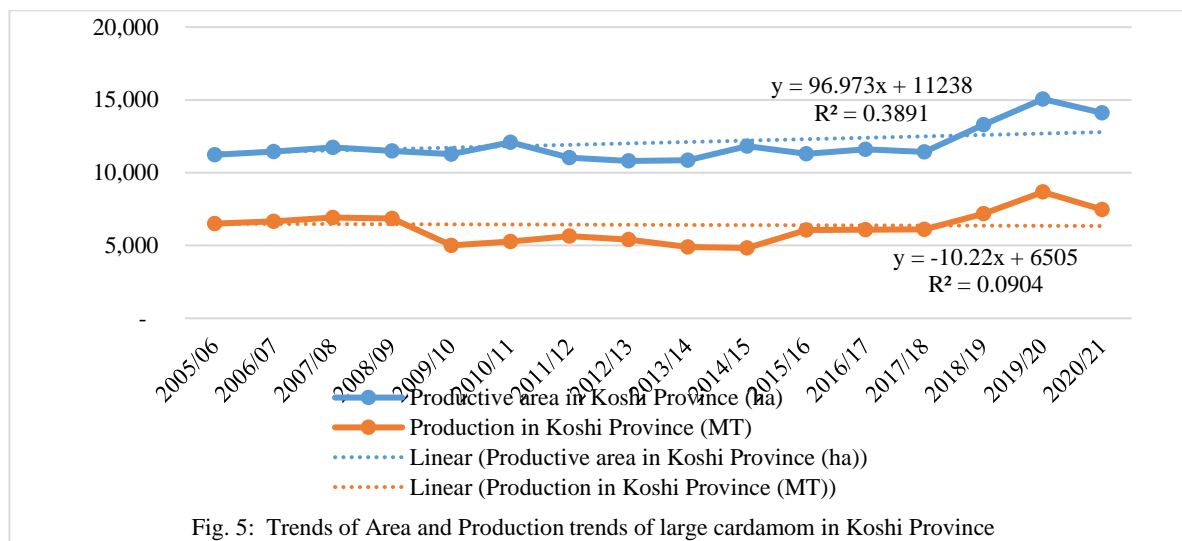


Fig. 5: Trends of Area and Production trends of large cardamom in Koshi Province

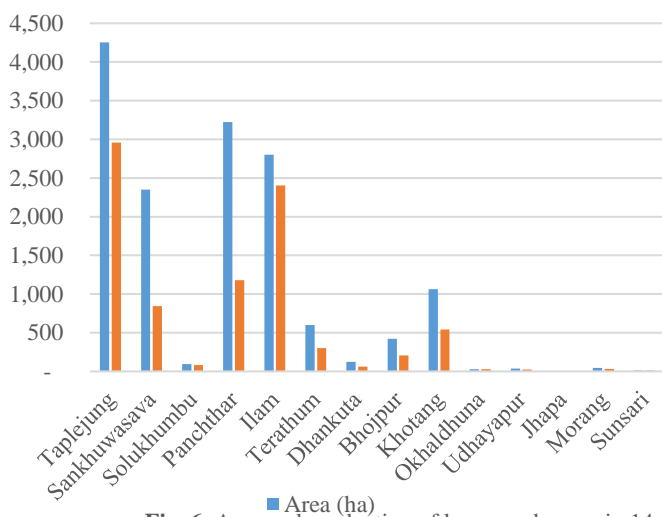


Fig. 6: Area and production of large cardamom in 14 districts of Koshi Province in 2019/2020

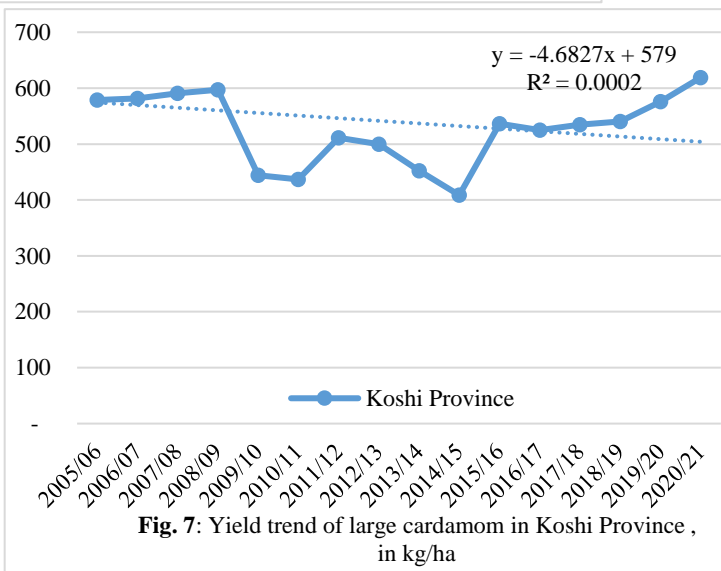


Fig. 7: Yield trend of large cardamom in Koshi Province, in kg/ha

Tea

The area contribution of Tea in Koshi Province to the nation is 90.26%, where the contribution on national production is 96.73%. All the parameters of production status (area, production, and productivity) are found increasing in the national context. In 2003/04 the area, production and productivity of Tea in Nepal was 15012 ha, 11651 MT and 0.776 MT/ha respectively whereas the area, production and productivity of Tea in Koshi province was 14178 ha, 11616 MT and 0.819 MT/ha respectively. In 2003/04 Jhapa was the largest producer (total area: 8323 ha; total production; 10060 MT and total productivity; 1.20 ha, followed by Ilam (total area: 4631 ha; total production; 1286 MT and total productivity; 0.278 Mt/ha), Panchthar (total area: 794 ha; total production; 170 MT and total productivity; 0.21 Mt/ha), Dhankuta (total area: 319 ha; total production; 80 MT and total productivity; 0.250 Mt/ha) and Terathum (total area: 111 ha; total production; 20 MT and total productivity; 0.180 Mt/ha). In 2003/04 potential districts

of Tea production were Jhapa, Ilam, Panchthar, Dhankuta and Terathum districts. Productivity of Tea was in the increasing trend until 2013/14 which is supported by Dhakal and Dahal (2016). Productivity of Tea slightly decreased for five consecutive years (2014/15 to 2018/19). Productivity of Tea was also lower in 2016/17 A.D. In 2019/20 the area, production and productivity of Tea in Nepal was 16041 ha, 8386 MT and 620 MT/ha respectively whereas the area, production and productivity of ginger in Koshi province was 14105 ha, 7475 MT and 0.619 MT/ha respectively. In 2019/20 jhapa was the largest producer (total area: 7340 ha; total production; 17429 MT and total productivity; 2.375 ha, followed by Ilam (total area: 7236 ha; total production; 6535 MT and total productivity; 0.903 Mt/ha), Panchthar (total area: 674 ha; total production; 56 MT and total productivity; 0.083 Mt/ha), Dhankuta (total area: 383 ha; total production; 36 MT and total productivity; 0.093 Mt/ha) and Terathum (total area: 123 ha; total production; 19 MT and total productivity; 0.093 Mt/ha). In

2019/20 potential districts of Tea production were Jhapa, Ilam, Panchthar, Dhankuta and Terathum districts (Fig. 8 & 9).

SWOT Analysis of Ginger, Large Cardamom and Tea Production and Marketing

Strength, weakness, opportunities, and threats (SWOT) analysis of ginger, large cardamom and tea in the Koshi province is presented in Table 1. The hilly terrain and poor

infrastructure and poor upgrading practices were the main hindrances in ginger, large cardamom and tea trade. Diseases and pests, price variation, lack of improved drying, curing, and packing methods at the farm level, many collectors, and high market margin were major constraints and threats in ginger, large cardamom and tea production. The SWOT analysis indicates that there were many challenges of ginger, large cardamom and tea production and marketing in Nepal.

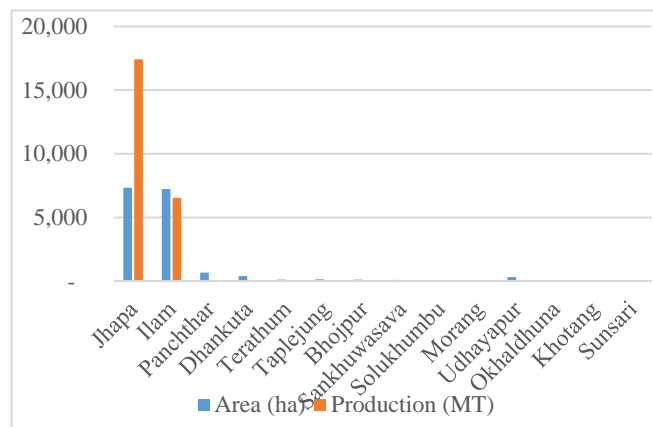


Fig. 8: Tea area and production in 14 districts of Province 1 in 2019/2020

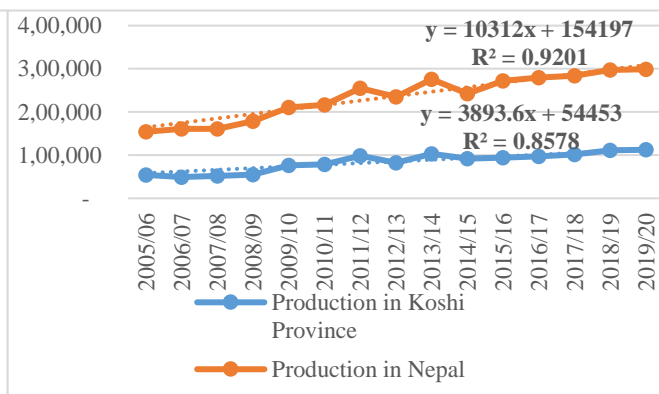


Fig. 9: Trend of ginger production in Koshi Province and national level (in MT)

Table 1: SWOT analysis of ginger, large cardamom and tea production and marketing in the study area

Strengths	Weaknesses
<ul style="list-style-type: none"> Favorable agro-climatic condition Traditional knowledge on cultivation; High value crop and use of sloppy upland with fruits Suitable crop for small and marginalized famers. Successful cultivation practices already carried out in different parts of Nepal High market demand in international markets High benefit cost ratio and profit margin Large number of producers and traders Long productive period and storage life Low investment to obtain regular inflow of cash income 	<ul style="list-style-type: none"> Ageing of crop and poor maintenance result into declining yield Increasing mortality rate due to disease and pests Lack of proper knowledge on cultivation practice sorting/grading Inconsistence quality of product Non-existence of auction practice Weak bargaining capacity of farmers Dependency on foreign market Weak extension services to transfer technology Lack of good quality of storage facility
Opportunities	Threats
<ul style="list-style-type: none"> Appropriate climate and geography suitability Good demand in international and national markets Value adding opportunities through grading, tail cutting, cleaning, curing and smoke-free improved drying High willingness of farmers Prioritized crops in the country 	<ul style="list-style-type: none"> Declining labor availability Double taxation system Incidence of pest and diseases District Forest Office has stopped large cardamom production in community forest due to its threat in bio diversity Domestic consumption is very low Declining international reputation due to poor quality (residual effects of insecticides/ pesticides) Intense competition from neighboring countries Lack of skilled technical manpower Uncertainty in price fixation Gradual increment in use of chemicals instead of suitable organic method

Conclusion

A study in Koshi province in Nepal reviewed the status of ginger, large cardamom and tea through trend analysis and Strengths, Weakness, Opportunities and Threats (SWOT) analysis techniques concluded collection and auction market point establishment, fixation of minimum ceiling/ floor price, value chain alliance and financing strategy and plan development, effective insurance scheme and access to loan mechanism, development of post-harvest handling practices at the farm level need to be focused by policy maker to increase the area, production and productivity of these commodities in Koshi province of Nepal which have great prospects and significance in the global markets. Koshi province having 13 districts (3 Terai, 1 Inner Terai (Udayapur) and 9 Hills and Mountains) Nepal was chosen for study. The information used in this study was taken from several publications produced by the Ministry of Agriculture and Livestock Development, Singhadurbar, Kathmandu between 2002/03 and 2020/21. Utilizing Microsoft Excel 2013, the data thus gathered was analyzed and interpreted. Secondary data compiled and analysed using time series data published from MoALD as well as key concerned stakeholders' consultation The study found that the area contribution of ginger in Koshi province to the nation is 34.32%, where the contribution on national production is 36.61%. All the parameters of production status (area, production, and productivity) are found increasing in the national context. Productivity of ginger was in the increasing trend until 2006/07. In 2007/08 and 2008/09 productivity of ginger slightly decreased. Productivity of ginger was also lower in 2014/15 A.D. In 2019/20 potential districts of Ginger production in Nepal are Ilam, Morang, Ilam, Taplejung, Sunsari and Bhojpur districts. The area contribution of Large Cardamom in Koshi Province to the nation is 90.9%, where the contribution on national production is 90.8%. All the parameters of production status (area, production, and productivity) are found increasing in the national context. Productivity of Large cardamom was in the increasing trend until 2008/09. In 2009/10 and 2010/11 productivity of large cardamom slightly decreased. Productivity of Large Cardamom was also lower in 2014/15 A.D. In 2020/21 potential districts of large cardamom production in Nepal are Taplejung, Panchther, Sankhuwasava, and Terathum districts. The area contribution of Tea in Koshi Province to the nation is 90.26%, where the contribution on national production is 96.73%. All the parameters of production status (area, production, and productivity) are found increasing in the national context. In 2003/04 productivity of Tea was in the increasing trend until 2013/14. Productivity of Tea slightly decreased for five consecutive years (2014/15 to 2018/19). Productivity of Tea was also lower in 2016/17 A.D. In 2019/20 the area, production and productivity of Tea in Nepal was 16041 ha, 8386 MT and

620 MT/ha respectively whereas the area, production and productivity of ginger in Koshi province was 14105 ha, 7475 MT and 0.619 MT/ha respectively. In 2019/20 potential districts of Tea production were Jhapa, Ilam, Panchthar, Dhankuta and Terathum districts. The results of this research provide information that is important in national policy making. Moreover, the government would consider short-term strategies that offset post-harvest management practices of ginger, large cardamom and tea to capture net social benefits and competitiveness of quality products in the global market. On the other hand, government interventions to improve the training, access to credit, and technical service facility as well as encourage more profit-oriented behavior by farmers are necessary to enhance technology adoption of post-harvest practices of ginger, large cardamom and tea in the long-run. The results can significantly contribute to improve the ginger, large cardamom and tea producers, traders, and consumer policy and developing effective ginger, large cardamom and tea value-added practices for the global market. Furthermore, policy makers and researchers need to focus on significant factors determining the WTP of Nepalese ginger, large cardamom and tea considering socio-demographic, institutional, economics, and preferences variables, mainly brand, certification, quality, process products, and size.

Recommendation

Based on the findings of status of ginger, large cardamom and tea on Koshi province, the following recommendations were made which could be useful to the policy makers.

Policy makers

- Ginger, large cardamom and tea collection and auction market point establishment need to be developed in the niche production area for sustainable production and global value chain development in international markets.
- The minimum ceiling/ floor price needs to be fixed based on the record of cost-benefit analysis at the major production level of ginger, large cardamom and tea.
- Local, provincial, and national level ginger, large cardamom and tea production and value chain alliance and financing strategy and plan need to be developed for effective participatory market system development.
- An effective insurance scheme and access to loan mechanism for marginal farmers need to be established for business promotion of ginger, large cardamom and tea.
- Post-harvest handling practices at the farm level namely, improved drying and curing, tail cutting, grading based on size and color, packaging need to be developed in collaboration of local, provincial, and national government bodies in an effective and participatory manner.

- Global demand is based on consumers' preferences and supply records via. app system needs to be established at the national level for ginger, large cardamom and tea market promotion.

Authors' Contribution

R. Poudel, R.R. Kattel and S.C. Dhakal designed the research plan, collected the required data, analyzed the data and also prepared the manuscript. Final form of manuscript was approved by all authors.

Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

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