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## **Supply Situation of Vegetable Seeds in Nepal: An Analysis from Policy Perspective**

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### ABSTRACT

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*The government of Nepal has approved different policies and legislation related to seed and emphasized the importance of quality improvement in the seed sector. However, the public and private sectors face problems to access quality assurance services, maintain the quality of seeds and supply based on the demand to the consumer. Considering the situation, this paper tries to analyse existing production, requirements and distribution scenario of selected vegetable seeds along with policy issue in the vegetable seeds sub-sectors in Nepal. Based on the analysis, policy options were recommended for seed quality improvement and income generation. Results indicated that over the four decades, the demand for vegetable seeds is increasing at rapid rate compared to seed production. The national demand of vegetable seed could be met by adopting two strategies: first, the effort of varietal development, maintenance, testing and national listing of imported varieties that are suitable for different locations should be combined with the maintenance of the seed cycle based on the farmer's preference, and second, the effort is needed to improve the quality of seeds by adopting proper postharvest operation such as appropriate drying and storage technology. It is necessary to manage the supply of farmer preferred varieties and quality seeds through government initiative by creating conducive environment to private sectors investment. For seed quality improvement, the identified role of the public sector, private sector and community-based organizations (CBOs) should be implemented in right time synchronized to meet the national demands of the vegetable seeds.*

**Key words:** vegetable seeds, strategies, requirements, policy issues

## **INTRODUCTION**

Government of Nepal (GoN) has launched the Seed Act in 1988 and the enabling Regulations in 1997 to make available high quality seed for increased production and to protect the seed user and seed seller from fraudulent practices (Shrestha et al., 2001). Consequently, the Ministry of Agriculture and Cooperatives (MOAC), with the advice of the National Seed Board (NSB), has formulated a National Seed Policy, 2056 (1999), in compliance with the Seed Act and Regulations and the ongoing seed program. Seed certification in Nepal is voluntary, but truthful labeling for containers of notified crops varieties offered for sale in market is compulsory, as per provision of Seed Act 1988 (Thapa et al., 2008).

National Seed Company Ltd. (NSC/L), government farms, research stations and private sectors are the formal seed supplying organizations, and they have good seed networks for seed replacement of cereals and vegetables. While International/National Non-Government Organizations (I/NGOs), different donor agencies and the government have been involved in seed production and seed supply system in the country, the informal seed supply system still plays a significant role in meeting the seed demand of the farmers (Thapa et al., 2008). Until the mid-1980s, more than 90 percent of Nepal's vegetable seeds requirement was met by informal sources, i.e., own production and farmer-to-farmer exchange. But in the last thirty years the commercial seed sector has grown rapidly. From a mere 10 tonnes of commercial seeds produced in 1975/76 (9 tonnes from government farms and one tonne from private growers), it reached around 1335 tonnes in 2012. The total demand for vegetable seed in Nepal is around 2085 Mt (VDD, 2012). Above data indicate that the total production of seed in Nepal is not fulfilling the national demand (750 mt deficit). To meet the national demand, the remaining quantity of seed is being imported from abroad and farmers are using their saved seed. Now the formal sector supplies 70 percent of the total demand, which was only 10 percent in 1984/85. Currently, the vegetable seed production is mainly organized through contract production, with technical support mainly provided by the Vegetable Development Directorate (Department of Agriculture, GoN/ Nepal), Nepal Agricultural Research Council and different

NGOs (Thapliya, 2006 and NARC, 2012). Even though there is an increasing trend of seed supply from formal sectors, the farmers at the field level are facing problems regarding its quality aspects. Furthermore, Thapa (2007) reported that from samples collected in the years from 2000/01 to 2006/07 in Nepal, about 24% of the tested samples were found to be below standard, indicating that low quality seeds were being sold in the market. This indicates the need for an effective seed law enforcement program and active participation of the private sector in the quality assurance system in Nepal to meet prescribed seed standards. On this background, this paper analyzed the existing production and distribution scenario, policies, legislation and guidelines related to vegetable seeds sub-sector in Nepal. Based on the analysis, policy options were recommended for seed quality improvement and seed supply based on consumers demand to generate information for actors involved in vegetable seeds supply chain in Nepal.

## METHODOLOGY

The majority of data used in this paper were from secondary sources (publication from Seed Quality Control Center (SQCC), Nepal Agricultural Research Council (NARC), Vegetable Development Directorate (VDD) etc) except some data related to seed production from seed companies and other seed stakeholders. The information collected from the different sources was coded, tabulated and analyzed using Microsoft excel for calculating present national production requirements and the supply situation of vegetable seeds. For the case study, five vegetable crops including onion (*Allium cepa*), tomato (*Solanum lycopersicum*), cucumber (*Cucumis sativus*), okra (*Abelmoschus esculentus*) and French beans (*Phaseolus vulgaris*) were selected after discussion with seed experts and related stakeholders based on their relative importance in Nepal.

Compound growth rate (CGR) of vegetable production area, vegetable seed production and seed requirements were calculated over the past four decades. The future projection of required quantity seed for the above mentioned vegetables for the coming five years were also analyzed. The detail description of compound growth rate (CGR) and growth rate (GR) are given below.

### Compound growth rate

Growth of any variable indicates its past performance. The analysis of growth is usually used in economic studies to determine the trend of a particular variable over a period of time. As it indicates the performance of the variable under consideration, it can be used to make interpretations and to evolve policy decisions. Compound growth rate (CGR) of vegetable production area, vegetable seed production and seed requirements were calculated over the past four decades.

$$Y_t = a b^t u_t \quad (1)$$

Where,

$Y_t$  = dependent variable for which growth rate was estimated

$a$  = intercept

$b$  = regression coefficient ( $1 + g$ ), where  $g$  is the compound growth rate,

$t$  = years which takes values, 1, 2, ..., n, and

$u_t$  = disturbance term for the year  $t$ .

The equation was transformed into log-linear form and was estimated using the ordinary least square (OLS) technique. The compound growth rate ( $g$ ) in percentage was then computed from the relationship:

$$g = \{ \text{Antilog of } (\ln b) - 1 \} * 100 \quad (2)$$

The significance of the regression coefficient was tested using the student's *t* test (adapted from Gaire et al., 2011 and Gujrati, 1999).

### **GR calculation for selected vegetable seeds for 5 years (2011/12 to 2016/17)**

The growth rate (GR) for the next 5 years was calculated from the following equation:

$$P_1 = P_0 (1 + r)^n \quad (3)$$

Where  $P_1$  = future requirement of seed,  $P_0$  = present production /utilization of seed,  $r$  = growth rate,  $n$  = number of years. In our case:

$$\log (P_1) = \log (P_0) + 5 \log (1 + r)$$

$$\log (1 + r) = (\log P_1 - \log P_0) / 5$$

$$\log r = X$$

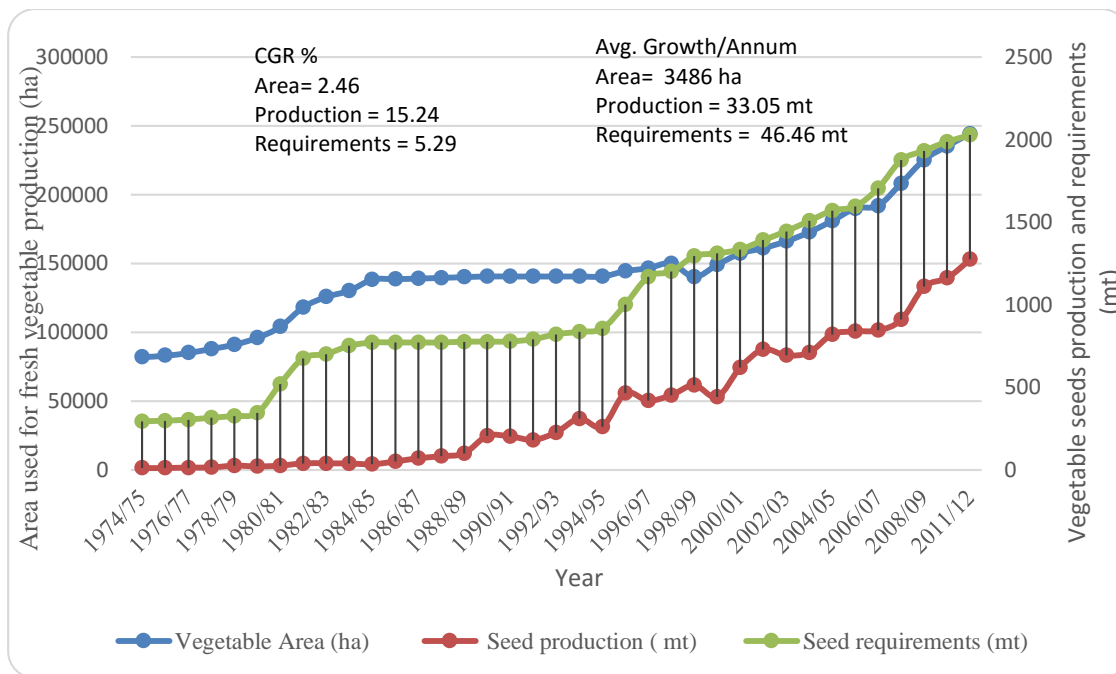
Where value of  $(\log P_1 - \log P_0) / 5 = X$

$r = e^X$ , where growth rate  $r$  is the exponential function of  $X$

## **RESULTS**

### **Vegetable seed production and requirements in Nepal**

The data for area used in fresh vegetable production and total vegetable seed production and requirements in Nepal are available since 1974/75. Area under the vegetable crops in 1974/75 was 82,000 ha, total physical production of vegetable seeds was 10 mt and requirements were 293 mt. These indicators increased substantially during 1974/75-2011/2012. Compared to 1974/75, the vegetable production area increased by about three-fold (244,102ha), seed production increased by 127-fold (1274.4 mt) and seed requirements increased by almost 7-fold (2085 mt) in the year 2011/12. The compound growth rate of fresh vegetable production, vegetable seeds production and seed requirements was 2.46%, 15.24% and 5.29%, respectively, over this period (VDD, 2012; SQCC, 2012). The private sector started entering in seed business in the early 1980s with enforcement of the Seed Act of 1989, which has boosted the critical role of private seed industry in Nepal. Since the early 1990s, the government of Nepal has been making some efforts at privatization of the seed industry and at present, the private sector accounts for more than 95% share in organized vegetable seed production and marketing (Bharati et al., 2008). Even though the percentage increment in seed production was much higher than seed requirements, average annual growth rate of production was lower (33.05 mt) compared to seed requirements (46.46 mt) in Nepal. The vertical line shows the shortfall between per annum seed production and seed requirements (Figure 1). Since the late 1990s, vegetable production area, the demand for vegetable seeds and seed production have increased in parallel, but with a gap of approximately 750 mt between them being met through either import or through informal channel (farmers to farmers exchange, illegal entry of seeds).

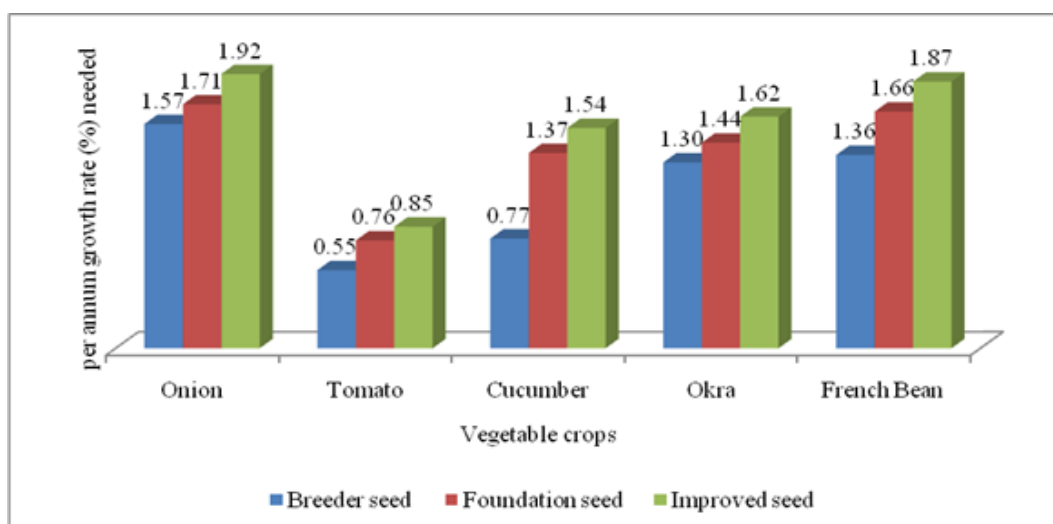


**Figure 1.** Area used for fresh vegetable production, total domestic seed production and seed requirements in Nepal over four decades

To answer the question how much vegetable seeds is required to meet the national requirements, the needed growth rate of domestic seed production to meet the national requirements were calculated. Projection was performed until 2016/17 based on available data. During projection of area, average annual growth rate 1974/75-2011/12 was used and it was assumed that the annual growth rate will be constant. Of the total seed, 75% is accounted for by peas, beans, onion, radish, cowpea and okra. The size of the different vegetable seeds is different and its seed rate and multiplication ratio also varied based on crops. So, in case of vegetable seeds requirements, the source seed (breeder and foundation seed) and improved seed requirements of only five selected vegetable crops were calculated for precise results based on the seed rate and multiplication ratio required for each individual crops.

In case of onion, total breeder, foundation and improved seed production in the year 2011/12 was 0.011 mt, 0.366 mt and 10.06 mt, respectively (NARC, 2012; SQCC, 2012; Field Survey, 2012). To meet the national requirements from domestic production based on the available area for onion production in the year 2016/17, the projected amount of above mentioned seeds is about 0.105 mt, 5.28 mt and 264.40 mt. The growth rate of 1.57, 1.71 and 1.92 per year is needed for breeder, foundation and improved seed, respectively to meet the above requirements of onion seed production. The breeder, foundation and improved seed production for tomato in the year 2011/12 was 2.7 kg, 113 kg and 13051 kg, respectively (NARC, 2012; SQCC, 2012; Field Survey, 2012). Only 0.133 kg, 27.9 kg and 5858 kg of breeder, foundation and improved seed, respectively, is needed to fulfill requirements in the year 2016/17. The present production is enough to meet the national requirements. The growth rate of 0.55, 0.76 and 0.85 per year is sufficient for breeder, foundation and improved seed, respectively to meet the above requirements of tomato seed production. A similar situation was the case for breeder seed of cucumber. The breeder, foundation and improved seed production for cucumber in the year 2011/12 was 5.35 kg, 30 kg and 1650 kg, respectively (NARC, 2012; SQCC, 2012; Field Survey, 2012). The quantities of 1.44 kg, 144 kg and 14478 kg of breeder, foundation and improved seed, respectively, were needed to fulfill requirements in the year 2016/17. Thus, present production of breeder seed is enough to meet the national requirements. The growth rate of 0.77 for breeder seed is sufficient; however, a growth rate of 1.37 and 1.54 per year is

needed for foundation and improved seed, respectively, to meet the above requirements of cucumber seed production. In case of okra, total breeder, foundation and improved seed production in the year 2011/12 was 0.012 mt, 0.580 mt and 25.52 mt, respectively (NARC, 2012; SQCC, 2012; Field Survey, 2012). To meet the national requirements from domestic production based on the available area for okra production in the year 2016/17, the projected amount of above mentioned seeds is about 0.45 mt, 3.60 mt and 288 mt. The growth rates of 1.30, 1.44 and 1.62 per year are needed for breeder, foundation and improved seed, respectively to meet the above requirements of okra seed production. There are different types of French bean are available in Nepal. During calculation of seed production and requirements, all types (sword, pole and bush type) of French bean were included. Total breeder, foundation and improved seed production in the year 2011/12 was 0.081 mt, 1.17 mt and 25.91 mt, respectively (NARC, 2012; SQCC, 2012; Field Survey, 2012). To meet the national requirements from domestic production based on the available area for French beans production in the year 2016/17, the projected amount of above mentioned seeds is about 0.37 mt, 14.80 mt and 592.08 mt. The growth rates of 1.36, 1.66 and 1.87 per year are needed for breeder, foundation and improved seed, respectively to meet the above requirements of French bean seed production (Figure 2).



**Figure 2.** Details growth rates of breeder, foundation and improved seeds for different vegetable crops

Brief summary of the seed laws, policies and guidelines in Nepal

Seed laws, policies and guidelines	Priority given for seed/ vegetable seeds
Nepal Seed vision	Government of Nepal (GoN) has prepared the seed vision 2013-2025 as a seed sector development strategy in Nepal. It aims to increase crop productivity, enhance income and

(2013-2025)	generate employment through self-sufficiency, import substitution and export promotion of quality seeds. It envisages doubling the number of locations for specific high yielding competitive varieties to be released by 2025. Improved seed production will be increased threefold through the formal system. Seed replacement rate will be increased at least up to 25 percent for cereals and over 90 percent for vegetables (SQCC, 2013)
Agriculture Biodiversity Policy: 2007 (2063)	This policy focuses on farmer to farmer seed exchange, utilization of indigenous knowledge and technology, and management of agri- bio-diversity & its utilization (MoAC/GoN, 2007).
Agriculture Enterprise Promotion Policy: 2006 (2063)	Development of special economic zone, e.g., commodity production area and agricultural product export area, where seed can be one of it. Commercial service center establishment for quality agricultural input production, strengthening seed certification system, seed import & export and registration of indigenous knowledge/technology are the major focuses given in this policy (MoAC/GoN, 2006).
National Agriculture Policy: 2004 (2061)	It focuses on the development and strengthening of National Resource Centers considering development & geographical regions. These centers are responsible for providing source materials like seeds/saplings (with other inputs & services). Special consideration for private sectors is given. Regular monitoring of import, production & stock condition of major inputs including seeds, and assurance of supply is also highlighted. Moreover, emphasis on free seed for contract farming, hybrid and improved seed production and regulation of GMOs (MoAC/GoN, 2004).
National Seed Policy: 2000 (2056)	It has prioritized 7 important areas with the main objective of ensuring production and distribution of quality seeds, promote export by producing quality seeds, make the seed business effective in terms of existing world trade, and conserve and protect intellectual property rights over seeds of local crop varieties having distinct genetic traits. Authority of varietal development and maintenance to non-government and private sector; de-notification of technically unsuitable varieties and information of such de-notified varieties to farmers; conservation of agro biodiversity and establishment of variety rights; coordination with national and international seed companies for seed development and production; production and regular supply of source seeds on the basis of farmers demand; export of high value seeds; balance of source seed through NSB; authority of foundation seed production in private sector; contract seed production, seed certification and truthful labeling; introduction of quality declared system; involvement of private sector in seed testing, sample collection and crop inspection for quality; rental facilities of seed processing plant and storage to private sector; seed pledging; strengthening NSB; establishment of quality control center and seed testing laboratory in private sector; provision of buffer stock for emergency; study, research and regulation of GMOs, transgenic plants and tissue culture; preparation of bio-safety regulation and human resource development are the major priorities given in the policy (Bhandari, 2012 & MoAC/GoN, 2000).
Seed Regulation: 1997 (2054)	It has provisions of three subcommittees under National Seed Board such as variety registration and release sub-committee (variety release/registration, notification/ de-notification), planning & monitoring sub-committee (planning for regular seed supply, monitoring of seed production and supply, balance sheet setting procedure, coordination between public-private sector and seed pricing), and quality standard setting & management sub-committee (quality declaration and certification procedure setting). A new draft on seed regulation has been prepared and is under consideration based on the Seed Act 1988 (amendment 2008). In its amendment it focuses on production of breeder seeds from NARC, foundation seeds from companies/private sector and certified seeds (C1-C3) from local CBOs like groups, cooperatives. It also highlighted the involvement of private sector on seed business & quality control (Bhandari, 2012 & MoAC/GoN, 2000).

Seed Act: 1988 (2045 amendment 2064 -2008)	<p>A seed act was passed by parliament in 1998 to regulate quality seed production functions (Thapa et al., 2008). It is a brief document, which allows regulations to be made to deal with its enforcement (Shrestha et al., 2001). The main features of Seed Act 1998 are: functions, duties and powers to NSB; power to constitute sub-committee under NSB; establishment/functions, duties and responsibilities of Central Seed Testing Laboratory (CSTL); power to notify the kind and varieties and prescribe the minimum level of purity and germination of notified kind varieties; truthful labeling of container of notified kind varieties is compulsory (voluntary seed certification); appointment/functions, duties and responsibility of seed analyst and seed inspector; permission from NSB for import and export of notified kind varieties from Nepal; power to hear the cases and provision to institute the cases and punishment; reorganization to national and international organization for seed testing and certification; and power to frame the rules for seed law enforcement.</p> <p>Government of Nepal revised the Seed Act 1988 to redefine the certain terms and definitions and make it apposite in the line of international practices and context of the World Trade Organization (WTO). This was first amended in 24 Jan. 2008. The main provisions in amended Seed Act, 1988 include: redefining the terms and definition in line with international practices: mandatory participation of women in NSB; licensing system to establish private seed testing laboratory; establishment of Seed Quality Control Centre (SQCC) in place of Seed Certification organization; authority to private sector to involve in quality assurance system through licensing of seed analysts; seed sampling and crop inspection; appointment of chief of SQCC as member secretary of NSB; permission from NSB is required for seed business; restriction to sale un-notified kind and varieties of seeds; establish the fees and levied service charges for seed testing and certification; and increase fines and punishments ( MoAC/GoN, 1998).</p>
Agriculture Perspective Plan: 1995-2015	<p>Among four important input priorities set by APP, technology is considering an important input which also includes seed production as a technology. It recommends seed production along with non-research activities to be diverted to competitive private sector operations, i.e., market based. Moreover, high value-crops are among commodity priorities – e.g., vegetable seeds are prescribed for hills &amp; mountains (APP, 1995).</p>
Community Seed Bank-Implementation guideline-2065 (2009)	<p>It focuses on type of seed such as modern varieties (MV), farmers varieties; seed multiplication and storage through collective and individual approach; seed processing using farmers and modern methods and seed exchange through cash transaction, barter and seed loan (Shrestha et al., 2013).</p>

## DISCUSSION

In most of the policies, guidelines and legislation related to seeds, there is more focus on the quality seed production and assurance of its supply for increasing production and productivity of the crops. Even though the government of Nepal approved different policies and legislation, most of the public and private sectors face problems to get quality assurance services in time due to limited government resources and manpower (Thapa et al, 2008). In addition, most of the seed produced by public and private sectors is marketed without meeting prescribed minimum seed standards and proper labeling due to lack of their own internal quality assurance system and effective seed law enforcement program in Nepal (SQCC, 2003). Low quality seeds were being sold in the market, which demanded an effective seed law enforcement program and active participation of private sector in quality assurance system in Nepal to meet prescribe seed standards for proper drying, storage and truthful labeling of notified kind and varieties. National Seed Company Ltd. (NSC/L), government farms, research stations and private sectors are the formal seed supplying organizations. They have very good seed networks for seed replacement of cereals and vegetables. Even though, different donor agencies and government have been involving in seed production and seed supply system in the country, the informal seed supply system plays a significant role in supplying seed demand of the farmers (Thapa et al., 2008). It is estimated that 90% of the total production and distribution of cereal seed in



Nepal is still met through the informal sector (Thapa Chhetry, 2006 cited in Thapa et al., 2008). Less than 5% of the total requirements are met through the network of NSC/L and less than 1% is reported to be met through imports (Hada and Dawadi, 2001 cited in Thapa et al., 2008).

Seed certification in Nepal is voluntary, but truthful labeling for containers of notified crops varieties offered for sale in market is compulsory as per provision of the Seed Act 1988 (Thapa et al., 2008). In the field, it is observed that, most of the farmers are producing un-notified varieties of different crops and selling them to the market without truthful labeling (Field survey and personal communication with various stakeholders, 2012). The main reasons for doing that were due to more demand for those varieties, their easily availability and lower price. The formal seed sector may need to consider the notification and formalization of those varieties which are the farmers' preference rather than focus on multiplication of only registered varieties. In the case of cereals, seed certification programs are in place, but in case of vegetable seed production, seed certification programs have not been initiated yet, which is one of the major factors for quality deterioration of vegetable seed. Illegal import, untrained sellers (agro-vets), unlabeled seeds and weak seed inspection are the major factors for poor policy implementation (Shrestha and Pandey, 2011). Effective implementation of seed policy and legislation, development and harmonization of seed policy with latest development, demand based source seed production and marketing and faster development, release and deployment of farmers preferred varieties in farmers field is required for efficient functioning of seed system in Nepal (Gauchan et al., 2014).

Available data showed that the open pollinated (OP) seeds that were sourced entirely from domestic production about a decade ago are being rapidly replaced by imports (Budhathoki et al., 2002). At the same time, hybrid seeds are becoming popular, especially among commercial growers. In Nepal, only one hybrid variety of tomato called Shrijana has been registered and K1F1 hybrid of cucumber is in the process of registration among different vegetables (NARC, 2012). Out of 244 vegetables varieties registered, 214 varieties are hybrid. The only registered varieties of okra and French bean were OP, but more than 80% of varieties of tomato, cucumber and onion registered for import were hybrid (Paudyal, 2012). All the registered varieties for import were F1 generation (hybrid). The reason for importing of those hybrids might be due to higher quality of seed, higher production and suitability for different climatic conditions and seasons as the domestically released varieties are not adapted to all ecological domains in all seasons. In one side of our result showed that the present production of tomatoes source seed (breeder, foundation) and improved seed is enough for the national requirements. Similarly, present production of cucumber seed is also enough for national requirements if proper seed chain is maintained after production of breeder seed. At the same time, 22 varieties of tomato and 32 varieties of cucumber were registered for import. These data reflect that production of only certain varieties for particular crops is not sufficient to meet the national requirements across all vegetables. To meet the national demand, varietal development, varietal maintenance, maintenance of the seed cycle, and improvement of seed quality must be improved based on the preference of the farmers by keeping them in center. It is necessary to manage the supply of farmer preferred varieties through government by creating conducive environment to private sector investment. Vegetable seed is a very international business, particularly for advanced varieties and hybrids, so it is not necessarily evident that Nepal can or should aim to produce all of its own vegetable seeds. Certainly some of the lower value seeds that can be produced locally (onion, okra, pea, bean, etc.), and there is also potential for Nepal to do hand-pollinated hybrids such as Shrijana tomato.

Budhathoki et al. (2002) reported that the quality of Nepalese seeds has been deteriorating, prompting farmers to switch to imported seeds. Low seed moisture content is pre-requisite for long-term storage and is the most important factor causing loss of seed viability and vigor during processing and storage. The demand for quality seed is increasing day by day, presenting

new challenges to meet the consumer's demands by taking competitive advantage in the context of international practices and WTO. The present need is to identify the roles of public and private sectors in seed quality management for supply of good quality seeds at national and international levels in sustainable ways through which every actor in the seed chain benefits from the improvement in seed quality. For seed quality improvement, the possible role of the public sector, private sector and community-based organizations (CBOs) are described below.

### **Roles of the Public Sector**

- Increase the involvement of the private sector in seed business through revising and developing the quality assurance fee to support seed testing, field inspection, and seed certification to sustain private seed business.
- Strengthen the monitoring and supervision system to control the quality of seed on the basis of national seed and field standards.
- Establish seed certification programs to improve seed production and quality control.
- Provide seed crop inspectors, seed samplers and seed analysts in government, non-government and private sector who are monitored through a regulatory framework.
- Issue seed licenses for quality seed production and distribution by district and regional offices.
- Raise awareness about improved seed among general farmers, emphasizing quality parameters and seed regulation
- Reduce the postharvest loss and improve the germination and vigor of the produced seed by improved drying and packaging
- Focus on providing soft loans to the private sector for the promotion of seed enterprises especially for source seed production and post-harvest operations.
- Support capacity building and harmonization of seed programs to maintain the seed quality and the seed propagation cycle in a sustainable way.
- Train the local level agro-vets for maintaining the quality of seed and provide some supports for maintaining good storage conditions in the marketing chain.
- Harmonize the seed act, rules, and regulations according to regional, national and international standards.
- Focus on continuous technology generation and dissemination in collaboration with private sectors.
- Coordinate and integrate seed programs guided by the seed vision, policy, act and regulation.
- It is suggested on the testing and national listing process that assures the imported varieties are suitable for different locations, rather than trying to do all of the breeding and seed production in Nepal.

### **Roles of the Private sector**

- Work in close coordination with the public sector to improve seed quality and availability.
- Invest in research and development for quality improvement.
- Conduct comprehensive sensitizing programs for seed law enforcement (discussions, meetings, seminars and workshops).
- Backstopping the CBOs and farmers for quality seed production at the field level as well as for post-harvest operations.
- Strictly follow the seed certification and truthful labeling of seed.
- Encourage farmers to use high quality seeds.
- Be accountable for providing a high of standard seeds to end users.
- Use good drying, packaging and storage practices to maintain seed quality (good vigor and germination percentage).

- Continuously supply drying and storage materials at reasonable prices as and when required to CBO, dealers and farmers.
- Move toward selling seed based on seed count rather than seed weight basis for high priced seed.

### **Role of CBOs**

- Be accountable for maintaining field standards during seed production.
- Use proper drying, handling and storage practices to maintain the quality of seed and minimize losses.
- Form seed quality control groups within the organization to monitor and enforce standards.

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