

An overview of different seed production initiatives in Nepal

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Abstract

Findings of study related to seed and seed initiatives in seven districts encompassing different classes of seed systems have been explained. Source seed produced by public and private institutions in Nepal is illustrated to make proper analogue as to how seed systems could be made practically functional. SWOT analysis of important seed systems is compared in issues pertaining to seed systems in Nepal. Information received from the seed related stakeholders has been analyzed to draw the inference covering different seed system initiatives in Nepal. On the basis of scientific evidences collected from concerned stakeholders from cross section of study districts on various issues of seed, recommendations have been proposed to make effective seed systems by amalgamation of available seed production initiatives under single funneled seed system that could be implemented to sustain food security and enhanced productivity of crops in general and major food crops in particular in Nepal.

Key words: single funnel seed system, seed initiatives, SWOT analysis, DISSPRO, CBSP

Introduction

Merriam-Webster free dictionary defines seed as the grains or ripened ovules of plants used for sowing. In other words, seed is the fertilized ripened ovule of a flowering plant containing an embryo and capable normally of germination to produce a new plant. In still broader sense, seed is a propagative plant structure (as a spore or small dry fruit). Likewise, seed in zoological sense is a propagative animal structure; a small egg (as of an insect), a developmental form of a lower animal suitable for transplanting; specifically the condition or stage of bearing seed and semen that fuses with ova and give rise to a zygote finally an animal passing through the different stages of cell differentiation and development.

There are different classes of seed and source seed is maintained and used for subsequent classes of seed production. Source seed is important aspect of maintaining seed purity for enhancing yield of any crops in question. Use of seed of an appropriate class and from an approved source is necessary for raising the seed crop. Four classes of seeds, breeders, foundation, registered and certified have been defined by the Association of Official Seed Certification Agencies (AOSCA). In Nepal, practically four classes of seed are officially recognized. These are nucleus, breeder, foundation and certified seed; however, there is provision of truthfully labeled seed which can be taken as registered seed. Seed produced from these classes differ widely. **Nucleus seed** (www.agriinfo/...) is the initial amount of pure seed of improved variety or parental lines of a hybrid produced under supervision of the plant breeder who has evolved that variety. The nucleus seed is genetically and physically pure and does not contain other impurities. Nucleus seed should retain original vigor of the variety or parental line. **Breeder's seed** is the genetically pure seed produced by the concerned breeder or by the institution which is used for the production of foundation seed. **Foundation seed** is also genetically pure seed produced from breeder's seed under

strict supervision. Foundation seed is the source of registered and/or certified seed. **Registered** is the progeny of foundation seed that is so handled as to maintain satisfactory genetic identity and purity, and that has been approved and certified by a certifying agency. This class of seed should be of a quality suitable for production of certified seed. **Certified seed** is the progeny of foundation or registered seed. Certified seed is so handled as to maintain satisfactory genetic identity and purity and that has been approved and certified by the certifying agency. There are different classes of certified seed- seed produced from the first generation of certified seed is called C-1, likewise, seed produced from C-1 is called C-2 seed and so on and so forth. For self pollinated crops such as rice, wheat, and millet certified seed up to C-3 classes can be used whereas for cross pollinated crops such as maize, radish, and cauliflower proper isolation distance and inter crossing among varieties of same species should be checked to produce certified seed for open pollinated varieties of these crops. For hybrids, beyond F1 progeny there is drastic reduction in yield in case of successive generations of certified seed, hence use of new seed every planting season is necessary.

Since the time when men first domesticated plants, they have saved seed from their harvest for the next crop. They exchanged seed among themselves or with other tribes according to their customs and practices. This simple practice is the basis of the informal seed system, which is also referred to as the farmer based seed system or the traditional seed system. FAO reports indicate that 85% of global seed requirements come from the informal seed system, indicating its importance, in world agriculture. In Nepal, more than 90% of the cereal seed comes from traditional or informal system in which farmers save seed for next planting as well. Formal organized seed production activity is a relatively recent activity that was started in 1883 in the United States and which later spread among the more developed countries such as Holland, Australia and Canada over the last 75 years (Jaysinghe, 2011). Unlike the traditional seed system, the formal seed production activity is based on a complex interaction involving many institutions governed by appropriate legislation. The public sector is now increasingly directing their efforts towards addressing the needs of the farmers. The variety release committees within developing countries are increasingly considering the farmers needs before a new clone/inbred is released as a variety. All these changes contribute positively towards addressing the lack of improved seed in a given country.

Many seed related programs have been launched in Nepal both in public and private sectors. Of course, these have helped to increase food security and enhance crop production. Often time some of the seed initiatives have common goal with different names which has created confusion in policy and field level. Therefore, there is a need to harmonize these different programs under one umbrella thereby single seed system having same objectives can effectively be made functional in new paradigm. Important seed initiatives launched are district seed self sufficiency program (DISSPRO) 2055/56 implemented in different districts by district agriculture Development offices (DADOs), community based seed production program (CBSP) launched by HMRP/CIMMYT in 2056/57, implementation guidelines of community seed bank (CSB) 2065 in different districts, community seed production programs launched to support food security by GoN and donor agencies such as such as irrigation and water resource management program (IWRMP) and USAID seed production program and other programs. Similar seed production programs are carried out by different donor agencies, agrovets, seed dealers and certain CBOs to support food and nutritional security in Nepal. This has created confusion as to which seed production programs are launched in and around district. Likewise, GoN has started providing subsidy to farmers on purchase of improved seed from 2068.

This paper tries to explain the condition of various seed production programs citing examples of cross section study. It also suggests way how to mitigate limitations of these programs and recommends ways for effective seed production initiatives in Nepal.

Methodology

Data collection was done in seven districts viz; Dolakha, Kavrepalchowk, Sindhupalanchowk, Syangja, Chitwan, Bara and Kathmandu by preparing questionnaires. Interview was taken from various groups comprising of seed production cooperatives, extension service providers, source seed producers, seed entrepreneurs, agrovets, seed growers, community based seed producers, seed bank, and seed experts. Data were tabulated and analyzed by using descriptive statistics. Frequent field visits by authors in locations of six districts were done. On the basis of direct field visit and findings of primary data, interpretation was made pertaining to different issues which are described in result and discussion section. A highlight of institutions in the districts where information was collected with respect to different aspects of seed related concerns is illustrated (Table 1). From these districts a total of 54 institutions and groups were interviewed for collecting primary data on seed and seed related issues.

Table 1. List of different seed production initiatives in the study districts during 2012

	Type of the group/cooperative/ institution/ experts	D i s t r i c t							Total
		KTM	Bara	Kavre	Chitwan	Syangja	Dolkha	S.Palchok	
1	CBSP Group	0	0	0	0	2	1	1	4
2	Seed Company	0	2	0	1	0	0	1	4
3	Seed Cooperative	0	1	2	0	0	1	0	4
4	DISSPRO Groups	0	1	2	2	0	1	1	7
5	Community Seed Bank	0	0	1	0	0	0	0	1
6	Seed Service Provider/DADO	0	1	1	1	1	1	1	6
7	Seed Expert	2	1	0	1	1	1	0	6
8	Source Seed Producer	0	1	0	1	0	1	0	3
9	Seed Supplier/distributor	0	1	0	2	1	2	3	9
10	Seed Users' Group	0	2	0	2	0	3	3	10
	Grand Total	2	10	6	10	5	11	10	54

Results and Discussions

Seed production status

In 2011, improved seed produced from different seed production initiatives for cereal, legumes and oil seed crop was 32.37 thousand metric tons (Fig. 1). Of these, seed production of rice was (11.4 thousand mt), wheat (6.89 thousand mt), maize (7.65 thousand mt), lentil (2 thousand mt), mung (1.95 thousand mt), rajma (2.1 thousand mt), and tori (0.38 thousand mt). If we take the example of rice seed, the produced quantity is sufficient to cover 285000 ha are in the first cycle. From this area

if 1.0 ton/ha seed is produced and out of that 20% seed is recycled which is sufficient to cover 0.71 million hectare of area which is 50% coverage of total rice area in the country whereas in reality the seed replacement rate is around 9% for rice in Nepal. It indicates that there is a lot to do to increase seed replacement rate (SRR) of crops to increase food security. So is the case with other crops so far as SRR is concerned. To increase SRR of rice to 25% there is a need of 15 thousand metric tons of improved seed. If we give little attention that much of improved seed is not beyond our capacity. For maize, 7.65 thousand metric tons of improved seed is sufficient to cover around 47% maize area in the country. Same story applies to other crops as well. The only problem for increasing SRR for crops in question is that seed produced by different agencies needs to channelize through a proper system. Therefore, the study proposes a unified single funnel seed system by amalgamating all the seed systems that are right now implemented in the country. This will help to maintain seed record in one hand and on the other hand systematized seed production networks could be established by following one funnel seed production system. This will curtail unnecessary programs, check duplication of similar programs thereby effective seed production system could be established.

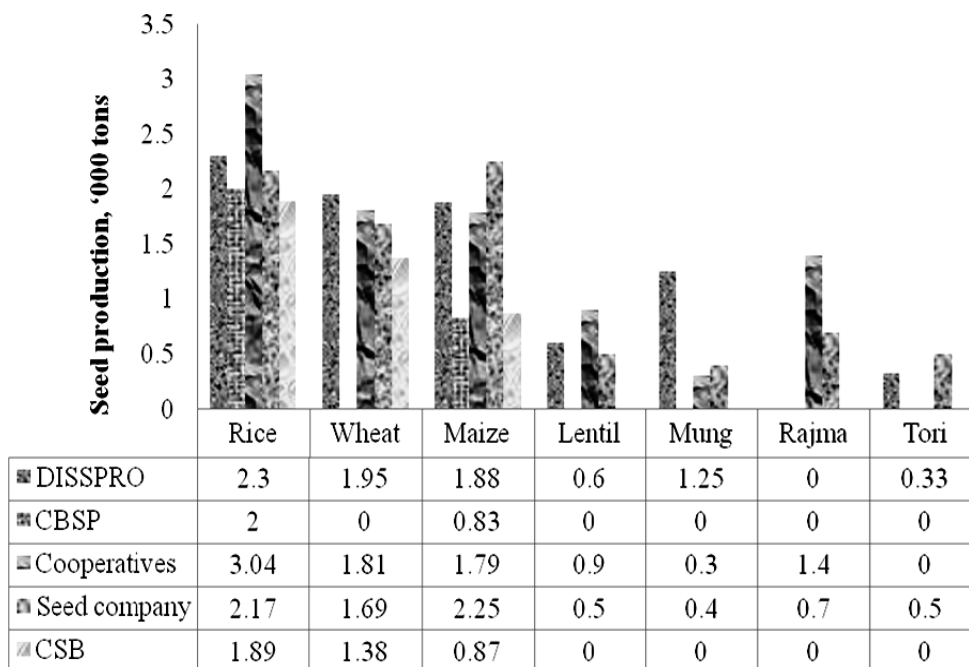


Fig. 1. Seed production (tons) through different seed initiatives during 2011
(Source. Crop Development Directorate, DoA, 2011)

In study districts (Bara, Kavre, Chitwan, Syanjga, Dolakha and Sindhupalchowk), the share of seed production of rice was found highest for cooperative followed by seed company, DISSPRO, CBSP and CSB (Fig. 2). The same trend followed for other crops as well. However, CBSP was mainly effective for maize in the hilly districts due to support from HMRP in the project districts. The important point to note is that CBSP was implemented for rice indicating its importance in crops other than maize. Therefore, the model of CBSP in other crops also getting momentum mainly because of its advanced nature including research and development going hands in hands thereby farmers can evaluate new varieties in their field in areas implemented CBSP. Because of so many

programs of seed production were running in districts which is further making complication and confusion in the seed production systems.

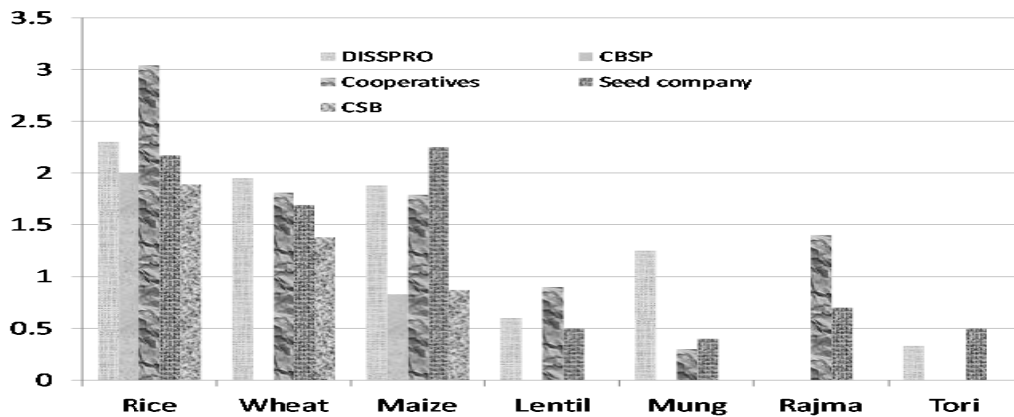


Fig.2. Seed production (mt) of crops through different seed initiatives in Nepal, 2012
(Source. Field survey, 2012)

Institutions involved in seed production status

Seed multiplication in Nepal is done both by public and private sectors. Source seed of cereals and legumes crops is mainly done by NARC, a public institute whereas certified and improved seed production is done by public and private sectors. Now some of the private sectors have also been involved in producing some quantity of source seed of self pollinated crops in the supervision of technicians.

There are different agencies involved on seed sector development in Nepal. NARC, DoA, National Seed Company (NSC) and Government Farms are the public sector led agencies, where, District Seed Self Sufficiency Program (DISSPRO) Groups/Cooperatives, Community-Based Seed Production Program (CBSP) Groups/Cooperatives, Community Seed Bank (CSB), and Farmers' Groups are the community led agencies. Seed Entrepreneurs' Association of Nepal (SEAN), Agrovets, and Seed Companies are the private led important agencies. The CSB is recently initiated institution and it is mainly concentrated in maize in hill districts under the Hill Maize Research Program (HMRP) funded by Swiss Development Corporation in collaboration with CIMMYT. Hence, these are the important organizations involved to seed production. Salt Trading Limited (a public organization), IWRMP, and USAID are also involved in seed production in some of the locations of the country.

Present status of source seed production of major cereals

Current production of breeder and foundation seeds in cereals is sufficient to meet the projected seed replacement rate in major cereals (rice, maize and wheat) and potato, if seeds are produced in a seed cycle (BS-FS/SS-CS-IS) is followed using standard seed multiplication system. However, source seeds produced currently in the country do not provide adequate choices of preferred varieties to the diverse group of clientele in different agro-ecological domains and socioeconomic settings. In addition, source seeds are misused due to inadequate planning and unregulated seed

distribution, lack of incentives for source seed production/marketing and farmers perception of quality seeds.

Source seed production of cereals and legumes is mainly done by NARC. A three years (2007/08 to 2010/11) record of source seed production by NARC is given in Table 2. This amount of source seed seems sufficient provided seed completes correct seed cycle (BS to FS to CS to IS). The irony is that source seed taken to produce certified seed is hardly recycled for seed purpose rather it is used as grain purpose. As a result, there is no proper follow up of seed recycling in the seed system. This had negative consequences on food security and enhanced crop productivity. Also, there is no consistency of BS production in NARC. This could be because of lack of logistic support and technical manpower in the institution.

Table 2. Crop wise breeder seed (BS) production during 2007/08 to 2010/11 by NARC

SN	Crop	Breeder seed (mt)			
		2007/2008	2008/2009	2009/2010	2010/2011
1	Rice	7.700	8.900		30.73
2	Maize	3.900	1.800		6.14
3	Wheat	20.800	20.800		64.07
4	Legumes				1.23
5	Hill crops				0.22
6	Oil seed				0.72
7	Vegetable				0.19
	Total	32.400	31.500		103.3

Source. Monitoring Division, 2011 and Seed Technology Division, 2010, NARC.

Scenario of seed requirement and replacement rate

A scenario of seed replacement rate (SRR) has been illustrated to make real understanding of SRR of major crops in Nepal. Total seed requirement (TSR), total seed supply (TSS), and seed replacement rate (SRR) of different crops indicate that there is a big discrepancy between TSR and TSS resulting in low SRR for major crops in Nepal is cited herewith during three years from 2008/09 to 2010/11 (Table 3). The figure clearly shows that it needs still much to do with SRR to increase seed transaction, however SRR for vegetable is very encouraging compared to cereals. Standard SRR for cereals and legumes should be more than 25% but in our case it is still hovering around one digit level. Therefore, there is a long way to go to meet the standard SRR of major crops for meeting food security in the country.

Table 3. Total seed requirement (TSR), total seed supply (TSS), and seed replacement rate (SRR) of different crops (2008/09 to 2010/11) in Nepal

FY	2008/2009			2009/2010			2010/2011		
	TSR (mt)	TSS (mt)	SRR %	TSR (mt)	TSS (mt)	SRR %	TSR (mt)	TSS (mt)	SRR %
Paddy	77472	4643	5.99	77463	5071	6.55	77797	6768	8.7
Maize	17019	990	5.81	17403	1040	5.98	17508	1147	6.55
Wheat	80645	5531	6.85	84777	7007	8.27	83394	8245	9.88
Millet	NA	NA	NA	2655	3	0.11	2659	53.18	2.0
Lentil	NA	NA	NA	5685	32.96	0.58	7352	230.5	3.13
Rapeseed	NA	NA	NA	1533	17.36	1.13	1841	51.85	2.85
Vegetables	NA	NA	NA	1457	1036.7	71	1457*	1036.7 *	71 *
Others	NA	NA	NA	NA	NA	NA	20399.8*	1019.99*	5.0*
Total	175234	11164	6.3	190973	14208	7.44	212407.8	18579.4	8.75

Source. SQCC/NSB 2010/11, * estimate

SWOT analysis of DISSPRO, CBSP/CSP

Analysis of strength, weakness, opportunity and threat (SWOT) of important seed systems of Nepal was done by stakeholders (seed experts, service providers, seed users, seed growers, cooperatives, source seed producers, seed entrepreneurs (traders, agrovets) by making standard questionnaires). On the basis of information of stakeholders SWOT analysis findings are presented in Table 4.

From the above information it was concluded that there is a need of unified seed system in order to make seed system reliable, sustainable, and standard in line with sustaining food security and enhancing productivity. Aside from these, study on seed storage, marketing, transportation, use of inputs, quality assurance, subsidy, and all preproduction and post production aspects of seed related issues were covered to draw inference of seed system of Nepal. On the basis of these findings inference were drawn as to how seed system of Nepal could be improved in a way that meet need of present day.

Table 4. SWOT analysis of DISSPRO, CBSP/CSP

SNo	Indicator	DISSPRO	CBSP/CSB
1.	Funding	Functioning under limited resources	Modestly funded
2.	Geographical domain	Terai, road accessible area (Wider)	Remote, mountain and mid hills area (limited to hills)
3.	Farmers' institution	DISSPRO groups and Cooperatives	Primary CBSP groups, Strategic Seed Cooperatives and Community based Seed Companies (C-C-C approach)
4.	Crops under seed multiplication	Rice, wheat maize, lentil, rajma, etc	Mainly Maize
5.	Seed cycling	Less than 35%	More than 80%
6.	Linkages	Poor research and extension linkages	Extension and research is linked through PVS, FATs, IRD, agronomic/mother-baby trials etc.
7.	Technical support	Production focused	Varietal development, seed multiplication, collection, processing and marketing (entire value chain)
8.	Institutionalization	Well institutionalized and recognized	Recognized mainly in the hills
9.	Social inclusion	Not considered (technical focus)	Involvement of women and small farmers
10	Investment and output	NRs 23,000/ ton of seed	NRs 114,000/ton of seed
11	Commercialization	Limited in Terai	Encouraging in the hills
12	Exit strategy	None	Private sector led seed business
13	Capacity building and training	Limited (production focus)	Encouraging (Inclusion, governance, business plan, infrastructure, quality control etc.)
14	Seed quality control	Mostly internal and local	Both external (regional seed testing laboratory (RSTL) and internal (Community Seed Promoters)

Recommendations

On the basis of information received from the different stakeholders of seed entrepreneurs and field study the following recommendations were made. These recommendations, if implemented, seed business in Nepal could go the transformation change in days to come.

1. Adoption of a single funnel seed system for different community based seed initiatives will provide synergy and impacts can be significantly increased

2. This will avoid duplication of seed production program, make easy to apply uniform norms, regulation and standardization of seed production and facilitates coupling with effective M&E of seed initiatives in the districts.
3. This study strongly recommends developing a single funnel seed system through a common guideline capturing the strengths of different community based seed production programs to ensure public-private-community partnerships along the entire seed value chain as envisioned in National Seed Vision (2013 to 2025).
4. Institutional arrangement. Community Seed production groups, Seed Cooperatives and community seed company and their federation at district, regional and national levels are the main institutions involved in seed business.
5. Roles, responsibilities and clarity of different actors should be clarified. NARC, DoA, SQCC, private sector, donors, CBOs, I/NGOs.
6. Institutionalization of contract seed production and seed crop insurance provisions should be ensured
7. Community Seed Bank should be integral part of community based seed production initiatives and should be linked to National Gene Bank (for conservation of agro-biodiversity).
8. Preparation of district seed balance sheet, advanced seed planning articulating 33% SRR on cross pollinated crops and 25% SRR on self pollinated crops.
9. Advanced source seed supply system should be established in a decentralized manner through targeted crop breeding, variety maintenance and capacity building of the source seed producers.
10. Seed quality assurance system should be implemented through public-private partnerships by strengthening public and private seed laboratories, logistic and human resources.
11. Gender and Social Inclusion in seed production program should be promoted.
12. Improved communication system to create seed related data base from local level linkages with national and international seed information systems should be established.
13. Linking seed production program with local constituents for local level sustainable seed self sufficiency through financial and technical resource mobilization should be ensured.
14. There is a need of output based, single funnel seed support system to farmers' groups, cooperatives and seed companies for facilitating revolving fund, small infrastructure support, seed insurance, seed pledging, soft loan and duty free privileges on equipments, packaging materials provision by executing common norms.
15. Improved communication system to create seed related data base from local level linkages with national and international seed information systems is necessary.
16. There should be a good Linkage between seed production program and local constituents for local level sustainable seed self sufficiency through financial and technical resource mobilization.
17. There should be a good provision of output based, single funnel seed support system to farmers' groups, cooperatives and seed companies for facilitating revolving fund, small infrastructure support, seed insurance, seed pledging, soft loan and duty free privileges on equipments, packaging materials provision by executing common norms.
18. There is a need of effective Monitoring (M) and Evaluation (E) of seed systems.

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