

**Research Article**

## **Assessment of present status and action plan development of vegetable seed enterprise in Rukum, Nepal**

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### **ABSTRACT**

Vegetable seed enterprise is a highly potential sub-sector for the economic growth of rural farmers in Nepal. Rukum has been known as the most important district for vegetable seed production since long time because of favorable agro-climatic condition. However, Rukums' sub-sector is facing several limitations including organized production and marketing, technology adoption and entrepreneurship development. This study has been carried out to assess the vegetable seed sub-sector of Rukum and propose action plans accordingly for the sustainable seed enterprise development. The study conducted stakeholder workshop and field survey; consulted district line agencies, seed producers and cooperatives, agro-vets and seed companies, and reviewed previous works. The study found that there were many individual farmers, farmers' groups and cooperatives being involved in vegetable seed production in the district. The role of private sector is emerging rapidly with higher share in the seed marketing. The public sector is still a major player for conducting research; and provision of source seeds, quality assurance and other support services. Strategic efforts and action plans are needed to push the existing traditional seed sub-sector towards commercial venture. Technology adoption for quality seed production, processing and marketing; transformation of the classical seed sub-sector into a competitive and sustainable enterprise; organized and demand led seed production programs; and coordination and participatory approaches among stakeholders in seed value chain activities are highly recommended.

**Key words:** Assessment, vegetable, cooperatives, seed, enterprise, quality

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## INTRODUCTION

Vegetable seed is a highly prioritized sector of Nepal for the growth of rural economy (UMN, 2015). Rukum has long been known as the most potential district for the vegetable seed production in Nepal (SVSPC, 2014; DDC, 2012; HVAP, 2011). The diverse agro-climate from warm sub-tropical to cool temperate Himalayan range offers tremendous scope of growing seeds of various vegetables in Rukum (Dhakal, 2013). In Nepal, only 50% of the national demand of the vegetable seeds has been met by the domestic production over the last decade (KUBK, 2015). In addition, the district has a great opportunity to fetch the increasing domestic as well as export markets of vegetable seeds (Joshi, 2015; DDC, 2013).

However, there are some limitations on the vegetable seed production and marketing in the district. First, seed marketing is not yet well organized in the overall seed system with proper grading, standard packaging and labeling because of inadequate quality control services (Timsina and Shivakoti, 2018; Gauchan, 2015; Joshi, 2015). Secondly, low level of knowledge and capacity at the farm level, low quality seed production, and low seed storage and processing facilities are also the major constraints (UMN, 2015; Adhikari, 2013; DDC, 2012). Moreover, low seed volume and quality are the main concerns for the commercialization of seed enterprise (Khanal, 2015; MoAD, 2013).

In this context, this paper focused to assess overall existing status of vegetable seeds production and marketing; institutional development of seed producers groups and cooperatives, line agencies' programs and support and overall perception of seed sector stakeholder in the district. Likewise, the study identified action plans for the sustainable development of the vegetable seed sector in Rukum.

## MATERIALS AND METHODS

The study was conducted in Rukum during 1 to 25<sup>th</sup> December 2016. The district was selected purposely for the study, as the district is one of the most potential districts for vegetable seed production in Nepal. A participatory approach to the district stakeholders of the seed sector was employed to collect the information for the study. The information for the study was collected from three levels: first from seed producer's groups/cooperatives; second from district level seed cooperatives, agro-vets, service providers; and third from central level seed companies and service providers. A field survey was carried out by following the checklist to identify the problems and areas of intervention in the seed sector. Local agro-vets and some major seed companies were consulted. Major practices of seed collection and value addition at community level were also observed and analyzed. An interaction program among the district seed stakeholders was organized at Musikot, Rukum in 9<sup>th</sup> December 2016. Seed growers, cooperative members, public and private line agencies, seed entrepreneurs, local agro-vets and some major seed companies were participated in the workshop. From the workshop, firstly, an assessment of present situation of seed production in the Rukum was accomplished. Secondly, the participants' views and ideas for recommending activities or the action plan for vegetable seed sub-sector development were duly noticed. Finally, SWOT analysis of Rukum seed sub-sector was also done. Literatures on seed production and marketing were reviewed. Additionally, sources at local as well as national level have been consulted to get secondary information of this sub-sector.

## RESULTS AND DISCUSSION

### Vegetable seed enterprise overview and assessment

Rukum is the potential district for vegetable seed in the mid-western region of Nepal with diverse agro-climates from warm sub-tropical river basin to cool temperate high areas (DDC, 2013). The study revealed that few seed producers groups and cooperatives were found following pre-seed sowing contract with seed companies for their seed marketing, while many of them were found transacting the seeds without any contract with the seed companies. The annual production of vegetable seed was reported at 80.1 t in Rukum in 2012 (Table 1).

**Table 1. The seed production record of various vegetables in Rukum, 2012**

SN	Crop	Variety	Production (t)
1.	Radish	Mino Early	51.00
		Chalis Dine	7.79
2.	Onion	Red Creole	11.77
3.	Broad Leaf Mustard (BLM)	Khumal Chaudapat	5.00
		Marpha Chaudapat	0.30
4.	Turnip	Purple Top	0.42
5.	Spinach	Haripate	0.44
6.	Pole Bean	Trishuli Simi-1, Chaumase	0.30
7.	Garden Pea	Sikkime	0.76
8.	Cauliflower	Kathmandu Sthaniya	2.28
Total			80.1

Source: DADO, Rukum 2013

There are 24 seed entrepreneurs registered with National Seed Board (NSB) from Rukum (DADO, 2015; SVSPC, 2014). The major actors in seed marketing are local vendor, agro-vets and private seed companies (PSCs). Some cooperatives are selling their seeds on their small scale (MEDEP, 2013).

### Seed producer's groups and cooperatives

The farmers groups and cooperatives that have their own seed processing facilities in the district are mentioned in Table 2. The study revealed that very few cooperatives have capacity of over 100 t seed sale annually with their own processing facilities in the district. Similarly, about 1,000 households were found being involved in seed production. . In general, there has been practice of collecting the seeds from the farmers by the cooperatives before selling to the PSCs. Seeds are commonly sold either to the local middlemen, agro-vets or seed company's agents. .

**Table 2. Vegetable seed producer groups and cooperatives in Rukum, 2012**

SN	Farmers Groups/Cooperatives	Crops/varieties	Production (t)
1.	Shrijansil Tarkari Utpadan Mahila Krishak Samuha, Simle -9	BLM: KCP Turnip: PT Radish: ME, Chalis Dine	1.5 23.0 8.0
2.	Lali Gurans Krishak Samuha, Mahat	Onion: RC	6.0
3.	Samsitoshna Unnat Tarkari Biu Utpadan Sahakari Sawastha Limited, Kholagaun -4	Pole Bean: Chaumase Radish: ME Onion: RC Cauliflower: KS BLM: KCP	0.5 1.0 2.0 1.0 0.5
4.	Yekikrit Krishi Sahakari Sawastha Limited, Peugha-8	Spinach: Haripate	1.0
5.	Janjagaran Krishi Samuha, Arma-8	Garden Pea: Sikkime	7.5
6.	Batala Namuna Tarkari Biu Utpadan Samuha	Cauliflower: KS	8.5
7.	Ghodepaila Krishiak Sahakari Sawastha Limited, Aathbiskot-4	Onion: RC Radish: ME	4.0 2.0
8.	Janajagaran Krishak Samuha, Musikot-4	Pole Bean: Chaumase BLM: KCP	5.0 2.0
9.	Hatemalo Krishak Samuha, Muru-4	Onion: RC	2.0
10.	Sanibheri Tarkari Beeu Utpadan Sahakari	Radish: ME, Onion: RC Cauliflower: KS	8.0
11.	Rukumeli Krishi Sahakari	Onion: RC	6.0
12.	Akikrit Krishi Sahakari	Radish: ME Onion: RC	3.0 1.0
Total	12 farmers groups/cooperatives	8 vegetable crops and 9 varieties	81.5 t

*Note: KCP=Khumal Chaudapat; PT=Purple Top; ME=Mino Early; RC=Red Creole; KS=Kathmandu Sthaniya*  
*Source: DADO, Rukum 2013*

The Rukums' then District Development Committee (DDC) has identified 42 major VDCs as the potential areas for vegetable seed production under the Periodic District Development Plan (Table 3). The identified VDCs from high hill to low river basin areas could be fully utilized for vegetable seed production of diverse crops and varieties. Many of them carry prospects of growing high value seeds like carrot, cabbage and potato in the high hill. Similarly, it also brings a scope of area expansion and increased volume of vegetable seeds production in the district.

**Table 3. Potential areas for vegetable seed production in Rukum**

Potential Areas	Potential crops/varieties
1. High-hill (1,600 to 3,000 m asl): 11 VDCs Ranmamaikot, Hukam, Taksera, Kol, Kakri, Rangsi, Jaang, Pyang, Sisne, Swala Khadi and Gotamkot	Carrot, cabbage, Marpha Chaudapat and potato seed
2. Mid-hill (800-1,600 m asl): 23 VDCs Mahat, Morawang, Kanda, Chunwang, Rukumkot, Musikot, Swalapakha, Pokhara, Pipal, Baphikot, Jhula, Magma, Duli, Bhalakcha, Chaukhawang, Rukha, Khara, Maru, Peugha, Arma, Ghetma, Athibasandagaun, Aathbiskot	Radish: Mino Early, Chalis Dine BLM: Khumal Chaudapat Cauliflower: Kathmandu Sthaniya Onion: Red Creole Pole bean: Trishuli Simi-1, Chaumase Garden pea: Sikkime, Sarlahi Arkel Cowpea: Sarlahi Tane Spinach: Haripate Turnip: Purple Top
3. Low land river basin areas (762 to 800 m asl): 8 VDCs Bijayadhari, Kotjaahari, Kholagaun, Nuwakot, Purtimkanda, Garayela, Chibang, Silli	BLM: Manakamana Garden Pea: Sikkime, Sarlahi Arkel Pole bean: Chaumase, Trishuli Simi-1

Source: DDC, 2013

### ***National seed demand and supply***

In Nepal, only 50% of the national demand of the vegetable seeds has been met by the domestic production over the last decade. Of total 2,000 t vegetable seeds demand, around 75% of the total domestic demand is accounted by peas, bean, onion, radish, cow pea and okra (KUBK, 2016; Timsina & Shivakoti, 2018; Timsina *et al.*, 2015). Likewise, cauliflower, cabbage, onion, radish and tomato are the top five vegetables in terms of area under cultivation that account for 50% of the total vegetable areas in Nepal (Baral, 2017; KUBK, 2016; Gauchan, 2015). SQCC's report revealed that Kathmandu-based seed entrepreneurs bought only about 340 t of vegetable seeds produced domestically (SQCC, 2013). Moreover, about 30-45% of the vegetable seed demand is being met by informal supply in Nepal (Timsina *et al.*, 2015).

This scenario of national requirement and domestic production indicates a huge gap between demand and supply of vegetable seeds. It shows a negligible share of Rukum in the national requirement. The high demanding seeds such as garden pea, bean, onion, radish, cowpea and others are being imported in huge amount, which could be easily grown in Rukum. But, there are many areas yet to be intervened for the improvement of the seed sub-sector in the district.

### ***National seed policies and programs***

The vegetable seed sub-sector in Nepal is ruled by the Seed Act, 1988; Seed Regulation, 1997; and National Seed Policy, 1999. The Seed Act aims to maintain the seed quality in a well-planned manner upon production, testing, and processing. The Act allows to produce and distribute two categories of seed namely, certified seed and truthfully labeled seed. Thus, thrust in the truthful labeling should be given in the future action plan to maintain the seed quality in the district. For this, provision of source seeds and seed testing facilities, field supervision and monitoring from the concerned line agencies and capacity building of the farmers with improved production husbandry and processing technologies are among the

important areas to be intervened The National Seed Policy has highlighted the provision of quality control, private sector involvement, strengthening of the organizations with modern technologies for the sustainable development of seed sub-sector (MoAD, 2013; Bhandari, 2012). Thus, future plan of the district should accommodate these areas.

The National Seed Vision 2013-2025 has prioritized the development of domestic seed industry through local production, processing and marketing of high quality seed with the active participation of both private and public sectors. To tap the opportunity as prioritized by the nation, the local government should underline their forth coming development plans and programs for the seed sector development in the district.

### **SWOT Analysis**

The SWOT (Strength, Weakness, Opportunity and Threat) analysis showed many issues, which is given in Table 4. These include: capacity building, production, training, collaboration and information sharing, infrastructure, logistic and policies.

**Table 4. SWOT analysis of Rukum's seed enterprise, 2016.**

<b>Strengths:</b>	<b>Weakness:</b>
– Appropriate agro-ecology and climate	– Limited technology and knowledge adoption
– Growing demand of seeds	– Lack of entrepreneurship and business knowledge
– Adequate human resources	– Poor institutional development, collaboration and linkage
– Growing involvement of private sector	– Low volume and quality production
– Developing road infrastructures	– Use of inadequate and inefficient inputs
– Seed is nationally prioritized sector	– Rain-fed production and seasonal dependence
<b>Opportunities:</b>	<b>Threats:</b>
– Growing domestic and export markets	– Competition with imported seeds
– Increasing producers and seed companies	– Poor infrastructures
– Import substitution and export promotion potential	– Seasonal road access and irregularities in seed supply
– Incentives and subsidies	– Inaccessibility to finance
– Emerging youth farmers	– Unpredictable weather condition and prolonging drought

### **Major Stakeholders of Vegetable Seed Sub-sector in Rukum**

The public institutions involved in seed sub-sector are: Agriculture Knowledge Centre , Sub-tropical Vegetable Seed Production Center (SVSPC), District Coordination Committee Office, Central Seed Testing Laboratory, Seed Quality Control Centre (SQCC) and Regional Seed Testing Laboratory, Khajura.

The DADO, Rukum focuses on seed production, infrastructure development and establishment of agro-based industry and seed processing plant. The SVSPC, Rukum has mandate to produce and distribute the foundation seed of major vegetables; including trainings; and technology verification and extension. The foundation seed production and distribution in 2016/17 from the SVSPC was 1440 kg of major vegetables. However, the study revealed that the production in the SVSPC was insufficient to the total requirement of source seeds in the district. The vegetable seed sub-sector has been given due emphasis in the periodic district development plan, as the most important enterprise for the economic growth

of the district (DDC, 2012). Similarly, the RSTL, Khajura has mandate to carry out the field monitoring and supervision for seed certification in the district.

The private organizations involved in the vegetable seed sub-sector in the district include: Micro-Enterprise Development Program (MEDEP), and United Mission to Nepal (UMN). MEDEP has been working on the development of micro-entrepreneurship in the potential fields including vegetable seed enterprises. UMN has been worked on seed sub-sector in Rukum since 2009 in collaboration with SVSPC, Rukum to strengthen farmers' technical capacity and market networks (KUBK, 2016). Currently, SEAN Seed Service Centre Limited (SSSC), National Seed Company Ltd (NSC), CG Seeds and Fertilizers Pvt. Ltd., and Rukumeli Agro Seed Center are major buyers of seed produced in Rukum. SSSC has annual turnover of over 180 t of vegetable seeds that Rukum's seed covers 60% of total transaction. Large PSCs are trying to make pre-sowing contract on seed production.

Of total, 24 agro-vets are working in the seed trading with annual average sales turnover 0.5 million to maximum of 10 million rupees. Agro-vets are collaborating in seed marketing and information sharing on market.

### Rukums' Seed Value Chain

Major actors in the seed value chain in Rukum are Department of Agriculture (DoA); NARC; DADO; SVSPC; SSSC; Seed Testing Laboratory; I/NGOs; and private agencies represented by PSCs, seed dealers and retailers. NARC carries out the variety development; maintenance; and breeder and foundation seed production and supply. DoA, NSC and private sectors including the cooperatives/CBSP groups produce and multiply foundation seed in close supervision of NARC research centers. The role of the respective institutions in the seed value chain is mentioned in the Table 5.

**Table 5. Major Stakeholders and their functions of Seed Value Chain in Rukum.**

Stakeholders	Functions
1. NARC stations (HRD, Khumaltar; HRS, Dailekh; HRS, Malepatan; and ARS, Jumla); DoA farms; SVSPC; SSSC and other licensed PSCs	– Source seed production and distribution (Radish, BLM, Onion, Cauliflower, Garden pea, Pole bean, Turnip and Spinach, Cowpea, Carrot, and Cress)
2. Farmers, seed producer cooperatives	– Seed production
3. Cooperatives and farmers groups, local agents, and PSCs	– Processing and marketing
4. Seed laboratory in the region, licensed seed laboratories	– Seed analysis
5. Local agrovets, seed dealers appointed by private seed companies	– Marketing
6. Local markets in Rukum; Regional markets: district headquarters, Nepalgunj, Surkhet, Dhangadi, Mahendranagar, Tulsipur, Ghorahi, Butwal; National markets: Kathmandu, Biratnagar, Nepalgunj	– End markets
7. NARC, DoA, SQCC, NSB, VDD, DADO, SVSPC, DDC, DCCI, AEC/FNCCI, Political parties, MEDEP, KUBK, UMN, CEAPRED, SSSC, CG Seeds and Fertilizers Pvt. Ltd.	– Business services and enabling environment

Note: HRS (Horticulture Research Division); HRS (Horticulture Research Station); ARS (Agricultural Research Station); VDD (Vegetable Development Directorate); DCCI (District Chamber of Commerce and Industry); AEC (Agro Enterprise Centre); FNCCI (Federation of Nepalese Chambers of Commerce and Industry)  
Source: KUBK, 2016

**Plan of Actions for the Development of Rukums' Vegetable Seed Sub-sector**

The following action plan is suggested to improve the seed sub-sector. The suggested plan of actions for short, medium and long term with responsible agencies for the development of Rukum vegetable seed sub-sector is given in Table 6.

**Table 6. Suggested plan of actions for the development of Rukum vegetable seed sector**

Areas of intervention	Suggested activities			Responsible organizations
	Short term	Mid term	Long term	
1. Institution development	1.1 Reform organization with defined role for proper functioning seed system in the district	1.1 Prepare database of the district vegetable seed	1.1 Develop policies and programs for proper functioning of the seed farmers, groups and cooperatives	NARC, DoA, SQCC, NSB, Municipality /rural municipality, AKC, SVSPC, DDC, AEC/FNCC I, SSSC MEDEP, KUBK, UMN, Political parties
	1.2 Prepare working guidelines and regulations	1.2 Acquire support and coordination of public as well private line agencies	1.2 Carry out one-door-system to accommodate farmers, groups and cooperatives involved in vegetable seed production and marketing in the district	
	1.3 Generate capital resources			
	1.4 Enhance business knowledge and skill of seed farmers, groups/cooperatives			
	1.5 Develop and mobilize technical human resources			
2. Production	2.1 Impose to follow seed production manual of major vegetables	2.1 Develop a mechanism for field supervision and monitoring for seed quality control	2.1 Make the seed sector competitive in terms of seed volume and quality	NARC, DoA, SQCC, AKC, SVSPC, farmers groups/cooperatives
	2.2 Develop production plan based on the market demand	2.2 Determine crop zoning for seed production	2.2 Make all stakeholders of the seed value chain technically perfect	
	2.3 Develop a mechanism for the procurement of quality source seeds	2.3 Identify potential pockets for seed production as per the agro-climates		
	2.4 Conduct verification and demonstration of seed production technologies			
3. Processing and value addition	3.1 Establish collection, processing and storage infrastructure at village level	3.1 Carry out seed quality inspection and certification from the concerned line agencies	3.1 Develop Rukum brand seed with ensured seed quality	NARC, DoA, AKC, DDC, FNCCI, PSCs, farmers' groups and cooperatives
	3.2 Upgrade and expand the processing infrastructures and facilities	3.2 Establish seed testing laboratory at district level		
	3.3 Establish a complete processing plant to carry out cleaning, drying, grading and packaging at district level	3.3 Enforce practice to carry out proper packaging with truthful labeling		
4. Capacity building	4.1 Conduct trainings and field schools to upgrade the skill and knowledge of all actors of the seed value chain	4.1 Develop and mobilize technical human resources		NARC, DoA, VDD, AKCSQCC, SVSPC, I/NGOs

5. Marketing	5.1 Explore seed market agencies for the expansion of seed business	5.1 Carry out market promotion activities: advertisements in FM, newspaper, and TV media;	5.1 Develop trustworthy environment between producers and PSCs	MOAD/SQCC, SSSC, AEC/FNCCI, Local agrovets, PSCs, cooperatives, media organization s
	5.2 Establish market network and contract with seed companies	5.2 Arrange contract agreement with PSCs to ensure marketing	5.2 Develop Market Information System to keep up update information about the seed markets and prices	
	5.3 Develop the roster for market agents			
6. Business services	6.1 Conduct technology demonstration activities	6.1 Empower the district body of farmers' cooperatives with technical resources and facilities	6.1 Arrange a mechanism to restrict the illegal seed supply from the district	NARC, DoA, SQCC, NSB, VDD, AKCSVSPC, DDC, Political parties
	6.2 Collaborate with line agencies for technical supports and services			
	6.3 Coordinate farmers, groups and cooperatives	6.2 Facilitate the farmers for financing and investment		

**Note:** AKC=Agriculture Knowledge Centre

## CONCLUSION

Based on the study, Rukum has the potential opportunity of rural economy growth through the development of vegetable seed sub-sector. There are many areas to be intervened for the improvement of this sector towards commercialization. First, the district seed sub-sector should have a clear vision to develop the sector as technically perfect, economically viable and sustainable enterprise. Secondly, the sector should have clear strategy for quality seed production based on market demand. To accomplish these objectives, suggested plan of actions should be implemented.

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## Author Contributions

The study was carried out in collaboration of both authors. The study hypothesis, design, implementation and data measurement were carried out in coordination of both authors. In together, both the first and second authors implemented the stakeholder workshop; household surveying; field visit; and consultation with line agencies and seed companies. The first author A.B. Pun reviewed and compiled the information of the study, while the second author D. Poudyal prepared the manuscript. Both authors read and approved the final manuscript.

### Conflicts of Interest

The authors have declared that no competing interests exist regarding the publication of this paper.

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