

Vegetable Development in Nepal: Achievements and Future Strategy

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Abstract

Nepal's vegetable sector has experienced significant growth over the past sixty years due to population expansion, economic progress and use of improved technology. The sector has seen notable improvements in policy development, institutional development and technology generation and transfer. However, the contribution of vegetables, horticultural specialties and nursery products to the country's GDP has only increased minimally. Despite this, there has been a substantial increase in the cultivation area, production and yield of vegetables since the initial fiscal year of the study period. Additionally, there has been a significant reduction in the gap percentage between vegetable seed demand and production. Although the pandemic hindered target production in 2020/21, different farms were able to exceed their seed and seedling production targets from 2016/17 to 2019/20. Furthermore, there has been a slight decrease in vegetable imports in FY 2018/19, with increased exported vegetable quantity found in several previous years. Overall study shows that there is increasing trend in the area and production of vegetable over the years, however, the rate of increment is very low as compared to its potentiality. Despite various approaches adopted in the vegetable sector development, a focused strategy on inclusive commercialization is necessary to optimize investment for the growth of the vegetable sector.

Keywords: Production, Sector, GDP, Development, Commercialization

Introduction

Nepal's increasing population, economic progress and rising spending power from income growth and migrant remittances have resulted in a growing demand for vegetables. In addition, the emerging middle class is seeking fresher, healthier and processed foods. Per-capita vegetable consumption has more than doubled over the past two decades, reaching 114 kg per year.

Nepal's agro-climatic variability, with unique agro-ecological zones favored by altitudes, topography and aspect, presents a vast opportunity for growing various types of fruits, vegetables, flowers, spices and other plantation crops. Out of 599 species of food plants, 400 belong to horticultural groups and 200 of those are vegetable crops (Regmi, 1982). However, only about 50 species are currently in cultivation. Vegetable development with the adoption of an agro-eco-zonal based approach took place during the 5th Five-year plan (1975/76 -1979/80). To fit into these agro-ecological zones and micro-climatic pockets for each region and season, at least four sets of adaptable vegetable varieties under each kind of crops and their seed availability is the ideal requirements for the year round supply of a particular kind of vegetable. Thus, it involves two tiers of research viz. fresh vegetable production and seed production.

While there have been significant advances in policy development, institutional development and technology generation and transfer in the vegetable development sector during the last sixty years, there are still challenges to be addressed. Nepal's membership in the WTO and regional trade associations, increasing education levels and nutrition knowledge of the people and growing demand and import of vegetable commodities offer high prospects for vegetable development. However, enhancing production, improving physical infrastructure, enhancing marketing and promotion of processed products are still major challenges.

With the objective of increasing the production, productivity and quality of vegetable crops, several institutions, such as the National Agriculture Research Council (NARC) and University systems including Tribhuvan University (TU), Agriculture and Forestry University (AFU) and Purbanchal University (PU), are engaged in vegetable research to address the problems related to vegetable crops. Extensive literature reviews have been conducted to carry out research on the different aspects of vegetable development in Nepal, with major focuses on varietal improvement, management, including off-season production, plant protection, nutrition, etc.

Achievements on Vegetable Development

Contribution of Vegetable sector on National Economy in last five years

The agriculture sector plays a crucial role in Nepal's economy, with a significant contribution to the gross domestic product. However, the contribution of agriculture alone to the GDP in the last five years has been around 16%, which is not a satisfactory indicator for the development of agriculture. On the other hand, when considering agriculture, forestry and fishing together, they have contributed an average of 25% to the nation's GDP. In recent years, there has been a significant increase in the contribution of vegetable, horticultural specialties and nursery products to the GDP, with almost 6% of the total contribution (as shown in Table 1).

Table 1. Overall Contribution of Agriculture sector in GDP in last five Years.

Sector	Overall contribution in GDP(%) at current price				
	2074/75 (2017/18)	2075/76 (2018/19)	2076/77 (2019/20)	2077/78 (2020/21)	2078/79 (2021/22) Preliminary
1. Agriculture, Forestry and Fishing	25.63	24.92	25.16	24.9	23.95
2. Agriculture	16.6	16.16	16.51	16.29	15.6
Growing of vegetables, horticultural, specialties and nursery products	5.58	5.2	5.5	5.84	5.99

Source: Central Bureau of Statistics

Vegetables production in Nepal for the Last Ten Years.

Over the past decade, the agriculture sector in Nepal has seen a steady increase in the cultivation area, production and yield of vegetables (Figure 1). From 2011/12 to 2020/21, the cultivation area has increased by almost 16%, while production has jumped by 21% in the fiscal year 2020/21. However, productivity has only increased by 4.38% in the final year. Overall, the cultivation area, production and productivity were continuously increasing, except for in the fiscal years 2016/17, 2019/20 and 2020/21.

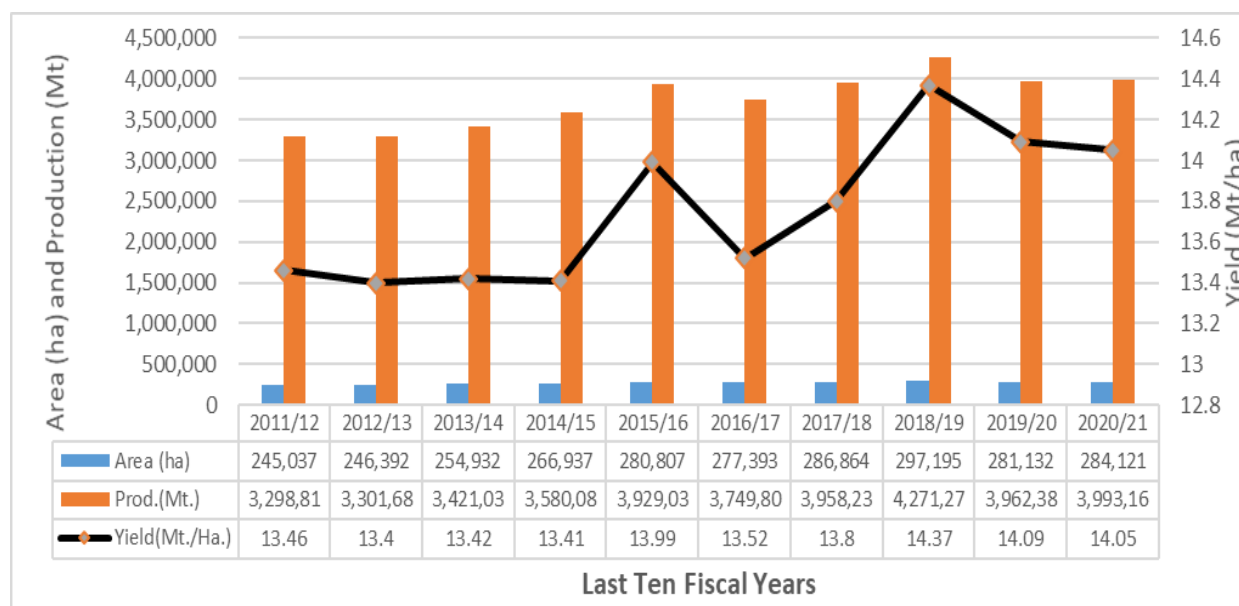


Figure 1. Trend of Area, Production and Productivity of Vegetables in Last Ten Fiscal Year

(Source: MoALD, 2011/12-2020/21)

In recent years, vegetable farming has become an attractive job among farmers due to its potential for cash profits, often from small acreages, within a short period of time (CASA Nepal, 2020). Notably, the benefit-cost ratio (B : C ratio) of vegetables (1:3) is higher than that of cereals (1:1.5), making it a more financially rewarding option (Bhandari et al., 2015). Moreover, the commercialization rate of vegetables is also higher (30-50%) than cereals and fruits (SAWTEE, 2017), further adding to its appeal among farmers. As a result, more farmers have been engaged in vegetable farming, leading to an increase in the total cultivation area. In fact, the fresh vegetable area increases by roughly 10,000 hectares every year (MoALD, 2020).

However, the favorable climatic conditions, seed and fertilizer supply and mechanization of vegetable farming are also important factors contributing to the increased trend of vegetable production in Nepal (Pandey et al., 2017). Despite these advantages, the productivity of vegetables can be constrained by external factors such as the incidence of diseases and pests, climatic hazards, a decline in land ownership and the depletion of soil fertility due to heavy chemical usage (Rai et al., 2019). Therefore, it is essential to adopt sustainable and resilient farming practices to overcome these challenges and ensure long-term productivity and profitability in the vegetable farming sector.

Vegetable Seed Demand and Production in Nepal

The production of vegetable seeds has been continuously increasing in the farmers' fields through contract production between farmers' groups/cooperatives and seed traders since 1975/76. This increase can be attributed to the cumulative efforts of various projects and both private and public sectors. As shown in Figure 2, the production of vegetable seeds in farmers' fields and government farms has steadily increased from 1975 to 2017. Although seed production in government farms has remained relatively constant at an average of 10 metric tons (MT), it has been decreasing in recent years. This decrease may be due to the farms/centers' focus on breeder's and foundation seed production.

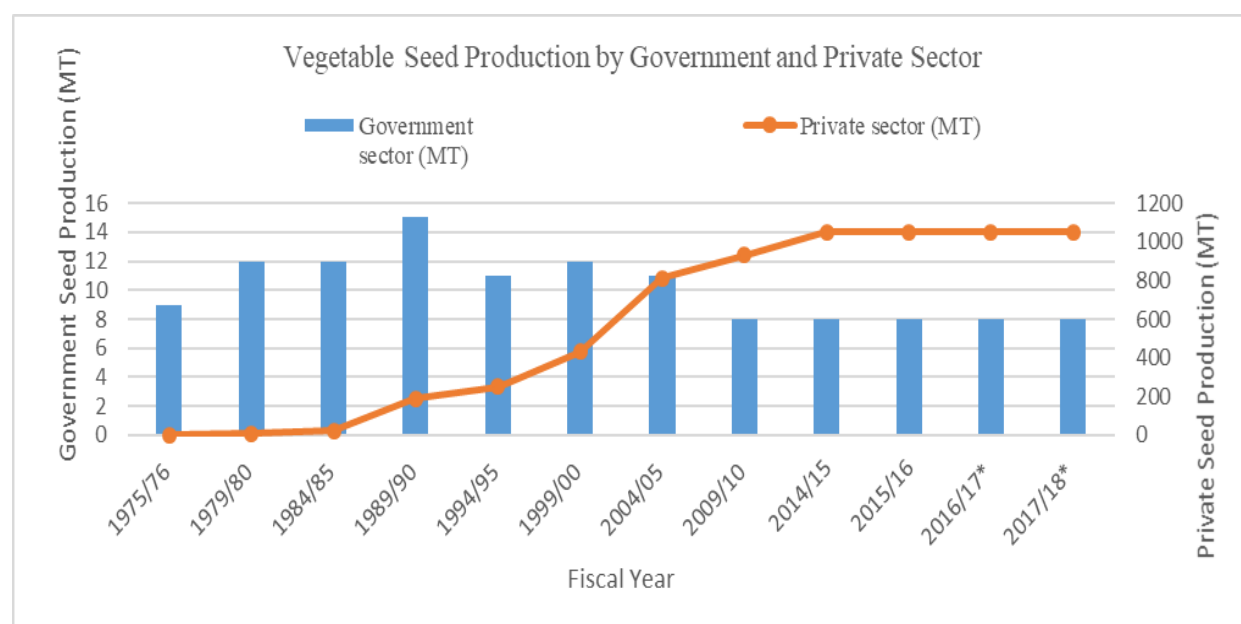


Figure 2. *Vegetable Seed Production by Government Sector and Private Sector*

(Source: I. R. Pandey / *Comprehensive Insights in Vegetables of Nepal*, 2021)

The seed production in Nepal has seen a remarkable increase from 10 MT in 1975 to 1,050 MT in 2016/17, which is parallel to the domestic seed requirement. This growth in seed production has resulted in a significant reduction in the seed requirement gap, although the projected gap in seed availability remains close to 50%.

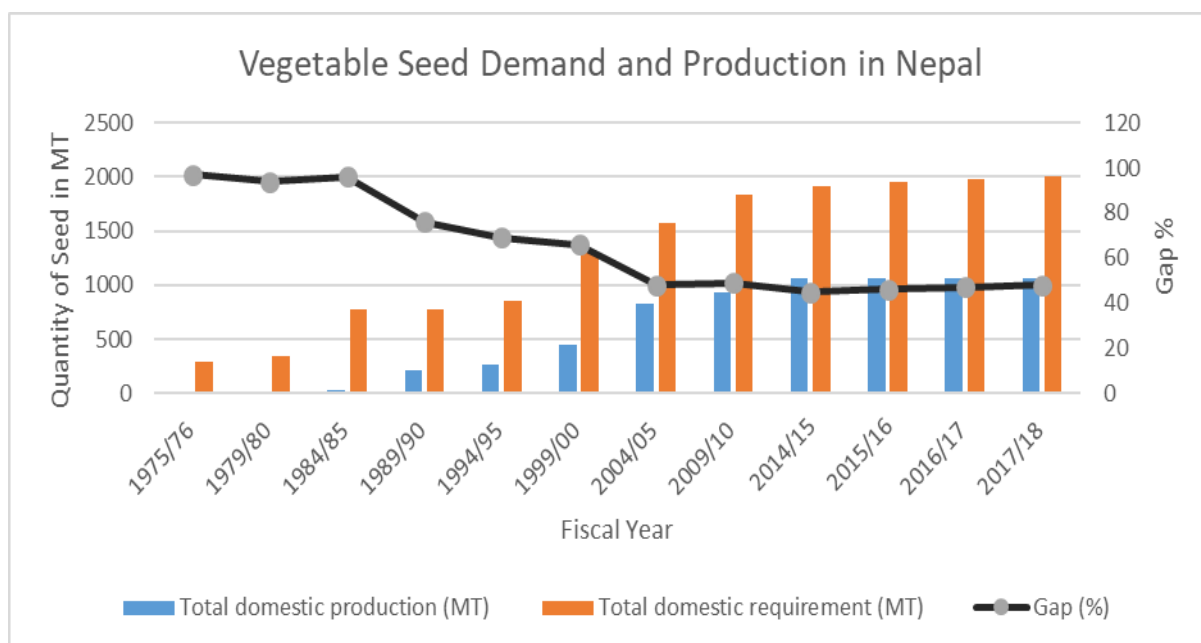


Figure 3. Vegetable seed demand and production in Nepal.

(Source: I. R. Pandey / Comprehensive Insights in Vegetables of Nepal, 2021)

Vegetable Seed and Seedling Production by farms for five fiscal years

The National Potato, Vegetable and Spice Crop Development Center operates various farms with specific responsibilities for vegetable seed and seedling production and distribution. Figure 4 displays the production of vegetable seeds over five fiscal years in response to target goals. The data reveals that four of those years saw successful production exceeding the set targets. However, in the fiscal year 2020/21, the production failed to meet the target, likely due to the COVID-19 pandemic.

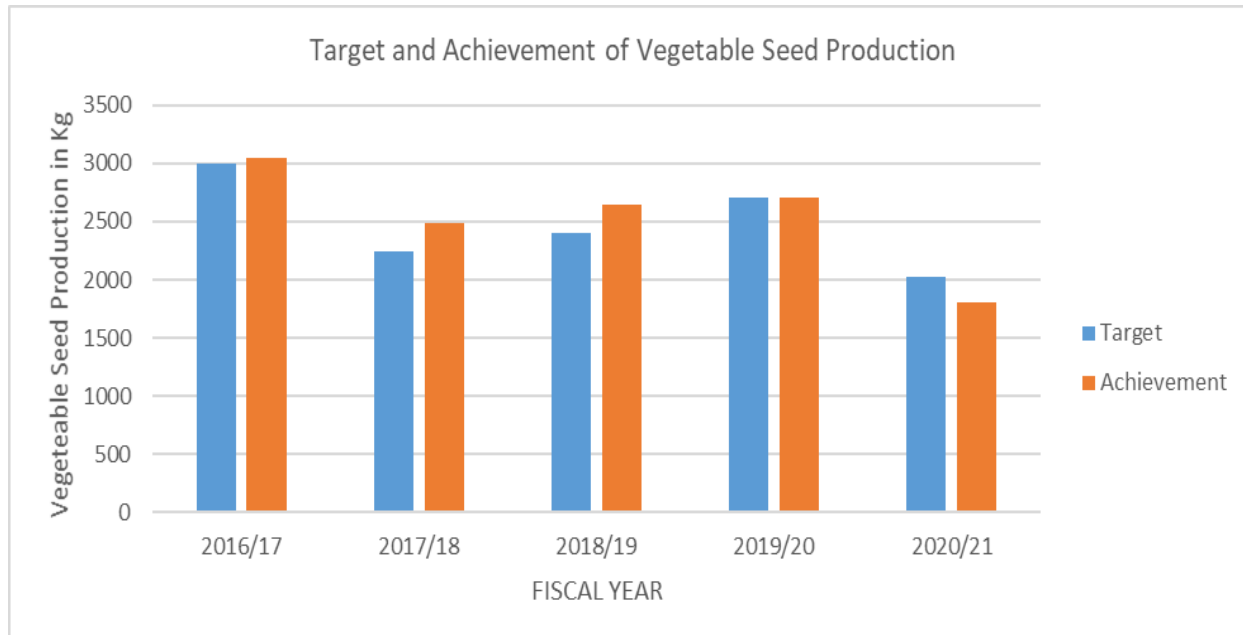


Figure 4. Target and Achievement of Vegetable Seed Production from different farms in five Fiscal Year

(Source: Annual Progress Report 2020/21, NPVSC)

Similarly, the figure below demonstrates the target set for seedling production and distribution in five fiscal years and the actual production achieved. It is clear that the production of seedlings consistently exceeded the target set in all five fiscal years, indicating the effectiveness of the production and distribution system. However, like with seed production, the pandemic resulted in lower production than the target in the last fiscal year.

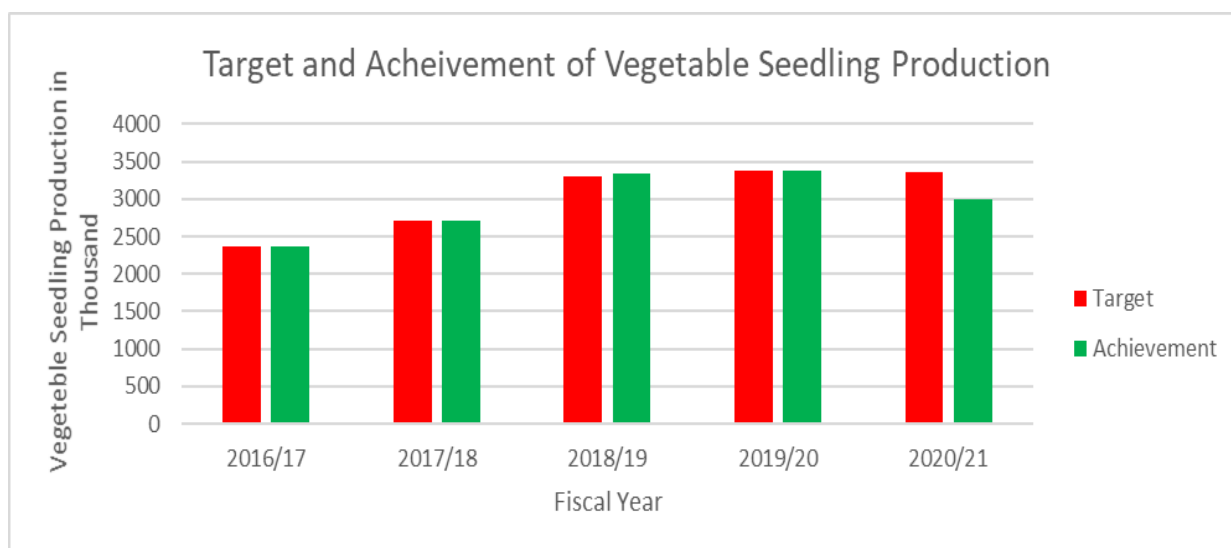


Figure 5. Target and Achievement of Vegetable Seedling Production from different farms in five Fiscal Year

(Source: Annual Progress Report 2020/21, NPVSC)

The above data indicates a significant achievement in the production and distribution of seeds and seedlings from farms, which is a positive development in the agricultural sector.

Import and Export of vegetable crops

Based on the available data, it is evident that there has been a consistent increase in the quantity of vegetable imports in Nepal from 2009/10 to 2018/19. The figure below demonstrates the import data for each fiscal year during the study period and it is evident that the import quantity has been rising every year. Notably, in the last four years, the import quantity has been higher than the average import data. Despite the increasing quantity of vegetable imports, the import value was lower in 2017/18 than the previous year. Additionally, there was a slight decrease in the import quantity of vegetables in FY 2018/19 compared to the previous year. Overall, the data suggests that Nepal is heavily dependent on vegetable imports to meet its domestic demand and efforts should be made to increase domestic production to reduce the import bill.

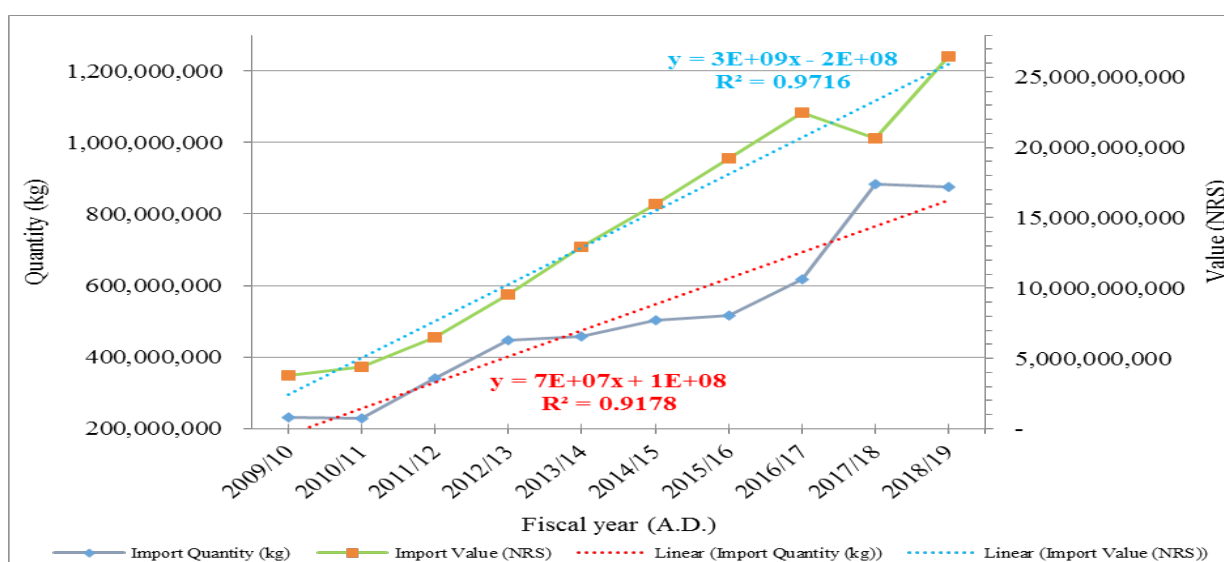


Figure 6. Import quantity and value of vegetable sub-sector in Nepal (2009/10 - 2018/19)

(Source: B. Adhikari and A. Pokhrel, 2020)

In the past decade, the vegetable sub-sector has seen a decrease in the quantity of exported vegetables, except for the years 2014/15, 2017/18 and 2018/19, where the exported vegetable quantity increased compared to the respective previous years. However, in the fiscal year 2018/19, there was a decrease in the quantity of vegetable

exports by 51.47%, with a subsequent fall in value by 71.25%, compared to that of 2009/10. Moreover, the export value has risen in 2012/13, 2015/16 and 2018/19 compared to successive previous years, but each year, besides these years, had a decreasing export value. These trends can be considered as recent achievements in the vegetable sector (Figure 5).

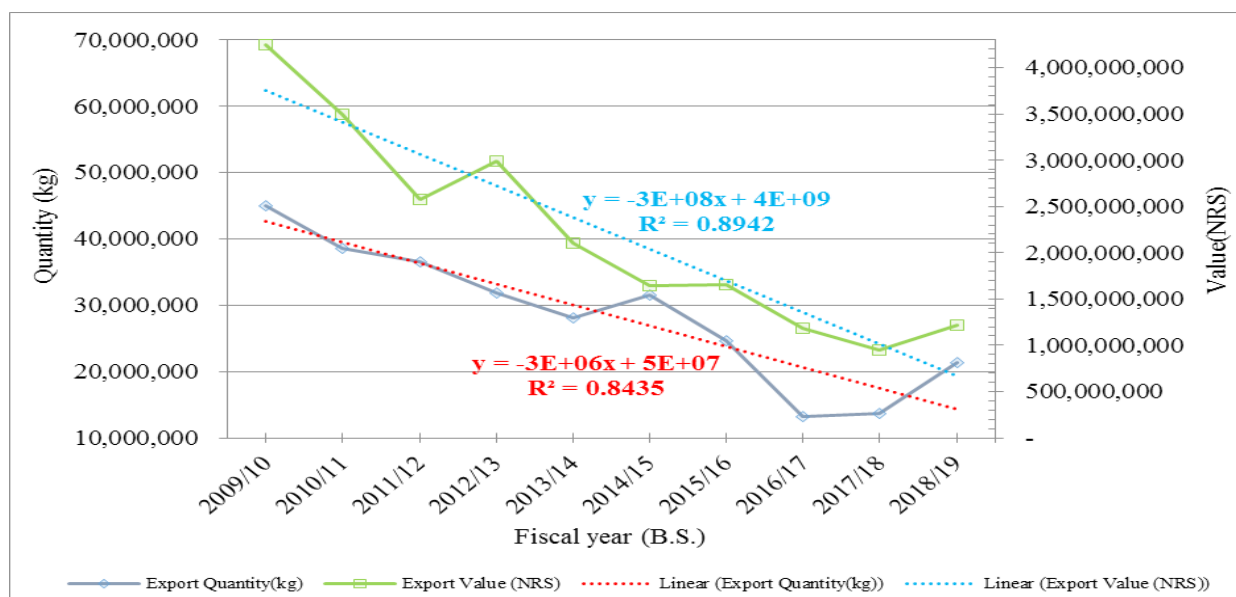


Figure 7. Export quantity and value of vegetable sub-sector in Nepal (2009/10 - 2018/19)

(Source: B. Adhikari and A. Pokhrel, 2020)

The data on vegetable imports and exports in Nepal suggest that there is a significant gap between the volume and value of vegetable imports and exports. Imports of vegetables have been consistently higher than exports, indicating a need for greater emphasis on promoting exportable commodities within the vegetable sub-sector.

In recent years, Nepal has seen a sharp increase in vegetable imports, while exports have declined. In 2011/12, imports accounted for approximately 70% of total vegetable trade, with most of the trade occurring with India. This suggests that domestic vegetable production has not kept up with the rapidly increasing demand for vegetables in Nepal.

To capitalize on the opportunities presented by the vegetable sector, it is essential to further promote commercialization of vegetable production in Nepal. This can be achieved by investing in research and development, encouraging private sector participation and expanding infrastructure and logistics support to facilitate the export of vegetables to international markets. By doing so, Nepal can boost its economy while meeting the growing demand for fresh and nutritious vegetables in domestic and international markets.

Future Strategy in Vegetable Sector Development

To improve the vegetable sector, it is important to have a well-planned strategy that includes policy matters, infrastructure development, manpower development and mobilization, structural modification in the context of the new federal system, resource allocation and coordination among different stakeholders. Additionally, addressing binding constraints to commercialization and engaging more smallholder producers should be a priority. The vegetable sector strategy should focus on optimizing engagement with Small and Medium Enterprises (SMEs) seeking investment to drive growth. This can be achieved by providing necessary support and incentives to SMEs to encourage investment in the sector. Furthermore, there should be a focus on capacity building, knowledge transfer and technology adoption to improve the production and quality of vegetables. With a comprehensive and targeted strategy, the vegetable sector has the potential to contribute significantly to the overall development of Nepal's economy.

Variety development and maintenance

Nepal must take measures to strengthen its seed industry by collecting, evaluating and developing pest-resistant and stress-tolerant varieties from local germplasm for climate resilience. In order to reduce the dependence on imported hybrids, NARC should establish a Hybrid Research Unit (HRU) under National Commodity Programs and

Divisions with adequate funds and human resources, as envisioned in Seed Vision 2025. Variety maintenance is also crucial for quality source seed production. Maintaining crop varieties in their original ecological domain is necessary to produce quality source seed and retain the original genetic purity and unique characteristics of the varieties. However, there is currently limited use and compliance with the zoning concept in variety maintenance. The Variety maintenance chart for vegetables, prepared during the 1980s by VDD and recently revised by National Seed Board (NSB), should be implemented based on agro-ecological zones, domains of the research centres and farms. Additionally, the original genetic traits and unique characteristics of some of the popular vegetable varieties of Nepal that have been published could be further revised and put into practice. A comprehensive strategy must be developed that includes policy matters, infrastructure development, manpower development and mobilization, structural modification in the context of the new federal system, resource allocation and a mechanism for coordination among different stakeholders, to ensure the future improvement of the vegetable sector. The strategy should aim to optimize engagement with Small and Medium Enterprises seeking investment to drive growth while addressing binding constraints to commercialization and engagement of more smallholder producers.

Special attention to achieve the National Seed Vision Target

The National Seed Vision 2013-2025 launched by the Government of Nepal has set specific targets for variety development and seed production in the vegetable sector. However, the support programs and projects have not been effectively implemented and the targets seem unachievable. The National Seed Vision aims to develop and release 30 hybrids, with 20 by the public sector and 10 by the private sector, to increase vegetable production and productivity as well as seed replacement rate from 68% to 90% by 2025. To achieve this goal, it is necessary to prioritize the identification of crop research farms and immediately enhance the job. Effective implementation of support programs and projects, as well as proper funding and infrastructure development, are crucial for the successful achievement of the targets set in the National Seed Vision for the vegetable sector.

Major Niche Production Pockets and Niche Commodities

Different types of vegetable seeds can be grown in various regions of Nepal during different seasons, by adjusting the sowing and flowering time to suit the prevailing climate. Some vegetable crops require both vernalization and long-day conditions for flowering and maturity, which are available in Nepal. Commercial production of specific crops and varieties has been established in certain districts with long-standing experience in vegetable seed production. These districts should be prioritized, with emphasis on identifying specific niche pockets for niche commodities within these districts.

International and national linkages and collaboration

To improve the vegetable sector, it is important to develop and strengthen links for increased germplasm exchange and sharing of information and technology. Currently, the weak linkage of domestic plant breeding programs with the national gene bank limits the availability of new germplasm, modern technological information and the use of locally diverse genetic resources. To address this issue, it is suggested that gene bank operational guidelines be developed and implemented with special reference to vegetable crops. Additionally, research collaboration and partnership among NARC, AFU, DoA and NARDF should be reoriented towards the national goal of hybrid variety development in vegetable crops. To achieve this, it is essential to prioritize linkages with international institutions and universities, as well as joint ventures for new variety development and hybrid seed production by both government and private sectors.

Government Policies and Plans

The government's strategy should prioritize market-oriented, high-value vegetable commodities that can contribute to both internal and export markets, as well as poverty reduction through commercialization. To achieve this, the government must formulate and execute policies that facilitate growth in the agriculture sector through improved governance, productivity, commercialization and competitiveness. In addition, the following issues should be prioritized:

- Establishing big storage house facilities to ensure year-round supply and price stabilization.
- Strengthening capacity building for horticulturists and frontline extension workers.
- Mobilizing foreign aid and investment through a single door policy.
- Ensuring implementation of crop insurance policies for commercial farmers.
- Strict adherence to sanitary and phytosanitary (SPS) measures for exportable commodities.

Conclusion

Nepal's vegetable cultivation area has been steadily increasing, as farmers realize that it offers better returns. Compared to maize and fruits, vegetables have higher commercialization rates of 30% to 50% and a higher cost-benefit ratio of 1:3 compared to 1:1.5 for cereals. Moreover, off-season varieties of vegetables have emerged as an effective means of reducing poverty, as their demand is increasing and they fetch higher prices. The contribution of vegetables to GDP, the increase in the area and production of vegetables, the increase in domestic seed production, the decrease in the gap percentage of domestic seed production and the production of off-season vegetables have all been recognized as major achievements in the development of vegetable production in Nepal.

However, the vegetable sub-sector is complex, as it involves a wide range of vegetable species, sub-species and varieties that must be adaptable to varying agro-ecological environments. Therefore, it is crucial to have well-thought-out short-, medium- and long-term vegetable research inputs from both the public and private sectors, including seed companies, non-governmental organizations and farmer's cooperatives, to meet the targets set in the National Seed Vision and Agriculture Development Strategy (ADS).

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