

Prospects and Challenges of Vegetable Seed Business in Nepal

K.K. Poudel^{1*}, L.R. Paudel² and D. Adhikari¹

¹ Programme Manager, KUBK, MoALD, Nepal

¹ Seed coordinator, KUBK, MoALD, Nepal, and

² General Secretary SEAN, Nepal

*Corresponding email: kaushalpd@gmail.com

Abstract

Vegetable seeds have been identified as a high value and low volume product which has potential impact in agriculture development. Seed contributes to increase crop productivity by 20-25 %. Agro-climatic diversities of Nepal can be utilized to produce large amount of vegetable seeds for internal demand. The internal seed production is in decreasing trend and only 16% of demand was fulfilled by formal source of domestic production. There is huge gap in demand (1873 mt) and production (308 mt) of vegetable seed in the country but this sector is not yet considered and implemented as a major sub sector in Nepal. Government has formulated Seed Act, Seed Regulation, National seed policy and Seed Vision 2013-25 for creating enabling environment for seed production and marketing. Formally the vegetable seed production was initiated since 1952 from horticulture farms of public sector and it was started by private sector when SEAN was established in 1991. National seed policy assumed assurance of quality seed production and supply, export promotion and import substitution and provisioned foundation seed production at private level whereas seed vision clearly conceptualized and identified seed value chain actors including input output of the seed chain components. This paper aims to explore the present vegetable seed production status, its potentiality, constraints, opportunities and challenges in new federal structure of the country. As the country is always facing shortage of vegetable seeds, the demand for vegetable seeds are always increasing with increase in fresh vegetable production. The vegetable seed production area increased by more than three folds, seed production increased by almost 23 folds and demand increased by almost 6 folds in 2016/17 as compared to 1977/78. The private sector contribution increased drastically from 3.2 mt in 1977/78 to 302.3 mt in 2016/17 after establishment of SEAN. At present, 32 agencies accredited for foundation seed production including private seed companies as envisioned by seed vision. Lack of quality source seeds, consolidated land availability, harmonized buyback agreement, sustainable marketing, effective quality control mechanism and seed processing facilities are the major hindrances in promotion of vegetable seed business in the new federal context of the country.

Keywords: *Agroclimate, Seed business, Buyback agreement, Marketing*

1. Introduction and Purpose of the Study

Vegetable seeds have been identified as a high value; low volume product which has potential impact in agriculture development of rural areas. It is a key component among all inputs which contribute 20-25 % in crop productivity. The share of agriculture sector to the national GDP is in declining trend in the recent years and contributions at current prices is estimated at 31.23 percent and the share of vegetable to agriculture GDP alone is 14.88 percent (MoAD, 2015). It is estimated that over half of the commercially required improved vegetable seeds are supplied by domestic (in country) production and rest of the seeds are imported from India, Japan, Korea, Thailand and other countries (HVAP, 2011). The recent trend recognized the comparative advantage of vegetable seed production particularly as an important low-volume /high –value women's business (IFAD, 2012). The demand for improved seeds is increasing every year due to increase in the area under fresh vegetables both for main season and off-season. The agro-climatic diversity of Nepal has an advantage of producing different kinds of vegetable seeds. This advantage can be utilized to produce large amount of vegetable seeds for meeting internal demand and export potential as well. In spite of huge potentiality, national level plans and policies; the vegetable seed sector is not yet considered as a major input sector in Nepal.

In the past, some special programs/projects were implemented to boost up the vegetable seed business. Koshi Hill Agriculture Project was implemented in eastern hills of Nepal with the aim to develop cereal and vegetable seed production and supply system. Fresh Vegetable and Vegetable Seed Production Project was implemented from 1979 to 1994 with systematic and integrated approach to vegetable seed production and marketing and established a number of seed processing infrastructures in different regions of the country. Vegetable, Fruits and Cash crops Development Project was initiated in entire Rapti Zone area. Koshi Hill Seed and Vegetable Project were implemented in Koshi hills of Nepal for an effective, sustainable and market oriented seed and vegetable program. Similarly, Vegetable Seed Project (VSP), funded by SDC and implemented by CEAPRED supported poor farmers of remote areas by diversifying their income opportunities through vegetable seed production and marketing. Other projects HIAMLI, HVAP, IWRM, RISMFP and currently KUBK-ISFP is also supporting in vegetable seed businesses by providing matching grant and other facilities.

In this context of Nepali vegetable seed business, this paper aims to explore the present status of seed business in the country, major constraints, opportunities and challenges in new federal structure of Nepal. In the past, different horticultural farms were established to address and utilize the agro climatic zones for potential vegetable crops seed promotion. Local/Indigenous crops/ varieties were collected, screened, released and recommended for release from suitable location where crops were adopted and developed. Similarly, exotic crop/varieties were also acclimatized and adopted in different farm locations and recommended for seed production in those locations where these varieties were developed. Presently in the changing context and restructuring of federal Nepal it has to be revisited and recommended for seed production according to provincial set up.

2. Policy Environment

Government of Nepal has formulated Seed Act (1988) Seed Regulations (2013), National Seed Policy (1999) and seed Vision 2013-25 for creating enabling environment for seed production

and developing formal seed sector to make the seed business competitive, sustainable and self sufficiency by integrating public and private sector. The main role of Seed act (1988) is to regulate the quality seed production and marketing. The seed act has provisioned National Seed Board (NSB) an advisory body of Government of Nepal for developing seed related policies, rules and regulations. The new Seed Regulation (2013) is private sector friendly and provisioned the private seed inspector, laboratory establishment at private sector, seed certification and truthful label seed for quality assurance. Likewise; National Seed Policy (1999) assumed assurance of quality seed production and supply, export promotion and import substitution and provisioned foundation seed production at private level. Seed Vision 2013-25 also clearly conceptualized and identified seed value chain actors including input output of the seed chain components. These value chain components include varietal development and maintenance, seed multiplication, seed processing and conditioning, seed marketing and seed use (SQCC 2012).

3. Methodology

- Literature review
- Experience sharing of past and present special programs involved in vegetable seed production programs
- Sharing knowledge of different stakeholders

4. Results and Discussion

4.1 National Scenario

The demand for vegetable seeds is always increasing with increasing demand of fresh vegetable (VDD 2016/17) in Figure 1. The gap between the seed production and requirement is becoming wider in the later years with increase in area under fresh vegetables (Figure-2). The area under fresh vegetable in the year 1977/78 was 88,000 ha with the productivity potential of 5.3 mt /ha and seed production of 13.6 mt and requirement 314 mt (VDD 2012/13 and 2016/17), which substantially increased to 2,82,809 ha with the production potential of 13.7 mt/ha (Figure-1). During 2016/17 total seed production was 308.7 mt (Govt. 6.45 mt and Private 302.3 mt), and requirement was almost 1,873 mt (Hybrid-599.7 and Op varieties-1273.52 mt respectively) (VDD 2016/17). As compared to 1977/78 the vegetable seed production area increased by more than three and half fold (2,82,809 ha), Seed production increased by almost 23 fold (308.7 mt) and requirement increased by almost 6 folds (1873.27mt). The private sector contribution in seed production has increased drastically from 3.2 mt in 1977/78 to 302.3 mt in 2016/17. Percentage increment in seed production is higher than the seed requirement, even though the gap between production and requirement is becoming wider.

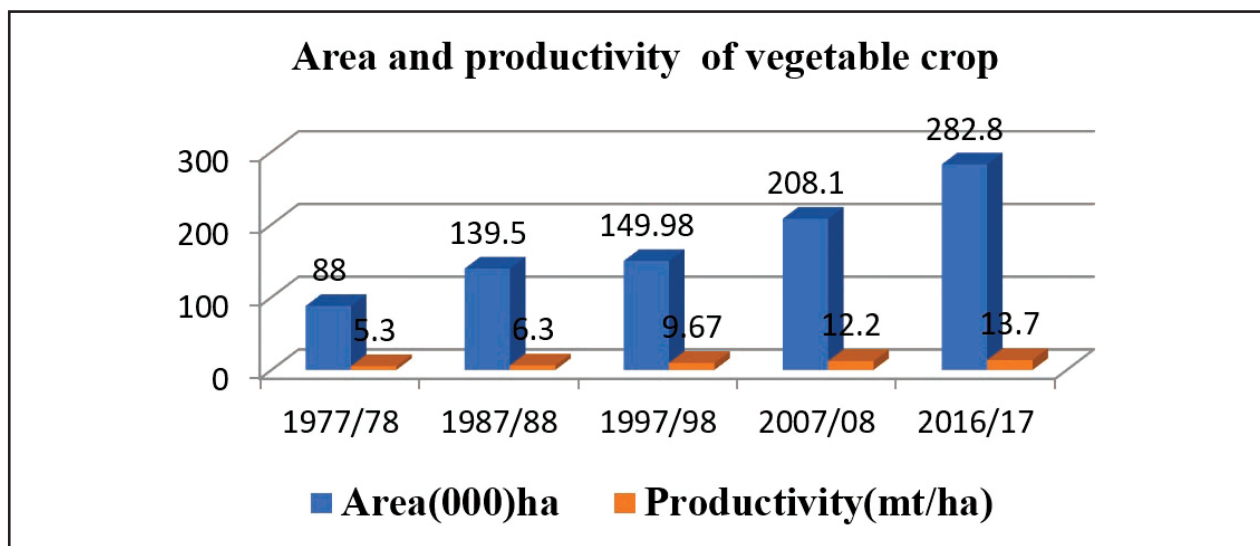


Figure 1: Area and productivity of vegetable in last 39 years at 10 years interval

Source: VDD 2016/17

The present vegetable seed production status compared to seed vision target is very important to appraise the vegetable seed business development scenario of the country. Vegetable seed production was in increasing trend, but declined in the year 2017 with decrease in production in private sector (Table-1).

Year	Production status (mt)				Projected requirement (mt)	
	2000	2005	2010	2017	2020	2025
Vegetable seed	442	820	1107	308.6	1909	2472

4.2 Vegetable Seed Production and Requirement in Nepal

Production of vegetable seeds in the remote hills of Nepal is one of the promising strategies to promote economic growth and poverty reduction (SDC 2009). The vegetable seed production in Nepal was initiated after the establishment of Horticultural Division under Department of Agriculture in 1952. Many farms and commodity programs were established during late sixties and seventies and establishment of Nepal Agriculture Research Council (NARC) in the year 1993 (Mohan *et al.*, 2017). NARC has the sole responsibility of supplying breeder seed required to produce foundation seed needed for improved seed production at farmers level. After the implementation of seed regulation 2013, thirty two agencies accredited for foundation seed production including Private Seed Companies (PSCs), NGOs and Agriculture Cooperatives under direct guidance of Seed Quality Control Center (SQCC). Present vegetable seed production, requirement and gap is presented in figure 2.

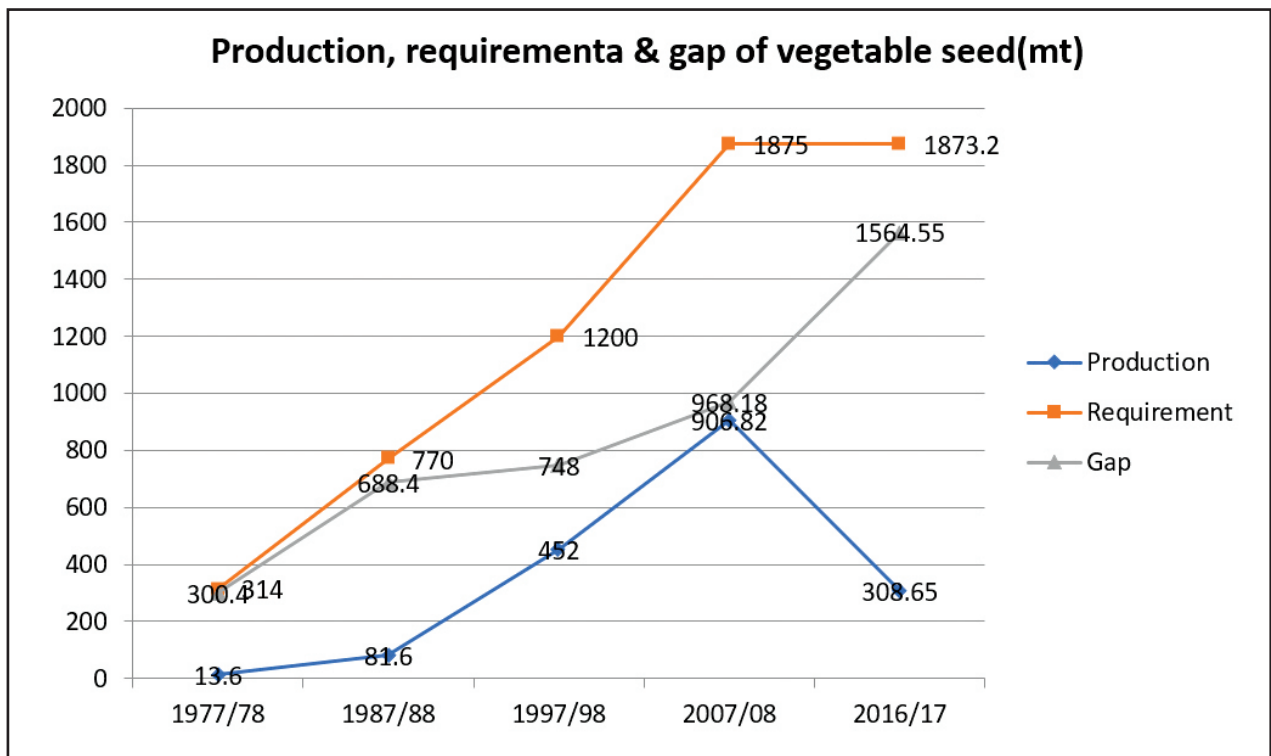


Figure 2: Production, requirement and gap of vegetable seed

Source: VDD 2012/13 and 2016/17

4.2.1 Supply situation of vegetable seeds in Nepal

Vegetable seed production and requirement data for the last 39 years are available, and the demand gap for vegetable seed is calculated. The share of private sector in vegetable seed production has significantly increased since the late 1989/90. The seed production figures are fluctuating; however, data revealed that the share of government sector in seed production is shrinking and private sector is expanding. The vegetable seed production of the country in the year 2016/17 is 308.74 mt (Government 6.452 mt and private 302.287 mt) and the requirement is 1873.274 mt (VDD 2074/75). Vegetable seed production trend, requirement and gap at every 10 years interval is presented (Figure- 2).

4.2.2. Import situation of vegetable seed in Nepal

The demand gap of vegetable seeds is mostly fulfilled by importing hybrid and OP seeds from Korea, Japan, Thailand, India, Italy, Pakistan, China and USA. Besides, the remaining gap is fulfilled by farmer saved seed. The import summary situation of different vegetable seeds with its value of the last 5 years is presented in figure 3.

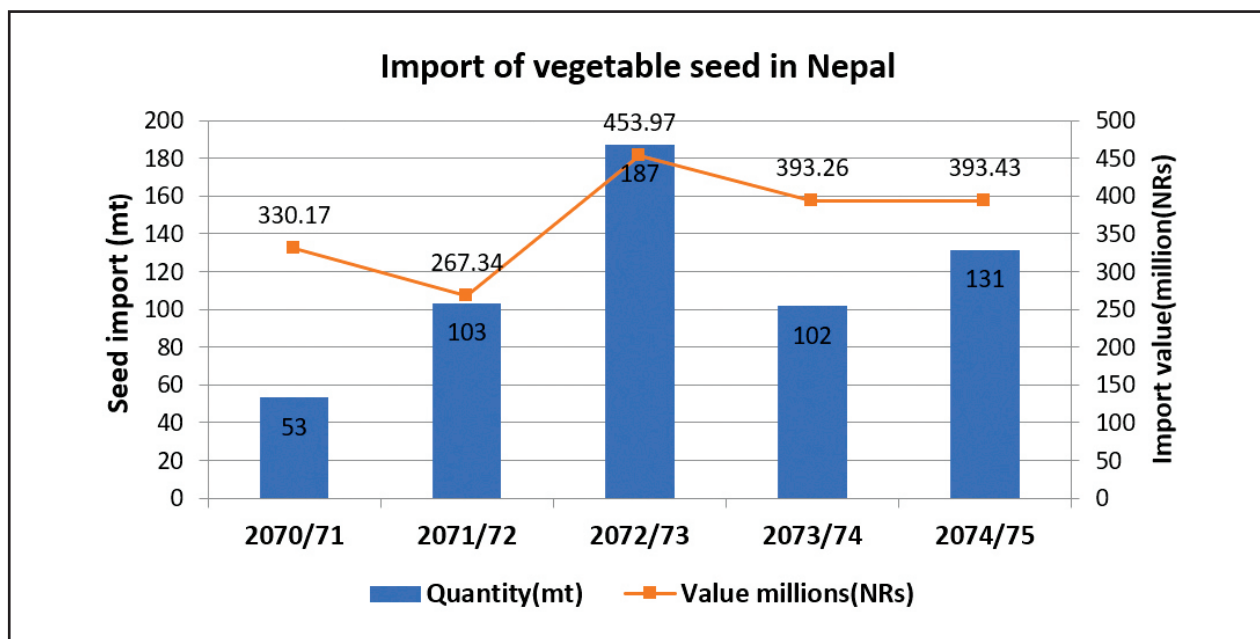


Figure 3: Import of vegetable seeds in Nepal

Source: SQCC data base 2018

4.2.3 Vegetable seed Replacement Rate

Seed replacement rate denotes how much of the total cropped area was sown with improved seeds in comparison to farm saved seeds. It also denotes actual quantity of seed distributed to farmers and actual seed required for cultivation of crops. The SRR of vegetable is expected to be 90% by the end of 2025 as envisaged in seed vision 2013-25. The actual seed replacement rate of vegetable till 2017 and projected SRR 2020 and 2025 is presented (Figure-4).

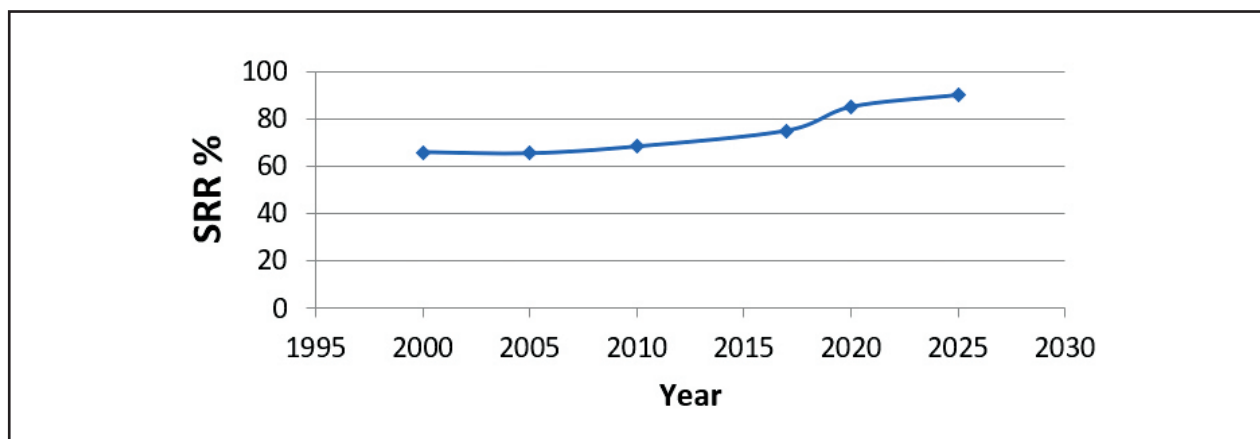


Figure 4: Seed replacement rate in vegetable crops (SQCC 2016/17)

Source: SQCC 2016/17

4.2.4 Share of hybrid and open pollinated seeds

Number of vegetable varieties released and registered for cultivation in Nepal is 344. Out of the total cultivated varieties 94 (27.32 %) are OP varieties and 250 (72.67 %) are hybrids. Of the total of 250 hybrids only one Srijana variety of tomato is a native variety (produced annually approx 200 kg) and rest is imported. The analysis of imported hybrid and OP vegetable seed indicates that seeds of cauliflower, broccoli, hot pepper, bitter guard, water melon, snake guard, ridge guard, Chinese cabbage and peckchoi are exclusively hybrid seeds while asparagus, okra, beans, khol

rabi, lettuce, broad leaf mustard, cow pea, sugar beet, pea and swisschard are exclusively imported OP varieties. Not only the hybrid seed but also the seeds of other varieties pertinent to cabbage, cucumber, onion, carrot, squash, sweet pepper, brinjal, radish, bottle guard and coriander seeds are imported. The share of OP and hybrid seed imported in 2017/18 is 83.8% and 16.2% respectively, and the share of top seven imported OP and hybrid is presented in figure-5.

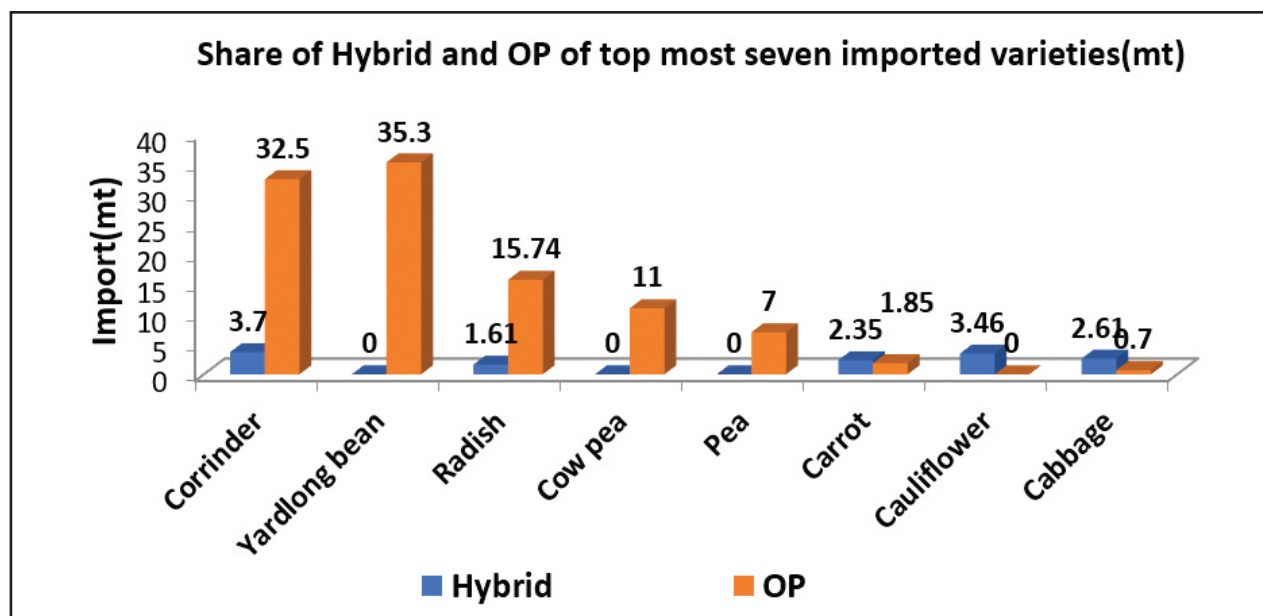


Figure 5: Import of hybrid and OP seed in top most seven crops during 2017/18

Source: SQCC 2017/18

4.2.5 Export situation of vegetable seeds

During recent years, the export of vegetable seed from Nepal is negligible. During last two year, Nepal exported only 1845 kg of vegetable seed in 2016/17 and 522 kg in 2017/18 (Table-2). However, some seeds of radish, carrot, BLM and beans are regularly exported to India through informal channel (SEAN personnel communication).

S.N.	Crop	Export (kg)		Country of export
		2016/17	2017/18	
1	Carrot seed	1600	500	Bangladesh
2	Bitter guard	200	0	Bangladesh
3	Cucumber	10	0	Bangladesh
4	Cauliflower	25	0	Pakistan
5	Tomato	10	17	Pakistan, Bangladesh
6	Cabbage	0	5	Bangladesh
	Total	1845	522	

Source: NPQP (2016/17), Hariharbhawan

5. Challenges of Vegetable Seed Production

The agro climatic diversity of Nepal has an advantage to produce a number of vegetable seeds which provides comparative advantage to the seed sector of Nepal. This opportunity can be utilized to produce various vegetable seeds to minimize the existing gap between production and requirement (SQCC, 2013). Besides huge potentiality of seed production in varied agro climatic condition of Nepal it has faced many constraints and challenges during seed production. Some of the significant challenges observed in vegetable seed production can be summarized as follows.

- Lack of quality source seed
- Imbalance between requirement and supply
- Perishable nature of seed
- High cost of production
- Climatic problems
- Small land holding of farmers
- Incidence of disease and pests
- Seed quality deterioration
- Lack of research and development activities

6. Prospects for Vegetable Seed Business in Nepal

6.1 Favorable Agro Climatic Conditions

The agro climatic diversity of Nepal ranging from temperate to tropical has an advantage of producing different kind of vegetable. The large amount of seed can be produced so as to meet the internal demand and have great prospects of exporting the quality seed to countries like India, Bangladesh, Pakistan, Sri Lanka and other countries (HVAP, 2011). Nepal's high/mid hills is potential for seed production of carrot, cauliflower, cabbage, swischard, broccoli, radish, onion while bean pea, cowpea, okra, eggplant, sponge guard, bottle guard and a variety of warm season vegetables seed can be produced in terai region. This unique gift of nature can be utilized for vegetable seed production in Nepal throughout the year.

6.2 High Demand of Vegetable Seed

Data on fresh vegetable production, seed production and requirement during the last 38 years showed that area under fresh vegetable increased to more than three and half folds and seed production increased by more than 23 folds. Information available has shown that seed production and requirement gap is becoming wider in later years.

6.3 Huge External and Domestic Market

The scope of vegetable seed production in Nepal is enormous as there is high demand of seed to fill the gap of domestic market. At present in 2016/17 the hybrid seed import from other country is about 348.7 mt with a value of 418.4 million NRs (TEPC 2016/17). Seed vision 2013-25 has emphasized to increase export by 5 % and substitute the import by 20 %. Thus, there is high scope of vegetable seed production in Nepal both for export promotion and import substitution.

6.4 Cheap Labor Availability

Vegetable seed cultivation requires high labor for different cultural operations. Potential vegetable seed production area in Nepal mostly lies on mid/high hills where use of farm machineries' is very low resulting high labor requirement for different farm operations. Seed production of vegetable is labor intensive. Hence, labor resources available in Nepal can be utilized for vegetable seed production at reasonable rates.

6.5 Other Opportunities of Vegetable Seed Production

- Income generation
- Import substitution and export promotion
- Employment generation
- Seed certification and truthful labeling
- Appropriate policy and legal system are in place
- Seed processing, storage and seed testing facilities are developed at private sector
- Favorable agro climatic variation
- Seed sector support programs
 - Government agencies: VDD/DOA, NARC
 - Projects: KUBK-ISFP, HVAP, IWRM, AFSP, NAFSP, CSISA
 - Private/NGOs : SEAN, PSCs, AEC, CEAPRED, LIBIRD, FORWARD

7. Seed Production Program in Provincial Set up

Horticulture master plan (1990), fruit development and vegetable development guidelines of different period has prepared a clear outline of potential areas of fruits, vegetable and other horticultural crops based on the agro ecological belt of the country. Vegetable seed research and development programs are mandated different farms/centers for maintenance of specific crop/varieties. The proposed role of the government in the federal context is in table 3.

Table 3: Vegetable seed production role in new federal structure (Proposed)		
Government	Responsible Institution	Role
Federal	MoALD/SQCC/NSB/ NARC	Variety release and registration Variety recommendation to particular agri eco zones Prepare national balance sheet Formulation of national seed policy and regulation
Province	Provincial Agriculture Ministry	Preparation of Provincial seed balance sheet with coordination of SQCC and Federal Ministry Implementation of source seed multiplication programm in coordination with NARC Establishment of seed resource center under Province Implementation of varietal maintenance plan for each Province as proposed

	Seed Testing Laboratories	Field inspection, seed testing and seed certification Seed quality regulation at Provincial level
Local	Municipality/Rural Municipality	Facilitation in Land Consolidation, Implementation of seed production programme in potential pocket of concerned local institutions Assist in marketing of improved seed in close coordination with seed producer and Private seed dealer Assured seed quality control in coordination with Provincial Ministry/STL Regulation of seed quality control and seed marketing in close collaboration with Provincial Ministry/STLs

8. Partnership Programs with Private Sector

Despite the development in modern technology, Nepali agricultural research is still lagging behind and rely more on traditional methods of plant breeding. Only one Srijana variety of tomato variety is officially released and almost all of imported hybrid crop varieties share cent percent in domestic market supply. Hybrid varieties of vegetables and cereals are very popular among commercial growers in Nepal. This is high-time to initiate and commercialize hybrid seed production program in Nepal in either way (PPPs or joint venture) to grab expanding market segment. With the advent of modern technologies such as the markers technology and genetic engineering, seed research has become very expensive and limited to resource full research institutes and seed companies. At present SEAN, SSCN and other seed companies are being capacitated to implement the hybrid seed production program so a partnership program is potential for hybrid seed production.

9. Conclusion

Only sixteen percentages of demand was fulfilled by domestic formal source of seed and rest was estimated by informal source and imported seeds. The internal production trend is decreasing. The imported seed in 2018 was 131.35 mt (SQCC, 2018) from formal source. Out of this hybrid seed import is 21.232 mt (16.2 %) of the total import. It shows the huge amount of open pollinated seed having been imported. In the past various efforts were made to support the vegetable seed production programs through special programs/projects. At present very few special programs prevails to address the seed business.

Lack of quality source seed, high production cost, scattered seed production pockets, poor quality control facilities and safe market disposal of seed in competitive prices is being major challenges to boost the seed business in Nepal. Quality of seed is one issue and it has been dominated by imported hybrid and open varieties. Hybrid seed demand especially in case of Cole crops, tomato and cucumber is inevitable but other open pollinated varieties are potential to produce in Nepal. The following recommendations are proposed to address the challenges of vegetable seed business in Nepal.

10. Recommendations

- a. The mandatory responsibility of variety/crop maintenance needs to be revisited and provided new responsibility to farms/center in new federal structure.
- b. Strict licensing system should be followed to control the seed quality and import. Seed trading and seed testing mechanisms should be in control of SQCC and other provincial authorities.
- c. Assured seed quality control by seed certification and truthful labeling. Use of private seed inspector is being urgent to support the seed producing farmers/groups as there are no seed inspectors available in districts in the absence of DADO.
- d. Identification of potential seed pockets, consolidation of pocket land, pre production plan and buyback agreement; assurance of quality source seed, inputs provides congenial seed business promotion for farmers and trader.
- e. Social/neighborhood proximity of group formation approach should be revisited and group formation should be based on land proximity of the farmers in selected pockets/zone.
- f. SQCC has to start certification process of vegetable seed.
- g. Multi stakeholder platform (MSP) practiced by HVAP and KUBK, can be replicated to perform the buyback agreement and marketing system harmonization in every seed producing districts and pockets.
- h. Redefining research and development activities: NARC should be given priority for the hybrid research in the line of seed vision target. Agricultural Universities should also be involved in hybrid R&D works.
- i. Streamlining of informal seed: Only 60-70 percentages of vegetable seed is coming in formal market so remaining seed should be streamlined in formal market by providing technical and legal support to the farmers and traders.
- j. Institutional strengthening and capacity development of seed agencies stakeholders by providing technical, legal and financial support. Easy access to soft loans or matching grant is inevitable to strengthen the seed business ahead.
- k. Import substitution of OP varieties: Huge amount of imported OP varieties are now dominating the internal production. So promotion of quality seed production and its safe marketing is very important.
- l. Strong monitoring and regulatory function has to be implemented in all level of government to control the illegal crop/varieties introduction in the market.
- m. Encourages the producers through output based grant/incentives
- n. In close coordination of NARC, private sector/companies should encourage for hybrid seed production. Government has to provide access to inbred lines, technical trainings, public sector resources of processing and other support.
- o. Development of networking of seed data base through digital technology. SQCC has already lunched digital balance sheet management software.

References

- HVAP, 2011. A Report on value chain analysis of vegetable seeds in Nepal. Governed of Nepal, Ministry of Agriculture and Co-operatives, High Value Agriculture Project for Hill and Mountain Areas (HVAP).

- IFAD, 2012. Design Completion Report Volume-2, Asia and Pacific Division, Programme Management Department, International Fund for Agriculture Development (IFAD)
- Koundinya, AVV and P. Kumar, 2014. *Indian Vegetable Seed Industry: Status and Challenges* in International Journal of Plant, Animal and Environment Sciences Volume 4:62-68.
- KUBK, 2018. Annual Progress Report 2073/74, Government of Nepal, Ministry of Agriculture Land Management and Cooperatives , Kisan ka lagi Unnat Biu Bijan Karyakram-Improved Seeds for Farmer's Programme (KUBK-ISFP).
- NPQP, 2018. Annual Report 2073/74. National Plant Quarantine Programme, Harihar Bhawan. Lalitpur, Nepal
- PQPMC, 2019. Annual Programme and Statistical book 2074/75. Ministry of Agriculture and Live stock Development, Plant Quarantine and Pesticide Management Center, Harihar Bhawan, Lalitpur, Nepal.
- Sharma, D., H. Neupane, L. R. Paudel and L. P. Paudel, 2015. Prospects and Problems of Seed Business in Nepal. Paper presented at National seed Summit held in Kathmandu September 14-15, 2015.
- SQCC, 1988. The Seed Act, Government of Nepal, Ministry of Agriculture.
- SQCC, 1999. National Seed Policy, Government of Nepal, Ministry of Agriculture.
- SQCC, 2013. The Seed Rules, Government of Nepal, Ministry of Agriculture Development, Seed Quality Control Center, Hariharbhawan, Lalitpur, Nepal.
- SQCC, 2018. Annual Progress Report. Government of Nepal, Ministry of Agriculture Land Management and Cooperatives, Seed Quality Control Center, Hariharbhawan, Lalitpur
- SQCC, 2013. National Seed Vision 2013-25. Seed Sector Development Strategy, Ministry of Agriculture Development, Seed Quality Control Center, , Hariharbhawan, Lalitpur
- Swiss Agency for Development and Cooperation (SDC), 2009. Vegetable Seeds to improve livelihood in rural Nepal Asia brief-Partnership results, Swiss Agency for Development Cooperation, South Asia Division.
- Thapa, M. B. and S. Dhimal, 2017. *Horticultural Development in Nepal: Prospects, Challenges and Strategies in Universal Journal of Agricultural Research* 5(3):177-189.
- Timsina, K., G.P. Shivakoti and K. J. Bradford, 2015. Supply Situation of Vegetable Seeds in Nepal: An analysis from Policy Perspective in Nepalese Horticulture volume 10(1): 26-36.
- VDD ,2016. National Data base of Vegetable, Potato and Spices Crops. Government of Nepal, Ministry of Agriculture and Cooperatives, Vegetable Development Directorate, Khumaltar, Lalitpur
- VDD, 2019. Annual Progress Report. Government of Nepal, Ministry of Agriculture Land Management and Cooperatives, Vegetable Development Directorate, Kumaltar, Lalitpur