

SUBMITTED TO: GOVERNMENT OF NEPAL, MINISTRY OF AGRICULTURAL
DEVELOPMENT, KISANKALAGI UNNAT BIUBIJAN KARYAKRAM

Seed Sector Policy Review

Final Report

Submitted by: Tek B Thapa, National Consultant

2016

JANAKINAGAR, BUTWAL

Acknowledgement

Many people have significantly contributed in different ways since the beginning of this review. The following list is not all-inclusive and those who helped me with valuable information are acknowledged. My sincere appreciation goes to Mr Uttam Kumar Bhattarai, Secretary, Ministry of Agricultural Development for inspiration and guidance. Thanks are also due to Dr Suroj Pokharel, Joint Secretary of MOAD for his support with in-depth knowledge and experience in the seed sector of Nepal. Mr Dharma Datta Baral, Chief Seed Development Officer, deserves special appreciation for his meticulous suggestions and provision of much needed data which formed the basis of analysis presented in the report.

Mr Laxman Prasad Poudel, Program Manager of KUBK, was of immense help and encouragement for the conduct of this review. He not only accompanied me in the field visit but also helped organize logistics in an efficient manner to cover greater number of respondents and districts in the given timeframe. Mr Ramji Devkota and Kul Prasad Dawadi of KUBK deserve whole-hearted appreciation in conducting this review.

My indebtedness and gratitude goes to the following individuals who contributed in so many ways to the success of this endeavor: Mr Dila Ram Bhandari, Mr Basudev Subedi, Mr Giri Dhari Subedi, Dr Surendra Lal Shrestha, Dr Dilli Ram Sharma, Dr Pradyumna Raj Pandey, Dr Mina Nath Poudel, Dr Devendra Gauchan, Mr Purushottam Hada, Mr Mahendra Poudel, and Dr Mahendra Prasad Khanal.

Mr Durga Prasad Adhikari, Managing Director of SSSC, has provided valuable insights into the role of the private sector entrepreneurs for the promotion of a vibrant seed industry in the country. Many farmers, seed traders, seed company officials, cooperative members and NGO representatives were of special help in providing information valuable for the study.

Individuals of NARC stations, Plant Quarantine Check Post, Seed Testing Labs, and District Agriculture Development Offices deserve special thanks. My sincere indebtedness goes also to those many people whom I fail to mention here as they are numerous. As helpful as these many contributions have been, the final responsibility for this review rests with me.

Table of Contents

1. Introduction	12
2. Objectives of the Review	13
2.1 Specific Objectives	13
2.2 Terms of Reference	13
3. Nepal Seed Sector	14
3.1 History of Modern Seed	14
3.2 Present Status of Seed Sector	15
3.2.1 Overall	15
3.2.2 Share of Public and Private Sector in Seed Business	15
3.2.3 National Seed Company Limited	16
3.2.4 SEAN Seed Service Centre (SSSC) Limited	19
3.2.5 Seed Import	21
3.2.6 Cereal seeds	21
3.2.7 Vegetable seeds	22
3.2.8 Forage Seeds	24
3.2.9 Buffer Stock	24
3.2.10 Nature of Supports in Seed Sector	26
3.2.11 Monitoring and Evaluation System	26
3.2.12 Achievements, Weaknesses and Opportunities	27
4. Methodology	29
4.1 Review of Documents	29
4.2 Meetings with Government Officials and Stakeholders	29
4.3 Field Visit	29
4.4 Data Sources and Type of Information	30
4.5 Seed Distribution System	30
4.6 District Level Input Suppliers and Stakeholders	30
4.7 Workshops	31
5. Policy, Act and Regulation	31
5.1 The Thirteenth Plan	31
5.2 National Agricultural Policy (2004)	32
5.3 Agricultural Development Strategy	32

5.4 Agriculture Biodiversity Policy (2007)	32
5.5 Nepal Agricultural Extension Strategy (2007).....	33
5.6 Seed Vision	33
5.7 National Seed Policy (2000)	34
5.7.1 Variety Development and Maintenance	34
5.7.2 Seed Multiplication	35
5.7.3 Seed Processing and Conditioning.....	38
5.7.4 Quality Control.....	38
5.7.5 Private Sector Participation	40
5.7.6 Seed Supply	40
5.7.7 Marketing	40
5.7.8 Institutional Strengthening	41
5.7.9 Modern Technology and Biotechnology	41
5.8 Seed Act (1988).....	41
5.8.1 National Seed Board	43
5.8.2 Legal Framework	44
5.8.3 International Seed Trade	45
5.8.4 Institutions Involved	46
5.8.5 Indian Experience	47
5.9 Plant Variety and Farmers' Rights Protection.....	48
5.10 Exchange of Germplasm and the International Treaty	49
5.10.1 Capacity Building at International Level	49
5.11 Seed Regulations (2013)	49
6 Seed Trade Harmonization	50
6.1 Regional Institutional Factors	54
7. Recommendations	54
7.1 Policy Reforms	54
7.2 Varietal Development and Maintenance	56
7.3 Seed Multiplication, Processing and Conditioning	58
7.4 Quality Control	59
7.5 Marketing and Pricing.....	60
7.6 Institutional Strengthening	61

7.7 Cross Cutting Issues 61

7.8 Monitoring and Evaluation 61

7.9 Legislative Reform and Seed Trade Harmonization 62

8. Action Plan to Implement the Recommendations 64

9. Concluding Remarks 70

List of Tables

- Table 1. Brief historical account of Nepalese seed industry
- Table 2. Numbers of new rice, wheat, and maize varieties introduced in India, Bangladesh and Nepal
- Table 3. Seed sold (metric ton) by NSCL
- Table 4. Rice, wheat and maize area planted to seeds from NSCL
- Table 5. Annual sales of improved seeds (mt) by National Seed Company Ltd
- Table 5.1. Formal import of seed, 2010/11 to 2014/15 (price in thousand NRS)
- Table 6. Seed production and import situation (mt) of major crops in Nepal, 2008/09 to 2014/15
- Table 7. Seed replacement rates in some major crops
- Table 8. Production and requirement of vegetable seeds in Nepal
- Table 9. Status of the foundation seed demand and supply (mt), 2013/14
- Table 10. Results of the seed market inspection
- Table 11. Prevailing legislations in Nepal, India, Bangladesh and Pakistan
- Table 12. Field and seed standards in open pollinated rice in Nepal, India, Bangladesh and Pakistan
- Table 13. Provisions in seed regulatory frameworks of Nepal, India and Bangladesh
- Table 14. Suggested schedule of activities for the Seed Sector Policy Reform

List of Boxes

- Box 1: Trade related legislations
- Box2: Institutions involved

References

List of Annexes

- Annex 1. Terms of Reference of National Consultant
- Annex 2. Persons Met

Acronyms

ABTRACO	Agri-Business and Trade Promotion Multipurpose Cooperative Limited
ADS	Agriculture Development Strategy
AEC	Agro-Enterprise Center
AFU	Agriculture and Forestry University
APP	Agriculture Perspective Plan
ARPP	Agricultural Research and Production Project
ARS	Agricultural Research Station
ASC	Agriculture Service Center
ASYCUDA	Automated System of Customs Data
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Trade and Economic Cooperation
BS	Breeder Seed
B.Sc.	Bachelor of Science
CBD	Convention on Biological Diversity
CBS	Central Bureau of Statistics
CBSP	Community Based Seed Production/Producer
CDD	Crop Development Directorate
CDO	Chief District Officer/Crop Development Officer
CEAPRED	Center for Environmental and Agricultural Policy Research, Extension and Development
CMSQS	Common Minimum Seed Quality Standard
CS	Certified Seed
CSISA	Cereal Systems Initiative for South Asia
CSTL	Central Seed Testing Laboratory
DADO	District Agriculture Development Office
DCCI	District Chamber of Commerce and Industries
DDC	District Development Committee
DDG	Deputy Director General
DFID	Department for International Development
DFTQC	Department of Food Technology and Quality Control
DISSPRO	District Seed Self-Sufficiency Program
DG	Director General
DLS	Department of Livestock Services
DOA	Department of Agriculture
DUS	Distinctness, Uniformity and Stability
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FG	Farmers Group
FMTA	Framework for Material Transfer Agreement
FNCCI	Federation of Nepalese Chambers of Commerce and Industries
FS	Foundation Seed
FY	Fiscal Year
GDP	Gross Domestic Product
GIZ	German Agency for International Cooperation
GMO	Genetically Modified Organism
GON	Government of Nepal

ha	Hectare
HICAST	Himalayan College of Agricultural Science and Technology
HVAP	High Value Agriculture Project
HYV	High Yielding Variety
IARC	International Agriculture Research Center
IFAD	International Fund for Agricultural Development
(I)NGO	(International) Non-Government Organization
IPPC	International Plant Protection Convention
IS	Improved Seed
ISFP	Improved Seed for Farmers Program
ISPSM	International Standards for Phytosanitary Measures
ISTA	International Seed Testing Association
ITK	Indigenous Technology and Knowledge
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
ITPS	International Trade Promotion Section of MOAD
kg	Kilogram
KUBK-ISFP	Kisankalagi Unnat Biubijan Karyakram-Improved Seed for Farmers Program
LDC	Least Developed Country
LIBIRD	Local Initiatives for Biodiversity Research and Development
LMO	Living Modified Organism
MD	Managing Director
M&E	Monitoring and Evaluation
MB	Methyl Bromide
MLS	Multilateral System of Access and Benefit Sharing
MOAD	Ministry of Agricultural Development
MOC	Ministry of Commerce
MOF	Ministry of Finance
MOFSC	Ministry of Forests and Soil Conservation
MOI	Ministry of Industry
MOLD	Ministry of Livestock Development
MOS	Ministry of Supplies
MSP	Minimum Support Price
mt	Metric Ton
NACCFL	Nepal Agricultural Cooperative Central Federation Limited
NAES	National Agricultural Extension Strategy
NAP	National Agriculture Policy
NARC	Nepal Agriculture Research Council
NPC	National Planning Commission
NPQP	National Plant Quarantine Program
NRB	Nepal Rastra Bank
NSB	National Seed Board
NSCL	National Seed Company Limited
NRs	Nepalese Rupees
NSPM	National Standards for Phytosanitary Measures
NTFP	Non-Timber Forest Product
NTIS	Nepal Trade Integration Strategy
OIE	World Organization for Animal Health
OPV	Open Pollinated Variety

PACT	Project for Agricultural Commercialization and Trade
PBR	Plant Breeders' Rights
PFA	Pest Free Area
PFDD	Pasture and Forage Division
PFM	Plan Formulation and Monitoring
PICC	Policy for International Cooperation and Coordination
PPD	Plant Protection Directorate of DOA
PPP	Public Private Partnership
PQ	Plant Quarantine
PVR	Plant Variety Rights
QDS	Quality Declared Seed
QSDM	Quality Standards Determination and Management
R&D	Research and Development
RAD	Regional Agriculture Directorate/Director
RARS	Regional Agricultural Research Station
RDP	Rapti Development Program
RISMFP	Raising Incomes of Small and Marginal Farmers Project
RKC	Revised Kyoto Convention
RPPO	Regional Plant Protection Organization
RSTL	Regional Seed Testing Laboratory
SAARC	South Asian Association for Regional Co-operation
SAFTA	South Asian Free Trade Agreement
SAWTEE	South Asia Watch on Trade, Economics and Environment
SEAN	Seed Entrepreneurs' Association of Nepal
SFDB	Small Farmer Development Bank
SMTA	Standard Material Transfer Agreement
SPISP	Seed Production and Input Storage Project
SPS	Sanitary and Phytosanitary
SQCC	Seed Quality Control Centre
SRR	Seed Replacement Rate
SSNP	Social Safety Nets Project
SSSC	SEAN Seed Service Center
SSSP	Seed Sector Support Project
STDF	Standards and Trade Development Facility
TEPC	Trade and Export Promotion Center
TOR	Terms of Reference
TPS	True Potato Seed
TU	Tribhuvan University
UK	United Kingdom
UPOV	International Union for the Protection of New Varieties of Plants
USA	United States of America
USAID	United States Agency for International Development
VARR	Variety Approval, Release and Registration
VCU	Value for Cultivation and Use
VDC	Village Development Committee
VDD	Vegetable Development Directorate
WTO	World Trade Organization
ZHC	Zero Hunger Challenge

Executive Summary

Seed Replacement Rate in Nepalese major cereal crops was very low—about 12 % in 2014. Consequently, productivities are low, competitiveness in national and international markets is weak, food security is threatened and contribution to Gross Domestic Product is about one third. Therefore, KUBK commissioned a Seed Sector Policy Review to investigate, *inter alia*, into: (a) current Seed Policy, Seed Act and Regulations; (b) seed trade harmonization and phytosanitary measures; (c) and initiatives to be taken by government to attract private sector investment in the Nepalese seed industry.

To conduct the said Review: field visits were undertaken in Chitwan, Rupandehi, Rukum, Dang and Banke districts to solicit seed value chain actors' responses ; interaction meetings were held with concerned stakeholders, farmers and policy makers; and extensive literature review was undertaken to gauge the gap between the practice in Nepal and in the globalized seed market. This paved the way for recommendations put forth herewith for the consideration of the Government of Nepal to create favorable climate for a vibrant seed industry capable of ensuring food and nutrition security, increasing employment and reducing poverty.

The outcome of the Review will follow. The National Seed Policy (2000) was designed to implement the then Agriculture Perspective Plan (1995-2015) which had twin objectives of augmenting agricultural growth and reducing poverty. The current objectives now have changed to food and nutrition security, Zero Hunger Challenge, private and non-government sector participation, globalization, competitiveness, plant breeders' and farmers' rights, and demand for quality seeds including hybrids. Therefore, the Policy should be reformed to address these challenges. There should also be consistency among the GON policies governing seed development: for example, the Industrial Policy (2010) should include seed industry as one of the priority industries.

Nepalese farmers have narrow choice of varieties of their preference. There are multiple reasons for this. Annual average numbers of major crop varieties introduced in Nepal are the lowest when compared to India and Bangladesh. In quest of new varieties, illegal trade of un-notified varieties is rampant from across the border. Private introduction of exotic varieties is restricted in Nepal. Two years' experimental data is required for the DUS test of new varieties while one year's data is enough in USA, India and EU. In fact, Nepal and South Asian countries can mutually benefit from each other from varietal breeding research and seed trade. The SAARC Seed Bank Agreement, the Cereal Systems Initiatives for South Asia (CSISA), donor-funded projects and other bilateral and multilateral forums should be utilized to facilitate mutual benefit.

World Trade Organization member countries' policies and regulations should not be used as an excuse to unnecessarily restrict trade with other countries. These provisions should be justified scientifically and on the basis of WTO rules. Nepal follows ISTA procedures and methods in its quality assurance system. This should be taken as the starting point to harmonize seed trade, especially with South Asian countries which, one way or the other, are related to ISTA procedures and methods. It is often argued that Nepal is shy in policy reforms. Periodic seed status surveys, say, in every five years, by an independent expert body will unfold achievements and shortfalls for corrective future actions.

Nepal's capacity should be developed to enable participation in WTO regimes and regional agreements. The areas for capacity building should focus on human resources, infrastructure, negotiation skills and funding. The resulting national seed industry should be a viable and sustainable business by enhancing agricultural growth to positively impact upon national economy with the participation of the private, community, cooperative, non-government and public sectors.

1. Introduction

As population rises role of agriculture receives more prominence in meeting the need for food, feed and fiber. High quality seeds are the vital means to increase agricultural output through augmenting productivity. In agriculture dependent economy like Nepal, Gross Domestic Product (GDP) growth, rural employment and poverty reduction can be achieved through expansion of area under modern seed triggered by seed trade.

Nepalese agriculture employs about two-thirds of the national labor force and contributes about one-third to the GDP. To this day, it is characterized by subsistence and smallholder farming awaiting commercialization and modernization. Poverty is rampant in the farming community where more than two-thirds of the poor reside. Due mainly to the low level of commercialization and modernization, youth migration from agriculture is a major constraint to farming, leaving agriculture to the care of the womenfolk, elderly people and child labor. At times there are cases of land left fallow due mainly to the scarcity of farm labor during the peak planting and harvesting seasons. Food insecurity in vulnerable groups and in remote areas has been the recurrent problem and rising food importation is a worry for the nation.

Nepal has embarked on Zero Hunger Challenge (ZHC) by 2025 on 13 March 2016 (Kantipur Daily, 14 March 2016). Under the Challenge there will be: 100% access to food all year round; zero stunted children less than two years of age; all food systems sustainable; 100% increase in smallholder productivity and income; and zero loss or waste of food. In so doing, the Government of Nepal (GON) has approved the Ten-Year National Action Plan 2025 to fulfill Nepal's commitment made in Rio+20 Conference on Sustainable Development in 2012 and reemphasized by (ESCAP's) 69th Commission Session in 2013. This is in line with Nepal's constitutional provision of fundamental Right to Food for every citizen (Part 3, Article 36)¹. This ambitious undertaking should be pursued with the highest political commitment to improve agriculture, including the basic input of modern seeds. At present, Nepal stands at 44th out of 76 countries in the hunger list and 157th in the Least Developed Countries. In recent years, agricultural diversifications have shown promising results in some subsectors like vegetables, cash crops, milk and poultry. But these efforts are not sufficient to transform economy to a higher growth path in the twenty first century in an attempt to push the nation to the level of developing country by 2022². Agriculture's share to contribute towards that direction has to be realized by putting concerted efforts and exploiting the potential hitherto untapped for.

With Nepal's accession to WTO and as a member of regional trade organizations, Nepalese seed agencies should modernize themselves to adopt latest innovations to become competitive in both national and international markets. In this vein, seed quality control plays the most important role because the world market is becoming more competitive day by day (SQCC, 2015)³.

¹ Constitution of Nepal. September 20, 2015. GON. Nepal Gazette. Kathmandu.

² The Thirteenth Plan. 2014. GON, NPC. Singha Durbar, Kathmandu.

³ Biu Bijan Pramanikaran Nirdeshika (in Nepali), GON/MOAD, SQCC, Harihar Bhawan, Lalitpur, 2072 BS (2015).

2. Objectives of the Review

2.1 Specific Objectives

The detailed tasks of the present review are the following:

- i. Prepare an Inception Report how consultant will accomplish the assigned task and collect feedback from the public and private sector stakeholder consultation and finalize the plan of action incorporating the feedback and suggestions.
- ii. Review the current Seed Act, Rules, Regulations and Policy guidelines of Nepal with a view to identifying gaps in these aforesaid legal documents.
- iii. Identify gaps in order to incorporate and operationalize the Seed Trade Harmonization Regulations at national/international level and provide appropriate recommendation based on the analysis made in point ii. Besides, the consultant needs to dig out the seed standards required for seed trade including phytosanitary measures.
- iv. Organize interaction meetings with related stakeholders. Some of the suggested key stakeholders could be the officials of the MOAD, SQCC, DOA, CDD, VDD, and DADOs. Seed producer groups (Farmers Groups/Cooperatives) from the program districts and national, regional and local seed entrepreneurs and suggest SQCC and National Seed Board (NSB) to ensure an effective enabling environment for formal seed sector development.
- v. Based on the analysis made as per point iv, recommend appropriate subject matter for Seed Act, Rules and Regulations and Seed Policy amendments.
- vi. The consultant is required to validate the output of the assignment through a validation workshop taking account of subject matter recommended for Seed Act/Seed Regulation/ Seed Policy amendments in wide group of national stakeholders (relevant decision and policy makers as well as private sector those involved in the seed industry) and incorporate appropriate suggestions in the report.
- vii. Suggest specific action and initiatives to be performed by the government to attract private sectors' investment along the seed value chains.

Present a report to the KisanKalagi Unnat Biubijan Karyakram (KUBK-ISFP), Ministry of Agriculture Development (MOAD) in consultation with the National Seed Board (NSB) and Seed Quality Control Center (SQCC) in full compliance with national legal processes.

2.2 Terms of Reference

The detailed Terms of Reference has been presented in Annex 1.

3. Nepal Seed Sector

3.1 History of Modern Seed

Use of modern seeds dates back to early 1960s with the introduction of high yielding varieties of major cereal crops from abroad. As time elapsed, institutions were created anew—like Agriculture Inputs Corporation, Central Seed Testing Laboratory, Seed Quality Control Center, etc.—to shoulder the responsibilities demanded by seed development activities. Donor partners have played important roles in the creation and strengthening of infrastructures, human resource development, seed research, extension and quality control services. Among them USAID, DFID, GIZ, SDC and FAO had significant contributions in the past and some are still supporting through project-based activities. Private seed entrepreneurs and NGOs are active in the seed business and their role is ever increasing in recent times. Policy and legislations were framed much later: National Seed Policy in 2000; Seed Act in 1988 (amended 2008); and Seed Regulations in 1997 (current Regulations in 2013).

A brief overview of the historical events in Nepalese seed industry has been presented in the table below.

Table 1. Brief historical account of Nepalese seed industry

Year	Formal seed sector key events
1960	High yielding variety of wheat Lerma 52 released
1962	Establishment of seed testing laboratory under Agronomy Division, Khumaltar
1964	Designated membership of Central Seed Laboratory with International Seed Testing Association (ISTA)
1966	Seed testing laboratory moved to Agriculture Botany Division to work closely with breeders as the division deals with the major crop commodity units identified
1966	Rice variety CH-45 released
1974	Agriculture Input Corporation (AIC) established under Corporation Act 1965
1975	Contract vegetable seed production at farmers' level
1977	Contract cereal seed production at farmers' level
1980	Seed Production and Input Storage Project (SPISP) funded by USAID
1981	Vegetable Seed Production Project (FAO) financed by the government of Switzerland
1982	Seed Technology and Improvement Program (STIP) initiated
1983	First National Seed Seminar conducted
1984	Central Seed Science and Technology Division established
1985	Import of hybrid seed in vegetables and maize started by private sector
1988	Seed Act enacted
1990	Second Seed Seminar organized
1991	Establishment of Seed Entrepreneurs' Association of Nepal (SEAN)
1993	Koshi Hills Seed and Vegetable Project (KOSEVEG), funded by DFID
1997	Seed regulations enacted
1998	Seed Sector Support Project (SSSP) funded by DFID
1999	National Seed Policy approved
2000	Establishment of SEAN Seed Service Centre Limited (SSSC)
2001	Third seed seminar organized
2001/02	Seed Quality Control Centre established
2002	National Seed Company Limited established
2004	Vegetable Seed Project initiated with SDC funding
2008	Fourth seed seminar organized. First amendment of Seed Act, 1988
2010	Seed Science & Technology Division revived in NARC
2013	Seed Regulations enacted

Source: This table draws heavily from GON/MOAD/SQCC. 2013. National Seed Vision (2013-2025), p.7. Harihar Bhawan, Lalitpur.

3.2 Present Status of Seed Sector

3.2.1 Overall

The success of Green Revolution in early years was bestowed by new seed-fertilizer technology accompanied by irrigation and agricultural chemicals. Access to modern and quality seeds at affordable prices by farmers is the key to increasing agricultural productivity. It has been established that modern quality seeds increase productivity up to 20 percent depending on varieties and management practices⁴. In Nepal, cereals account for some 90 percent of the area cropped and total production. The current seed replacement rates (SRR) for major cereals (rice, maize and wheat) and vegetables stand at about 12 percent (SQCC, 2014) and 66 percent (Seed Vision, 2013) respectively. Consequently, cereal crop yields in Nepal are among the lowest in South Asia and the growth rate amounts to less than one percent over the past three decades. However, SRR alone does not guarantee that the seeds used necessarily increase productivity. Quality of seeds plays an important role.

The total number of varieties of all crops notified⁵—both by release and registration processes— by the National Seed Board (NSB) amounts to 605 by 2016 (SQCC, 2016). In case of vegetables, commercial vegetable growers have resorted more and more to hybrids which are mostly imported. Hybrids are grown to some 60% of the vegetable area. On the whole, Nepalese seed production and distribution has increased primarily due to the role played by the private sector. It should be noted that the seed producers and users are becoming increasingly aware of quality aspects that should be credited to seed legislation and monitoring practiced in the country.

Given the unmet demand for the quality seed in the country, active and potential private sector players are eager to participate in the expansion of the seed business. But there are underlying constraints to such participation. The first and foremost demand and need of the private seed companies is the establishment of seed infrastructures—such as processing, cleaning, grading, treating, packaging and storage facilities and associated modern machines and equipments. Other needs include seed testing laboratory for internal quality control, human resources development on hybrid varietal breeding supported by the government, joint venture with NARC in varietal development and maintenance, sharing of land with the government for variety development, supply of promising inbred lines for hybrid, and permission to the private companies for testing of imported varieties.

3.2.2 Share of Public and Private Sector in Seed Business

The total quantity of formal seeds available in the market amounted to 28,016 mt⁶ (2014) of which about 64% was attributed to the public sector. The quantity sold from both public and private sectors is increasing in recent years. Of the varieties developed till 2014, public sector contributed significantly— 245 out of 251; only 6 varieties were developed by the private sector (Dr Mahendra Khanal, Power Point presentation during the Seed Summit, 2015). Out of the total 38 seed processing facilities, 20 of them are in the private. Seed storage facilities available in the country are for 28,494 mt; both private and public share almost the equal volume. This suggests that existing storage facility is just enough for the seed produced within the country. The functional Seed Testing Laboratories (STLs) available are mostly in the public sector (12) and the private sector facilities are only in two places.

⁴ GON/MOAD, SQCC. 2014. Annual Progress Report, 2013/014, Harihar Bhawan, Lalitpur.

⁵ GON/MOAD, SQCC. 2016. *Rastriya Biu Bijan Samiti bata Suchit Bali tatha Jatharu in Nepali*, 2072/73. Lalitpur.

⁶ Power Point Presentation by Dr Mahendra Khanal in the Seed Summit, 2015.

According to the Seed Vision, 88 mt of Breeder Seed (BS), 2,978 mt of Foundation Seed (FS) and 92, 527 mt of improved seed is to be produced from formal sector in 2025. To meet this requirement, seed production has to be increased by almost three and one half times from the level of 28,016 mt in 2014. It is not plausible for the public sector to step up the production, except for BS, and much of the increase in production and sale has to be forthcoming from the private and community sectors. The private and the community should be so prepared as to take up the challenge, for which the government and seed value chain actors need to act in unison to create enabling environment for the intended growth.

The introduction of new varieties in three Asian countries is given in the following Table 2. The introduction by private companies constituted mostly the hybrid varieties of rice and maize. In case of wheat, the public introduction of varieties was self-pollinated in Nepal and Bangladesh.

Table 2: Numbers of new rice, wheat, and maize varieties introduced in India, Bangladesh and Nepal (annual averages)

Crop	India (2005-2010)			Bangladesh (2003-2012)			Nepal (2003-2012)		
	Private	Public	Total	Private	Public	Total	Private	Public	Total
Rice	13.2	40.0	53.2	9.2	2.8	12.0	1.7	2.0	3.7
Wheat	06.7	15.8	22.5	0.0	0.7	0.7	0.0	0.5	0.5
Maize	22.7	13.0	35.7	1.9	8.0	9.9	1.6	0.7	2.3

Source: USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia. Note: For India, numbers of private varieties are from 34 companies only. For Bangladesh, maize data is for 2002-2011.

Table 2 reveals that Nepal ranks the lowest and India the highest in the introduction of new varieties. Thus, among the three countries, Nepali farmers have the lowest choice for new varieties, on the average.

3.2.3 National Seed Company Limited

The National Seed Company Limited (NSCL) was established in 2002 under Company Act 1996 as a government undertaking (seven share holders) to produce, procure and sell different seeds like of cereals, legumes, vegetables and oilseed crops⁷. It runs on commercial footing with the aim of satisfying farmers' demand for improved seeds. Government farms and Nepal Agriculture Research Council (NARC) supply the Company with bulk of foundation seeds for seed multiplication through private contract growers. The seed supplied by NSCL over the three and a half decades (Table 3) showed a slow growth (1,824 mt in 1980/81 to 2,630 mt in 1999/2000), except in recent years (4,530 mt in 2009/10 to 12,390 mt in 2014/15) which is the result of "seed subsidy program" by the government through NSCL. To date, wheat seed still comprises of the major share (78% in 2009/10 and 52% in 2014/15) of the seeds distributed by NSCL.

⁷ Available at www.nscl.org.np

Table 3: Seed sold (metric ton) by NSCL

Crop	1980/81	1989/90	1999/00	2009/10	2015/16
Rice	204 (11%)	146 (6%)	326 (12%)	959 (21%)	5,100 (41%)
Wheat	1,516 (83%)	2,122 (89 %)	2,244 (85%)	3,554 (78%)	6,400 (52%)
Maize	104 (6%)	126 (5%)	25 (<1%)	0.05 (<1%)	400* (3%)
Other seeds	0	0	35 (2%)	17 (<1%)	490 (4%)
Total seeds	1,824(100%)	2,394(100%)	2,630(100%)	4,530(100%)	12,390 (100%)

Source: Central Bureau of Statistics (1991), MOAD (2010) and NSCL for 2014/15. Note: Other seeds in 2014/15 include lentil (250 mt), rapeseed (225 mt) and vegetables (15 mt). * Means projected.

The company has its own distribution network; the main centers are in Itahari (East), Janakpur and Hetauda (Centre), Bhairahawa (West), Nepalgunj (Mid-West) and Dhangadhi (Far West). It has two R&D sites—Jhumka (East) and Nawalpur (Centre). The seed processing (mechanized), storage, packaging and quality assurance laboratory facilities are its key assets. NSCL is supplying seeds produced by contract seed growers, producer groups and cooperatives from about 26 districts of the country; six of them are from mid-hills. NSCL cannot operate fully from the seeds of its own farm and contract seed growers but draws on, through tenders, the participation of private companies to fulfill its requirement. Seed producer groups, cooperatives, and private seed companies participate in the tender bidding process and NSCL collects from successful bidders. Last season, NSCL collected seeds from DISSPRO, contract growers and other seed multipliers, and administered "seed subsidy program" of the government. NSCL sells through its network of dealers in the country; it directly sells to the users also. Of all the seeds sold by NSCL, 85% comprises of the Truthful Label. NSCL is the price leader for agricultural seeds. It provides premium up to 25% on cereals, and transportation is free up to its processing plant.

The average national rice and wheat areas planted to NSCL supplied seeds were 2.3 and 3.8 percent respectively for years 2011/12 to 2013/14 (Table 4). NSCL sale of maize seeds was negligible since commercial growers in Terai depended mostly on imported, formally and informally, hybrid seeds from India.

Table 4. Rice, wheat and maize area planted to seeds from NSCL

Crop	Average area (2011/12–2013/2014), (ha)	Average NSCL seed sales (2011/12–2013/2014), mt	Seed Rate (kg/ha)	Area planted to NSCL seed (ha)	% of planted area
Rice	14,79,671	1,357	40	33,925	2.3
Maize	8,83,262	0.135	20	7	~0
Wheat	7,59,878	3,434	120	28,617	3.8

Source: GON/ MOAD. 2014. Statistical Information on Nepalese Agriculture, Kathmandu and Table 5.

There are a number of agrovets and private seed companies active in sale of seeds but the reliable data is grossly lacking. In recent times, distribution of improved seeds by NSCL has increased substantially; the annual sale has been presented in Table 5.

Table 5. Annual sales of improved seeds (mt) by National Seed Company Ltd

Type	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Paddy	958.969	1209.041	1200.464	770.129	2099.290	3328.557	5100
Wheat	3554.582	2981.359	2181.932	2944.685	5176.988	5815.841	6400
Maize	0.050	0.840	0.000	0.305	0.100	0	400*
Vegetable	6.749	2.253	2.921	2.862	3.304	1.065	15*
Lentil	6.245	12.891	8.579	26.616	7.213	3.485	250
Jute	1.120	0.000	0.000	0.000	0	0	0
Rapeseed	1.538	3.026	1.758	2.443	2.265	36.200	225
Sesbania	0.51	1.836	0.000	0.000	0	0	0
Others	0.000	0.000	0.200	0.123	0.450	0.028	0
Total	4529.763	4211.246	3395.854	3747.163	7289.610	9185.176	12390

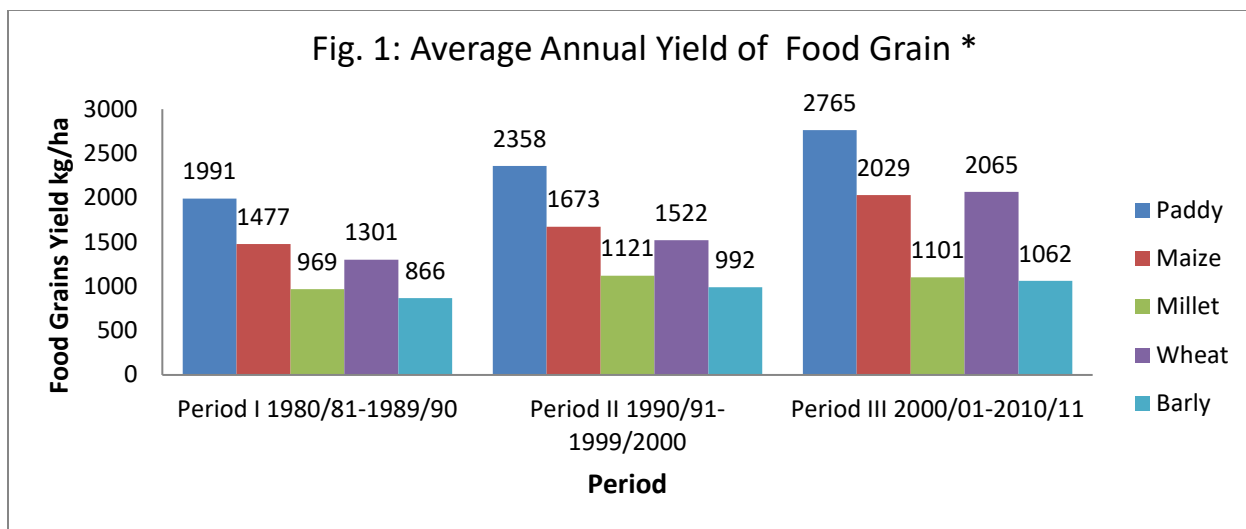
Source: MOAD, Singha Durbar, Kathmandu and NSCL. Personal communication with Mr Dharma Raj Adhikari, MD of NSCL for 2015/16. * Indicates projected figure. Note: Others include sesbania also in year 2011/12.

The private seed companies do not have a stable seed market since they depend on public agencies for supply of early generation source seeds and sell their production also to NSCL, government and donor programs. Nepal seed policy seems restrictive with respect to the private sector introduction of new seeds; the result has been low SRR which otherwise would have been much higher with the Indian varieties at no additional cost to the government. Despite policy restriction which requires formal registration of varieties through a lengthy process, illegal trade has flourished with Indian varieties (e.g., Sarju 52 of rice). In some regional countries variety registration is automatic (Bangladesh for most crops) and voluntary (India and Thailand). The remote areas incur high transport cost to import seeds from other areas. Therefore, farmers are multiplying especially modern varieties of rice and wheat themselves; the cross-pollinated modern maize varieties are produced by community based seed producers with support from Hill Maize Research Program (HMRP) and the government.

During the dawn of agricultural development initiatives, government-owned institutions (like NSCL) were mobilized for input supplies; but now debates are rife as to the promotion of such institutions to the discouragement of the private sector growth. Concern has been raised while entrusting the "seed subsidy program"⁸ solely to NSCL without the direct participation of the private seed sector stakeholders. In 2013/14, NSCL sold a total of 6550.2 mt— 4768.9 mt wheat seed (on 35% subsidy) and 1781.3 mt paddy seed (on 20-35% subsidy). The subsidy incurred amounted to NRs 111 million. There is lack of level playing field for private sector as there is no opportunity to participate in the "seed subsidy program". This restricts the private sector growth in seed business.

The agricultural technical human resource available in the Company dates back to its founding and has only B. Sc. level agricultural graduates (18) supported by disciplinary staff (18) working in the seed wing.

The average yields of crops are low, which is primarily the cause of poor quality seeds used for planting, coupled with complementary inputs use and poor management practices. Yields of cereals have been presented in Fig.1 below. The paddy yield was 2.0 mt/ha in the decade of the 1980s; it grew to about 2.8 mt/ha in the decade of the 2000s.



* Data Source: Ministry of Finance (2011) and MOAD (2011)

3.2.4 SEAN Seed Service Centre (SSSC) Limited

SSSC was established in 1999 as a commercial service-oriented business entity of SEAN (Seed Entrepreneurs' Association of Nepal) members. SEAN was registered in 1991 as a non-profit organization and its members are registered seed firms, seed producer groups and individual seed entrepreneurs. The very objective of SEAN is to strengthen the role of private sector in expanding the market for Nepalese farmers. Several national and international agencies have extended support in

⁸ Such programs comprise of seed support to 2015-earthquake victims, emergency relief to flood and drought—affected areas and the like. Besides government program, many bilateral and multilateral partners also launch seed support programs in such affected areas.

establishment and growth of SEAN, namely, GON/MOAD, FNCCI (AEC), USAID, DFID, GIZ and FAO, and donor-supported projects. Vegetable seeds are its prime commodities and deals with maize seeds as secondary item.

SSSC started the production of foundation seeds after obtaining permission from NSB in 2006 and runs the only Seed Testing Laboratory in the private sector since 2013. The laboratory carries out germination, physical purity, and moisture tests as priority. Grow-out test and crop inspection are done in seed multipliers field. It has processing, conditioning and storage facility, and operates R&D in rented land. Vegetable seeds marketed by SSSC adopt Truthful Label for the quality control. The source seed obtained by maintenance and selection breeding is supplied to the seed producers for further multiplication.

Srijana Hybrid tomato seeds (100 kg) and Khumal Hybrid 2 maize seeds are produced by utilizing the rented land in Thankot and in farmers' fields. SSSC has a qualified breeder supported by agricultural graduates (2) and support staff (4) in the field. According to SSSC, annual national turnover amounts to about 2000 mt of vegetable seeds (OPV and hybrid) of which 50% is imported; more hybrid seeds are imported than OPV. The national share of SEAN is about 100 mt per year and maintains one mt as buffer stock. The net profit of SSSC in fiscal year 2014/15 was about NRs 8.5 million. Rampur Hybrid 2 (problem of synchronization) and Gaurav maize hybrids are not popular among farmers.

According to SSSC, there seems to be no problem with seed trade harmonization in the Asia-Pacific region; the disease and pest lists are harmonized⁹. But in practice, India discourages seed export from Nepal by demanding the reexamination of the consignment by the Indian quarantine authority; and such test is very expensive in India (about ICRs 8,000/mt of seed)¹⁰. The absence of mirror quarantines in some Indian border check points hinders smooth seed trade with India. This should be pursued in the bilateral Agricultural Working Group meetings with India.

On the constitution of the NSB sub-committees, suggestion was made that: (1) nomination by NSB should be made for at least a full term, with a possibility of extension for one more term; (2) slots should be made available at the rate of 20% of total members for the business house representation; (3) one member should be from the cereal and vegetable seed companies; (4) one eminent scientist experienced in varietal breeding, government policies, legislation and procedures should be represented; and (5) once the quota is fixed the organization concerned should be free to elect the representative to the sub-committee or the NSB.

The private sector suggestions for seed sector growth include: infrastructures, and machines and equipments of various kind; green house, shed house; collaboration with NARC on varietal development; supply of tested inbred lines by NARC; capital investment; limitation of land; DISSPRO to be started in vegetable seed production; and support to seed producers.

⁹ Personal communication with Mr Durga Adhikari, MD of SSSC.

¹⁰ Ibid.

3.2.5 Seed Import

Among cereals, rice and maize seeds were the major ones formally imported into the country in 2013/14 (SQCC, 2014; p.114); paddy 977 mt (worth NRs 28,93,20,000) and maize 786.8 mt (worth NRs 24,40,86,165). Rapeseed (Tori) constituted 0.54 mt amounting to NRs 7, 11,872. Thus in 2013/14, a total of 1,764.34 mt of seeds amounting to NRs 53, 41, 18,037 were formally imported into the country (Table 5.1). Importation of paddy and maize seeds further increased respectively to 1122 mt and 1519 mt in 2014/15.

Table 5.1. Formal import of seed, 2010/11 to 2014/15 (price in thousand NRS)

Crop	2010/11		2011/12		2012/13		2013/14		2014/15	
	Quantity (mt)	Price (NRs)	Quantity (mt)	Price (NRs)	Quantity (mt)	Price (NRs)	Quantity (mt)	Price (NRs)	Quantity (mt)	Price (NRs)
Maize	260.7	NA	261	NA	751.0	NA	786.8	244086	1519.0	377349
Rice	554.6	NA	555	NA	953.0	NA	977.0	289320	1122.0	380234
Vegetable	NA	NA	59.2	NA	65.9	NA	53.2	330166	103.3	267336
Total	-	NA	875.2	458547	1769.9	625363	1817.0	863572	2744.3	1024919

Source: SQCC

More than 30 vegetable crop seeds—about 53.2 mt amounting to NRs 33,01,65,922— were imported into the country in 2013/14. Cereals and vegetable seeds taken together NRs 86, 42, 83,959 worth of agricultural seeds were imported in 2013/14. This figure rose to more than Nepali Rupees one billion in 2014/15. Seed is imported mainly from India, China, Japan, South Korea and Thailand and the number of licensed importers was 42 in 2013/14 (SQCC, 2014). The informal trade from across the border adds further to this figure, which is not easy to account for.

The availability of seeds, which is the production and import situation, of some major crops has been given in the following table.

Table 6. Seed production and import situation (mt) of major crops in Nepal, 2008/09 to 2014/15

Crop	2008/09	2009/10	2010/11	2011/12		2012/13		2013/14		2014/15	
	Prod	Prod	Prod	Prod	Imp	Prod	Imp	Prod	Imp	Prod	Imp
Rice	5071	6768	7209	8027	555	9135	953	9537	977.0	10650	1122
Maize	1040	1147	2094	2469	261	2492	751	2330	786.8	2500	1519
Wheat	7007	8245	9109	9554	NA	10958	NA	10216	NA	11500	NA
Lentil	33	230	121	105	NA	190	NA	280	NA	310	NA
Tori	18	52	97	144	NA	154	NA	140	0.54	155	NA
Total	13169	16442	18630	20299	-	22929	-	22503	-	25115	-

Source: SQCC. NA= not available. Prod= production and Imp=import.

3.2.6 Cereal seeds

It has been observed that the traditional methods of sorting seed, processing and saving own seed for use by farmers has decreased over time owing to local availability in the market especially in accessible areas. Truthfully labeled seeds in major cereals are marketed by seed producer groups, seed producer cooperatives and agrovets at an increasing rate in recent years. Private sector has also started producing foundation seeds which were traditionally produced by government farms. The agencies producing foundation seeds total up to 21 by 2014. Hybrids are mostly imported; and locally developed Open Pollinated Variety (OPV) seeds are available for marketing.

In recent years, SRR in major cereals has increased considerably (Table 7). This is accountable: (1) to the introduction of the Truthful Label system for quality control that encouraged the private sector participation, (2) to the government "seed subsidy program" channeled through the NSCL, and (3) to quality awareness of the consumers triggered by quality assurance system in the seed sector.

Table 7. Seed replacement rates in some major crops

S. No.	Crop	Seed replacement rates in percentage						Projection by Seed Vision, percentage	
		2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2015	2025
1	Paddy	6.5	9.1	9.6	10.5	11.9	13.4	15.0	24.2
2	Maize	4.8	5.2	9.2	11.3	11.4	11.3	14.4	31.6
3	Wheat	8.4	9.4	9.9	10.4	11.9	11.0	13.0	22.5
4	Lentil	0.6	3.1	1.7	1.5	2.7	4.1	6.2	22.0
5	Rapeseed	1.1	2.9	4.8	7.3	7.7	7.7	5.9	13.9

Source: SQCC; National Seed Vision (2013-2025) for projection.

The Cereal Systems Initiative for South Asia (CSISA) was started in 2009, and includes Nepal, Bangladesh and India to support national and regional efforts on improving cereal production. CSISA has more than 300 public and private sector partners to focus the improvement of crop varieties and dissemination of improved cropping systems. This is a platform for a regional dialogue on the role of seed and related inputs.

3.2.7 Vegetable seeds

In FY 2012/13, a total of 3522.8 kg (BS 78 kg and FS 2,892 kg, IS 552.6 kg and Srijana Hybrid 0.2 kg) of vegetable seeds were produced by the government horticulture farms under the technical supervision of Vegetable Development Directorate (VDD) of DOA¹¹. Added to that is the True Potato Seed (TPS) of 20 kg and seed potato of about 18.5 mt. The rest is met by the private sector supply, and import. The buffer stock of the vegetable seeds maintained in Khumaltar amounts to 500 kg and is instrumental in meeting the requirement for emergency and disaster relief management of drought and flood occurrences frequent in the country. This buffer stock comprises of breeder, foundation and improved seeds. The horticultural farms are also maintaining germplasm of the vegetable seeds.

As is understood that most commercial vegetable growers use hybrids that are almost all imported; a mere 0.2 kg of Srijana tomato hybrid seed, bred in Nepal, was produced by government farms under DOA in 2069/70. About 100 kg seed of Srijana hybrid was said to have been produced in farmers' fields under NARC's technical supervision in FY 2014/15 (personal communication with NARC's HRD staff). The poor condition of horticultural crop variety development is exemplified by the land area available in Khumaltar of only one hectare each for Central Vegetable Seed Production Center/VDD (DOA) and Horticulture Research Division of NARC where the senior horticulturists work. There is a serious bottleneck of land area availability for both vegetable research and development activities. The eight-hectare land previously allocated for vegetable R&D purposes has been now shared by an international organization, a dairy development corporation, a gene bank and two R&D agencies. It is not always necessary that government agricultural agencies should shoulder the brunt of encroachment whenever new land is needed for any purpose but that allocation could have been done in alternative ways,

¹¹ Available at www.vdd.gov.np

including acquiring land elsewhere. This is a chronic problem with MOAD to cater to the needs of other agencies whenever new land is required. In a way this shows how agriculture does not get priority in practice by the government. The relocation of agricultural R&D agencies could have been another solution rather than being squeezed for want of land resources.

The total production and requirement of vegetable seeds has been presented in the following Table.

Table 8. Production and Requirement of Vegetable Seeds in Nepal

S. No.	Fiscal Year	Vegetable Seed Production (mt)			Seed Requirement (mt)	Area Covered (ha)	Vegetable Production (mt)	Productivity (kg/ha)
		Government	Private	Total				
1	Average: 1980/81 to 1989/90	11.05 (5.8)	56.73 (32.2)	67.78 (26.6)	727.50 (4.5)	1,31,383 (3.4)	7,64,285 (7.1)	5,817 (3.6)
2	Average: 1990/91 to 1999/2000	12.94 (-1.7)	333.95 (9.6)	346.89 (9.1)	1,004.64 (6.0)	1,43,256 (0.6)	12,75,720 (26.9)	8,905 (3.1)
3	2000/01	15.80	603.80	619.60	1334.00	157162	1652979	10518
4	2001/02	14.00	715.00	729.00	1390.00	161048	1738086	10792
5	2002/03	14.00	679.60	693.60	1444.00	165988	1799973	10844
6	2003/04	11.00	NA	NA	1507.00	172586	1890100	10952
7	2004/05	10.64	810.00	820.64	1569.00	180823	2065193	11421
8	2005/06	6.75	830.00	836.75	1595.00	189864	2190122	11535
9	2006/07	5.78	835.00	840.78	1705.00	191922	2298689	11977
10	2007/08	6.82	900.00	906.82	1875.00	208108	2538904	12200
11	2008/09	6.93	1100.0	1106.93	1932.00	225154	2754406	12233
12	2009/10	8.09	1150.0	1158.09	1987.00	235098	3003821	12777
13	2010/11	7.73	1265.0	1272.73	2026.00	244102	3203563	13124
14	2011/12	6.91	NA	NA	2085.00	245036	3298816	13463
15	2012/13	7.83	1044.9	1052.73	2114.00	246392	3301684	13400
16	2013/14	7.09	NA	NA	2167.00	254932	3421035	13420

Source: Vegetable Development Directorate. 2015. Annual Progress Report (FY 2013/14), *in Nepali*. Khumaltar, Lalitpur, Nepal. NA=not available. Note: figures in parentheses indicate annual average growth rates.

The decade of the 1980s started to experience a surge in vegetable seed production with the government initiative, including FAO support through fresh vegetable and vegetable seed production project, and active participation of the private sector. The private sector annual average growth rate of vegetable seed production was 32.2% in the 1980s; that decelerated to 9.6% in the 1990s though the quantity produced was much higher at about 334 mt. In the decade of the 1990s, with the increased participation of the private, the public sector average growth rate was negative at 1.7% and in recent years the absolute quantity of vegetable seeds produced is much lower (7.09 mt in 2013/14) than the average figure (12.94 mt) of the 1990s.

Nepal's demand for horticultural products is increasing and is vital for increasing farmers' income and employment, and improving food and nutrition security. Nepal lags behind the neighbors in each step of the value chain of horticultural crops technological development and cannot compete in the regional and international markets.

3.2.8 Forage Seeds

Livestock population per household and density of ruminant animals is very high in Nepal. The national annual animal feed deficit is high at 36 percent¹² and seasonality in green fodder availability, inter alia, results into low livestock productivity.

The Pasture and Forage Division (PFD) of NARC has the mandate of pasture, fodder and fodder trees seed development. It conducts training of forage seed producers for the production of foundation seeds. Its objective is also to identify potential native species of forage crop seeds prevalent in different agro-ecological regions. There is pressing demand from commercial livestock farmers for quality fodder crop seeds rich in protein.

Thus far nine varieties of fodder crops have been released and registered; six of oat (released), one each of berseem, rye grass (Dhunchu), and white clover (Pyauli). There are many common fodder species adapted to local conditions and should be at least registered for up-scaling by seed multiplication and market promotion. When producers started seed multiplication, the prevalence of insects and diseases, and problem in grain setting were noticed; this was not the case when livestock were fed with green fodder and seed multiplication was not in practice. Therefore, upon the demand from seed producers and farmers, priority has been given to registering those commonly grown promising fodder species based on performance and adaptability to particular conditions. Registration enables producers to go for insurance, which is yet to be initiated, of the forage crops. Similar to other agricultural crops seed production, the fodder seed producers are demanding support for mechanization in land preparation, processing, cleaning, grading, packaging, transportation, and storage facilities from the government accompanied by technical services and source seeds. Unfortunately, there are no breeders in the Pasture and Fodder Division yet; all activities are carried out by professionals of animal science background.

Under the cool season crop improvement program focus has been given to the forage seed production following the community based seed production model with the engagement of cooperatives comprising of about 50 farmers. The beginning has been made with seed production of oat, berseem and vetch grasses for the winter season, and teosinte intercropped with cowpea for the summer season. Future researchable areas include forage germplasm maintenance, quality seed testing and evaluation of hybrid species, among others. The PFD needs development of manpower resources (long term training in varietal development and maintenance techniques, breeding), laboratory facilities, processing and conditioning, grading, packaging and storage infrastructures.

3.2.9 Buffer Stock

The seed buffer stock program lacks commitment and continuity. Nepal is prone to natural calamity—both in dry and wet seasons. An estimated 10,000 mt seed buffer stock, excluding for potato, should be maintained in Nepal (Seed Vision, 2013). Buffer stock maintenance should be a regular phenomenon

¹² Pasture and Fodder Division, NARC, Khumaltar, Nepal.

rather than short term emergency management. Vegetable seeds are better placed than other crops in this regard. The concept of community nursery, especially for rice, caught wide attention in the past but was not systematically tested.

The SAARC Seed Bank Agreement¹³ was signed in November 2011 in conjunction with Framework for Material Transfer Agreement (FMTA). The FMTA is in support of operationalizing the SAARC Seed Bank Agreement to facilitate easy movement of seed and planting material in South Asia. The SAARC Seed Bank was established with the objectives of: providing regional support to national seed security by addressing regional seed shortages through collective actions; promoting increase of Seed Replacement Rate (SRR) with appropriate varieties at a faster rate with the use of quality seed; and acting as a regional seed security reserve. The Seed Reserve consists of quality seeds of the common varieties of rice, wheat, maize, pulses, and oilseeds. The Common Minimum Seed Quality Standard (CMSQS) and Seed Testing Procedures are to be in conformity with the ISTA procedures. The SAARC Seed Bank Board is tasked with the functions of developing a list of common varieties, quality testing method, and Common Seed Certification Standards and Procedures. The Board, in addition, has to facilitate harmonization of legislative measures concerning seed system. Member States have to maintain at least one percent of seed stock of the common varieties under the Seed Bank reserves.

The Framework (FMTA) is to facilitate exchange of seeds of common varieties among the Member States; and is to be implemented in accordance with the existing laws of SAARC Member States and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). As South Asian farming is characterized by fragmented lands and small landholdings by poor farmers who rely significantly on informal (traditional) system of farmer-to-farmer exchange of seeds, any decision to make regional institutional arrangements to exchange genetic materials and ensure seed and food security should not neglect the role of traditional seed system in strengthening farmers' rights to seeds and traditional knowledge.

GON has taken some initiatives to step up the seed sector especially after the approval of the Seed Vision in 2013. Though there is a commitment for the SAARC Buffer Stock and the internal need to manage for natural calamities, buffer stock management has not received any priority thus far. There was a buffer stock program in Daman of Makwanpur district with some facilities in the past; this facility is not operational as there is no drying floor and depends solely on natural condition. NSCL may be mobilized to operate national buffer stock in different locations like Bhedetar (East), Daman (Center), Palpa (West), Kapurkot (Mid-West) and Dadeldhura (Far-West) each of 1,000 mt capacity. These facilities have to be created anew.

Nepal provides naturally favorable conditions of topography, forest, mountains and climatic variability for seed production in the tropical/subtropical, temperate and alpine environment. However, there are limiting factors of communication, small landholding and infrastructural impediments which come in the way to seed development. Future seed development activities should be focused on selection, purification, processing, branding, storage and buffer stocking. Nepal seed quality standards are similar

¹³ Kamalesh Adhikari. 2012. Seed Banking in South Asia for Protection of Farmers' Rights. SAWTEE, Baluwatar, Kathmandu, Nepal.

to those of SA countries, and with appropriate harmonization of some parameters, trade can be promoted. Investment can be invited on joint ventures from neighbors and beyond.

3.2.10 Nature of Supports in Seed Sector

3.2.10.1 National

MOAD has initiated the establishment of Community Seed Bank with the purpose of reducing labor requirement, post harvest and storage loss in seed production. The support includes threshing, processing, grading, transit shed, packaging and storage at the community level in the 2015-earthquake hit districts. The beneficiaries have to shoulder 10% cost of the physical infrastructures and 50% cost of the machineries and equipments. This is targeted to farmers' groups and agricultural cooperatives engaged in seed business¹⁴ in the scale of 30 to 100 mt capacity.

Individual districts and NGOs have initiated on their own the seed entrepreneurship development but these actions are scanty compared to national food and nutrition security need and raising of SRR envisaged by Seed Vision (2013-2025).

3.2.10.2 Bilateral and Multilateral

Investment in the seed sector in Nepal is primarily accruing from the project-based supports of donor partners. Some of such supports were channeled through Seed Sector Support Project (SSSP-UK), Fresh Vegetable and Vegetable Seeds Project (FAO), KOSEVEG (UK), Seed Production and Input Storage Project, Agricultural Research and Production Project (ARPP-USAID), Rapti Development Program (RDP-USAID), etc. These efforts were hardly complemented and followed up after the project end by Government of Nepal to make seed industry a sustainable business. It is rather pathetic that the supports thus far focused more on the seed production, distribution and consumption aspects rather than establishment and strengthening of the sustained quality seed production infrastructures and mechanisms. In fact, there is a dire need to implement in a sustained manner an Agricultural Inputs Production and Marketing Development Program along the seed value chain.

In recent years, the project-based supports through Project for Agricultural Commercialization and Trade (PACT), Raising Incomes of Small and Medium Farmers Project (RISMFP), High Value Agriculture Project (HVAP), Kisanlalagi Unnat Biubijan Karyakram-Improved Seeds for Farmers Program (KUBK-ISFP) and Social Safety Nets Project (SSNP), to name a few, have invested in seed business on the basis of merit of the proposals by the proponents. The nature, commodity value chains and amount of such supports vary and are guided by the respective project objectives.

3.2.11 Monitoring and Evaluation System

The central level M&E function is entrusted to the Agriculture Inputs Management Section of the Food Security and Environment Division of Ministry of Agricultural Development (MOAD). Central level M&E is primarily limited to assessment of periodic reports from the organizations, and supplemented by occasional field visits. Similarly, the Plan Formulation and Monitoring Sub-Committee of the National Seed Board (NSB) chaired by the Joint Secretary of MOAD perform stocktaking in its meetings as they happen. In the district, DADO staffs oversee the day to day M&E functions. The Regional Agriculture

¹⁴ Available at www.doaengg.gov.np

Director (RAD) summons appellate hearing in issues related to offences regarding seed regulation violations.

The technical monitoring of the seed sector is performed by SQCC through periodic reports, cross check monitoring, seed store and seed certification monitoring and ad-hoc checks by officials of SQCC. The authority provided by the current legislation has helped seed quality control compared to the days prior to the establishment of SQCC.

3.2.12 Achievements, Weaknesses and Opportunities

3.2.12.1 Achievements

Although there is a lot to do in improving the seed industry in Nepal, some positive indications have been noticed given the efforts and investments in the past. These are the following:

- ❖ In recent years, SRR has increased, albeit slowly, in major crops due to the private sector participation and government intervention of "seed subsidy program";
- ❖ The use of Truthful Label seeds has increased over time due to legislative reform and this has helped in greater amount of seed distribution by the private sector and NSCL;
- ❖ There is an increase in private sector processing, conditioning, and storage facilities, and the practices of packaging and labeling have been introduced;
- ❖ The element of competitiveness prevails among seed entrepreneurs with differentiating factors of quality assurance, price and seed services;
- ❖ Seed companies have felt the need to develop quality manpower and are eager to develop new variety;
- ❖ Standards are developed for genetic and physical quality;
- ❖ Seed companies have begun to offer as many varietal choices as possible to the cultivators at competitive prices in new areas through expanded network of dealers and distributors;
- ❖ Contract seed production has been established as business development service with the provision of source seeds and production loan;
- ❖ Competitive grant scheme is available for seed business development, from production to marketing, through government-run bilateral and multilateral project-based financing;
- ❖ Member-based organizations have come up (e.g., SEAN);
- ❖ SQCC is active in preparation of balance sheet, capacity development training, regulation and monitoring;
- ❖ Entrepreneurs and farmers have become quality conscious; and
- ❖ Policy, act and regulation are in place.

3.2.12.2 Weaknesses

However, there are weaknesses that impede seed sector growth to the extent needed in Nepalese agriculture. These are summarized as under:

- ❖ Regular policy reform is not a priority, and seed industry has not been recognized by the Industrial Policy (2010) and the Industrial Enterprises Act (1992) which consequently excludes any incentive available for seed industry;
- ❖ The number of farmer-preferred varieties adapted to varied agro-ecological conditions are in short supply ;
- ❖ Modern crop breeding techniques (molecular breeding, fast-track breeding, biotechnology) are not used to induce faster varietal development;
- ❖ Funding in research, in general and varietal development and maintenance breeding in particular, is low ;

- ❖ Qualified manpower in crop breeding, seed science research, seed technology and multiplication, farm advisory services, and marketing is inadequate in public, private, and NGO sectors;
- ❖ Seed services of the government are grossly inadequate in remote areas plagued with food insecurity, poverty and difficult livelihood options;
- ❖ The culture of public and private agencies working together for common cause (e.g., sharing inbred lines and use of public processing facility) has not developed;
- ❖ There is weak integration along the seed value chain from breeding to seed use;
- ❖ There is inadequate program-budget-manpower linkage among research, development and academic institutions in seed sector;
- ❖ There is a brain-drain and current incentive mechanism neither stimulates nor attracts new generation of seed researchers, breeders and technologists especially in the public domain;
- ❖ Quality checks from breeding stock to improved seeds, along the value chain, is very weak;
- ❖ The regulatory body from center to district level is poorly equipped, with knowledge, skills and resources, to punish offenders of existing laws;
- ❖ Scientific breeding in economically important crops (e.g., vegetables, potato, spices, fruits, flowers, herbs, etc) is either at a very infancy stage or awaiting the dawn of the day;
- ❖ The exploitation of international seed trade is almost at a halt because of the absence of regular and systematic research on export market and trade harmonization issues;
- ❖ Seed buffer stock management is weak in vegetables and absent in others;
- ❖ Nepal seed industry development lacks integration of vital components [e.g., priority production and business loan, insurance, seed pledging facility, cold storage (for potato), periodic seed use survey, marketing extension, seed market information system, efficient custom and plant quarantine system for export, certification of organically produced seed, etc];
- ❖ Entry of untested varieties from land border, and sale of loose seeds;
- ❖ The NSB sub-committees do not represent all stakeholders to facilitate active feedback;
- ❖ Low investment and lack of planned seed (input) development program; and
- ❖ Lack of seed campaigns that result into long duration for adoption of new varieties.

3.2.12.3 Opportunities

- ❖ Nepalese constitution has provision for food sovereignty and GON has policy commitment on Zero Hunger Challenge 2025;
- ❖ There is ample scope for increasing productivities of major crops from the current levels which are low;
- ❖ The SAARC Seed Bank Agreement, Cereal Systems Initiative for South Asia, and bilateral and multilateral forums can be utilized for harmonization of quality standards and seed trade.
- ❖ Collaboration with multinational seed companies;
- ❖ Nepal is going to adopt federal structure of governance. Seed services can be decentralized, seed trade can be promoted to suit to federalism by restructuring seed agencies and strengthening capacities of organizations at various levels;
- ❖ Nepalese seeds can be exported to SAARC countries and beyond;
- ❖ Current seed replacement rates have to be increased and there is scope for a vibrant seed industry;
- ❖ Modern crop breeding techniques can be adopted with coordinated development of human resources in public and private sectors and planning with adequate resources to provide more farmers' preferred new varieties; and
- ❖ Seed database can be established and services expanded through seed marketing information system.

4. Methodology

4.1 Review of Documents

The major documents reviewed that directly related to this study were:

- National Seed Policy ,2000
- National Agriculture Policy ,2004
- Seed Act, 1989
- Seed Regulations , 2013
- Agriculture Biodiversity Policy, 2007
- Agriculture Development Strategy, 2015
- Seed Vision, 2013-2025
- The Thirteenth Plan (2013/14-2015/16)

In addition to the documents mentioned above, information was drawn from related other national and international documents that dealt with seed policy, seed trade, Sanitary and Phytosanitary (SPS) harmonization and legal aspects. These are given in the reference section.

4.2 Meetings with Government Officials and Stakeholders

Interaction meetings were held with the officials particularly from MOAD, SQCC, NARC, DOA, CDD, VDD and DADOs as suggested by KUBK. Stakeholders from private and non-government sectors were also consulted. Meetings with SEAN, private seed companies, seed producer groups (farmers groups and cooperatives), seed processors, importers and exporters, seed testing laboratory and other seed entrepreneurs were held to solicit their responses.

4.3 Field Visit

Ten days' field visit was completed in the districts outside Kathmandu with the aim of getting first hand information from the stakeholders like farmers, agro-vets, DADO, seed producers, seed processors, breeders, extension workers, seed industries, and the gamut of entrepreneurs related to the seed industry. The visit was agreed based on the resources (time and money) available for the conduct of the study. Districts were so chosen as to extract feedback and suggestions from the stakeholders on the amendments to the current seed policy, act and regulations to promote the functioning of a vibrant seed industry/business in the country. In the beginning, field visit was not envisaged in the study; but it was realized that the first hand information originating from close consultation with the stakeholders and observation in their areas of operation is vital for assessing the problems and listening the respondents in identifying the gaps and formulating recommendations.

The districts of Chitwan and Rupandehi were originally chosen from the Terai-Madhesh for the reasons of the presence of seed entrepreneurs who produce, process and trade seeds in substantial amount. Additionally, in the process of field visit, Banke and Dang district seed value chain actors were also consulted. These districts have common border with Indian states and provide information on border-effect in the seed business. The farmers are early adopters of the new agricultural technologies and can provide feedback on the issues related to the policy aspects of the study. These districts are

growing as major seed hubs and have ARSs, AFU (Chitwan) and technical expertise for technological information in need. In hills, Rukum was chosen because it is one of the KUBK project districts and seed production and trade has taken place for sometime there.

4.4 Data Sources and Type of Information

Major data and related information were drawn from both the primary as well as secondary sources. Primary sources comprised of interviews with government officials, farmers, seed producer groups, agro-vets, seed companies, non-government organizations, breeders and seed associations. The secondary sources were the seed and relevant policies, acts, regulations and related legislations of the country. The publications of different organizations were important sources of information. A checklist of questionnaires was prepared for each category of respondents and the feedback and suggestions were documented, analyzed and reported accordingly. List of information to be collected was also prepared for easy recording of the feedback information and data. Given the restrictions, at times, in the mobility of vehicles due to strike and *bandh*, telephonic and mail responses were also solicited. Web searches provided many important data and information. Publications of international organizations and legislations of foreign countries were consulted.

4.5 Seed Distribution System

There are formal and informal seed distribution (marketing) networks prevalent in the country comprising of public, community and private institutions. These networks were studied and strengths and weaknesses inherent in them were analyzed for improvement, if any, through interventions in the legislation. The exploration constituted the in-depth study from the seed wholesalers to the retail level, including the importation.

4.6 District Level Input Suppliers and Stakeholders

The Crop Inspector at the DADO is the key person responsible for regulating the seed business in the country. The subject matter specialists in crop, horticulture and agricultural extension—based on their availability in the district in that order—are assigned as Crop Inspector after imparting training and due process of examination. The Regional Seed Testing Laboratory (RSTL)—one in each Development Region—serves important function in both regulating and providing technical services to the seed entrepreneurs.

At times, the informal seed sellers are observed in the weekly hat-bazaars (mostly in the Terai) and they serve as important seed suppliers for individual households especially for vegetable kitchen gardening. Agrovets supply most of the agricultural inputs like seeds, fertilizer and plant protection chemicals. Critical as they are in the supply of inputs as well as front level advisory service to the farmers, possibilities of exploring ways to systematically mobilize the agrovets in the seed value chain should be looked into. Agricultural cooperatives discharge many functions and serve their members by distributing agricultural inputs, organizing seed production, processing and linking with traders within and beyond the district periphery.

The District Seed Self-Sufficiency Programme (DISSPRO) run under the DOA has served important function of training farmers groups and cooperatives on seed production and trade. Some start up monetary and material support is given through DADO and facilitation for business linkage is also

provided. It has been quite some time now that this program needs revisiting for scale-up to cope with Seed Vision objectives. It was also suggested that DISSPRO should be extended to other crop species, like vegetables, for example. In Terai, since some level of seed commercialization has taken place and private seed companies are taking up mass seed production, DISSPRO can be discontinued in such districts and focused more, with increased emphasis in seed related activities of production, processing, grading, storage and internal and export marketing functions.

4.7 Workshops

Two workshops were to be organized during the assignment period: (i) one workshop was held on 27 January 2016 to share the Inception Report and to receive feedback and suggestions on how this study can be made more responsive to the need of the country, and (ii) two, to validate the output of the assignment through a Validation Workshop participated in by wide group of national stakeholders, and to solicit appropriate suggestions towards the end of the assignment.

5. Policy, Act and Regulation

5.1 The Thirteenth Plan

The Thirteenth Plan 2070/71-2072/73 (2013/14-2015/16) attaches high importance to the role of agriculture in employment generation and livelihoods improvement of two-thirds of the national population, and recognizes the contribution of improved seeds and technology in commercialization and ensuring food and nutrition security. Agriculture policy and legislation reform is not up to date to keep pace with time and the enforcement of existing ones has not been effective. The basic production inputs, including quality seeds, are in short supply and laboratory infrastructures are poor. Recognizing these problems, the Plan envisages strengthening and expanding the processing technology and regulating quality and health standards of agricultural products.

The overarching objective is to increase production and productivity with the use of quality inputs. Competitiveness in international market is contingent upon the use of quality standards in production, processing and trade with effective regulatory mechanism. This is particularly true in case of seed as primary input which is basic for agricultural productivity growth as well as export promotion. Priority has been attached to strengthening of the private and public enterprises in the form of resource centers for quality seeds production. For timeliness in inputs supply and to reduce cost of production, insurance, soft loan, support in machineries and equipments for agriculture industries and tax incentives are instrumental. On seeds, particular emphasis has been laid in: harmonization of standards and criteria, strengthening of laboratories, agro-biodiversity conservation, maintenance and use, capital subsidy and soft loan for agro-entrepreneurship development, engagement of young farmers, hybrid variety development and seed production in cereals and cash crops, coordinated efforts among national and international organizations and local bodies, mechanization to ward off labor shortage, cooperative/community seed processing and distribution, farmers groups and cooperative seed stores, construction of threshing floor and establishment of seed self-sufficiency fund. For potato seed growers, support in seed fund and packaging, subsidy in pre-basic seed, rustic store construction and

true potato seed distribution are planned. The livestock feed national campaign has identified oat, berseem, stylo, teosinte and giant vetch as the leading forage crops to supplement livestock feed in reducing the cost of production of livestock products. Attention is also paid in the exportable commodities identified by the Nepal Trade Integration Strategy (NTIS). These are the provisions in the Plan and it is in its final year of implementation but the achievements are far from satisfactory.

5.2 National Agricultural Policy (2004)

The earlier agriculture development vision in the country was framed by the Agriculture Perspective Plan (1995-2015) which had dual objectives of poverty reduction and agricultural growth with strong emphasis on yield-augmenting technology inputs in the Terai. In fact, the National Agriculture Policy (NAP) was designed to implement APP and subsequent sub-sector policies were aligned to this umbrella policy, NAP, which emphasized on: (i) increased productivity through technological interventions, (ii) shift towards modernization and commercialization of production, and (iii) natural resource base protection and disaster risk management.

With more than a decade past now and strategic thrusts changing with passage of time, this Policy itself warrants the review.

5.3 Agricultural Development Strategy

The Agriculture Development Strategy (ADS) is prepared with a vision of “A self-reliant, sustainable, competitive, and inclusive agricultural sector that drives economic growth and contributes to improved livelihoods and food and nutrition security leading to food sovereignty,”¹⁵ spanning a period of 20 years including a 10-year action plan and roadmap. However, as a living document it warrants review and revision after the making of new constitution.

The Agricultural Development Strategy has envisaged the voucher system for inputs (seed, fertilizer, breed and extension service) whereby targeted farmers receive voucher that empowers them to buy the input of their preference. The voucher system is to be piloted first and, if the evaluation shows positive results, it should be replicated and up-scaled. The successful voucher system is expected to replace the direct subsidies.

5.4 Agriculture Biodiversity Policy (2007)

Agro-biodiversity has importance in ensuring food security and improving livelihoods of the population. Some of the rich Nepalese genetic resources are in the verge of extinction over time and space and thus the policy emphasizes conservation, maintenance and sustainable use of the available diversity. Agro-biodiversity policy was formulated as a commitment in the Convention on Biological Diversity (CBD), 1992. The policy is an integral component of biodiversity and was formulated based on the spirit of National Agricultural Policy 2004 in order to ensure social, economic and environmental benefits to the Nepalese people.

The policy objectives aim to contribute in maintaining sustainable ecological balance in the long run to promote the conservation and use of agro-biodiversity in national seed, food quality and safety, and

¹⁵ Government of Nepal, Ministry of Agricultural Development. 2015. Agriculture Development Strategy, Singha Durbar, Kathmandu.

product marketing. The authority to assign rights to ownership of the agricultural genetic resources rests with Ministry of Agriculture Development (MOAD) and the ownership of local agricultural genetic resources remains with farmers, farming communities and the Government of Nepal for their roles in conservation, maintenance and sustainable use of these resources.

The implementation of programs on scientific studies, research, and extension for conservation, maintenance and sustainable use of agro-biodiversity is limited owing to lack of effective institutional mechanism. The responsibility of implementation and monitoring of the policy is entrusted to the Committee formed at the central level for this purpose. Thus far the central Committee seems to have focused on policy aspects rather than on implementation and monitoring for which a separate mechanism is needed.

MOAD should develop strategies to initiate field level programs with Ministry of Forests and Soil Conservation (MOFSC) and the farmers groups to prepare comprehensive list of agro-genetic resources, and farmers' indigenous technology and knowledge (ITK). Some initiatives are in place but grossly inadequate owing to lack of continuity in the programs.

5.5 Nepal Agricultural Extension Strategy (2007)

The strategic vision focuses on the participatory, inclusive, cost effective and result-oriented agricultural extension service to address the need and demand of different categories of farmers and agro-entrepreneurs. Following the strategy, the current extension system organizes service delivery through the farmers' group approach and some of these groups graduate into cooperatives for commercial production and marketing. Seed producer groups and community based seed producers (CBSP) have emerged as a result of the approach. The basic objective is to enhance sustainable livelihoods of the farming community through agricultural value chain development for productivity growth and poverty reduction.

The farm advisory service is primarily the responsibility of the government sector (DADO) but Non-Government Organizations (NGOs) are also active at the grass roots with limited coverage in the districts. The extension system is thinly spread over the districts as the number of Agriculture Service Centers (ASCs) has been reduced to 378 from the earlier 932 in the country at the rate of four each in Terai and mountain districts and six in the mid-hills.

The study conducted for Agricultural Extension Directorate of Department of Agriculture (DOA) emphasized revitalization of the Farmers Groups in terms of reorganization of the groups for making them active through institutional trainings on management, leadership and fund mobilization (ABTRACO, 2007). Funds raised by the groups needed focus for investment in appropriate enterprises to raise farm incomes.

In the 21st century, the extension strategies face the dual challenges of supporting market competitiveness for commercialization of agriculture in a global market and addressing rural poverty alleviation. Aside from implementing extension programs, attention should also be paid to other related services of marketing, environmental conservation, poverty reduction and off-farm activities (Thapa, 2008).

5.6 Seed Vision

The Seed Vision (2013-2025) is the overarching document that shapes and guides the national seed sector for the period specified. It has the following objectives:

- The broader objective entails increase in crop productivity, income and employment.
- It targets quality seed self sufficiency, import substitution and export promotion.
- Specific indicators have been proposed in the expectation of measurable outputs and impacts over the period as: (i) doubling the number of location specific high yielding varieties (HYVs); (ii) increase in improved seed production by threefold; (iii) public and private seed laboratories test and analyze over 40,000 seed samples per annum, and; (iv) seed replacement rate to increase up to 25 percent for self-pollinated cereal crops and over 90 percent for vegetables. Similarly on productivity front rice and vegetables yields will reach 3.8 mt and 19 mt per hectare respectively. Nepalese high quality seeds will find over 750 mt of export market annually. The impact will be the ensured food security for poor, women and disadvantaged groups.
- The interventions comprise of four interwoven strategies: i) strong varietal development, release and maintenance breeding; ii) engagement of public, community and private enterprises in seed multiplication, processing and conditioning backed by efficient seed quality services; iii) imparting marketing skills to seed entrepreneurs, and investment in seed infrastructures; and iv) providing quality seeds of farmers' choice.

By diversifying farmers' choice including use of local genetic resources, the Vision intends to create an enabling environment by developing efficient and effective public, community and private seed related organizations with a healthy business culture. By the implementation of the Seed Vision: (i) food production will increase by over 40 percent compared to the base of 2010 to the level of eight million tons of edible food thereby ensuring food security and reducing poverty; (ii) about 255,000 person days of employment will be created in 2025; (iii) by the use of local land races for diverse varietal development to suit to different ecological regions and climate change adaptation, agro-biodiversity will be conserved, and; (iv) there will be substantial contribution to gender equality and social inclusion.

5.7 National Seed Policy (2000)

5.7.1 Variety Development and Maintenance

The policy has clearly recognized the roles of private and non-government sectors in the varietal development and maintenance thus far carried out by the government sector. These sectors will be allowed to participate only after prerequisite infrastructures have been developed for the same. The new varieties developed through research will only be made available for general cultivation after the completion of procedures laid down by Variety Approval, Release and Registration (VARR) subcommittee of the National Seed Board (NSB). However, given the porous border with India and multiplicity of the local germplasm with the growers not all varieties grown in the country have complied this.

The conservation of agro-biodiversity has been categorically emphasized by the policy as it is the means to ensure seed security. In the wake of the Farmers Rights, Article 9 of the International Treaty recognizes the contribution of the local and indigenous communities and farmers in the centres of origin and crop diversity for the conservation and development of plant genetic resources that

constitute the basis of food and agriculture especially in Least Developed Country (LDC) like Nepal (www.planttreaty.org/content/farmers-rights).

One important departure in this policy is that Plant Variety Rights (PVR) or Plant Breeders Rights (PBR) has been advocated but this remains to be enacted. PBR is a form of intellectual property rights applicable for plant species and is important for the growth of private business in more industrialized agriculture. Breeders get incentive for their efforts and companies get benefits for their investment in plant breeding. According to the Patent Design and Trade Mark Act 1965, the patent rights can be held for a period of seven years.

The government sector (mainly NARC) has collaboration with International Agriculture Research Centers (IARCs) for the seed development and multiplication but the private and non-government sectors have still been shy in developing joint venture with both national and international organizations as envisaged by the policy. De-notification of varieties on technical grounds has been a practice with the NSB but the information transmitted does not sufficiently reach farmers on time so as to discontinue them; more education is needed to discontinue the denotified varieties.

The varietal development and maintenance has not received due share in terms of investment of funds and allocation of manpower which it deserves; it receives about 27 % of the research fund and about 11% of the total available human resources in crop and horticulture subsectors in NARC (Seed Vision, 2013). Many crops of economic importance—such as vegetables, fruits, forage, herbs, flowers, spices—do not yet have national research programs. Given that farmer-preferred competitive new varieties are needed, the VARR process has to be speeded up without compromising the requirements for distinctness, uniformity and stability (DUS).

Aside from NARC, few NGOs— for example, LIBIRD and CEAPRED—and private sector have the varietal research and seed development activities. Research and development organizations should join hands in variety release, but DOA has very little role to play for lack of coordination and participation.

A USAID study¹⁶ observed as follows the variety registration process in Nepal:

"Registration has been more difficult for field crops. A 2012 study of barriers to doing business in agriculture reported the process to register a new variety takes more than 1,250 days and costs more than \$2,000".

SAARC Seed Bank Board and SAARC Seed Forum can be good venues for South Asian (SA) countries to discuss coordination of moving varieties from one to the other countries.

5.7.2 Seed Multiplication

By 2025, national requirement of improved seeds will be 92, 527 mt (Seed Vision, 2013). The production of improved seeds has no identified location and producers. The seed production chain of

¹⁶ USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.

BS-FS-CS-IS has not been successful in meeting farmers' choice and quantity demanded. It is argued in the scientific debate that even the Breeder Seed does not pass quality checks; because there are no quality standards for BS as in Bangladesh and Pakistan. At times, foundation seeds have been misused; these are used for improved seed production and even for consumption purposes¹⁷. As the responsibility of seed quality maintenance and required quantity production of BS rests with the Breeder, seed quality control aspect has not been adhered to in the absence of quality supervision. It is high time that BS quality standards be developed and then evaluated by a Committee of competent breeders by instituting a mechanism of reward and punishment.

Both quality and quantity of the nucleus and breeder seed production in required amount should be ensured for the smooth implementation of the seed system that would require assured production and marketing arrangements for sustenance of the system itself. The central level decision by NSB and voluntary participation of stakeholders, as is practiced now, is not a viable option for the supply and use of these seeds. A workable and pragmatic mechanism should be provisioned in the policy that remains binding for the stakeholders. NSB draws a balance sheet of required quantity of BS for the production of FS; but it is not predictable. To make it more predictable, a system of advance payment would make both the BS producers and FS buyers responsible. The private sector has moved forward in the production of foundation seeds which is a positive step promoted by the policy.

¹⁷ Small farmers cannot hold for long the foundation seeds; if it is not sold on time they use for home consumption.

An account of the foundation seed demand and supply has been presented in Table 9 below.

Table 9. Status of the foundation seed demand and supply (mt), 2013/14

S.No.	Crop	Foundation Seed Production	Foundation Seed Demand	Balance
1	Paddy	438.6	313.01	125.59
2	Wheat	496.95	546.7	(49.75)
3	Maize	84.52	48.17	36.35
4	Finger Millet	1.5	1.2	0.3
5	Rapeseed (Tori)	6.47	5.32	1.15
6	Lentil	8.52	24.6	(16.08)
7	Soybean	1.5	0.9	0.6
8	Mung bean	0.001	1.12	(1.119)
9	Cowpea	0.06	2.3	(2.24)
10	Chick pea	0.23	0.44	(0.21)
11	Radish	NA	0.448	NA
12	Bean (Simi)	NA	0.978	NA
13	Pea	NA	0.548	NA
14	Mustard (<i>Rayo</i>)	NA	0.002	NA
15	Onion	NA	0.025	NA
16	Cauliflower	NA	0.009	NA

Source: SQCC, 2014. Note: NA means not available.

There is unmet demand of wheat and lentil foundation seeds, followed by some vegetables. In general, it seems that foundation seed supply has improved over the years especially after the private sector participation.

The widespread farm-saved seed system should be recognized and strengthened by the new policy in question as the corner stone of the seed system for some time until a fully market-based seed supply system takes shape in the country.

Registration of seed growers has started, but contract growing with respect to crop and varieties for a particular domain is yet to be materialized. Seed entrepreneurship development should be focused in specific geographical areas (popularly known as "pocket area" in the Nepalese context) that satisfy technical, infrastructural, economic and service aspects for a sustainable seed production system such that technical services and business transactions are predictably managed. As is recognized by Seed Vision, seed production for specific crop species should be concentrated in the "pocket area" and this approach should be mandated by the future policy for reasons explained earlier.

Nepal is endowed with varied agro-climatic conditions suitable for growing multitude of competitive crop seeds. This can be capitalized to participate in the international market. Seed export depends on the quality standards, price and right type of seed demanded by the international destination users. Nepal has absolute advantage in some crop seeds— including neglected, underutilized and near-extinct

species— owing to uniqueness in climate, natural habitat and agro-biodiversity that should be exploited for export promotion.

Community Seed Banks have also been initiated by the private sector as social initiatives. These should be supported by and coordinated with government, private, farmers and cooperative initiatives.

Thus far little attention has been paid to forage seeds. The commercial livestock farming warrants quality forage seeds supply so as to reduce the cost of production by feeding forage grasses. Similarly, floral market has continuously boomed in recent years and there is a need to substitute import of flower seeds by initiating research and development activities.

In areas not connected with road networks and devoid of other technical and infrastructural facilities, care should be taken to promote community based seed production model for some time until they become accessible. These areas are in hills and mountain districts which should be supported by government with Seed Reserve Fund for program and budget in seed production (soft loan), infrastructures (processing, grading, drying, packaging, etc), storage, transportation, and marketing coupled with technical services. Private sector should be encouraged for participation with matching grant.

5.7.3 Seed Processing and Conditioning

Public and private sector combined, currently there are 20 seed processing plants with cumulative processing capacity of 20-25 mt/hr which should be more than doubled (55 mt/hr) to produce 50,000 mt of processed seeds to be stored for six months (Seed Vision, 2013-2025). Thus, there should be substantial investment to build additional capacity of processing plants, preferably with modern technology as existing ones are old and need upgrading.

5.7.4 Quality Control

Central Seed Testing Laboratory of SQCC was accredited by ISTA in 2012 to issue ISTA certificates of seed quality (Orange International Certificates). Some seed importing countries tend to ask for ISTA certificate of seed quality.

The seed policy has made provision for Quality Declared Seed (QDS) System aside from the erstwhile seed certification and the use of Truthful Label for the seed quality control. There seems to be a dilemma, and the debate is going on as to whether QDS should be started in Nepal. SQCC has not advocated for the implementation of QDS and private sector has not shown any interest to participate in it. Government, private and non-government sectors conduct crop inspection, sample collection, seed testing and seed analysis for quality control which is monitored by SQCC. However, with limited manpower and meager institutional resources located in Kathmandu and accessible areas, the SQCC is unable to oversee the monitoring function nationwide. As the seed business expands and cultivators become quality conscious, quality control should be entrusted to the private business for the industry to sustain on its own by establishing goodwill. However, SQCC should retain the function of overseeing the quality control by decentralization of authority to qualified DADO and RSTL staff.

In 2014, quality assured seeds conforming to minimum quality standards shared about 12 percent in cereals and 76 percent in vegetables¹⁸. The quality assurance comprises of adherence to prescribed field and seed standards following legal provisions.

The SQCC carries out seed market inspection each year to monitor the seed quality standards. An account of such inspection for the past decade is given below (Table 10).

Table 10. Results of the seed market inspection

S. No.	Fiscal Year	Percentage of samples conforming minimum seed quality standards	
		Germination percentage	Physical purity percentage
1	2004/2005	70.0	88
2	2005/2006	73.0	100
3	2006/2007	84.5	94
4	2007/2008	81.0	96
5	2008/2009	66.0	96
6	2009/2010	81.7	100
7	2010/2011	86.4	100
8	2011/2012	86.5	100
9	2012/2013	86.6	100
10	2013/2014	77.9	100

Source: SQCC, 2014.

In general, seed quality checks comprise of the three standards—germination, physical purity and moisture percentages—in Nepal. On inspection of the seed market by quality control agencies of GON, all samples did not conform to the minimum germination percentage set by the regulation (Table 10). Only 66 percent of the samples inspected conformed to the requirement of minimum germination percentage in FY 2008/09. Likewise, not all samples tested for physical purity standards were up to the required level in four of the ten years. The question of physical purity is less serious than germination factor; however, there is no concession for either standard. This suggests that seed entrepreneurs should be trained further and market inspection should be stepped up to maintain quality standards.

A total of 2,826 ha of fields were inspected by SQCC and five regional labs in 2013/14. Hybrid and foundation seed multiplication was inspected of paddy, maize and wheat only. The other crops fields inspected consisted of mustard, lentil, mung , cowpea, barley, chick pea, and pigeon pea.

A total of 1087 mt of seeds were certified by the certification agencies comprised of SQCC and five regional seed testing laboratories in 2013/14. The source seeds of different standards—breeder, foundation and certified— were certified, the bulk of which consist of major cereals (paddy 631.6 mt, wheat 387.6 mt and maize 57.6 mt). Smaller quantities of mustard, millet, cowpea, radish, lentil, soybean and groundnut (all together about 10.2 mt) were also certified.

The use of bio-technology for healthy seed and saplings production (e.g., banana, cardamom, citrus) is in use in limited scale with both the private and the public sectors.

¹⁸ Dr Mahendra Khanal. Seed Quality Assurance and Marketing. Available at www.sqcc.gov.np.

5.7.5 Private Sector Participation

National Seed Policy requires that the government and semi-government entities lease out the processing units and storage facilities¹⁹ to the private sector, but this process has not started yet. Similarly, seed pledging facilities and soft loan for seed storage has yet to be started. Local taxes and octroi levied in seed business should also be reviewed. The Industrial Enterprises Act (1992) has made certain provisions for priority sector industries and the seed companies should also be categorized and recognized by the Act.

Increase in SRR in recent years is also accountable to increased private sector participation in seed distribution and seems likely to continue in near future too. However, policy provisions for soft loan disbursement, infrastructure support and enabling environment (favorable climate) will be decisive factors to encourage private and non-government sectors' participation.

Private sector's contribution to new varietal introduction—rice, maize and wheat taken on average during 2003-2012— was almost the same as of the public sector, though the private was more interested in rice and maize, that too on hybrid varieties (USAID, 2014). On seed production, out of the total amount of 28,016 mt in 2014 about 36% was contributed by the private sector.

5.7.6 Seed Supply

The data on status of seed production varies according to the source available. Dr M N Poudel et al (2013) estimated improved seed produced²⁰ in 2011 from different seed production initiatives for cereal, legumes and oil seed crops as 32,370 mt—rice 11 400 mt, wheat 6 890 mt, maize 7 650 mt, lentil 2 000 mt, mung 1 950 mt, rajma 2 100 mt, and tori 380 mt. The SQCC estimate for 2014 was 28,016 mt which is basically the production from formal seed system. Nepalese seed supply depends heavily, about 90%, on informal seed system and neighbor India is at about 70% for the same (USAID, 2014).

5.7.7 Marketing

A demand and price signal is required for seed marketing. Current information pertaining to seed stock, varieties and price is lacking. In the sowing season, farmers rely on local market and buy seed whichever is available. This limits their choice for seeds. To alleviate this problem, a reliable Seed Information System should be devised and implemented. For this a web-based Seed Databank should be operationalised by SQCC. This Databank should be updated periodically and should contain demand for and supply of particular crop varieties. The possibility of cooperating with seed associations, AEC and DCCI in the establishment and operation of the Databank should be explored. The aim should be to decentralize gradually to regional and catchment areas of the seed market. The absence of Agricultural Marketing Act has been seriously felt in the country.

The remote areas are poorly served by seed services but some initiatives include transport subsidy for districts designated under support program by the government. Source seeds for seed multiplication purpose get transport and price subsidy with limited technical support.

¹⁹ Total seed storage capacity in the country is for 28,494 mt which the public and private sectors share almost equal amounts in storage capacity (Khanal, 2015; powerpoint presentation in Seed Summit, 2015).

²⁰ M N Poudel et al. 2013. An Overview of Different Seed Production Initiatives in Nepal. *In* Agronomy Journal of Nepal, Vol. 3, 2013. Crop development Directorate, DOA, Harihar Bhawan and Agronomy Society of Nepal, Kathmandu.

As an example, in case of rice the main channels of seed marketing are the dealers, cooperatives, retailers, individual traders and farmers themselves²¹. Seed companies sell through agrovets, their own dealers, and retail shops. Cooperatives also have dealers, retail shops and their own members as buyers. Some NGOs and DADOs also are their buyers. The seeds are mostly (70-90%) sold on credit. Again, about 90% of the seed supply comes from the traditional informal sector led by the farmers in Nepal; the informal sector supplies 70% in India (USAID, 2014).

5.7.8 Institutional Strengthening

Since its establishment, NSB secretariat is awaiting strengthening to shoulder the responsibility entrusted to it. SQCC has been established following the policy; so are the private seed testing laboratories. All the public seed research and development (R&D) organizations are waiting for further strengthening. Further strengthening of these institutions demand manpower, infrastructure, knowledge and skill development, and funding. Strengthening of private seed entrepreneurs should also be taken into account for R&D, promotion of internal seed business and participation in export seed market.

5.7.9 Modern Technology and Biotechnology

Initiatives are to be taken in research works in bio-technology, genetic engineering (for GMO, transgenic plants production) and tissue culture. These works focus research on imported plants and seeds to see whether these materials contain elements that negatively impact on life and environment. The bio-safety rules suitable for Nepalese conditions will have to be in place. The physical and human resources needed for the planned development of the modern technologies are yet to be provided.

In sum, a vibrant seed policy is the means to move agriculture forward by making the Nepal Seed Industry capable of participation in the competitive world market. For this, use of modern technology is of utmost importance.

5.8 Seed Act (1988)

GON framed its first ever Seed Act in 1988 that subsequently expanded regulatory oversight over both the private and public sector. New policy and legislations have made significant strides in the Nepalese seed industry. The Seed Act as amended in 2008 has liberalized seed production, processing and conditioning and marketing for greater reach of the users. By the notification in Nepal Gazette, the Act came into force: in three districts in 1989; 30 more districts in 2005; and rest of the country in 2013. Notwithstanding, rising demand for quality seed has not been met, and plant breeders' and farmers' rights have yet to be addressed by new enactment. Licensing of private seed laboratory, private participation in quality assurance system and permission by NSB for seed business are the new provisions. In all, 14 seed testing laboratories out of 17 are functioning—CSTL under SQCC, six under DOA, two under NSCL, two under NARC, and one each under DLS, SEAN and CEAPRED. Twenty seed processing infrastructures are in place with the seed entrepreneurs of which six of them are with NSCL. Charges can be levied for seed testing and certification services. Penalty or punishment has been

²¹ Gauchan, D. et al. 2014. Strengthening Seed System for Rice Seed Production and Supply in Nepal.

introduced for contravention of procedures laid down by the Act. Some guidelines and procedures are under preparation by SQCC.

The Act has expanded the section in definitions needed for harmonization and has provision for the constitution of the National Seed Board. The nominated members may be removed before their full term if the GON so desires and the NSB can invite as observer the national or foreign expert if deemed necessary by the Board.

An account of prevailing legislative provisions in some South Asian countries has been presented below.

Table 11. Prevailing legislations in Nepal, India, Bangladesh and Pakistan

SN	Items	Nepal	India	Bangladesh	Pakistan
1	Seeds Act	Seeds Act 1988	Seeds Act 1966	Seed Ordinance 1977	Seed Act 1976
	Latest amendment or replacement	Amended in 2008	Amended in 1972	Amended in 2005	Amended in 2014
2	Seeds Rules	Seeds Rules 1997	Seeds Rules 1968	Seed Rules 1998	Seed (Registration) Rules, 1987
		Replaced by new Rules in 2013	Latest amendment in 2014		Seeds (Truth-in Labeling) Rules, 1991
			Seeds (Control) Order 1983 amended in 2006		Pakistan Fruit Plants Certification Rules, 1998

Source: Dr Mahendra Khanal. Seed Quality Assurance and Marketing. Available at www.sqcc.gov.np

Recent Nepalese legislative provisions are friendly for seed industry development, in general. However, some stipulations are restrictive and need harmonization with neighboring countries. (1) The registration of exotic varieties requires two seasons' test results (Seed Regulations, 2013), and these tests are to be done by government agency. This is applicable to all crop seeds, which is difficult to comply; and neighbors have different provisions for different crops. For example, in Andhra Pradesh state of India, private seed companies may submit one year data for the same purpose. (2) The test result obtained from seed testing laboratory is valid for only six months (Seed Act, 1988) and retesting is compulsory after six months which is unrealistic as compared to the neighbors. (3) The Crop Development Officer at DADO performs conflicting roles; one, technical service provider related to seeds as Crop Inspector; and, two, as Seed Sampler to file case against violations of legislation before DADO who gives verdict.

Besides, field and seed standards in SA countries are different and need harmonization for seed trade. A case of rice in point has been presented in the following table.

Table 12. Field and Seed Standards in Open Pollinated Rice in Nepal, India, Bangladesh and Pakistan

SN	Parameter	Nepal		India		Bangladesh			Pakistan		
		FS	CS	FS	CS	BS	FS	CS	PS	BS	CS
Field Standards											
1	Isolation distance (m)	3	3	3	3	3	3	3	10	10	3
2	Other crop plants (Max %)					0	0.1	0.2			
3	Other varieties (Max %)	0.05	0.20	0.05	0.20	0	0.10	0.50	None	0.05	0.10
4	Objectionable weeds (Max %)			0.01	0.02	0	0.01	0.02	None	None	0.02
5	Seed borne disease infected plants (Max %)	0.20	0.50			5	10	20	None	None	0.10
Seed Standards											
1	Pure seeds (min %)	98	98	98	98	99	97	96	99.99	98	98
2	Inert matter (max %)	2	2	2	2	1	2	3	0.01	1.0	1.50
3	Husk less seeds (max %)			2	2						
4	Other crop seeds (max per kg)	10	20	10	20	2	5	10			
5	Other distinguishable vars (max per kg)	10	20	10	20	Trace	1%	1%	None	0.05%	0.10%
6	Total weed seeds (max per kg)			10	20	2	8	10	None	None	None
7	Objectionable weed seeds (max per kg)	2	5	2	5						
8	No. of seeds infected by diseases (max %)			0.1	0.5						
9	Germination (min %)	80	80	80	80	80	80	80	80	80	80
10	Moisture (max %)	13	13	13	13	12	12	12	12	12	12
11	Moisture vapour-proof containers (max %)			8	8						

Source: Dr Mahendra Khanal. Seed Quality Assurance and Marketing. Available at www.sgcc.gov.np

5.8.1 National Seed Board

The NSB is the advisory body to the GON in matters related to the formulation of national seed policy. The powers, functions and duties of the Board are: i) coordinating the public and private sector in seed production and distribution, ii) encouraging the private sector to invest in seed business, iii) regulating or cause to be regulated the quality of seed produced internally or imported from outside the country, iv) approval, release and registration of the new varieties, v) granting breeder's right after performing DUS tests, vi) establishing quality standards, vii) issuing permission for seed testing laboratory, viii) providing advice to GON on charges on seed services, and ix) conducting examinations for licensing of the crop inspectors, seed samplers and seed analysts.

The Act made provision for: notification of a variety or type of seed, minimum seed quality standards, permission or restriction for export and import of the notified seed, detail information in the seed

container, appointment of the crop inspector, seed sampler and seed analyst, seed service fee, and punishment for the default.

5.8.2 Legal Framework

This section deals with legal framework, aside from Seed Act and Regulations treated separately in other sections, to look into promotion of internal and external seed trade. The main legal documents that regulate import and export of goods are given in Box 1 below.

Box 1: TRADE RELATED LEGISLATIONS
<p>CUSTOMS:</p> <ul style="list-style-type: none">➤ Customs Act (2007)➤ Customs Rules (2007)
<p>EXPORT AND IMPORT LICENSING</p> <ul style="list-style-type: none">➤ Export and Import Control Act (1957, as amended in 2006)➤ Export and Import Rules (1978)
<p>TECHNICAL BARRIERS TO TRADE</p> <ul style="list-style-type: none">➤ Nepal Standards (Certification Mark) Act (1980, as amended)➤ Nepal Standards (Certification Mark) Regulations (1982, as amended)
<p>SANITARY AND PHYTOSANITARY MEASURES</p> <ul style="list-style-type: none">➤ Nepal Seeds Act, 2045 (1988), amended 2008➤ Seed Regulations 2013➤ Plant Protection Act, 2064 (2007)➤ Plants Protection Rules, 2066 (2010)➤ The Food Act, 2023 (1966)➤ Food Regulation, 2027 (1970)➤ Feed Act (Animal Concentrate), 2023 (1966)➤ Animal Health and Livestock Services Act (1998)
<p>COMPETITION POLICIES</p> <ul style="list-style-type: none">➤ Competition Promotion and Market Protection Act (2007)➤ Competition Promotion and Market Protection Regulation (2007)➤ Consumer Protection Act (1998)➤ Consumer Protection Regulation (2000)
<p>Source: USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.</p>

The Customs Act (2007) complies with the Revised Kyoto Convention (RKC) requirements for customs procedures and trade facilitation. Because of the landlocked nature of the country, export to and import from third countries must transit through India, incurring substantial shipping costs and delays thereby resulting into high trade costs. Some progress has been made in customs processing with implementation of Automated System of Customs Data (ASYCUDA), still much remains to be done to expedite customs clearance; volume of documents, trained staff and trade infrastructure impede work performance. Plan is underway for Integrated Customs Check Point to process clearance from under the same premise, but the progress is slow. Nepal is a natural trade partner with India and more than 60% of Nepal's imports and exports are traded with India. Bulk of the revenue comes from taxes

collected at the border. A five percent agricultural reform fee is charged to imports from India and Tibet.

The measures taken for export promotion by GON are the application of lower tax rates, special economic zones and export processing zones but except for lower taxes on agricultural products, other facilities are limited. Environmental protection and food security reasons are important for levying export tax on some goods.

For the mobilization of capital, human and other resources, Foreign Investment and Technology Transfer Act 1992 (amended 1996) makes legal provision towards regularization and promotion of foreign investment and technology. This Act enables any national seed industry to enter into "Technology Transfer Agreement" with foreign investor: (1) to use any technological right, specialization, formula, process, patent or knowledge of foreign origin, (2) to use any trade mark of foreign ownership, and (3) to get foreign technological, consultancy, management and marketing services²².

5.8.3 International Seed Trade

There is very little export of seed from Nepal, except from illegal supply by smugglers to India. But Nepali farmers have benefitted a great deal from public and private breeders of India. Aside from formal import by private companies, an unknown amount and varieties of seeds— more hybrids than OPV the quality of which is dubious—enter into Nepal through unofficial channels. Variety registration is mandatory for cultivation in Nepal; while it is voluntary, except in some states, in India.

²² Foreign Investment and Technology Transfer Act (1992). Available at <http://www.lawcommission.gov.np>.

A comparison of seed regulatory frameworks of Nepal, India and Bangladesh has been presented in Table 13.

Table 13. Provisions in seed regulatory frameworks of Nepal, India and Bangladesh

Legal framework of the Country	Registration to Start Seed Company	New Variety Registration	Seed Production or Wholesale Marketing			Sale of Seed	
			Registration of Contract Seed Producer	Seed Import Requirement	Seed Certification	Registration of Seed Dealer	Approval for Seed Export
Nepal	Required	Notification required (11B)	Not required	Phytosanitary Control; not clear [permit required (15.1) or prescribe details for export (15.3)]; import restricted if variety damages agriculture & export restricted on basis of risk analysis (15A).	Two systems prevail: (a) seed certification system, (b) Truthful label system. QDS not functional. Quality standards of notified seeds prescribed (12).	License required (11A & 13)	Required
India	Required but automatic (nominal fee)	Voluntary for all species	Not required	(a) phytosanitary criteria; (b) seed quality for sale in India; (c) the label states the variety or kind of seed; (d) seed import for cotton, wheat, and some other crops is allowed only by government.	For all crops, except for varieties released by public research.	Required but automatic (nominal fee); states may waive the requirement	Required; (a) seeds must meet India's quality standards; and (b) labels must state the variety or kind. The Essential Commodities Act allows GOI to limit seed exports for food crops, fruit, vegetables and jute for other reasons.
Bangladesh	Required but automatic (7 days, no charge)	Automatic for all but 5 notified crops (rice, wheat, sugarcane, jute and potatoes). Testing varieties for 2 years (VCU and DUS) then decided; when successful, registration takes 860 days and costs \$878 (Articles 5 and 6, Ordinance; Article 7, Rules)	Not required	(a) Phytosanitary criteria; (b) seed quality; and (c) for 5 notified crops the variety must be registered (Article 17, Ordinance).	Voluntary at the retail level for all species and varieties; required for BS & FS produced by government agencies.	Required but automatic (7 days, no charge).	Based on seed quality (Article 17, Ordinance).

Source: This table draws heavily from: USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.

5.8.4 Institutions Involved

MOAD, other GON Ministries, the Central Bank, National Planning Commission (NPC) and other government organs are the institutions related to seed subsector in Nepal (Box 2). FNCCI is the representative of the private sector and works through the Agro Enterprise Center (AEC) in production and trade of agricultural seeds. To improve efficiencies and to lower costs in doing business, it has not

been effective to coax government for policy reforms, laws and procedures due to: overshadow by political deadlock, general distrust of private sector intentions or limited ability to affect change²³.

Box 2. INSTITUTIONS INVOLVED

- ❖ Ministry of Agricultural Development (MOAD)
- ❖ Ministry of Livestock Development (MOLD)
- ❖ Ministry of Commerce (MOC)
- ❖ Ministry of Supplies (MOS)
- ❖ Ministry of Finance (MOF)
- ❖ Ministry of Industry (MOI)
- ❖ Nepal Rastra Bank (NRB)
- ❖ National Planning Commission (NPC)
- ❖ Trade and Export Promotion Center (TEPC)
- ❖ Federation of Nepal Chambers of Commerce and Industries (FNCCI)
- ❖ Agro-Enterprise Center (AEC) of FNCCI
- ❖ Private Seed Companies
- ❖ NGOs
- ❖ Farmers' Groups and Cooperatives
- ❖ Donor Partners

The Agro-Enterprise Center (AEC) of FNCCI promotes production and trade of high-value agriculture products. One Village One Product program of GON-AEC collaboration has encouraging results in some products; but external trade has not flourished as expected. Emphasis is more on fresh products rather than on seeds and planting materials.

Industrial Enterprises Act 1992 (amended 1997) Section 3(c) should include the seed industry to encompass the seeds of cereals, pulses, oilseeds, vegetables, fruits, spices, flowers, forage, herbs (MAPs and NTFPs inclusive), trees and shrubs.

Designated products produced by small farmers are exempt from Competition Promotion and Market Protection Act 2007; but these products remain to be designated by the Act, which MOAD should pursue for the purpose.

5.8.5 Indian Experience

Indian federal and state governments differ in seed legislations. Federal government does not require variety registration to sell seeds; but seed companies must label the seed variety. Different states have

²³ USAID. 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.

their own regulatory frameworks: for example, in Andhra Pradesh variety registration is required but it depends on information provided by the seed company²⁴.

In the late 1980s, India permitted large foreign companies into the seed industry and allowed private import of seeds and germplasm. The 1988 reform requires one year of field trials for imported seeds of a new variety of major food crops; focusing on pests and diseases not on other performance characteristics.

5.9 Plant Variety and Farmers' Rights Protection

Farmers' Rights

According to the FAO estimate²⁵, 75 % of crop diversity was lost between 1900 and 2000 largely due to the replacement of farmers' varieties with modern varieties. As the informal seed system supplies about 90% of the total seed requirement in the country, the community seed (informal) system should not be undermined but strengthened with appropriate policy, legal and institutional measures for the realization of farmers' rights. Then local seed production, storage, use, exchange and reuse, and local traditional knowledge should be protected. Though local varieties have low productivity but they give considerable security during flood and drought because they withstand unfavorable climatic conditions and are preferred due to good taste. Their productivity, however, should be improved.

The community seed banks may be of value to protect Farmers' Rights. These are of two types—one, selling seed to the farmers, and two, conserving seed materials but not for sale. Community seed banks protect Farmers' Rights with maintenance of crop genetic diversity; they are the means for ex-situ conservation and farmers have control over the seeds. Gene banks are the form of ex-situ conservation but have limitations: access to farmers is limited, and traditional seed management practice may be lost.

Components of Farmers' Rights are: protecting traditional knowledge (sharing, documentation), participation in decision-making (policy, law formulation), and ensuring the rights to save, use, exchange and sell seed. Farmers are the custodians of crop genetic resources which should be scaled up for conservation. The Benefit Sharing Fund of the Plant Treaty²⁶ is an important source for scaling up of genetic resources for developing countries.

The International Union for the Protection of New Varieties of Plants (UPOV) was established in 1961 as an intergovernmental organization to provide a system of plant variety protection for the development

²⁴ USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.

²⁵ FAO. 2010. The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture, Rome.

²⁶ The International Treaty advocates farmers' rights and contains measures such as: the protection of traditional knowledge of relevance to PGRFA; the right to equitable benefit-sharing and the right to participate in national decision making related to PGRFA.

of new plant varieties. The plant variety protection is applicable to breeder only and farmer's right is not recognized under UPOV. Under Nepalese conditions a farmer is engaged in seed production, multiplication, sell, use and storage for the following year. Furthermore, s/he is the repository of crop biodiversity, and hence this system of UPOV is not suitable. Under UPOV, the breeder's right is granted if the variety confirms to DUS test, and is newly bred. However, the variety can be used for breeding other varieties and for non-commercial uses. Such variety is protected for a limited period and then passed on for public use.

5.10 Exchange of Germplasm and the International Treaty

The International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty) sets legal binding on access and benefit-sharing for plant genetic resources for food and agriculture (PGRFA). Its objectives are: conservation and sustainable use of PGRFA; and fair and equitable sharing of benefits, in harmony with the Convention on Biological Diversity (CBD) for sustainable agriculture and food security. The Food and Agriculture Organization (FAO) helped negotiate the International Treaty to facilitate the exchange of plant genetic material for research and breeding that came into force in 2004. The Contracting Parties to the International Treaty have established a global gene pool called the Multilateral System of Access and Benefit-Sharing (MLS) to make available to each other 64 food and forage crops.

5.10.1 Capacity Building at International Level

FAO is the technical agency of the United Nations (UN) and provides technical assistance for the development of national policies and legislations for implementation of international regulatory frameworks. It adopted Global Plan of Action (GPA) for the conservation and use of PGRFA in 1996 (revised 2011) and now helps development and strengthening of seed sector.

FAO provides assistance to its Member states in: (a) national seed policy development through a participatory process in matters of seed quality assurance schemes including seed quality control and variety release procedures, legislation, extension services, manpower development, credit and subsidies, local seed enterprises, taxation, international cooperation etc;(b) regional harmonization of seed regulations; (c) seed production and quality assurance; and (d) Quality Declared Seed (QDS) System which FAO developed in 1993 (revised in 2006).

5.11 Seed Regulations (2013)

These regulations were promulgated in 2013 and have the following salient features.

The NSB can constitute sub-committees as per need pursuant to Section 6 of the Seed Act. At present three subcommittees are operational: i) Variety Approval, Release and Registration (VARR), ii) Plan Formulation and Monitoring (PFM), and iii) Quality Standards Determination and Management (QSDM). The constitution of these sub-committees suggests that there is overwhelming majority of the government sector representatives. The common private sector representative in all these subcommittees is from the Seed Entrepreneurs' Association (SEAN). There is an NGO represented in the VARR subcommittee. Such representation may limit the interaction with and feedback from the

private sector in the sub-committee meetings. Hence, constitution of the subcommittees should be broadened to include the representation of all actors of the seed value chain.

The powers, functions and duties of these sub-committees have been detailed out in the Regulations. The right of ownership of the seeds of a new variety can be acquired by the breeder(s) after the completion of the due process laid down in the Regulations. But there is still lack of Plant Variety and Farmers' Rights Protection Act for the execution of the provisions in the Regulations.

The seed standards for the Truthful Labeled Seed System have been defined as: Breeder Seed, Source Seed, Labeled Seed and then the Improved Seed while for the Seed Certification System the classes are: BS-FS-CS-IS in that continuum. Different countries or group of countries have defined seed standards in their own way; e.g., the EU have classified seeds as (1) professional variety seeds which must be registered and are meant for commercial growing and are mostly hybrids, and (2) amateur variety seeds which are not meant for sale but are limited to home gardens and are primarily OPVs.

New provision regarding the compensation to the grower has been made in case of financial loss due to false information and substandard quality of seeds sold by the seed seller or distributor. DADO hears the case filed by the seed sampler, and an appeal can be furnished before the Regional Agriculture Director (RAD). The Regulations contain the related formats and schedules for easy processing of the requests made.

6 Seed Trade Harmonization

There are so-called "Three Sisters" as expert bodies which develop standards, guidelines and recommendations that form the basis for WTO-SPS Agreement for member countries. These are: the Codex Alimentarius Commission for food safety, the World Organization for Animal Health (OIE) for animal health and animal diseases transmittable to humans and the International Plant Protection Convention (IPPC) for plant health. The WTO Sanitary and Phytosanitary (SPS) measures set out the basic rules as to how governments can apply food safety, animal and plant health measures. The SPS Agreement is so framed as to facilitate WTO member-countries to formulate legislation to protect from health risks in such a way that there are no unnecessary restrictions in international trade²⁷; the restrictions, if any, are the subject of scientific assessment of health risks. Any new change by the member should be notified to the World Trade Organization (WTO) Secretariat so that producers of exporting countries adapt to such new requirement for trade. For the purpose of the present study on seed policy and regulation, IPPC is the expert body that sets international standards used to prevent the introduction and spread of pests of plants, plant products and other regulated articles and to promote appropriate measures for their control. The framework for the development of national phytosanitary measures is established by the IPPC. The Convention is governed by the Commission on Phytosanitary Measures, which adopts international standards for phytosanitary measures. Currently 177 governments adhere to the IPPC.

Seed trade has been globalized under the purview of regional and global trade organizations like SAFTA and WTO. After Nepal's accession to WTO in 2004, at least 35 notifications comprising of

²⁷ Available at https://www.wto.org/english/thewto_e/20y_e/sps_brochure20y_e.pdf.

Nepali legislation documents translated into English have been submitted thus far. WTO has notified the directive on export-import inspection and certification system in Nepal. The Plant Protection Directorate (PPD) of DOA has been designated as the National Plant Protection Organization (NPPO) for Nepal. Manual has been prepared for import and export of seed to inspect at border points the plant health, plant products and planting materials. The manual helps the quarantine officials to identify, test and control the seed-borne diseases of cereal and vegetable crops. The border check post quarantine officers were given training on laboratory procedures, and heat and fumigation treatment as quarantine measures.

The National Plant Quarantine Program has prepared guidelines and procedures related to SPS measures. These are: introduction to plant quarantine in Nepal, methyl bromide (MB) fumigation for use in wood packaging materials in international trade, national guidelines on Pest Free Area (PFA), guidelines on survey and surveillance of citrus tristesa virus and citrus greening virus, and quarantine test procedures for phytosanitary control of seeds. Eight new PQ check posts were established to make a total of 15 PQ check posts of which 11 are along the Nepal-India border points, three of them along the Nepal-China border line and one in the Tribhuvan International Airport for the regulation of agricultural trade. Methyl Parathion and Monocrotophos are banned (Prior Informed Consent) pesticides through a notification in Nepal Gazette in 2007 and their review of toxic residue is on-going that revealed more than the tolerance level. In line with APPPC, streamlining and building land border quarantine scientific procedures is an on-going activity with NPQP and these obligations include: (1) all WTO members notified of quarantine pests of apple, citrus, potato, ginger and garlic after approval by National Plant Quarantine Committee (NPQC), (2) 33 National Standards for Phytosanitary Measures (NSPM)²⁸ completed, and study is underway to implement these, (3) export-import operational manual for plant quarantine procedures completed and in use, (4) PQ logo developed and uniform and ID card for PQ inspectors prepared and in use, (5) NPQP authorized to use IPPC logo in wood packaging materials after MB fumigation, and (6) NPQP will have post-entry quarantine facility, and fumigation chambers will be built each at TIA and Birgunj dry port.

Membership of International Plant Protection Convention (IPPC) was obtained in 2006. DFTQC was designated as National SPS enquiry point as a single contact point for information. The International Trade Promotion Section (ITPS) in MOAD was designated as SPS National Notification Authority to notify WTO to ensure transparency and to meet obligations on regular basis. The Plant Protection Act 1972 and the Seed Act 1988 were respectively amended in 2007 and 2008. Similarly, Plant Protection Regulations 1975 (amended 2010) and Seed Regulations 2013 were also approved. Manual of Standards and Trade Development Facility (STDF) was implemented with FAO support in 2008-10 and another STDF was approved in 2010 for SPS Agreement. Under STDF-170 Project, human resource capacity development on plant health (quarantine management), 192 persons were trained in different modules with the activities of: Methyl Bromide fumigation, plant health inspection and quarantine procedures, commodity pest risk analysis, establishment of pest free areas, pest diagnosis and handling, phytosanitary certification and administrative procedures, pest survey, surveillance and monitoring, risk communication and risk management. NARC and DOA will work jointly for the declaration of pest or disease free areas and areas of low pest or disease prevalence in mandarin and sweet orange. The Regional Plant Protection Laboratories will partake in this SPS program under the supervision and support of Regional Directorate of Agriculture and PPD. Slow but important steps have been taken but much remains to be done to comply with full implementation of WTO-SPS measures. Important steps are needed to capacitate existing human resource to meet international

²⁸ Nepali translations of ISPSM.

phytosanitary obligations. On the other hand, there has been a chronic problem of qualified staff transferred to other positions from quarantine responsibilities.

For the purpose of international seed trade, Nepal has to harmonize seed import and export regulations in line with WTO and SAARC countries. The WTO-SPS agreement also encourages governments to establish national SPS measures consistent with international standards, guidelines and recommendations. The SPS Agreement allows governments to use national or international standards. Each country can set standards appropriate to its own but it should ensure that strict health and safety regulations are not used as an excuse to protect domestic producers. It is the Regional Plant Protection Organization (RPPO) that facilitates member country to harmonize national phytosanitary measures, in collaboration with IPPC Secretariat, with international measures. The European Union (EU) has a Plant Health Directive (legislation) that protects its member states from introduction and spread of organisms harmful to plants or plant products that threaten agriculture, food security and public and private environment. The IPPC has three primary areas on seed trade: i) development and implementation of international standards for phytosanitary measures; ii) exchange of official phytosanitary information to facilitate trade, and iii) a substantial capacity development program to assist developing countries in building their national capacities to meet their international phytosanitary obligations.

Nepal Trade Integration Strategy (NTIS) is administered by Ministry of Commerce (MOC) and MOAD is a beneficiary for strengthening trade capacity in the form of quarantine services (training and equipments), seed multiplication (e.g., lentil foundation seeds), carpet wool, honey, tea, cardamom, to name a few. Nepal Trade Integration Strategy (NTIS) 2010 promotes trade and export competitiveness. NTIS has identified 19 goods and services for increase in production, value addition and export promotion. As NTIS is in the process of revision, seed industry should be recognized and included in the strategy. Nepal has entered into World Trade Organization (WTO) and is a member of regional organizations like South Asian Free Trade Agreement (SAFTA) and Bay of Bengal Initiative for Multi-Sectoral Trade and Economic Cooperation (BIMSTEC). The Thirteenth Plan (2013-2016) of GON envisages new policy (e.g., intellectual property rights) and relevant act and regulations; some existing acts and regulations are to be amended to make them trade-friendly. Attempts for increasing production and competitiveness are underway but the progress is slow primarily due to political instability. Nepal has not benefited much from WTO and bilateral and regional agreements because of supply-side constraints and transport problems.

In general, since Nepal has framed legislation based on ISTA procedures and methods, her international seed trade should not encounter hurdles but the fact remains that potential exportable seeds should be identified for the destination market beginning with neighboring countries of the SAARC region. However, it should not be pre-empted that seed export will be smooth and guaranteed. Market research, collaboration with international seed agencies, compatibility of seed products, trade negotiation, etc should be looked into. Harmonized seed testing methods and regulatory standards can serve as the answer to international seed trade. Nepal has ISTA accredited laboratory and follows procedures and methods as laid down by ISTA. The EU and USA have established equivalence to facilitate seed trade with the cooperation of ISTA. Seed health methods are not in wide use in Nepal; the demand for trade healthy seeds are important to control diseases of mycology, bacteriology and virology origin. In sum, quality standards are the foundation of the seed trade, be it import or export. Harmonization should be aimed at building synergy rather than competition with different testing

methods in use. Harmonization of policy should be the beginning with collective action for the development of the standardization of tests for promotion of trade.

Under the Industrial Enterprises Act 1992, agro-industries, if categorized as priority industries, are entitled to a 50% reduction on income tax. Subsidies for seeds, fertilizer and irrigation are provided to the producer farmers. However, the total subsidies on agricultural inputs have been considered low. Nepal can further benefit from Article 27 of the Agreement on Subsidies that is allowable under special and differential treatment for LDCs²⁹.

Nepal is heavily dependent on India for the bilateral agricultural trade; but the weak trading infrastructure has constrained the growth in seed trade despite favorable natural conditions for the production of diverse agricultural and other crop species. Rugged and difficult terrains in suitable growing hill and mountain domains for exportable seeds, electricity, plant breeders, mechanization in production and processing, storage, transportation and enabling private business environment constrain the seed development aimed at import substitution and export promotion. Public investment must be pledged in time-bound fashion to alleviate these obstacles for seed security to attain the goal of food and nutrition security and to improve livelihoods. This is a need to reduce Nepal's reliance on subsistence agriculture and to diversify and modernize the agricultural economy through access to regional and international trade.

The Plant Protection Act 1972 (amended 2007) and the Plant Protection Rules 1975 (amended 2010) govern Nepal's trade in plants and plant products. The Plant Protection Rules 1975 (amended 2010) provide for import restrictions on 19 plants and plant products from specific countries, empower Plant Protection Officers to confiscate infected plant and plant products and to impose fines for non-compliance with the legislation. The Act also established the National Plant Quarantine Committee for the protection of plants from pests, diseases and infections. The body in charge of implementing Phytosanitary Measures is the central office of Plant Quarantine, under the administrative supervision of the Plant Protection Directorate in the Department of Agriculture. The Act has to be effectively implemented and charges of violations, legal challenges to quarantine check post actions have to be recorded. It seems that there is a 'culture of compromise' among traders, customs clearing agents and PQ check posts³⁰. Consignments for bulk trading are inspected but not the goods for personal consumption. This is against the provision in the law that requires that each consignment should be inspected.

In 2006, Nepal and India had signed an MOU for an Integrated Customs Check Post with provision on both sides for goods trade and movement of the passengers (Kantipur Daily, March 9, 2016). This facility includes security personnel, immigration, baggage scanner, duty free shop, custom counter, banking, quarantine, warehouse and cold storage. Four border points—Biratnagar-Jogbani, Birgunj-Raxaul, Bhairahawa-Sunauli and Nepalgunj-Rupaidiya were identified to create such facilities. However,

²⁹ Available at http://www.fao.org/fileadmin/user_upload/legal/docs/lpo58.pdf

³⁰ Op. cit.

they are still under construction, some work is in progress in the former two locations and it is yet to be started in the later two.

6.1 Regional Institutional Factors

In sum, there are inherent problems in trade, particularly for agricultural products, in the SAARC region: delays and inefficient customs clearing procedures; divergent standards and quality control measures; lack of transparent behavior of officials; policy unpredictability; lack of necessary trade-related infrastructures such as warehousing, scanning and testing facilities, traffic congestion, etc; lack of harmonized customs procedures; disregard for phytosanitary documents (e.g., Indian quarantine certificate needed for export to India); and lack of policy coordination contribute to low levels of trade. At times, political and security-related barriers also hinder agricultural trade.

7. Recommendations

7.1 Policy Reforms

1. Current seed policy was designed to implement the then Agriculture Perspective Plan (1995-2015) which was based on growth and poverty reduction strategy. With the passage of time, current strategies are: food and nutrition security, Zero Hunger Challenge, private and non-government sector participation, globalization, plant breeders' and farmers' rights and demand for quality seeds, including hybrids. These should be addressed by the reformed policy.
2. Seed Industry should be included as priority industry in Annex 1 of the Industrial Policy (2010), Industrial Enterprises Act (1992) and other relevant policy and legislations so as to ensure seed security through a vibrant seed industry. Industries listed in Annex 1 are the priority industries. The Industrial Policy envisages Business Incubation Center for agriculture-and-NTFP based business with the provision of Business Incubation Service for youth and women folks. This should be capitalized for seed sector development.
3. Quality Declared Seed system has not been operational due to Truthful Label system becoming more popular among seed distributors. Moreover, seed certification system is also practiced in the country. Therefore, QDS system should be removed from the policy.
4. The Constitutional provision of food sovereignty and GON commitment to Zero Hunger Challenge 2025 require that food items are sufficiently produced and available to the people in need. To fulfill the objectives, the Minimum Support Price Policy (MSP) should be implemented in the country. Major cereals, pulses, important vegetables and milk should be covered by the Policy.
5. It is high time that National Agricultural Biotechnology Policy should be formulated with the objective of: food and nutrition security, food safety, protection of consumer health, environmental protection, farmers' welfare and security of national and international trade in farm products, including seed. Given our absolute advantage in unique genetic characters of some crops (like Jethobudho, Jumli Marshi, Jorayal Basmati, etc in rice), transgenic research in

such crops should be avoided so that future prospects for national and international trade is not affected.

6. Individual country can develop policies and legislations suited to needs, but these should not unnecessarily restrict trade with WTO member countries. National legislations should be justified scientifically and on the basis of WTO rules. Policies and legislations are sufficiently developed, but the crux of the problem in Nepal seed industry lies with enforcement and related issues. Nepal must be capacitated to participate in WTO regime and in regional seed trade.
7. National seed situation should be reviewed every five years by an independent expert body to assess achievements and shortfalls thereby providing suggestions for future courses of action.
8. National Seed Policy and relevant legislations should be reviewed every five years to evaluate their efficiency, effectiveness and relevance by independent evaluator for its timely reform therein. In so doing, documents of neighboring countries and trade partners should be monitored by an Expert Group of personnel drawn from relevant agencies in time intervals as agreed.
9. The seed trader (e.g., agro-vet) was found to have registered his/her business in multiple agencies, like DCCI, District Administration Office, DADO, Pesticide Registration and Management/DOA, Inland Revenue Office, local government, DDC, Department of Drug Administration, etc. This burden should be reduced.
10. Nepal is endowed with ecological zones that represent centers of genetic diversity in different agricultural crop species. These zones should be conserved for future as "Agro-Biodiversity Centers". For earmarking of these centers NARC, DOA and MOFSC should work together and develop guidelines to declare the Agro-Biodiversity Centers.
11. The rich agro-biodiversity of the country should be properly documented to protect from bio-piracy. National Gene Bank should be strengthened as a repository of national agro-biodiversity.
12. In recent times, Organic Farming is becoming popular and such areas should be earmarked as Organic Farming Zones. Seed certification for organically produced seed should be instituted.
13. Public and private matching investment in seed business should be prioritized and stepped up in components that enhance competitiveness, such as infrastructures, laboratories, quality parameters, skills and knowledge, mechanization, and the like.
14. Seed Business Plan should be prepared aiming at the development of the national seed sector covering a time-bound period, initially for five years. This Plan should cover the upgrading of: (a) human resource, (b) varietal breeding research and seed production, (c) processing, (d) storage, (e) marketing, (f) loan and insurance, (g) mechanization, and (h) increasing SRR. Academic institutions (e.g., AFU, TU, and HICAST) and the private sector should be integrated in seed sector development in collaboration with NARC, departments, and other stakeholders in seed science research, breeding, seed multiplication and teaching. Government assistance to these institutions should be made available to strengthen human resource and infrastructures required to discharge the agreed responsibility. Government should allocate "seed reserve fund" for five years, review the program and then modify accordingly. The nodal bank should

be identified. Interest rates and permissible amount (based on capacity to be developed) for each investment should be determined in advance.

15. Illegal movement of seeds, often of substandard quality and un-notified variety, has been a headache for quality control agency and loss to the cultivators. Firstly, regular meetings of law enforcing agencies in the country should be held and laboratory facilities should be upgraded along with training of personnel involved. Secondly, high level officials related to customs, trade, security, agriculture, and relevant government agencies of SAARC countries should convene a meeting or workshop to determine consistency in the application of custom laws and standards, and to harmonize sanitary and phytosanitary measures for improved customs processing in the region, saving time and cost for traders. The SAARC Seed Bank Agreement seeks to rationalize these measures. SAARC Secretariat could be the appropriate platform to coordinate this activity.
16. Farm mechanization has been utmost important in these years for efficiency and least cost operations. Mechanization scheme should cover: (i) machineries and equipments for land preparation, harvesting and transportation, (ii) seed processing, cleaning, grading, treating, packaging, (iii) seed storage (godown), (iv) and seed testing laboratory, etc. The engineering design and estimates (prototypes suitable for different capacities and agriculture domains) have to be finalized by competent engineering experts in consultation with seed science professionals. Monitoring of such works has to be planned by a joint team of competent engineer and seed technologist. The guidelines for the scheme should be prepared in accordance and in observance of technical and financial norms.

7.2 Varietal Development and Maintenance

1. New varieties of farmers' choice adapted to particular production domain are limited resulting into lower seed replacement rates. Fast track and modern varietal breeding techniques should be followed as a priority.
2. More number of varieties per year is needed for farmers to choose the preferred varieties. Nepal should encourage private import of varieties from conventional breeding, especially from India.
3. Nepal and SAARC countries should benefit from varietal breeding research from each other; for this, introduction of varieties should be facilitated, on top of seed trade. This will minimize smuggling of seeds the quality of which is dubious. The private seed companies should be allowed to introduce varieties after examination of DUS data presented by the companies. Tests for new varieties should be reduced to a year in place of two years experimental data in practice at present. This is practiced in other countries as well; for example, US, India, Bangladesh, EU, etc. The geographical indication for each variety should hold true as before.
4. Initiatives like the Cereal Systems Initiative for South Asia (CSISA), South Asia Seed Forum, SAARC Seed Bank Agreement, donor-assisted projects, bilateral (Agriculture Working Group Meetings) and multilateral platforms should be used for the improvement of crop varieties and dissemination of technology. These platforms should also be used for seed trade harmonization, harmonization of customs procedures, setting up of minimum seed quality standards, and exchange of germplasm.

5. Given the dearth of manpower, a comprehensive human resource development plan should be prepared to develop plant breeders and seed technologists in academia, public and private sectors. Degree courses, specialized short and long term trainings should be targeted on modern breeding techniques and seed multiplication in appropriate institutions within the country and abroad. Depending on specific need, outsourcing in modern breeding techniques (short term) should be considered for establishment of the system, for technology transfer and on-the-job training for national expertise.
6. NARC has collaboration and exchange of germplasm with International Agricultural Research Centers (IARCs). But Nepalese private sector has limited cooperation with these Centers. Concerted efforts and intimate communications have to be made by the private and NGO sectors, specifically, on promising inbred lines for hybrids.
7. Public Private Partnership (PPP) is a recognized modality in Nepal's mixed economy. But the practice is very limited in seed sector development. A time-bound joint program and budget between the public and private, and public and NGOs should be developed in new varietal breeding research and development. This should be started with, among other things, sharing of inbred lines particularly on maize, tomato and rice.
8. Testing of exotic varieties for registration has been a debatable issue as it is entrusted to only NARC by SQCC. Private seed associations are equally interested to participate in this activity. Private should also be invited to test exotic varieties and NARC should focus more on new variety breeding. SQCC should monitor the activity.
9. There are quite a number of eminent breeders and seed technologists, who previously served in various capacities in the seed sector in Nepal; some of them are still active in the market. Their service should be drawn to honor them based on their areas of expertise, in the short run. This will fill in the present gap of manpower shortage at least to a certain extent. This practice should be replicated in future too. Hiring of short term international experts should also be considered judiciously, if required.
10. National research and breeding programs limited in few crop species now should be extended to other crops, and strengthened beginning with vegetables and forage seeds in the first phase followed by other crop species in later phases.
11. Operational guidelines on crop specific hybrid research and seed multiplication should be developed and implemented. A Hybrid Research Unit should be established beginning with rice, maize and vegetables. Quality standards for hybrid seeds should be developed.
12. Maintenance of existing varieties in specified zone, as prepared by NSB, has to be strictly adhered to. In so doing, deployment of qualified manpower to undertake the responsibility should also be considered.
13. The Technical Working Groups should be charged with, among other things, providing regular feedback to research scientists the demand by farmers for new type of varieties and traits.
14. Breeder seed is the mandate of the breeder or the institution concerned. Thus far no mechanism monitors the Breeder Seed production activity. NSB should constitute a committee of eminent scientists to review and validate the current practice for improvement, if any. Foundation seed production has been taken up progressively by the private and NGO sectors; this should be encouraged further by the government to let NARC utilize more time for varietal

breeding, seed science research and technology generation. The academic institutions should be drawn to this fore with committed programs and budgetary support. This becomes more vital when federal structures are in place.

15. CSTL should conduct DUS test on its own of pipeline varieties by acquiring land and other infrastructures. This should be decentralized to RSTL in phased manner.
16. Private sector should be free to export seeds of varieties/hybrids developed by them following the procedures laid down by seed legislation; however, in case of natural calamity requiring seeds within the country, government may issue notice to this effect to restrict export.
17. Expenditures incurred on research and varietal development by private and NGO sectors should be exempt from income tax obligation.

7.3 Seed Multiplication, Processing and Conditioning

1. Nepal seed industry should aim to achieve varietal diversity as well as to produce enough quantity of quality seeds demanded by the cultivators.
2. Nepalese seed multiplication is confined to a limited generational stages of BS-FS-CS-IS sequence. In practice, some issues of foundation seeds used for production of improved seeds or for general cultivation or even for consumption have been noticed. This shows lacuna in seed planning, and should be corrected with standard seed multiplication stages. A high degree of ethics is expected of the stakeholders involved in seed multiplication coupled with meticulous planning and monitoring.
3. At times, mismatch of source seed availability has been noticed. One of the reasons is the inadequacy of farmer preferred varieties. But this problem can be solved, to a large extent, by introducing advance payment in favor of source seed demand by seed producers. This will not only guarantee the supply of source seeds but also provide incentive to the source seed producers. Contract agreement may be done for the purpose.
4. Hill and mountain districts need government support in seed research, production, processing and marketing activities due mainly to poor communication facilities, concentration of seed traders in accessible areas and low investment capacity. For initial years of seed business development, government should take supportive role in remote areas and consider it a necessary investment rather than treating as a subsidy. The priority industries established in underdeveloped areas are liable for facilities and concessions according to Industrial Policy (2010). Seed development activities should be focused in and around *Madhya Pahadi Lokmarga*.
5. Zoning concept in seed multiplication should be followed based on technical feasibility, business favorability, infrastructural availability and demand. Districts and particular crop seed production zones/pockets should be declared in close consultation with value chain actors. This enables technical and financial support in a judicious manner. This is in conformity with Industrial Policy 2010 (clause 11.23, p.9) of establishing Industrial Village and Product Development Centers. An alignment with as many existing policies as possible should enforce replication and applicability.

Zoning concept described above may make easy the focus to develop public services like road, electricity, irrigation, processing and storage infrastructures and other communication facilities for seed production zones/pockets.

6. For speedy spread of a new variety, sufficient quantity of pre-released foundation seed production has been a constraint. This issue should be handled with care by contracting seed companies in respective agro-ecological zone to multiply foundation seed of promising pipeline varieties as signaled by DUS test. SQCC and concerned breeder/institution should work together with the private seed companies to make necessary arrangement with needed support, including financial assistance to bear risk.
7. Popularizing a newly released variety takes unexpectedly a long time to reach farmers for mass adoption. The current approach is to conduct demonstrations and distribute minikits of new varieties by DADO to educate farmers for adoption. This approach should be changed by adaptive research in farmers' fields by: (a) giving joint responsibility of demonstration to NARC and DOA organizations in the field (e.g., DADO and ARS); (b) area for such demonstration should be increased to ten ha in terai and two ha in hills and mountains; (c) the cooperator farmers should be selected in coordination with VDC, and cooperators should bear 25% of cost of production; (d) compensation should be ensured if demonstration fails; and (e) this should be evaluated by ARS, DADO and VDC as a result of adaptive research.
8. Foundation seeds should be produced under the supervision of the seed specialist. Not all source seed producers have qualified manpower. A Seed Business Plan should cover the development of seed specialists in public, NGO, academic and private sectors.
9. The use of BS and FS in cereals should be judiciously used for further seed multiplication to increase SRR by improving seed balance sheet preparation, agreement between supplier and buyer, and monitoring mechanism.
10. Integrate technically appropriate places of Terai and hills for seed multiplication, storage and supply of seeds of identified crops in Nepal.
11. Revolving fund should be created for the establishment of buffer stock, its management and replenishment of seed stock. A Seed Databank should be set up to facilitate fast flow of information on the availability of varieties and their quantity. SQCC should be the notified agency to facilitate coordination among seed value-chain actors through information network. A guideline should be prepared for this purpose.
12. Seed pledging should be recognized as an instrument to encourage private sector participation and seed industry promotion.

7.4 Quality Control

1. The CSTL lacks land for grow-out test and relies on NARC facility. Land should be made available and facilities, including required manpower, should be created for CSTL to conduct grow-out test. This is necessary because CSTL should itself be assured of quality performance of the variety in question. In gradual manner RSTL should also be given this responsibility by: (a) imparting technical knowledge and skills to the regional staff; and (b) decentralizing quality control function to the regional level, especially required when the country implements federal structure of governance.

2. Breeder Seeds quality has been questioned in scientific debates. The question has arisen because of the lack of quality standards and monitoring. As suggested earlier (in varietal development and maintenance section) a Committee of eminent scientists should inspect and report the procedure and quality followed of Breeder Seeds to the NSB for corrective actions. A system of reward and punishment should be established. Needless to say, Breeder Seeds will eventually impact upon the quality of seeds distributed to the cultivators, and supplied to the possible export market. Therefore, Nepal should develop standards for Breeder Seeds and monitor to comply with South Asian neighbors of Bangladesh and Pakistan.
3. Nepal should explore bilateral and multilateral forums and utilize donor-supported project facilities to develop and harmonize seed quality. One such forum is the SAARC Seed Bank Agreement which suggests conformity with the ISTA procedures already followed by Nepal. The Agreement envisages developing a Common Minimum Seed Quality Standard (CMQS) and Seed Testing Procedures for different quality attributes of genetic purity, germination capacity, physical purity, moisture content, seed health or others to be specified by the SAARC Seed Bank Board which is yet to be constituted. This is an opportunity for Nepal to participate in this forum and benefit for harmonization of quality standards to participate in the international market. The other platforms are the projects funded by donor-partners, such as USAID, FAO, etc which can bring together countries for bilateral and multilateral negotiations. International Food Policy Research Institute (IFPRI) and its staff, along with FAO could be of help in this aspect. Nepal should explore other possibilities also. In general, Nepal relies on three quality tests—namely, germination capacity, moisture content and physical purity— for quality certification.

The SAARC Seed Bank Agreement seeks to: (a) develop common seed certification system and standard; (b) designate nodal seed testing laboratory and to improve seed testing capacity and capability in each country; (c) update and harmonize relevant Acts and Regulations; and (d) develop procedure on transgenic varieties in future. Nepal should pursue to benefit from such Agreement.

7.5 Marketing and Pricing

1. Newly released/registered high yielding varieties seeds should be subsidized at a higher rate than old varieties (say more than 10 years) for specified period to encourage fast adoption and increased SRR and productivity. Thus, in comparison, old variety (e.g. Nepal 297) seeds will cost higher thereby prompting variety replacement and greater productivity. Subsidy should be administered in such a way that any agency legally recognized (private, non-government, community, government, etc) by seed law is eligible for participation. This should also be addressed in the "seed subsidy program" implemented by the government.
2. Quality seeds are still out of the reach of majority of farmers who want them in planting season, in place accessible to them and in right quantity. Remote areas aside, even the accessible places in Terai and in road connections experience short supply in time of need. So, Seed Voucher Program should be initiated to empower the needy farmers by: (a) issuing farmers ID card, (b) defining coverage of the program with number of farmers and geographical

areas, initially at pilot scale and then expanding further, and (c) developing proposal with budget and program.

3. The private seed industry interviewees reflected that government should check the distribution of substandard seeds, including import, in the market such that the genuine seed entrepreneurs can operate with quality seeds through competition. This suggests that capability of law enforcement agency for quality control (SQCC, DADO) should be strengthened.
4. Nepalese seed companies should enter the Indian market by formal registration. NARC varieties are in use in India, e.g., Khajura-3 rice, and some wheat varieties seeds are exported informally (views collected during interviews). Nepal varieties can enter the Indian market even through registration process (varietal registration is voluntary in India). SEAN may be better placed to initiate the process.

7.6 Institutional Strengthening

1. Strengthening of NSB remains a foremost priority then recognized by National Seed Policy 16 years (2000 AD) ago. This should not be delayed any further.
2. Institutional Strengthening should be viewed from a broader seed sector wide perspective to include public, private, community, academia, farmers organizations and NGO sectors in financial, human, infrastructure and internal and export trade related aspects. Training of Trainers should be imparted to representatives of private organizations on quality standards, seed business management and conduct of export trade through competition. Private seed companies should be imparted with knowledge and skills in negotiation for promoting and expanding export seed market.
3. Given the present state of seed development in Nepal, bio-technology should be confined to research application only. Tissue culture is popular in some plant species (banana, citrus, cardamom, etc). Transgenic research should be selective not to infringe upon our absolute advantageous plant species (e.g., Jumli Marshi, Jethobudho, Joroyal Basmati of rice, etc).
4. Capability strengthening should also be focused on bio-safety and environmental safety infrastructure to deal with GM seeds for detection, analysis and quarantine.

7.7 Cross Cutting Issues

1. Some activities and functions are woman-friendly in seed business. Therefore, women-only seed business should be encouraged with priority on training, soft loan, infrastructure development, seed multiplication and trade. In seed policy and program, gender analysis and assessment, gender audit and gender budget system should be implemented.
2. Geographical areas, indigenous people, poverty, special areas and inclusiveness defined by the Constitution of Nepal should be addressed by the National Seed Policy and seed development programs.

7.8 Monitoring and Evaluation

1. Seed market inspection is one of the major functions carried out by SQCC to monitor seed quality standards. Crop inspectors at DADO deliver both technical service for seed development

and legal service to enforce seed legislation. These Inspectors need both capacity and capability building. Instances of legislation violations, actions taken, appeals to such actions and decisions made should be documented and made public.

2. Periodic seed status surveys should be conducted, every five years, by independent agency to solicit improvements in the seed sector. Public and private agencies should also be encouraged to do so for internal monitoring and to take corrective future courses of action.
3. Results and feedbacks received from regular monitoring should be used to develop capacity in areas deficient in specific skills and knowledge.
4. A comprehensive M&E plan should be designed for seed sector development.

7.9 Legislative Reform and Seed Trade Harmonization

1. The formulation of legislation is as important as its enforcement in the field. Therefore, evidences of law enforcement (e.g., action taken against law violations and appeals to decisions made) should be recorded and communicated through proper means (electronic, print, etc) to the parties for building confidence and assurance of quality.
Law enforcement has been weak at the district level in particular and countrywide in general. The responsibility of Seed Act and Regulation enforcement in the field lies primarily with DADO and RDA. Law enforcement agencies (DADO, RDA and others) should be equipped with skills and knowledge of procedures to implement Seed Act and Regulations. The Crop Inspector and Seed Sampler in DADO should be given further trainings regarding effective law enforcement procedures including lodging of the cases against the violators of the Seed Act and Regulations. For training purposes, the Judicial Service Training Center could be the appropriate institution. The experience can be shared with MOFSC which trained their officials. Arrangement should be made in such a way that after the formal theoretical knowledge in the Centre, the trainees should be sent back home in their respective places of assignment for about three months and asked to lodge at least one case and share it with the same batch of trainees. This has been proven an effective hands-on training for the MOFSC officials involved in quasi-legal jobs.
2. It is difficult to stop plant pests in South Asia because of the informal trade across porous land borders. Therefore, it is plausible to rationalize phytosanitary protection by strengthening protection at the region's borders and harmonizing the same for intra-regional trade. The SAARC Secretariat should bring in regional governments and seed industry representatives to rationalize and harmonize phytosanitary controls.
3. Communication and coordination among industrial promotion and administration agencies and their organs down to the field (such as MOAD, MOF/Department of Customs/revenue agencies, Ministry of Industry, Ministry of Commerce, and local government) is very weak. This should be improved through regular meetings in the field, followed by reporting and issuance of directives from the central level authorities. Joint field visits by central authorities have proven quite effective to sort out implementation gaps in the field. Cooperation, especially, between Customs and Agriculture is vital for international trade. This should be improved on inspection issues related to reducing number of documents, thus, saving time and cost to trade.

4. The Industrial Enterprises Act (1992) covers only vegetable seeds, recognized as one of the national priority industries, under Section (3), Subsection (c). This Act should be amended pursuant to Section 13, subsection (e) by recommendation to GON for inclusion in the classification of industries to cover all seeds of cereals, other field crops, vegetables, fruits, spices, flowers, herbs, fodder/forage, trees and shrubs and medicinal plants as seed industry. Only then concessions and facilities can be provided to the seed business according to this Act. This is also necessary for export and import licensing and trade.
5. Representations in the NSB and its sub-committees should be done by concerned persons of high repute and experience. Further, the members should be such appointed as to represent public and private sectors in a manner that serves the objective of the Board and sub-committees. Present practice is to represent the institution by virtue of position held, and the public representation is in large majority. The representatives may be drawn from private breeders, importers, exporters, seed testing laboratory, seed associations, NGOs, seed companies, MOFSC, Ministry of Commerce, Department of Customs, seed producer farmers and cooperatives and academia. In the private sector, institutions should be free to elect their representative and such representation should be ensured at least for the term in question. There must be at least one male and one female seed producer farmer in each sub-committee representing mountain/hill and Terai.
6. For Nepal to be abreast with WTO requirements and to meet international phytosanitary obligations, infrastructures, laboratory facilities and manpower capacity building should be seen as urgent need.
7. Illegal movement of seeds, often of substandard quality and un-notified variety, has been a headache for quality control agency and loss to the cultivators. Firstly, regular meetings of law enforcing agencies in the country should be held and laboratory facilities should be upgraded along with training of personnel involved. Secondly, high level officials related to customs, trade, security, agriculture, and relevant government agencies of SAARC countries should convene a meeting or workshop to determine consistency in the application of custom laws and standards, and to harmonize sanitary and phytosanitary measures for improved customs processing in the region, saving time and cost for traders. The SAARC Seed Bank Agreement seeks to rationalize these measures. SAARC Secretariat could be the appropriate platform to coordinate this activity.
8. Seed export trade seems to have been constrained, among other things, by discretionary interpretation by border officials of existing legislations, such as phytosanitary measures, between the trading countries. Therefore, the bilateral Agricultural Working Groups (e.g., between Nepal and India) should meet at regular intervals, and as per need, to sort out anomalies arising at the border/custom points. It seems, much confusion was created by individual interpretation during implementation of the provisions of legislation and measures by the border authorities resulting into troubles for the trading parties.
9. Since Nepal's bulk of trade is confined to bilateral trade with India, seed would not be an exception. Phytosanitary factors dominate the most and this should be facilitated by establishing mirror PQ check posts in India as agreed.

10. Provisions should be included in National Seed Policy to limit GM crops only for research, and ban on terminator seed.
11. Plant Variety and Farmers' Rights should be protected by enactment. Farmers' Rights should be protected according to the International Treaty and practices. Farmers are the custodians of crop genetic resources and their capacity should be scaled up through programs and budgets for in-situ and ex-situ conservation.
Community Seed Banks (CSBs) help implement Farmers' Rights by sustainable use and conservation of crop genetic diversity. Therefore, CSBs should be:
 - Established and expanded to reach maximum number of farmers;
 - Integrated in agro-biodiversity programs as repository of results of participatory plant breeding;
 - Treated as vehicle for climate change adaptation;
 - Included in seed legislation to ensure Farmers' Rights to save, use, exchange and sell farm-saved seeds;
 - Mobilized by extension service to let farmers choose between traditional and new varieties;
 - Linked to private seed companies to multiply seeds of farmers' choice; and
 - Supported by value chain stakeholders to establish community registers of farmers' varieties.
12. Agricultural Marketing Act should be promulgated.

8. Action Plan to Implement the Recommendations

An Action Plan for the implementation of the recommendations put forth has been given in Table below.

Table 14. Suggested schedule of activities for the Seed Sector Policy Reform

S. No.	Recommendations	Implementation Timeframe	Responsible Organizations	Cooperating Organizations
1.0	National Seed Policy 2000			
1.1	National Seed Policy should be timely reformed to address the food and nutrition security, Zero Hunger Challenge, private participation, globalization, and plant breeders' and farmers' rights.	End of 2016	MOAD, NSB	Private, NGOs and other stakeholders
1.2	Seed Industry should be included as priority industry in Annex 1 of the Industrial Policy (2010), Industrial Enterprises Act (1992) and other relevant policy and legislations so as to ensure seed security through a vibrant seed industry.	By 2017	GON, MOAD, NSB	MOI
1.3	Quality Declared Seed system should be removed from the Policy as Truthful Label system and seed certification system are already popularly practiced in the country.	By 2016	MOAD, NSB	
1.4	Minimum Support Price Policy (MSP) should be implemented to fulfill the Constitutional objectives of	By 2017	GON, MOAD,	

	food sovereignty and GON commitment to Zero Hunger Challenge 2025. MSP should cover crops and agricultural products related to food security.		NSB	
1.5	Formulate National Agricultural Biotechnology Policy	By 2017	GON, MOAD, MOLD, NSB, NARC	Departments, Academia
1.6	Nepal must be capacitated to participate in WTO regime and in regional seed trade.	By 2020	MOAD, MOF, NPC, MOC	Private Seed Companies
1.7	National seed situation should be reviewed every five years by an independent expert body to assess achievements and shortfalls thereby providing suggestions for future courses of action.	By 2018	NSB	DOA, DOLS, Private
1.8	National Seed Policy and relevant legislations should be reviewed every five years to evaluate their efficiency, effectiveness and relevance by independent evaluator.	By 2018	MOAD, NSB	DOA, DOLS, MOFSC, Private
1.9	The seed trader (e.g., agro-vet) registered his/her business in multiple agencies. This burden should be reduced.	By 2018	GON, MOAD, NSB	Relevant Ministries, SEAN
1.10	Nepal's centers of genetic diversity should be conserved for future as "Agro-Biodiversity Centers".	By 2018	MOAD, DOA, DOLS, NARC, MOFSC,	
1.11	The rich agro-biodiversity of the country should be properly documented to protect from bio-piracy. National Gene Bank should be strengthened as a repository of national agro-biodiversity.	On-going	MOAD, MOFSC, departments	Private
1.12	Organic Farming Zones should be declared and certification for organically produced seed should be instituted.	By 2020	MOAD, NSB, DOA	Organic seed producers
1.13	Public and private matching investment in seed business should be prioritized and stepped up in components that enhance competitiveness.	By 2017	MOAD, NPC	Private
1.14	Seed Business Plan should be prepared, initially for five years, to cover the upgrading of: (a) human resource, (b) varietal breeding research and seed production, (c) processing, (d) storage, (e) marketing, (f) loan and insurance, (g) mechanization, and (h) increasing SRR. Academic institutions and the private sector should be integrated in seed sector development.	By 2017	NSB, DOA, Academia	Private
1.15	Illegal movement of seeds should be checked by coordination among law enforcing agencies. High level officials related to customs, trade, security, agriculture, and relevant government agencies of SAARC countries should convene a meeting or workshop to determine consistency in the application of custom laws and standards, and to harmonize sanitary and phytosanitary measures for improved	By 2017	MOAD, MOF, MOS, MOHA	SAARC Secretariat

	customs processing in the region, saving time and cost for traders.			
1.16	Mechanize seed production for efficiency and least cost operation.	By 2018	MOAD	Private
2.0	Varietal Development and Maintenance			
2.1	(1) Fast track and modern varietal breeding techniques should be followed for: (a) Improvement of crop varieties and dissemination of technology through bilateral and multilateral cooperation. (b) Nepal's collaboration with SAARC countries for varietal breeding research to benefit from each other. (2) Encourage private importation of varieties (especially from India) from conventional breeding to provide wider choice to farmers.	(a) By 2018 (b) On-going (c) By 2018	(a) MOAD, NSB, NARC (b) MOAD, NARC (c) MOAD, private	(a) Cereal Systems Initiative for South Asia (CSISA), IARCs, SAARC Seed Bank Agreement, donor-assisted projects, bilateral (Agriculture Working Group) and multilateral Meetings. (b) SAARC Secretariat for coordination; private, NGOs
2.2	A comprehensive human resource development plan should be prepared to develop plant breeders and seed technologists in academia, public and private sectors.	By 2017	MOAD, NARC, Academia, Private	
2.3	Private and NGO sectors should develop cooperation with IARCs, specifically, on promising inbred lines for hybrids.	By 2017	Private, NGOs	
2.4	Sharing of inbred lines by NARC with private and NGOs for hybrid variety breeding.	By 2016	NARC	Private and NGOs
2.5	Private should also be invited to test exotic varieties for registration and NARC should focus more on new variety breeding. SQCC should monitor the activity.	By 2016	SQCC	Private and NGOs
2.6	Engage and honor retired eminent breeders and seed technologists in their areas of expertise to fill up the gap of manpower shortage.	By 2017	SQCC, NARC	
2.7	Research and breeding programs limited in few crop species now should be extended to other crops, and strengthened beginning with vegetables and forage seeds in the first phase followed by other crop species in later phases.	By 2017	NARC, DOA,	Private, NGOs
2.8	Guidelines on crop specific hybrid research and seed multiplication should be developed and implemented. A Hybrid Research Unit should be established beginning with rice, maize and vegetables. Quality standards for hybrid seeds should be developed.	By 2017	NSB, NARC	
2.9	Maintain existing varieties in specified zone by	By 2017	NSB, NARC,	Private

	deployment of qualified manpower.		DOA	
2.10	Constitute a committee of eminent scientists to review and validate the current practice of BS production and maintenance.	By 2017	NSB	NARC, DOA, DOLS, Private
2.11	CSTL should conduct DUS test by acquiring land and other infrastructures. This should be decentralized to RSTL in phased manner.	By 2017	NSB, DOA	
2.12	Private sector should be free to export seeds of varieties/hybrids developed by them following the procedures laid down by seed legislation; however, in case of natural calamity, government may issue notice to this effect to restrict export.	By 2017	MOAD, NSB, Private	
2.13	Expenditure incurred on research and varietal development by private and NGO sectors should be exempt from income tax obligation.	By 2017	MOAD, NSB, Private, NGO	
3.0	Seed Multiplication			
3.1	Observe standard seed multiplication stages of BS-FS-CS-IS for supply of quality seeds. Help improve seed balance sheet preparation for source seed supply.	By 2017	NSB, NARC, Seed Companies	
3.2	Introduce advance payment/contract agreement to make source seed supply predictable and to provide incentive to producers.	By 2017	NSB, NARC, DOA, farmers, Private	
3.3	Remote areas, mountains and selected hill districts should be supported by government to encourage private participation in: seed research, multiplication, processing and marketing.	By 2017	MOAD, NSB, private, NGOs	
3.4	Seed "Pocket Area" approach (zoning) should be followed for designated crop species seed multiplication. In hills and mountains, focus on <i>Madhya Pahadi Lokmarga</i> .	By 2017	NSB, Private and NGOs	
3.5	Public services like road, electricity, irrigation, processing and storage infrastructures and other communication facilities should be developed in support of seed production pockets (zones).	By 2020	NPC, MOF, MOAD	Concerned Ministries, Private
3.6	Pre-released foundation seed production should be contracted to private seed companies in respective agro-ecological zone with close cooperation of SQCC and concerned breeder/institution. This should be accompanied with financial assistance to avert risk, if any.	By 2016	NSB, NARC, Departments, seed companies	
3.7	NARC (ARS) and Department (DADO) should jointly conduct mass demonstration to popularise newly released variety in farmers' fields in the form of adaptive research; area 10 ha in Terai and 2 ha in hills and mountains; cooperator farmers should be selected in coordination with VDC, and cooperators should bear 25% of cost of production; compensation should be	By 2017	NARC, DOA, VDC, Farmers	

	ensured if demonstration fails; and evaluated by ARS, DADO and VDC as a result of adaptive research.			
3.8	Establish Revolving Fund to establish, manage and replenish the seed Buffer Stock. Seed Databank should be set up for information on availability of variety and quantity.	By 2017	MOAD, NSB, DOA	
3.8	Seed pledging should be recognized as an instrument to encourage private sector participation and seed industry promotion.	By 2017	MOAD	MOF
4.0	Quality Control			
4.1	CSTL and RSTL should conduct grow-out tests themselves.	By 2018	SQCC	
4.2	Breeder Seed quality standards should be developed and maintained through inspection by a Committee of eminent scientists.	By 2017	NSB	
4.3	Explore bilateral and multilateral forums and utilize donor-supported project facilities to develop and harmonize seed quality standards and trade.	By 2018	MOAD, NSB	
5.0	Marketing and Pricing			
5.1	New varieties should be subsidized at higher rate than old (>10 years) varieties for specified period to increase SRR and productivity.	By 2016	MOAD	
5.2	Initiate Seed Voucher Program to target the needy farmers.	By 2017	MOAD, CDD, Private	Departments
5.3	Private should be free to export seeds of varieties developed by them following seed legislation; except in case of natural calamity.	By 2017	MOAD, NSB, Private	
5.4	Conduct seed export market research	By 2017	DOA	Private
5.5	Demand and price signal is required for seed marketing; information pertaining to seed stock, varieties and price is lacking. Farmers buy seed available in local market. This limits their choice for seeds. A web-based Seed Information System should be implemented. The Seed Databank should be updated periodically.	By 2017	SQCC	AEC, DCCI
5.6	Nepalese seed companies should enter the Indian market by formal registration.	By 2017	Seed companies	MOAD
6.0	Institutional Strengthening			
6.1	NSB, SQCC, Labs, GMO testing should be strengthened.	By 2017	MOAD	
6.2	Conduct Training of Trainers (TOT) for public, private, community, NGO and farmers' organization representatives on quality standards, seed business management, and export trade.	By 2018	SQCC, DOA	Seed value chain stakeholders
6.3	Bio-technology in seed should be confined to research application only and terminator seed should be banned. Transgenic research should be selective not to infringe upon	By 2017	NSB, NARC	Academia

	absolute advantage plant species (e.g., Jumli Marshi, Jethobudho, Jorayal Basmati of rice, etc). Capacity should be developed on bio-safety and environmental safety infrastructure to deal with GM seeds.			
7.0	Cross Cutting Issues			
7.1	Women seed entrepreneurs should be encouraged by: training, soft loan, infrastructure support, seed multiplication and trade; incorporating gender analysis and gender budget system in policy and program.	By 2017	MOAD, NSB, CDD	Private and NGOs
7.2	Geographical areas, indigenous people, poverty, special areas and inclusiveness defined by the Constitution of Nepal should be addressed by the National Seed Policy and programs.	By 2017	MOAD, NSB	NGOs
8.0	Monitoring and Evaluation			
8.1	Seed market inspection by SQCC to monitor seed quality standards and enforcement of seed legislation by Crop Inspectors/Seed Sampler should be documented and communicated. The Inspectors need both capacity and capability building. Instances of legislation violated, actions taken, appeals to such actions and decisions made should be documented and made public.	By 2017	NSB	
8.2	Seed status surveys should be conducted, every five years, by independent agency to solicit improvements.	By 2018	NSB, SQCC	Private, NGOs
8.3	A comprehensive seed sector M&E plan should be designed and implemented.	By 2016	NSB, Private	
9.0	Legislative Reform and Seed Trade Harmonization			
9.1	Law enforcement agencies (DADO, RDA and others) should be equipped with skills and knowledge of procedures to implement Seed Act and Regulations.	By 2017	SQCC	
9.2	Rationalize phytosanitary protection by strengthening protection at the region's borders and harmonizing the same for intra-regional trade.	By 2018	MOAD	SAARC Secretariat
9.3	Improve coordination among industrial promotion and administration agencies and their organs down to the field through regular meetings and joint field visits.	By 2016	MOAD, MOF	MOC, MOI
9.4	Include all seeds of cereals, other field crops, vegetables, fruits, spices, flowers, herbs, fodder/forage, trees and shrubs and medicinal plants as seed industry in the Industrial Enterprises Act (1992).	By 2018	MOAD, NSB	MOI
9.5	Restructure NSB and its sub-committees to include persons of high repute and experience, farmers, private companies, exporters, other ministries, gender and geographical inclusion. Members should be appointed for the full term.	By 2017	MOAD, NSB	
9.6	To be abreast with WTO requirements and to meet international phytosanitary obligations,	By 2017	MOAD, NSB	Private, NGOs

	infrastructures, laboratory facilities and manpower capacity building should be seen as urgent need.			
9.7	Export trade seems to have been constrained by discretionary interpretation by border officials of existing legislations, such as phytosanitary measures, between the trading countries. Activate bilateral and multilateral forums.	On-going	MOAD, MOF, NSB	CSISA, SAARC Seed Bank Agreement, Bilateral Ag Working Group, etc
9.8	National Seed Policy should limit GM crops only for research, and ban on terminator seed.	By 2017	MOAD, NSB	Private, NGOs
9.9	Plant Variety and Farmers' Rights should be protected by enactment. Community Seed Banks (CSBs) help implement Farmers' Rights by sustainable use and conservation of crop genetic diversity. Therefore, CSBs should be: (a) Included in seed legislation to ensure Farmers' Rights to save, use, exchange and sell farm-saved seeds; (b) Integrated in agro-biodiversity programs;(c)Treated as vehicle for climate change adaptation;(d) Established and/or expanded; (e) Mobilized by extension service to let farmers choose between traditional and new varieties; (f) Linked to private seed companies to multiply seeds of farmers' choice; and (g) Supported by value chain stakeholders to establish community registers of farmers' varieties.	By 2018	MOAD, SQCC	Departments, private, NGOs
9.10	Agricultural Marketing Act should be promulgated.	By 2017	MOAD	

9. Concluding Remarks

National Seed Policy and legislative frameworks facilitate internal seed trade and promote export by providing favorable climate for seed business. The positive outcomes help increase seed replacement rates and, thus, augment productivity of crops to ensure food and nutrition security, increase employment and reduce poverty. The ultimate boost to GDP is possible through better performing agricultural sector for which seed as basic input is instrumental.

Farmers as focal point should be provided with choice of varieties of their preference. Enabling policy and legislative environment, fast track crop breeding, multiplication and distribution at affordable price of seeds of appropriate varieties in sufficient quantity, strengthening institutions to take up the responsibility, and private sector led seed business is expected to face agriculture sector's challenge in years to come.

References

GON, NPC. 2071 BS (2014). The Thirteenth Plan 2070/71-2072-/73 BS (in Nepali). Singha Durbar, Kathmandu.

http://www.fao.org/fileadmin/user_upload/legal/docs/lpo58.pdf

<https://search.wto.org/search>

<http://www.fao.org/docrep/019/i3514e/i3514e.pdf>

http://www.lawcommission.gov.np/page/16/?workflow_state=prevailing-laws-statutes-acts

World Trade Organization, Sanitary and Phytosanitary measures website, Available at:

www.wto.org/english/tratop_e/sps_e/sps_e.htm

STDF website: www.standardsfacility.org

<http://www.lawcommission.gov.np/en/documents/2015/08/plant-protection-rules-2066-2010.pdf>

SPS brochure: www.wto.org/english/thewto_e/20y_e/sps_brochure20y_e.pdf

SPS on the WTO website: www.wto.org/sps

WTO Online Bookshop: <http://onlinebookshop.wto.org>

SPS information management system: <http://spsims.wto.org>

http://vdd.gov.np/userfiles/files/Tarkari%20Annual%20Book_069-70_7-17,final.pdf

www.doaengg.gov.np

NARC, Pasture and Fodder Division. 2064 BS. Pasture and Fodder Division. Khumaltar.

GON, NARC, Horticulture Research Division. 2014. Annual Report 2070/71 (2013/14). Khumaltar.

National Seed Company Limited. Central Office, Kathmandu. Available at: www.nscl.org.np.

The Seeds Act Of Bhutan. 2000. Royal Government of Bhutan, Ministry of Agriculture. Available at:

<http://faolex.fao.org/docs/pdf/bhu36254.pdf>.

Ministry of Agriculture. The Seeds Act, 1966 (Act No.54 of 1966), New Delhi.

<http://agriexchange.apeda.gov.in/marketreport/Reports/Bangladesh%20Seed%20Laws%20and%20Regulations%20-%20A%20Chronological%20Summary%20New%20Delhi%20Bangladesh%2012-15-2014.pdf>

The Seed Rules, 1998 of Bangladesh can be accessed at: <http://www.sca.gov.bd/Default.aspx>

The National Seed Policy of Bangladesh can be accessed at: <http://www.sca.gov.bd/Default.aspx>

<http://www.oecd.org/tad/seed>

www.planttreaty.org

GON. Customs Act 2064 (2007)

GON. Customs Regulations (2007)

GON. Plant Protection Act 2064 (2007)

GON. Plant Protection Regulations 2066 (2010)

GON. Export and Import Control Act 1957 (Amended 2006)

GON. Export and Import Control Rules 1978

GON. Nepal Standards (Certification Mark) Act 1980

GON. Nepal Standards (Certification Mark) Regulation 1982

GON, MOAD, SQCC. 2072 BS (2015). Seed Certification Guidelines (in Nepali). Harihar Bhawan, Lalitpur, Nepal.

GON, MOAD. 2008. National Seed Policy 2000. In Krishi Sambandhi Niti, Ain, Niyam ra Aadeshharu ko Sangalo (in Nepali), Singha Durbar, Kathmandu.

GON, MOAD. 2008. Seed Act 1988. In Krishi Sambandhi Niti, Ain, Niyam ra Aadeshharu ko Sangalo (in Nepali), Singha Durbar, Kathmandu.

GON, MOAD, SQCC. 2014. Seed Regulations 2013. Harihar Bhawan, Lalitpur, Nepal.

GON, MOAD. 2008. National Agriculture Policy 2004. In Krishi Sambandhi Niti, Ain, Niyam ra Aadeshharu ko Sangalo (in Nepali), Singha Durbar, Kathmandu.

GON, MOAD. 2008. Agriculture Business Promotion Policy 2006. In Krishi Sambandhi Niti, Ain, Niyam ra Aadeshharu ko Sangalo (in Nepali), Singha Durbar, Kathmandu.

GON, MOAD. 2008. Agriculture Biodiversity Policy 2007. In Krishi Sambandhi Niti, Ain, Niyam ra Aadeshharu ko Sangalo (in Nepali), Singha Durbar, Kathmandu.

GON. Patent, Design and Trade Mark Act 1965.

GON, Ministry of Industries. 2010. Industrial Policy: Singha Durbar , Kathmandu.

GON, Ministry of Commerce and Supplies. 2010. Nepal Trade Integration Strategy 2010: Executive Summary and Action Matrix. Kathmandu.

Kamalesh Adhikari. 2012. Seed Banking in South Asia for Protection of Farmers' Rights. SAWTEE, Baluwatar, Kathmandu, Nepal.

Development Fund. 2011. Banking for the Future: Savings, Security and Seeds. A short study of Community Seed Banks in Bangladesh, Costa Rica, Ethiopia, Honduras, India, Nepal, Thailand, Zambia and Zimbabwe. Oslo: Norway.

FAO. 2010. The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture, Rome.

<http://www.farmersrights.org>.

GOI. 1966. The Seeds Act, 1966; GOI. 1972. The Seeds (Amendment) Act, 1972. All available at: <http://faolex.fao.org/>.

GOI. 1968. The Seeds Rules 1968; GOI. 1973. The Seeds (Amendment) Rules, 1973; GOI. 1974. The Seeds (Amendment) Rules, 1974; GOI. 1981. The Seeds (Amendment) Rules, 1981. All available at: <http://faolex.fao.org/>.

GOI. 1983. The Seeds (Control) Order, 1983; GOI. 2006a. The Seeds (Control) Amendment Order, 2006. Available at: <http://faolex.fao.org/>.

GOI. 1988. New Policy on Seed Development, 1988. Available at: http://seednet.gov.in/Material/NEW_POLICY_NPSD.pdf.

GOI. 1914. The Destructive Insects and Pests Act, 1914. Available at: <http://faolex.fao.org/>.

GOI. 1989. Plants, Fruits and Seeds (regulation of import into India) Order, 1989. Available at: <http://faolex.fao.org/>.

USAID. April 2014. Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia.

Pullabhotla H, G Shreedhar, A Ganesh-Kumar, A Gulati. 2011. A Review of Input and Output Policies for Cereals Production in Nepal. IFPRI discussion paper no. 01114. Washington, DC: IFPRI.

Crop Development Directorate/DOA and Agronomy Society of Nepal. 2013. Agronomy Journal of Nepal, Vol 3, 2013. Available at www.cddnepal.gov.np .

Annexes

Annex 1: Terms of Reference of National Consultant

Terms of Reference for Seed Sector Policy Review

Title Assignment	Seed Sector Policy Review
Types of Consultant	National
Mode of contract	Direct
Assignment duration	Person Months: 2
Primary assignment location	SQCC, Harihar Bhawan
Funding source(s)	Kisankalagi Unnat Biubijan Karyakram (KUBK-ISFP)

1. An overview of the KUBK-ISFP

Ministry of Agricultural Development with the financial assistance of the International Fund for Agriculture Development (IFAD, is implementing Kisankalagi Unnat Biubijan Karyakram (KUBK-ISFP³¹)) with an aim to contribute competitive, sustainable and inclusive rural growth. The development objective of the program is to improve rural household income through sustainable market driven agricultural productivity improvement strategies of rural agriculture based enterprises. Heifer International is a co-financier as well as an implementing partner of the programme and other implementing partners include Agro Enterprise Centre (AEC), Small Farmer Development Bank (SFDB) and Nepal Agricultural Cooperative Central Federation Limited (NACCFL).

The Programme is designed to support two key aspects of agriculture sector limiting productivity: (i) improvement of formal seed sector (cereals and vegetables), and (ii) improvement of smallholders' livestock business (goats and dairy). The Programme intervention strategy consists of four components, namely (i) Support to the Expansion of the Formal Seed Sector; (ii) Smallholder Livestock Commercialization; (iii) Local Entrepreneurship and Institutional Development and (iv) Programme Management and Coordination (PMO). The Programme has provisioned investment funds for grant schemes focusing on formal seed business and smallholders' livestock enterprises.

2. Purpose of the assignment

As per the KUBK-ISFP design document, the component 1: **Support to Extension of the Formal Seed Sector** aims to address the low seed replacement rates and poor quality seeds for vegetables and the cereals in the hills zone by promoting the 'Truthfully Labelled' and good quality seed production

³¹ ISFP- Improved Seed for Farmer's Programme [Kisan : Farmer-, kalagi : for, Biubijan: Seed and Breed, Karyakram : Programme]

through the formal sector development and supports. Therefore, this component strategically focused to expansion of formal seed sector and major outcomes under the component are; (i) improved enabling environment for seed production; (ii) improved expanded formal seed production; and (iii) increased demand for quality seed. These outcomes will be achieved through the strengthening role and capacity of NARC and DOA farms and SQCC and RSTL to produce required foundation seed and perform adequate seed quality control mechanism.

Moreover, as per the KUBK-ISFP designed document KUBK-ISFP can support the National Seed Board (NSB) and Seed Quality Control Centre (SQCC) for regulation of National Seed Vision 2013-2025 by improving prevailing Seed Act, Regulations and Policy. Therefore, KUBK-ISFP wishes to support the NSB and SQCC to review present national seed legislation and seed quality control mechanism of the country through review process for the amendment of seed Act, Regulations and Policy (if necessary) with the wider consultation of the relevant public and private stakeholders for effective implementation of the Seed Vision 2013-2025. In this connection, KUBK-ISFP planned to utilize 2 person-months of input of National Consultant to support legal framework for the development of formal seed sector in the country.

The purpose of the assignment is to review the present seed legislation and regulation system and trace out the shortfalls that limiting seed regulation mechanism of the country taking account of the prevailing Seed Act, Rules and regulations, and policies and recommend Government of Nepal (GON), Ministry of Agricultural Development for strengthening and amendments for better execution of formal seed sector in the country. The consultant shall need to take wider consultation with potential stakeholders from both public and private sectors that actively involved in the seed business to excavate the weakness for implementing the Seed Act and Regulations. Besides, the consultants should prepare an efficient and feasible implementation plan, and prepare the subject matters for amendments.

3. Detail tasks of the National Consultant

The consultant will work closely in coordination with related stakeholders both in public and private sector and will be working directly under the supervision of Policy for International Cooperation and Coordination (PICC) Division of the Ministry of Agricultural Development (MOAD). The detail task of the consultant will be as outlined below.

- i. Prepare an Inception Report how consultant will accomplish the assigned task and collect feedback from the public and private sector stakeholder consultation and finalize the plan of action incorporating the feedback and suggestions.
- ii. Review the current Seed Act, Rules, Regulations and Policy guidelines of Nepal with a view to identifying gaps in these aforesaid legal documents.
- iii. Identify gaps in order to incorporate and operationalize the Seed Trade Harmonization Regulations at national/international level and provide appropriate recommendation based on the analysis made in point ii. Besides, the consultants need to dig out the seed standards required for seed trade including phytosanitary measures.

- iv. Organize interaction meetings with related stakeholders. Some of the suggested key stakeholders could be the officials of the MOAD, SQCC, DOA, CDD, VDD, and DADOs. Seed producer groups (Farmer's groups/Cooperatives) from the programme districts and national, regional and local seed entrepreneurs and suggest SQCC and National Seed Board (NSB) to ensure an effective enabling environment for formal seed sector development.
- v. Based on the analysis made as per point iv, recommend appropriate subject matter for Seed Act, Rules and Regulations and Seed Policy amendments
- vi. The consultant is required to validate the output of the assignment through a validation workshop taking account of subject matter recommended for Seed Act/Seed Regulation/ Seed Policy amendments in wide group of national stakeholders (relevant decision and policy makers as well as private sector those involved in the seed industry) and incorporate appropriate suggestions in the report.
- vii. Suggest specific action and initiatives to be performed by the government to attract private sectors' investment along the seed value chains.
- viii. Present a report to the KisanKalagi Unnat Biubijan Karyakram (KUBK-ISFP), Ministry of Agriculture Development (MOAD) in consultation with the National Seed Board (NSB) and Seed Quality Control Centre (SQCC) in full compliance with national legal processes.

4. Deliverables

Inception report- three copies

Final Review Report (10 copies) with data and CD ROM.

5. Duration of Assignment

The input for the assignment is 2 person-months only. No additional input will be acceptable for the assignment.

6. Guidance for Assignment

Strategic guidance for the Consultant will be provided by Policy for International Cooperation and Coordination (PICC) Division of the Ministry of Agricultural Development. The SQCC, Programme Manager and Seed Coordinator of KUBK-ISFP will facilitate the consultant.

7. Counterpart facilities

The consultant is required to manage all the physical facilities, such as computers, photocopiers, papers, camera, vehicles and other equipments itself. No any counterpart facilities will be provided by the Programme. However, a modest office space with furniture will be provided for the consultant at SQCC office, Harihar Bhawan.

Annex 2: Persons Met

Mr Mitra Raj Dawadi, Seed Entrepreneur, Narayangadh, Chitwan

Mr Som Nath Ghimire, SADO, DADO, Chitwan

Mr Sudip Regmi, Crop Development Officer, DADO, Chitwan

Mr Dhan B Thapa, Horticulture Development Officer, DADO, Chitwan

Mr Govinda KC, National Maize Coordinator, National Maize Research Program, Rampur, Chitwan

Mr Chitra B Kunwar, Senior Scientist, National Maize Research Program, Rampur, Chitwan

Dr Tika Karki, Senior Scientist, National Maize Research Program, Rampur, Chitwan

Mr Tirtha Raj Rijal, Senior Scientist, National Maize Research Program, Rampur, Chitwan

Mr Jivan Shrestha, Scientist, National Maize Research Program, Rampur, Chitwan

Mr Bala Ram Bhandari, Scientist, National Maize Research Program, Rampur, Chitwan

Mr Santa Bahadur B K, Senior Technical Officer, National Maize Research Program, Rampur, Chitwan

Mr Bodh Raj Sapkota, Vice Chairman, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Shanta Raj Acharya, Joint Secretary, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Karna B Bhandari, Treasurer, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Kiran Poudel, Member, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Ram Prasad Parajuli, Official, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Degendra Mahato, JTA, Unnat Bij Briddhi Krishak Samuha, Patihani, Chitwan

Mr Deepak Sapkota, Crop Development Officer, Regional Seed Testing Laboratory, Bhairahawa

Ms Kala Budha Magar, Crop Development Officer, Regional Seed Testing Laboratory, Bhairahawa

Mr Uma Shankar Pathak, Plant Quarantine Officer, Regional Plant Quarantine Office, Belahiya, Bhairahawa

Mr Hari Khanal, Plant Quarantine Officer, Regional Plant Quarantine Office, Belahiya, Bhairahawa

Mr Bhoj Raj Sapkota, Senior Agriculture Development Officer, DADO, Rupandehi

Mr Ghana Shyam Choudhary, Horticulture Development Officer, DADO, Rupandehi

Mr Nabin Bhandari, Agriculture Extension Officer, DADO, Rupandehi

Mr Binod Gyawali, Crop Development Officer, DADO, Rupandehi

Mr Ramesh Jayaswal, Fisheries Development Officer, DADO, Rupandehi

Mr Shankar Gupta, National Seed Company Limited, Bhairahawa

Mr Shesh Raman Upadhyaya, National Wheat Coordinator, NWRP, Bhairahawa

Mr Nutan Raj Gautam, Senior Scientist, NWRP, Bhairahawa

Mr Ganesh Aryal, Act. Chief Customs Officer, Customs Office, Bhairahawa

Mr Gopal Bhattarai, Customs Officer, Customs Office, Bhairahawa

Mr Laxman P Poudel, Program Manager, KUBK, Butwal

Mr Ramji Devkota, Deputy Program Manager, KUBK, Butwal

Mr Lila Ram Poudel, Seed Coordinator, KUBK, Butwal

Mr Hari Sharma Neupane, Local Entrepreneurship and Institutional Development Coordinator, KUBK, Butwal

Mr Keshav Adhikari, Project Coordinator (AEC), KUBK

Dr Mahendra P Khanal, Senior Seed Development Officer, SQCC, Harihar Bhawan

Mr Subhas Raj Upadhyay, Chairman, Lumbini Seed Company Pvt. Ltd., Siddharthanagar, Rupandehi

Mr Kanhaiya, Managing Director, Lumbini Seed Company Pvt. Ltd., Siddharthanagar, Rupandehi

Mr Bhim Narayan Choudhary, Lumbini Seed Company Pvt. Ltd., Siddharthanagar, Rupandehi

Mr Sahadev P Humagain, SADO, DADO, Rukum

Mr Nar B Pandey, Janajagriti Agriculture Seed Producer Group, Musikot-9, Rukum

Mr Bhanu Malla, Chairman, Rukumeli Agri Cooperative, Sankh-8

Mr Khadananda Sharma, Secretary, Janajagriti Agriculture Seed Producer Group, Musikot-9, Rukum

Mr Bishnu Kumar Shrestha, Senior Vegetable Development Officer, Chapa, Rukum

Mr Him B Pandey, Farmer

Mr Phal B Pandey, Farmer

Mr Ram B Mahat, Farmer

Mr Krishna B Bohora, Farmer

Mr Bhuwan Jung Pudasaini, KUBK-ISFP, Rukum

Mr Kiran Malla, Farmer

Mr Bhim B Pandey, Group Member

Ms Sushila Pandey, Group Member

Ms Nar Maya Pandey, Group Vice-Chairperson

Mr Top B Pandey, Group Member

Mr Bhadra B Bohora, Group Member

Mr Sahadev P Humagain, Senior Agriculture Development Officer, DADO, Rukum

Mr Sambhu Nath, Horticulture Development Officer, DADO, Rukum

Mr Bal Krishna Shah, Horticulture Development Officer, DADO, Rukum

Mr Bandhu Ram Choudhary, Agriculture Extension Officer, DADO, Rukum

Mr Madhav KC, B Sc Ag, Secretary, Rukumeli Agro Seed Center, Tulsipur, Dang

Mr Mahendra Kumar Rokaya, Treasurer, Rukumeli Agro Seed Center, Tulsipur, Dang

Mr Krishna B Basnet, SADO, District Agriculture Development Office, Banke

Mr Bashir Ahamad Khan, Fisheries Development Officer, District Agriculture Development Office, Banke

Mr Dhan B Pun, Agriculture Extension Officer, District Agriculture Development Office, Banke

Mr Hasmulla Khan, Crop Development Officer, District Agriculture Development Office, Banke

Mr Chaturbhuj Choudhary, Horticulture Dev. Officer, District Agriculture Development Office, Banke

Mr Uma Nath Dawadi, Proprietor, Chitwan Agro-vet, Nepalgunj

Mr Dilip Kumar Singh, Crop Development Officer, Regional Seed Testing Laboratory, Banke

Mr Pradip Kumar Shrestha, JT, Regional Seed Testing Laboratory, Banke

Mr Basu Subedi, Officiating Program Director, Vegetable Development Directorate, Khumaltar

Mr Chandra Man Shrestha, Senior Horticulture Officer, National Potato Development Program, Khumaltar

Mr Deepak Adhikari, Senior Plant Protection Officer, Vegetable Development Directorate, Khumaltar

Mr Arun Kafle, Senior Vegetable Development Officer, Central Vegetable Seed Production Centre, Khumaltar

Mr Giri Dhari Subedi, Senior Scientist (S-4), Horticulture Research Division, NARC, Khumaltar

Dr Surendra Lal Shrestha, Senior Scientist, Horticulture Research Division, NARC, Khumaltar

Dr Tek Prasad Gotame, Scientist, Horticulture Research Division, NARC, Khumaltar

Mr Kishor Kumar Shrestha, Chief, Pasture and Fodder Division, NARC, Khumaltar

Mr Dharma Raj Adhikari, Managing Director, National Seed Company Limited, Teku, Kathmandu

Mr Durga P Adhikari, Managing Director, SEAN Seed Service Centre Limited, Thankot, Kathmandu

Mr Deependra Keshari Neupane, Production Manager, SEAN Seed Service Centre Limited, Thankot, Kathmandu

Dr Suroj Pokharel, Joint Secretary, Policy and International Cooperation and Coordination Division, MOAD

Dr Pradyumna Raj Pandey, Senior Agricultural Economist, Food Security, Agribusiness and Environment Division, International Trade Promotion Section, MOAD

Mr Arun GC, Agriculture Extension Officer, Food Security, Agribusiness and Environment Division, International Trade Promotion Section, MOAD

Dr Posh Raj Pandey, Chairperson, South Asia Watch on Trade, Economics and Environment (SAWTEE), Baluwatar, Kathmandu

Mr Kishor Maharjan, SAWTEE, Baluwatar, Kathmandu

Mr Dilli Ram Sharma, Director, Plant Protection Directorate, Executive Secretariat of the National Plant Protection Organization of Nepal, Harihar Bhawan, Lalitpur

Mr P L Hada, Program Chief, National Plant Quarantine Program, Harihar Bhawan, Lalitpur