

National Seed Vision

2013- 2025

(Seed Sector Development Strategy)



Summary of the main document



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Ministry of Agricultural Development
National Seed Board
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Nepal

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National Seed Vision 2013 - 2025

Abstract

New crop varieties and quality seeds are the most viable means to improve agricultural production and food security in a sustainable manner. Preparation of the Seed Vision 2013 - 2025 entailed an intensive desk review, field visits and consultations among the stakeholders. The document is developed as a pragmatic, holistic, and evidence based medium for a long term vision, as seed sector development strategy in Nepal. It aims to increase crop productivity, raise income, and generate employment opportunities through self sufficiency, import substitution and export promotion of quality seeds. The conceptual framework of the Seed Vision is based on the components of seed value chain: variety development and maintenance, seed multiplication, seed processing and conditioning, seed marketing and seed use. This Seed Vision provides strategic orientation and milestones, and envisions specific outputs and impacts over a specified period of time. The vision presents key strategies, process and inputs required to meet the desired outputs towards development of sustainable seed system in Nepal.

Seed Vision envisages doubling the number of location specific high yielding competitive varieties to be released by 2025. Improved seed production will be increased threefold through formal system. Seed replacement rate will be increased at least up to 25 percent for cereals and over 90 percent for vegetable crops. The vision will contribute significantly towards ensuring food security to poor, women and disadvantaged groups. Edible food availability by 2025 will reach 8 million mt, worth around 200 billion rupees at current price.

In order to achieve the stipulated targets, Seed Vision proposes four strategic directions: i) strengthen varietal development, release, and maintenance using diverse gene pool both from local and exotic sources ii) support public, community and private enterprises in seed multiplication, processing and conditioning through efficient seed quality services iii) enhance marketing skills of seed entrepreneurs and invest in seed related infrastructure iv) promote use of quality assured seeds by expanding farmers' choice including use of local genetic resources. The aim of adapting these strategies is to formulate enabling policy environment for developing efficient and effective public, community and private seed related organizations with business culture. Implementation of Seed Vision will lead to food security, employment generation, biodiversity conservation, climate change adaptation besides gender equity and social inclusion.

1 Introduction

A sound seed system sustains and reinforces the national agriculture through higher productivity growth rate. Agriculture still forms the largest economic sector in Nepal and its development means increasing the quality and quantity of agricultural products. It is established that use of better quality seeds increases crop yield up to 30 percent. Thus, seed plays a pivotal role for the development of agricultural sector. In order to raise the living standard of majority of Nepalese people, farmers should have an easy access to the required quantity of quality seeds at an affordable price. Mindful on the gravity of seeds in agriculture, stakeholders realized the need of a pragmatic, holistic and evidence based long term seed vision in Nepal. The Seed Vision aims at increasing crop production, raising income and generating employment through seed sufficiency, import substitution and export promotion of quality seeds. Undeniable factors such as: limited yield of crop varieties, lack of their documentation and management, excessive flow of exotic seeds and unavailability of quality seed in required quantity, prompted the preparation of the Seed Vision. Moreover, Nepalese seed sector is also plagued by a multitude of shortcomings such as a limited number of seed processing and storage facilities, weak seed marketing mechanism, low seed replacement rate, immature seed companies and limited number of skilled human resource. The main objective of Seed Vision is to address these burning problems and lay the ground work to establish a strong seed system.

1.1 Methodology

An experienced team of consultants drafted Seed Vision. The team visited commodity research stations, seed processing plants, seed testing laboratories, educational institutions, NGOs/INGOs, seed companies, seed producer groups, cooperatives, seed business groups, NARC and DoA besides other concerned organizations and individuals. The team discussed seed issues and compiled information. Outcome or the report was discussed in many group meetings and was reviewed by a panel of 17 experts before presenting to a national seminar on March 18, 2012 that brought together over one hundred participants representing government, farmers' organizations, seed companies, agro-vets, I/NGOs, donor communities, senior experts and policy makers and sister organizations of major political parties working for agriculture. Comments and suggestions on this document were also received from the NPC, concerned ministries, various organizations under the MoAD, I/NGOs, and private organizations later. Valid comments and suggestions received from these organizations are duly incorporated. It comprises of seven chapters: (1) Introduction (2) Overview of Nepal seed sector (3) Seed value chain analysis (4) Seed vision, objective and strategic direction (5) Seed sector development strategy (6) Impact and (7) monitoring.

1.2 Seed classes and systems

Seeds are classified as: (1) Nucleus Seed (NS), the first seed produced by a breeder (2) Breeder Seed (BS), pure seed controlled by the breeder or the institute producing it (3) Foundation Seed (FS), produced from BS (4) Certified Seed (CS) - CS-I and CS-II. CS-I is produced from FS, and CS - II is derived from CS - I. and (5) Improved Seed (IS), is produced from any seed classes and is a high quality seed, but it is not certified. Both informal and formal seed systems exist in Nepal. In informal system, farmers produce seed for themselves, exchange it with neighbors, provide it as gift to relatives and sell limited amount of seeds without any certifications. In formal seed system, public and private sectors produce seed for commercial purpose. They float seed in the market with proper bagging and tagging following seed inspection, testing and certification measures.

2 History of seed Sector development Strategy

2.1 History

Government initiated formal seed system in the late fifties and early sixties when exotic rice, maize and wheat varieties were introduced. Agriculture Input Corporation (AIC) started seed business from 1974 by establishing a seed processing plant and a seed testing laboratory. Till 1990, public sector dominated formal seed system and from 1991 onwards some seed entrepreneurs got organized. Also donor funded seed projects were being implemented. Subsequently, government enacted seed policy, act and regulation. Private sector got interested to invest and the government established some infrastructures for seed sector development. Donor community also focused on strengthening formal seed system. In 2002, the government established National Seed Company Ltd. Its establishment is an important step towards promoting seed business in Nepal. Government agencies are involved in various activities such as - formulating seed law and policy, conducting seed research, crop variety development and maintenance, BS and FS multiplication, seed quality control, marketing, training farmers on seed use besides seed extension and seed planning. Non-governmental agencies (NGOs) including, seed companies, cooperatives, seed dealers and communities also develop limited crop varieties but they are mostly engaged in producing, processing and marketing of cereal and vegetable seeds. Most of the existing policies such as Seed Act - 1988 and its first amendment - 2008, Seed Regulation - 2013, Seed Production Guidelines - 1998, Seed Policy – 1999, National Agriculture Policy - 2004, , Community Seed Bank Guidelines – 2009 and Three Years Interim plan (2010/11 – 2012/13) favor the strengthening of national seed system.

Since 1988, over 20 seed projects were launched in the country to deal with different aspects of seed. Some of them have contributed in integrating seed approaches, involving private sector in seed business, linking seed producers with seed traders, exploring export market besides introducing community seed production approach in Nepal. Most of these projects encountered limitations characterized by high operational cost, limited coverage of area and seeds. Inability to lavish attention on the establishment of sustainable seed

enterprises and lack of clear seed sector development strategy were other constraints of seed projects.

2.2 *Components of seed system*

Major elements of national seed system are: seed policy and regulation, planning and monitoring, varietal development and maintenance, seed production and management, field inspection and seed testing, seed certification, seed processing and conditioning, seed extension and marketing and protection of farmers' rights. These elements are grouped in five components for the purpose of seed value chain analysis:

- a. Varietal development and maintenance
- b. Seed multiplication
- c. Seed processing and conditioning
- d. Seed marketing
- e. Seed quality assurance and seed use

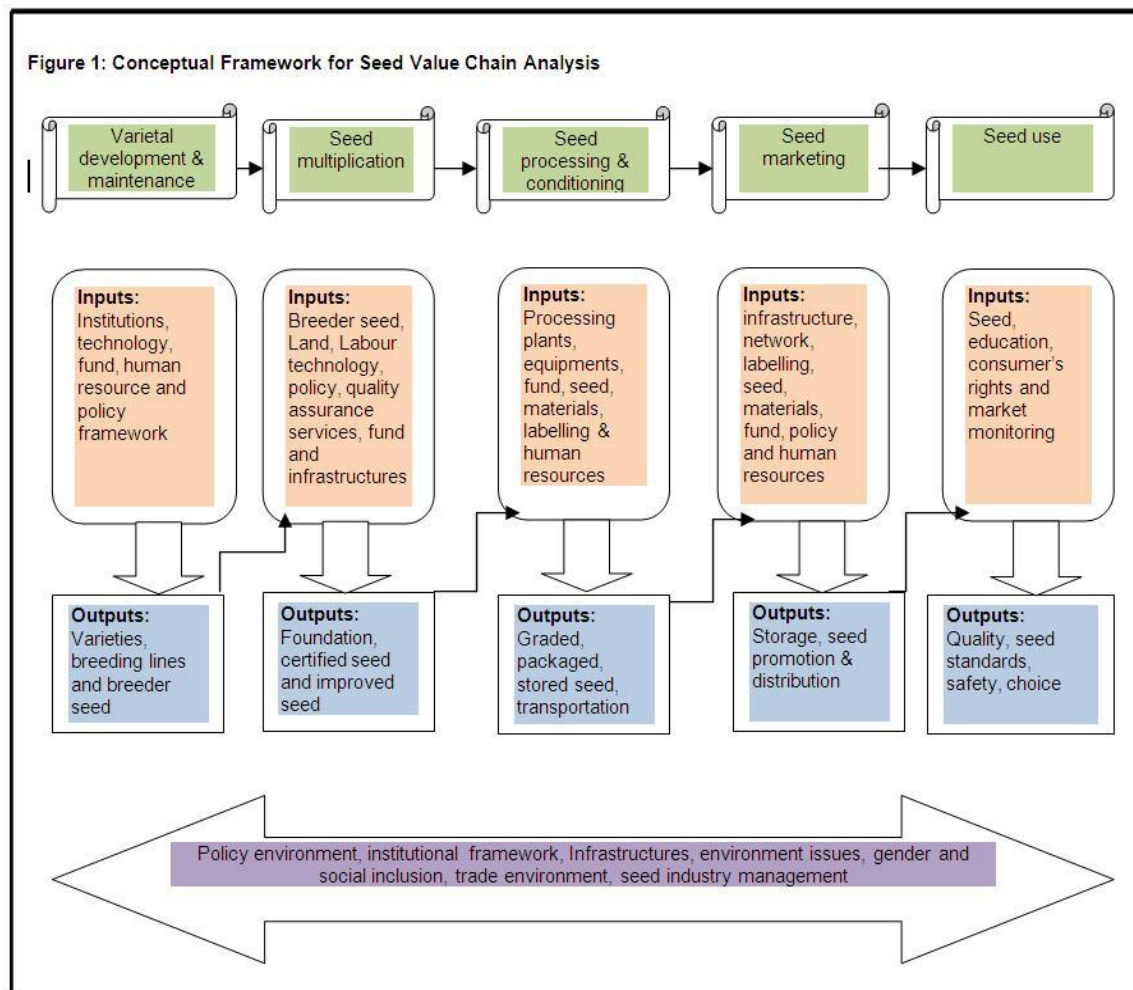
2.3 *Strength and opportunities of seed system in Nepal*

Analysis of seed system in Nepal reveals that Nepal holds a tremendous strength and opportunities to improve seed system. With a long experience on several approaches and models on seed business, Nepal boasts a solid foundation for the establishment and advancement of strong formal seed system. The analysis came up with some opportunities in varietal development and maintenance breeding such as: use of modern breeding techniques, standardization of breeding practices, coordinated support for decentralized breeding, expanded varietal choice, faster breeding cycle and use of local genetic resources with available labor force. In the domain of seed multiplication: use of diverse agro-ecological conditions, employing skilled human resources and infrastructures, integration of formal and informal seed systems, integrations of different seed production initiatives and private delivery of public seeds are some of -areas of opportunities. On marketing front, opportunities exist in enhancing capabilities of private sector, harmonization of export and import regulations, use of high quality packaging materials and supply of quality seeds in sufficient quantity. Likewise, from the perspectives of consumers - seed promotion campaign, improved demand forecasting system, monitoring of seed use, increased seed replacement rate and feedback mechanism are some of the opportunities to be exploited.

3 *Conceptual Framework*

Conceptual framework of the Seed Vision is based on seed value chain with inputs and outputs from the seed chain components (Figure 1). In order to maintain the prescribed seed multiplication steps, it is essential to analyze different steps of seed production along the value chain. The seed value chain operates along five key chains: varietal development and maintenance, seed multiplication, seed processing and conditioning, seed marketing and seed use. Quality control, policy environment, institutional

framework, infrastructures, environmental issues, gender and social inclusion, trade environment and monitoring are analyzed as crosscutting themes.



Analysis of issues, findings and lessons learned from the past experience are discussed along the value chain. Projection for development of competitive seed sector up to 2025 is proposed, based on conclusions and assumptions with moderate growth scenario¹.

4 Analysis and Projections

4.1 Variety Development and Maintenance

Variety development, release, registration and maintenance are the key components of the seed value chain and seed vision framework. Development, maintenance and deployment of new location specific high yielding competitive varieties are prerequisites

¹ Moderate growth scenario is when crop productivity growth rate is modest with the proposed investment under Seed Vision strategies.

for ushering in accelerated technological changes and are also the means for increasing agriculture production and income. However, at present investment in terms of research fund and human resources for variety development and their maintenance is very low, and required organizational and institutional framework is weak.

Analysis revealed that the rate of variety release recently is low in many crops except in major cereals. Considering limited or slow release of new varieties, there is an urgent need to increase the release of competitive varieties rapidly as to provide diverse choice for farmers. Variety release and registration process needs to be smooth and user friendly but should follow the minimum requirement of distinctness, uniformity and stability. By 2025, cumulative number of open pollinated varieties released needs to be almost doubled from the present status of 232 in 2010. That means following the implementation of the proposed seed vision strategy, the number of open pollinated varieties released should mark 423 in 2025.

Hybrid research is limited in Nepal due to lack of trained human resources, infrastructure and investment in both public and private sectors. In order to reduce the import of hybrids, public and private sector research institutions should be involved in hybrid research activities with adequate fund and human resources. For this, special action plan needs to be developed and initiated without further delays. By 2025, it is envisaged that, public sector will develop and promote 40 hybrids comprising, 20 in vegetables, 12 in maize and 8 in rice to meet the increased domestic demand besides import substitution. In addition, 20 hybrids comprising 10 in vegetables, 5 in maize and 5 in rice are expected to be developed and promoted by private sector².

Maintenance breeding is an important step in variety development as original characteristics of any crop variety need to be retained. Varieties of different crops are maintained in farm stations of corresponding agro ecological zones. However, there have been complaints on locally developed varieties regarding their physical and genetic purity. Therefore, a strong varietal maintenance program is necessary in all seed producing stations. Distinctness, uniformity and stability on seeds of any variety should be maintained. Breeding materials for rice, maize, wheat, potato and legume are available from international research organizations. However, genetic resources of other crops are not easily available. There is a technique to develop hybrid or other varieties by recycling imported hybrids varieties.

4.2 Seed Multiplication

At present, (2009-10), the quantity of breeder seed production for selected food crops and vegetables is 52 mt which matches with the breeder seed requirements. However, farmer preferred varieties of breeder seeds are not currently available. The quantity of required breeder seed production is based on required amount of foundation seeds derived from

² Private sector includes individuals and organizations outside the government such as seed entrepreneurs, seed companies, agrovets, I/NGOs, CBOs and cooperatives, etc.

crop production estimates using backward calculation³. By 2025, production of breeder seed with emphasizing on quality and varietal choice needs to increase to 88 mt

In 2009, foundations seed production for food and vegetable crops was 1471 mt. In total, the seed quantity produced is sufficient for the present level of seed replacement rate and improved seed production, if subsequent seed multiplication steps are maintained. Seed vision envisages that high yielding competitive varieties preferred by the farmers will be available as a result of enhanced capacity of research in public and private sectors. In 2025, the projected requirement of the foundation seed is 2, 978 mt, an estimation, based on required amount of certified/ improved seeds derived from crop production estimates.

The status of formal sector certified/improved seed production for food and vegetable crop was 32,352 mt in 2009. With the targeted seed replacement rate for the crops mentioned above, it is estimated that 92,527 mt of improved seeds will be required by 2025 (Table 1).

Table 1: Production of BS, FS and CS/SS and projected total requirement

S. No.	Seed class	Production statement (mt)				Projected requirement (mt)		
		2001	2005	2009	2010	2015	2020	2025
1	Breeder seed	52	50	52	53	55	71	88
2	Foundation seed	699	670	1471	1502	1977	2552	2978
3	Certified or improved seed	3583	10503	32352	37320	53944	76371	92527

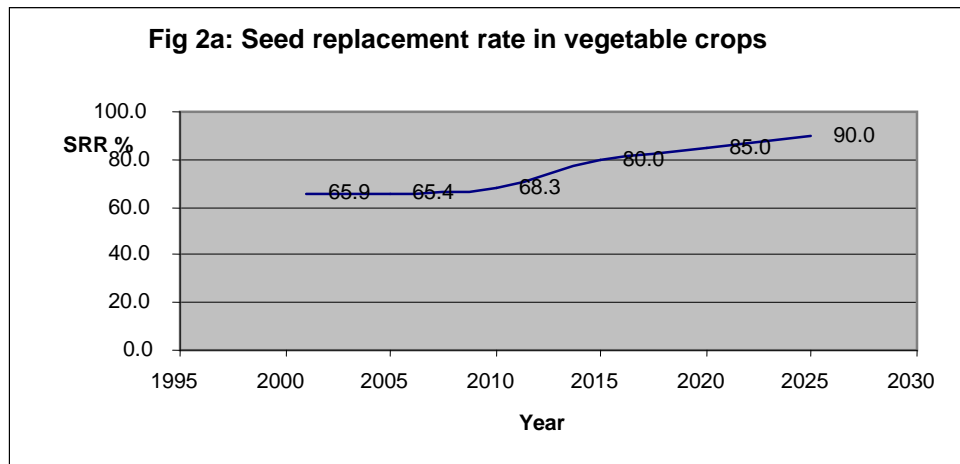
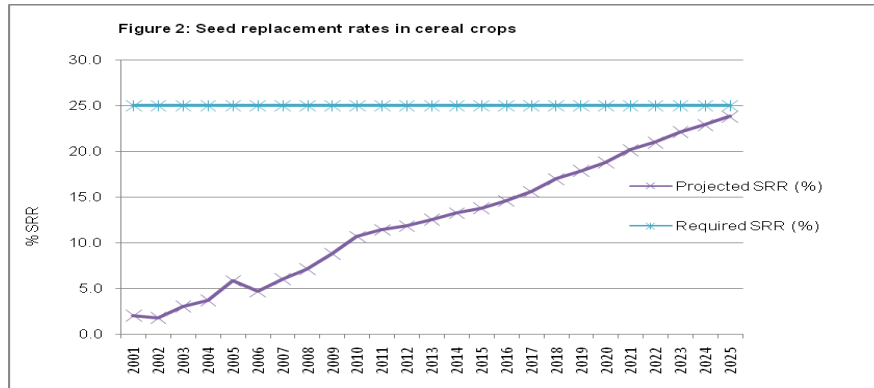
Source: Main document (National Seed Vision 2013 - 2025)

The projected requirement is estimated on the basis of proposed seed replacement at 25 percent in 2025. To obtain the projected quantity of seed by 2025, seed multiplication requires an area of 26, 801 ha, which is approximately double to the actual seed growing area, 13, 241 ha in 2009. However, the area will not stand as constraints.

4.3 Seed Replacement Rate

Ideally, the seed replacement rate (SRR) is 25 percent for self pollinated crops, 33 percent for cross pollinated crops and 100 percent for hybrid varieties. In 2009, SRRs of rice, maize, wheat and vegetable were: 9%, 7%, 9% and 66%, respectively. By 2025, SRR is expected to reach 25 percent in cereals and 90 percent in vegetable crops. The SRR is on increasing trend since 2001. Therefore the set targets will be easily achieved once the Seed Vision is implemented effectively (Figure 2 and 2a). Currently, hybrid seeds of maize, rice and vegetables cover 10 percent, 2 percent and 60 percent, respectively in the commercial pocket areas.

³ In background calculation, requirement of BS is calculated based on the required quantity of Foundation seeds, requirement of foundation seeds is further estimated based on the requirement of certified/improved seeds following three stages of seed cycle (BS-FS-CS/IS) and seed multiplication ratio (SMR). Certified/ Improved seeds are calculated based on crop area and production targets set by estimated seed replacement rates.

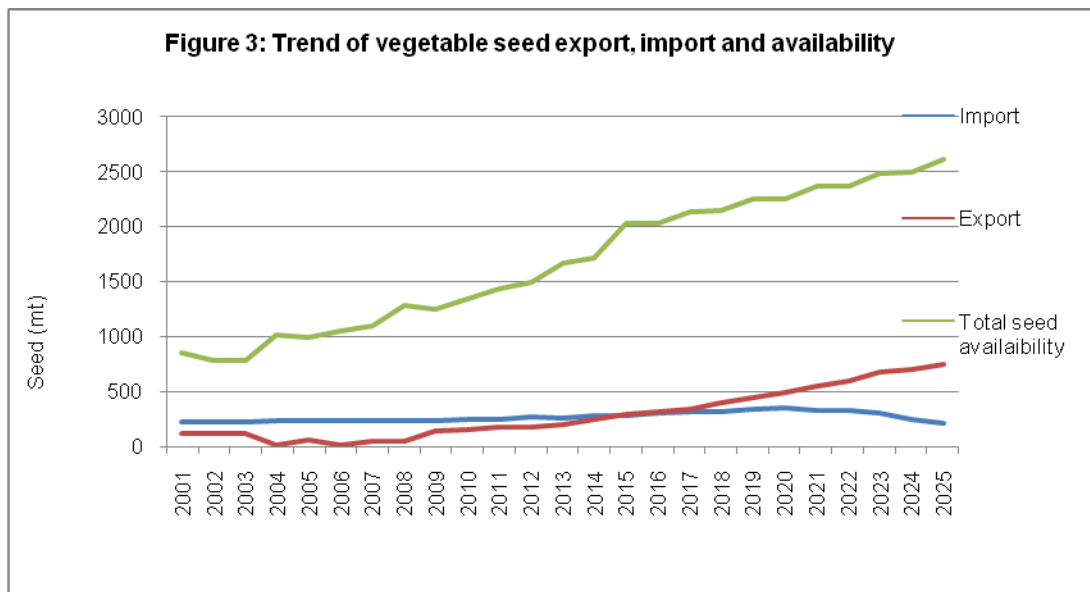


4.4 Seed Processing and Conditioning

Newly established plants by private sector and the community based organizations are functioning well, but many of the public sector seed processing plants are underutilized. Currently, trained human resource and infrastructures for seed processing and operations at the farmers' level is limited. At present a total of 20 processing plants are operational with seed storage of 11, 000 mt for about six months. By 2025, around 50,000 mt of quality seed needs to be stored for minimum six months in well equipped storage houses. Thus, this component requires high investment to meet the goals outlined by the Seed Vision. Mobile seed processing units will be effective for hilly areas. There were 13 functional seed testing laboratories in 2009 which annually analyzed 13,000 seed samples derived from 17,000 mt seeds. To analyze the seed samples of about 50,000 mt seed in 2025, the number of seed laboratories should be increased by three times. The vision proposes to establish at least 20 additional seed testing laboratories among public and private sectors by 2025. For the purpose of future use and to meet emergency needs, it is recommended that about 10 to 20 percent of the total seed of any commodity should be stored as buffer stock. In Nepal, requirement of seed buffer stock by 2025 is estimated to be about 10,000 mt.

4.5 Seed Marketing

Seed Vision 2013 - 2025 emphasizes on aggressive marketing to spread seeds of high yielding competitive varieties across the country. For this, it proposes developing and strengthening of seed networks, seed dealers and seed supply channels in public and private sectors. Some three decades of experience on seed production has established that seeds of different crops and varieties can be successfully multiplied and marketed in Nepal. . As of today Nepal imports around one-fifth (19%) of the vegetable seeds. This will be reduced to 8 percent by 2025 through the development of domestic hybrids. Meanwhile, international competitive hybrid varieties will continue to have an easy access in the country. ; . Share of export is expected to increase from 12 percent at present to 29 percent in 2025, especially through the export of open pollinated (OP) seeds. Seed Vision envisages increasing trend on vegetable seed availability, moderate rate of export and slight decline on imports as shown in Figure 3.



4.6 Seed Use

Evidence and observation point to the fact that use of quality seeds at the farm level is very low due to limited access and poor knowledge of farmers on the use of good quality seeds. Seed education/campaign needs to be promoted and massively implemented to aware farmers on the use of good quality seeds. In order to be informed on the status of open pollinated, hybrids, and low quality seeds prevalent in the market, National Seed Board needs to monitor seed use regularly.

4.7 Seed Quality and Other Policy Issues

The Seed Vision proposes to upgrade National Seed Board for inter-ministerial coordination (for forestry seeds and agricultural seeds). It also recommends encouraging the involvement of more representatives from private sector (private breeders, importers,

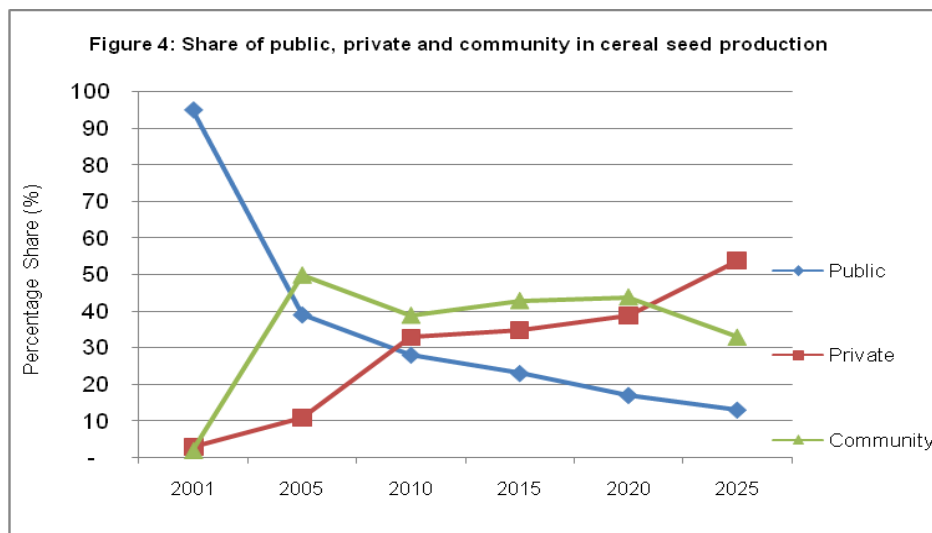
exporters, private seed laboratories, seed associations, etc) and other seed related committees in the board. Its other recommendations are: implementation of provisions in seed act to all 75 districts and aligning seed quality assurance services with growing community and private seed industries.

The Seed Vision promotes inclusive and equitable development that ensures full and active participation of women and disadvantaged groups. The policy revision suggested under the Seed Vision will facilitate awareness activities on gender and social inclusion and support the empowerment of women and disadvantaged groups.

Harmonisation of policies, acts and regulations are required to facilitate seed trade, enhance access of new seed varieties to farmers and for compliance with standard rules and procedures of World Trade Organization (WTO) and regional agreements of South Asian Association for Regional Co-operation (SAARC) and other regimes (e.g. South Asian Free Trade Agreement (SAFTA), Bay of Bengal Initiative for Multi-Sectoral Trade and Economic Cooperation (BIMSTEC). Similarly, suitable policies and programs are needed for consumer education so that farmers are able to protect their interests and express their demands⁴.

4.8 Public Private Partnership

Currently, public, private and community sectors almost have equal share in aggregate cereal seed production. The role of public sector is relatively high in wheat seeds (e.g. NSC), while share of community sector is higher in rice and maize. Private sector (e.g. seed companies) though has a moderate share in all of these three crops its share in vegetable crops is significantly high. The Seed Vision expects that the role of public sector in seed multiplication will decline as private and community sectors start growing faster (Figure 4).



⁴ Tripp R. and S. Pal (2001). The Private Delivery of Public Crop Varieties: Rice in Andhra Pradesh. *World Development* Vol. 29,(1), pp. 103-117.

The share of private sector in total seed supply will increase steadily to assume a dominant role in the latter period of 2020s. Community sector will grow faster in initial stage following the implementation of the Seed Vision and will lead in the next few years (until 2020). Its role will gradually decline as the private sector grows vigorously becoming more competitive.

Seed business is a service sector with high comparative advantage. The vision envisions private sector playing a dominant role in seed sector as in other countries by developing a professional and efficient management culture. The vision proposes the government to facilitate in strengthening or establishing four big private seed companies in Public Private Partnership (PPP) model by providing required land on lease, fund on grants/subsidy, exempting tax and custom duty on equipments and deputing skilled human resource. These companies should be competent enough to work effectively on main five components of seed value chain. Public sector should provide different genetic materials required for variety development. Public processing plants, seed testing laboratories, storage facilities and land should be shared with private sector also.

4.9 Conservation and Sustainable Use of Indigenous Genetic Resources

At present, above 90 percent of seed supply is from informal sector which includes local seed savings, exchange and local purchase. Special attention needs to be focussed in using these valuable resources for sustained crop improvement and for local seed security⁵. Rights of farmers and local communities need to be protected for equitable access and fair sharing of benefits. The proposed Plant Variety Protection and Farmers Rights Bill (2005) will strike a balance on the rights of farmers and breeders promoting investment on plant breeding research.

4.10 Human Resource Needs

Currently, the number of trained human resources available in the country in both public and private sectors for variety development, seed production, processing and marketing is estimated to be around 100. These human resources represent various disciplines related to seed such as: plant breeding, production agronomists, seed analysts, seed technology researchers, seed inspectors, processing plant operators /engineers, seed extension and marketing specialists. In 2025, the total number of various specialists required to support the activities proposed in the Seed Vision strategy, need to be increased to at least 300 (triple from present state). This estimation is based on projected seed crop area, seed quantity and the available institutional capacity in both public and private sectors.

⁵⁵ Sthapit, B.R., M.P. Upadhyay, P.K. Shrestha and D.I. Jarvis. Editors (2005). On-farm Conservation of Agricultural Biodiversity in Nepal. Volume I and II: Proceedings of the Second National Workshop, 25–27 August 2004, Nagarkot, Nepal. International Plant Genetic Resources Institute, Rome, Italy.

5 Vision Objectives and Strategic Directions

Vision: Quality Seed for improved well-being of farming families

Mission: Produce and manage supply of quality seeds to all farmers through a sustainable and competitive seed system

Goal: Increase crop productivity, raise income and generate employment opportunities through self sufficiency, import substitution and export promotion of quality seeds.

Objectives:

1. To enhance farmers' access to sufficient quantity of quality seed and other planting materials.
2. To increase seed replacement rate through increased production and supply of quality seeds.
3. To promote local seed security through conservation and sustainable use of agro biodiversity.
4. To create an enabling environment for developing, producing and marketing quality seeds of improved varieties of agricultural crops.

Strategies:

Following strategies will be adopted to attain the objectives mentioned above:

1. Promote use of quality seeds by expanding farmers' choice including use of local genetic resources.
2. Support public, community and private enterprises in seed production, seed multiplication, processing and conditioning through efficient seed quality services.
3. Strengthen varietal development, release, and maintenance breeding using diverse gene-pool both from local and exotic sources.
4. Enhance marketing skills of seed entrepreneurs and invest in seed related infrastructure.
5. Create enabling environment for developing efficient and effective public, community and private seed related organizations with business culture.

The proposed seed sector development strategies are based on existing organizational structure and practices. For effective implementation of these strategies, following guidelines or recommendations are imperative.

6 Activity Action Lines

6.1 *Varietal development and maintenance breeding*

- Investment and institutional strengthening: Increase investment, develop and upgrade human resource, create essential infrastructure and use modern equipments. Establish research stations in private sector also.
- Incentive to plant breeders: Develop incentive package to plant breeders and farmers. Facilitate individuals, seed companies, cooperatives and public sector to develop better crop varieties.
- Genetic improvement and variety maintenance: Use diverse gene pool to develop varieties with broad genetic base for wider adaptability in diverse agro-climatic conditions of Nepal. Designate all public farms and agricultural stations for maintenance of particular crop variety.
- Use of modern breeding techniques: Use available modern plant breeding methodology for the development of crop varieties. NARC should establish a separate hybrid research unit under each commodity research program. Promote private research institutions to develop different crop varieties in PPP model.
- Linkage: Develop and strengthen linkage with national and international institutions and academia. Strengthen the NARC gene bank and expand its network.
- Capacity building: Enhance scientific capacity for varietal development and maintenance at all levels. Establish varietal performance feedback system at grass root level and monitor seed and varietal research.
- Policy issues: Develop policy guidelines for hybrid research and partnership modality between public and private sector. Simplify and initiate the regulation process of landraces and improved seed varieties.

6.2 *Seed multiplication*

- Public sector seed production: Identify seed production zones and areas. Integrate community seed bank and district level seed production initiatives. Support local seed production in remote areas.
- Community based seed production: Prioritize and support this program and develop guidelines for participatory approach in quality seed production. Support community seed producer groups, community based organizations and cooperatives. Promote community gene and seed banks and provide source seed to this program.
- Private sector seed production: Establish and strengthen private seed companies by providing breeding materials and skilled human resources. Provide fund for infrastructure, equipments/machineries and land to seed companies. Develop resource sharing modalities between private and public

sector. Support in networking for regular planning, implementation and monitoring of seed production programs. Ensure that private sector establishes strong seed multiplication and research stations.

- Seed quality control: Monitor quality seed production and use at all levels of seed production based on seed regulatory mechanism and provide prescribed tags to all classes of seeds. Strengthen and monitor the testing of seeds and GMO laboratories. NSB should coordinate to develop seed balance sheet and other stakeholders should follow the plan as per the balance sheet. Conduct training on different aspects of seed production.
- Policy issues: Improve and enforce seed production contract form. Formulate or amend acts and regulation to protect the rights of seed producers and farmers. Regulate free movement of seeds within the recommended domains. Develop and facilitate seed crop insurance schemes, mechanize commercial seed production, create conducive environment for Foreign Direct Investment (FDI) and joint venture in seed business.
- Enhance seed growers' capacity to produce quality seeds using modern technologies.

6.3 *Seed processing and conditioning*

- Investment: Raise investment for processing plants, storage structures and seed testing laboratories in different regions. Establish seed collection centers in remote areas and if possible use small mobile processing units.
- Capacity building: Develop and train human resources on post harvest technology and infrastructures, both in private, cooperative, community level and public sector.
- Public private partnership: Develop and implement PPP guidelines for proper utilization of under used seed processing plants and storage facilities. Handover underutilized small seed structures to local seed producer groups, cooperatives, communities and private seed companies.
- Policy issues: Provide long term soft loan and grants to private sector and cooperatives to establish processing plants. Provide subsidy and custom free facilities to private sector on imports of processing and storage equipments and machineries.

6.4 *Seed marketing*

- Seed network: Develop and strengthen network of dealers and seed supply channels in public and private sector. Develop seed committees at district, region and national level for a proper planning and coordination.

- Seed marketing infrastructures: Develop district, regional and national seed market centers.
- Enhancing seed marketing skills: Develop institutional base for seasonal forecast of quality seed demand and supply. Train seed entrepreneurs and support local institutions to plan and market quality seed.
- Seed extension and market promotion: Promote new varieties of seed through extension tools. Support market campaign for promoting local seed distribution through seed fair, exhibition, tours, print and electronic media.
- Promotion of seed export: Support seed production of identified varieties of prioritized crops in selected pockets for export and provide incentives to exporters and explore international seed market.
- Capacity building: Strengthen the capacity of local institutions to market, monitor, analyze and disseminate information on current and future demand of seed. Train entrepreneurs in seed marketing.
- Policy issues: Facilitate free movement of seeds in recommended domain.

6.5 *Seed use*

- Seed campaigns: Provide support in increasing awareness of quality seed using different media and seed extension programs. Invest on the promotion of newly released varieties. Develop seed training manuals and print materials on seed use, and for a wide dissemination.
- Market monitoring of retailer chain: Conduct regular monitoring of seed quality along seed retailer chain and improve flow of quality seeds.
- Consumer rights: Educate seed users in protecting their rights on their access to quality seeds.
- Policy issues: Provide seed subsidy to the benefit of poor, women, disadvantaged and vulnerable households. Provide subsidy on locally developed new varieties. Enhance seed growers' capacity in producing quality seeds.

6.6 *Planning, coordination, monitoring and regulation*

- Planning, coordination and monitoring: Review and restructure National Seed Board (NSB) to meet the present need. To assist the implementation of National Seed Vision 2013 - 2025, the NSB needs to take main responsibility of coordinating the institutions under the Ministry of Agricultural Development and concerned line ministries at the central level. National Seed Board Coordinate and regulate seed programs to avoid duplication of activities and resources. Alert national level seed planning, review and monitoring committee. Focus community seed programs in remote areas and

private seed production in accessible areas for commercial production. District development committee (DDC) should be responsible on seed planning, resource mobilization and monitoring at district level. Organize annual workshop involving stakeholders at all levels.

- National seed information database: Develop a sound system for collection, processing and dissemination of seed related information. Conduct regular national seed survey and provide feedbacks to decision makers.
- Regulation of seed programs: Harmonize seed policies, seed related acts, regulations and standards in line with national interest as to be compatible with international regulations. Coordinate, facilitate and regulate seed programs at different levels. Develop policy guidelines for research and development, and use of GMOs, and conserve indigenous genetic resources. Develop policies for seed crop insurance and start seed buffer stocks for emergency and crop failure.
- Policy issue: Create enabling policy environment for joint venture among national and international seed companies and develop policy framework on import and export of crop seeds including hybrids.
- Capacity building: Strengthen skilled human resources at all levels and areas.

7 Activity Action Matrix

Activity action matrix for short (S), medium (M) and long-term (L) period with estimated costs and roles of implementing bodies are presented in Table 2.

Table 2: Activity Action Matrix

WBS	Major Activity proposed for implementing Seed Vision 2013 - 2025	Tentative additional cost (million rupees) per annum	Responsibility
100	S1: Promote quality seed use for seed security and crop productivity improvement through seed marketing extension		
110	<i>S 1.1: Improve policies and practices on reducing the use of low quality seeds</i>	91.5	MoAD, NSB, MoFSC, CU
120	<i>S1.2: Develop and support a participatory process for seed use planning</i>	65	DADO, DLS, DDC, VDC
130	<i>S1.3: Enhance household's capacity for financial resources to buy seeds from private sector</i>	20	DADO, DLDO, DDC, CBOs, HH
200	S2: Create an enabling environment for stakeholders' participation in seed multiplication, processing and conditioning through an established competitive seed system		
210	<i>S2.1: Improve system for seed multiplication steps (BS-FS-CS-IS) with active participation of private sector</i>	27	NSB, DoA, DLS, Private
220	<i>S2.2: Support implementing devolved seed production system</i>	76	DDC, RD RARS, OR, RSL, DADO, DLDO
230	<i>S2.3: Strengthen households and farmers' capacity for local level seed saving, multiplication and storage</i>	7.5	DADO, DLDO, VDC, DDC, Private, NGOs
300	S3: Varietal development and maintenance breeding component		
310	<i>S3.1: Strengthen national commodity research programs in varietal development and maintenance breeding</i>	100.5	NARC, NSB, DoA, Private
320	<i>S3.2: Support regional and local governments in the development, maintenance and release of location-specific crop varieties</i>	35	RARS, DDC, RD
330	<i>S3.3: Enhance access of new seeds and information to households and individual through participatory breeding</i>	25	DADO, DLDO, VDC, DDC, Private

400	S4: Enhance marketing skills of seed entrepreneurs and invest in seed related infrastructures		
410	<i>S4.1: Develop and strengthen seed networks, seed dealers and seed supply channels in public and private sector</i>	24.5	DoA, DLS,MoI, NSB, CBOs and Private, NGOs
420	<i>S4.2: Support local institutions to plan and market quality seeds</i>	27.5	DDC, DADO, RSL,RD, DLS and private
430	<i>S4.3: Support people in utilizing skills on quality seed use.</i>	215	DADO, DDC, DLSO,NGO, CBO
500	S5: Support developing efficient and effective seed related organizations with business culture through appropriate monitoring and evaluation system		
510	<i>S5.1: Develop a system and support NSB on seed related information collection, processing and dissemination</i>	32.5	NSB, CDD, Private
520	<i>S5.2: Promote seed entrepreneurs to make their small and medium microenterprises competitive</i>	80	MoAD, NSB, MoCI, MoF, Banks , Private
Total		827	

Source: National Seed Vision 2013 - 2025, Main Document

It is envisaged that actors in the seed value chain will fulfil their pragmatic roles, responsibility and commitment at the national, regional and local level for achieving Seed Vision goals. The total cost for proposed activities is NPR 827 million per annum estimated at the constant price of 2012. Out of this cost, NPR 491 million will be borne by the public sector and NPR 336 million will be borne by the private sector. The public sector needs to increase the existing investment from the central to district level through Government organizations, research organizations, academic institutions, and local authorities, such as DDC and VDC to accomplish the activities proposed in this matrix. The increasing investment from the public sector is also required to mobilize resources and encourage more investment from the private sector, which includes I/NGOs, farmers, seed entrepreneurs, cooperatives, seed companies, and financial institutions.

8. Expected Results and Impact

8.1 Results

Implementation of the Seed Vision is envisaged to bring following results by 2025

1. One million farm families will have an easy access to required quantity of quality seeds before planting season. The country will be self-reliant on food crop seeds.
2. Eighty eight metric tons of breeders, 2, 978 mt of foundation seeds and 92, 527 mt of improved seeds will be produced through formal system by 2025.
3. Seven hundred and fifty metric tons of Nepal produced quality seeds will have an improved access to export by 2025.
4. Seed replacement rate will increase up to 25 percent for cereals and over 90 percent for vegetable crops.
5. Quality seed will be available in market through quality control system with quality assurance and truthful labeling.
6. Four hundred and twenty three open pollinated varieties and 60 hybrids will be released by 2025 from public and private sectors.
7. Seed laboratories will test and analyze 40,000 seed samples annually.

8. Seed production and marketing will be carried out through structured and efficient seed system.
 9. Yield of rice and vegetable crops will increase up to 3.8 mt/ha and 19 mt/ha, respectively.
 10. Enhanced participation of private sector will increase and ensure availability of quality seeds in the market. Private sector will establish and strengthen four big seed companies.
 11. Two hundred and ninety three high level seed specialists will be developed in private and public sector.
 12. Farmers' rights will be protected and breeders will get incentive for developing better competitive varieties.
 13. Seed import and export regulations will be harmonized in line with WTO and SAARC standard.
 14. All stakeholders will be accountable to farmers. They shall participate responsibly in Nepalese seed system.
 15. With the implementation of Seed Vision 2013 - 2025, two hundred and fifty-five thousand people will get additional full time employment. Seed Vision will contribute to food security. Edible food availability by 2025 will reach 8 million mt, worth of 200 billion rupees at current price.
 16. Agro-based industries will have adequate raw materials from increased production.
 17. Nepal's seed sector will be rich enough to share its experience and knowledge with other countries.
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Source: National Seed Vision 2013 - 2025, Main document

8.2 Impact

Seed sector development strategy will have a significant direct and indirect impact on: (i) Ensuring food security and reducing poverty (ii) Generating employment opportunities (iii) Biodiversity conservation and adapting adverse impact of climate change and (iv) Gender equality and social inclusion.

9 Monitoring and Evaluation

9.1 Monitoring

Monitoring of the implementation of Seed Vision 2013 - 2025 shall take at these 4 levels, as presented in Table 3, in line with "Result Based Monitoring and Evaluation Guidelines, 2067 (2010)", developed by the National Planning Commission.

Table 3: Monitoring of Seed Vision 2013 - 2025

Levels	Content	Responsibility	Frequency
District level	Measurement of achievement at activity level. Implementation of District Poverty Monitoring and Analysis System (DMAS).	District Agriculture development Committee (Communities Groups, seed companies Cooperatives, NGOs, VDC, ASC, and DADO, DSCC, RARS)	Every four months
Regional level	Result indicators at the outcome and impact level. Overall monitoring and evaluation of the development activities operated within the region should be reported to the centre.	Regional Agriculture Development Committee (Regional directorates , DDC, RSTL, RARS, Line agencies, NGOs and seed companies)	Every four months and more frequently if required
Departmental and Ministerial level	The details of progress regarding Implementation of the project are presented and reviewed. Consequently, efforts are made to identify solution measures of the problems.	Ministerial Level Development Action Committee (MDAC), SQCC/NSB, DoA and NARC , Private sector	Every six months
National Level	Progress regarding implementation of projects under different ministries is reviewed and issues regarding inter-ministry coordination, policy issues as well as legal issues are discussed.	National Development Action Committee (NDAC), NSB	Annually

9.2 Evaluation

The implementation of National Seed Vision 2013 - 2025 will be evaluated periodically once in every five years and its final evaluation will be carried out at the end. Period evaluation will be conducted by the Government's own resources or by independent evaluators, but the final evaluation will be conducted by independent evaluators. The recommendations of periodic evaluation will contribute improving the implementation of this vision. However, the recommendations of the final evaluation will be helpful in the long run for effective implementation of policies, rules, regulations, and programmes related to the seed sector.

10 Conclusion

The National Seed Vision 2013 - 2025 will be a vital instrument in attaining the objectives of increasing food production and reducing the dependency of seeds in international market. It is expected that this vision helps in accelerating agricultural development by ensuring an efficient system for the supply of best quality seeds to farmers. The Government of Nepal trusts that the Seed Vision will receive full support from government agencies, political parties, donor agencies, academia, researchers, non

governmental organizations, seed companies, private seed entrepreneurs, seed producers, co-operatives, and entire stakeholders as it provides a broad policy framework to meet the objectives of sustainable development of agriculture sector, food security, and improved living standards of farm communities.