

Promotion of Community Based Seed Potato Production Technologies in the High-Hills/Mountains of Nepal for Food Security Improvement and Import Substitution

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Abstract

Potato is one of the most important vegetables in the terai and mid-hills while staple food in the high-hills of Nepal. Eleven potato varieties have been released and five varieties have been registered, a package of practices for ware and seed potato production technology suitable for different agro-ecological zones have been recommended by National Potato Research Program. Despite of the several attempts and achievements, production of potato is still far below to its potentiality as compared to neighboring countries primarily due to non-availability of adequate amount of quality seed tubers. Most of the farmers have been growing locally available poor quality degenerated seed tubers for many years without replacement. Availability of quality seed could be increased significantly by production of seed tubers utilizing naturally virus free areas of high-hills of Nepal through CBSP program. Technical capacity of the seed potato growers and technicians was empowered through practical trainings. Eight Rustic stores were constructed at CBSP sites of Ilam, Rasuwa, Lamjung, Parbat, Baglung, Rolpa, Jumla and Achham districts. Disease free source seed of recommended potato varieties were provided to the selected CBSP Groups & Cooperatives. The result revealed that seed tuber yield of 1370 kg BS₁ and 83172 kg BS₃ of Janakdev, Khumal Ujjal, Desire, Khumal Seto 1, Kufri Jyoti, Cardinal, Khumal Upahar and Desire was produced during F.Y. 2019/2020. In 2020/2021, tuber yield of 3548 kg BS₁, 6545 kg BS₂ and 192696 kg BS₄ of Jumla local, Khumal Ujjal, Khumal Upahar, Khumal Seto 1, Kufri Jyoti, Cardinal, Janak Dev, Desire, Khumal Bikas was produced. Similarly, tuber yield of 3799 kg BS₁ of Desire, Khumal Bikas, Janak Dev, Cardinal, Khumal Ujjal, Khumal Upahar and Kufri Jyoti; tuber yield of 15422 kg BS₂ of Desire, Jumla Local, Cardinal, Khumal Ujjal, Khumal Upahar, Khumal Seto 1, Kufri Jyoti; and tuber yield of 23288 kg BS₃ of Desire, Janak Dev, Cardinal, Khumal Ujjal, Khumal Upahar, Khumal Seto 1 and Kufri Jyoti was produced by different CBSP Groups and Cooperatives during F.Y. 2021/2022. Thus, seed replacement rate in the intervention areas has increased significantly through establishment of quality seed potato production, storage and distribution system.

Keywords: Basic Seed, CBSP, Rustic Store, Seed Potato, Ware Potato

Introduction

Potato (*Solanum tuberosum* L.) is one of the most important food crops of Nepal grown in quite diversified climatic conditions. With the development of high yielding varieties, support of irrigation projects and accessibility of inputs, awareness of farmers during last 10 years (2011-2021), the area, production and yield of potato has increased by 4.5%, 28.7% and 20.8% respectively. Area under potato is estimated 1,98,788 ha and total production 33,25,231 tons with an average productivity of 16.73 tons/ha (ABPSD, 2022). Potato occupies the 5th position in term of area coverage, 2nd in terms of total production and 1st in terms of productivity among the five major food crops grown in Nepal. About 90% demand of potato is fulfilled from domestic production. Potatoes are grown under diversified climatic conditions, altitude ranging from 70 to 4500 m in different seasons and harvested

accordingly in different times, almost throughout the year. Area coverage by improved potato varieties in Nepal is about 51% where as seed replacement rate is very low and this should be increased to at least 30-40% from the current level of about 20%. Low production and productivity of potato in Nepal can be attributed primarily due to the non-availability of adequate amount of quality basic seed at an affordable price in a timely manner. Farmers are using deteriorated seed tubers for many years without replacement. Most of the farmers have been normally growing locally available poor quality degenerated seed potatoes year after year resulting low national productivity as compared to developed countries. National demand for PBS is more than 1 million and NPRP is hardly producing about 0.2 million mini tubers annually. Generally, the potato fields of terai region of Nepal are mainly covered by some Indian varieties. Thus, major interventions focused towards the production of quality basic seed by utilizing naturally virus free areas of high-hills/mountains of the country, where high quality potato seed can be produced and stored under low-cost rustic storage system.

CBSP approach is regarded as improved version of DISSPRO, which is cost effective, has good community participation and empower the disadvantaged groups in the farm communities. For successful production of quality seed tubers, farmers need to be organized in Community-Based Seed Producer's Groups and Cooperatives. This project provides production inputs, on the spot practical trainings, rustic stores construction at CBSP sites and improves technical know-how on production, storage and marketing of seed potatoes. Production of good quality seed potatoes through PBS increased the availability of quality seed potato. Thus, the primary objective of this project was to establish a seed potato production system in the hill-hills/mountains of Nepal through dissemination of quality seed potato production technologies through Informal Seed Producers Group (SPG) approach using community-based seed production program to make high quality seed tubers available to farmers at an affordable price. The purpose of this project is to disseminate sustainable good quality seed potato production technologies with a view to improve the socio-economic status of the resource poor farmers of the high-hills/mountains.

Materials and Methods

Identification of CBSP Sites and selection of CBSP Groups and Cooperatives

Ilam, Lamjung, Parbat, Baglung, Rolpa, Jumla, Rasuwa and Achham districts were selected for implementation of Community Based Seed Potato Production (CBSP) Program. Nine Seed Producer's Groups and Cooperatives from the eight hilly districts were selected for implementation of Game changer project (Table 1.1).

Table 1.1. Name and address of Selected CBSP Groups and Cooperatives

SN	CBSP Groups & Cooperatives	CBSP Sites
1	Kalika Devi Agricultural Cooperative	Maijogmai, Nayabazar, Ilam
2	Seed Potato Producer's Group	Dordi, Purano Dwara, Lamjung
3	Fresh Vegetable and Seed Producer's Group	Jaljala, Mathillo Salija, Parbat
4	Milijuli Pragatisil Multipurpose Cooperative	Khambe, Masa, Dhorpatan, Baglung
5	Suryodaya Seed and Fresh Vegetable Producer's Group	Gangadev 3, Jinabang, Chami, Rolpa
6	Janjagaran Farmer's Group	Gangadev 6, Ranka, Rolpa
7	Hazariful Krishi Biu Utpaadak Group	Patarashi, Dillichaur, Lashi, Jumla
8	Galang Chhoding Sana Kishan Cooperative	Gatlang, Rasuwa
9	Mellekh Rural Municipality	Bindawashini, Mellekh, Achham

Farmers and Technician's Level Training on Quality Seed Potato Production Technology

Residential technician and farmer's level training was organized at Dhulikhel, Kavre from 23-29 December, 2019. Similarly, farmer's & technician's level training was organized at Mellekh Rural Municipality, Bindawashini, Achham from 16-18 March, 2022. Likewise, farmer's & technician's level training was organized at Gatlang, Rasuwa from 6-7 April, 2022. Technical capability of technicians and seed potato growers of the CBSP sites was enhanced through practical training.

Construction of Rustic Stores at each CBSP sites

Six Rustic stores were constructed at different CBSP sites of Ilam, Lamjung, Parbat, Baglung, Rolpa & Jumla during F.Y. 2019/2020 while two Rustic stores were constructed at Rasuwa and Achham districts with financial

and technical support of NARC. One Community Rustic Store was constructed by Janjagaran Farmer's Group, Ranka, Rolpa with financial support of Gangadev Rural Municipality during F.Y. 2020/2021.

Support of Chemical Fertilizers to CBSP Groups and Cooperatives

Chemical fertilizers were provided to the farmer's groups and cooperatives for conducting CBSP program at different CBSP sites. A total of 2500 kg of Urea, DAP and MOP were distributed to the CBSP groups during F.Y. 2019/2020 (Table 1.2).

Support of clean planting material as source seed to Different CBSP Groups and Cooperatives

In F.Y. 2019/2020, a total number of 18000 PBS of Desire, Janak Dev, Cardinal, Khumal Ujjal, Khumal Upahar, Khumal Seto 1 and Kufri Jyoti varieties (Table 1.3) were provided to CBSP Groups and Cooperatives for Basic seed (BS₁) production while 15840 kg Basic Seed (BS₂) of potato varieties viz. Desire, Janak Dev, Cardinal, Khumal Ujjal and Khumal Seto 1 were provided for Basic Seed (BS₃) production (Table 1.4).

F.Y. 2020/2021, a total number of 65670 PBS of Desire, Jumla Local, Cardinal, Khumal Ujjal, Khumal Upahar, Khumal Seto 1 and Kufri Jyoti varieties (Table 1.5) were provided to CBSP Groups and Cooperatives for Basic Seed (BS₁) production while a total of 1495 kg Basic Seed (BS₁) of Desire, Janak Dev, Cardinal, Khumal Ujjal, Khumal Upahar, Kufri Jyoti and Khumal Seto 1 varieties (Table 1.6) were planted by different CBSP Groups and Cooperatives for Basic Seed (BS₂) production. Likewise, 77798 kg Basic Seed (BS₃) of Janak Dev, Khumal Ujjal, Desire, Cardinal and Khumal Seto 1 varieties were planted by respective CBSP Groups and Cooperatives for Basic Seed (BS₄) production (Table 1.7).

In F.Y. 2021/2022, a total number of 43146 PBS of Desire, Khumal Bikas, Janakdev, Cardinal, Khumal Ujjal, Khumal Upahar and Kufri Jyoti varieties (Table 1.8) were provided to CBSP Groups and Cooperatives for Basic Seed (BS₁) production. Similarly, a total of 3548 kg Basic Seed (BS₁) of Desire, Jumla Local, Cardinal, Khumal Ujjal, Khumal Upahar, Kufri Jyoti and Khumal Seto 1 varieties (Table 1.9) were planted by different CBSP Groups and Cooperatives for Basic Seed (BS₂) production. Likewise, a total of 6545 kg Basic Seed (BS₂) of Desire, Janakdev, Cardinal, Khumal Ujjal, Khumal Upahar, Kufri Jyoti and Khumal Seto 1 were planted by respective CBSP Groups and Cooperatives for Basic Seed (BS₃) production (Table 1.10).

Technical support to CBSP Groups and Cooperatives at CBSP Sites

Frequent technical support was provided to the different seed producer's groups and cooperatives regarding site selection, field layout, planting, weeding, earthing up, roughing, harvesting, grading, storage and marketing of seed potatoes for three consecutive years (2019/2020- 2021/2022).

Table 1.2. Support of chemical fertilizers to different CBSP Groups and Cooperatives during F.Y. 2019/2020

CBSP Sites	Urea (kg)	DAP (Kg)	MOP (kg)	Total (kg)
Nayabazar, Ilam	150	250	100	500
Purano Dwara, Lamjung	150	250	100	500
Salija, Parbat	150	250	100	500
Dhorpatan, Baglung	150	250	100	500
Jinabang, Rolpa	75	125	50	250
Ranka, Rolpa	75	125	50	250
Dillichaur, Jumla	No chemical fertilizers were used due to organic declaration			
Total	750	1250	500	2500

Table 1.3. Support of PBS of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2019/2020

CBSP Sites	Quantity (No)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	500	1000		1000			500	3000
Purano Dwara, Lamjung			1000	1000	500		500	3000
Shalija, Parbat		1000		500		500	1000	3000

CBSP Sites	Quantity (No)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Dhorpatan, Baglung		1000		500		500	1000	3000
Jinabang, Rolpa	500		1000	500		1000		3000
Dillichaur, Jumla	2000					1000		3000
Total	3000	3000	2000	3500	500	3000	3000	18000

Table 1.4. Support of Basic Seed (BS2) of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2019/2020

CBSP sites	Quantity (Kg)					Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Seto 1	
Nayabazar, Ilam		2400		80	160	2640
Purano Dwara, Lamjung	1000	1500	500	50		3050
Salija, Parbat		2750		50	250	3050
Dhorpatan, Baglung	500	1500	1000	50		3050
Jinabang, Rolpa	500	500	500	25		1525
Ranka, Rolpa	500	500	500	25		1525
Dillichaur, Jumla	160				840	1000
Total	2660	9150	2500	280	1250	15840

Table 1.5. Support of PBS of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (No)							Total
	Desire	Jumla local	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	2000			3000			3000	8000
Purano Dwara, Lamjung	3000		2000	2070			1200	8270
Shalija, Parbat	3000		1000		1935		2320	8255
Dhorpatan, Baglung	2880		2000	3070				7950
Jinabang, Rolpa	2000						2000	4000
Ranka, Rolpa	2171						2000	4171
Dillichaur, Jumla	3000	4650				1000		8650
Gatlang, Rasuwa	2000			3029			3345	8374
Bindawashini, Achham	3000			2000			3000	8000
Total	23051	4650	5000	13169	1935	1000	16865	65670

Table 1.6. Support of Basic Seed (BS1) of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (Kg)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	30	60		80			40	210
Purano Dwara, Lamjung			55	44	36		15	150
Salija, Parbat		46		27		4	26	103
Dhorpatan, Baglung		150		62		75	75	362
Jinabang, Rolpa	20		20			20		60
Dillichaur, Jumla	375					235		610
Total	425	256	75	213	36	334	156	1495

Table 1.7. Support of Basic Seed (BS₃) of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (Kg)					Total
	Janak Dev	Khumal Ujjal	Desire	Khumal Seto 1	Cardinal	
Nayabazar, Ilam	15790	880				16670
Purano Dwara, Lamjung	9025	307	4280		1750	15362
Salija, Parbat	18356			2496		20852
Dhorpatan, Baglung	3900	200	750		2650	7500
Jinabang, Rolpa	3370		2895	450	3664	10379
Ranka, Rolpa	1055		518		60	1633
Dillichaur, Jumla			840	4562		5402
Total	51496	1387	9283	7508	8124	77798

Table 1.8. Support of PBS of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (No)							Total
	Desire	Khumal Bikas	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Kufri Jyoti	
Nayabazar, Ilam		465	4408					4873
Puranodwara, Lamjung					4671			4671
Shalija, Parbat	5000						275	5275
Dhorpatan, Baglung					2937			2937
Jinabang, Rolpa	1855		805			530		3190
Ranka, Rolpa	6825							6825
Dillichaur, Jumla	5235							5235
Gatlang, Rasuwa	4840							4840
Bindawashini, Achham	1880			2585	835			5300
Total	25635	465	5213	2585	8443	530	275	43146

Table 1.9. Support of Basic Seed (BS₁) of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (Kg)							Total
	Desire	Jumla local	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	100			274			183	557
Purano Dwara, Lamjung	80			200			125	405
Shalija, Parbat	19		21		25		41	106
Dhorpatan, Baglung	110		160	160				430
Jinabang, Rolpa	30						130	160
Ranka, Rolpa	4						24	28
Dillichaur, Jumla	329	312				57		698
Gatlang, Rasuwa	8			18			240	266
Bindawashini, Achham	479			176			243	898
Total	1159	312	181	828	25	57	986	3548

Table 1.10. Support of Basic Seed (BS₂) of recommended varieties of potato to different CBSP Groups and Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (Kg)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	200	680		320			180	1380
Dordi, Lamjung				1000	200			1200
Shalija, Parbat		360		30		21	30	441
Dhorpatan, Baglung		600		240		120	120	1080
Jinabang, Rolpa	72		70			102		244
Patarashi, Jumla	1600					600		2200
Total	1872	1640	70	1590	200	843	330	6545

Results

Nine seed potato producer's groups and Cooperatives from 8 hilly/mountain districts of Nepal were selected for implementation of Community Based seed potato production program. Technical capabilities of 25 seed potato growers and technician were empowered through residential training carried out at Dhulikhel Training Centre, Kavre from 23-29 December, 2019. Technical capabilities of 32 seed potato growers and technicians from Achham and Doti districts were empowered through practical training conducted at Mellekh, Bindabashini, Achham from 16-18 March, 2022. Technical capabilities of 30 seed potato growers and technicians from Rasuwa were empowered through practical training conducted at Ammachhodingmo Rural Municipality, Gatlang, Rasuwa from 6-7 April, 2022. Six rustic stores were constructed at different CBSP sites of Ilam, Lamjung, Parbat, Baglung, Rolpa and Jumla during F.Y. 2019/2020 while three rustic stores during F.Y. 2020/2021 for storage of seed potatoes.

A total of 1370 kg Basic Seed (BS₁) of Janak Dev, Khumal Ujjal, Desire, Khumal Seto 1, Kufri Jyoti, Cardinal and Khumal Upahar varieties were produced by different farmer's Groups and Cooperatives during F.Y. 2019/2020 (Table 2.1). Likewise, a total of 83172 kg Basic Seed (BS₃) of Janak Dev, Khumal Ujjal, Desire, Khumal Seto 1 and Cardinal varieties were produced by different CBSP Groups and Cooperatives during F.Y. 2019/2020 (Table 2.2). Likewise, a total of 3548 kg Basic Seed (BS₁) of Jumla local, Khumal Ujjal, Desire, Khumal Seto 1, Kufri Jyoti, Cardinal and Khumal Upahar Varieties were produced by different CBSP Groups and Cooperatives during F.Y. 2020/2021 (Table 2.3). Likewise, a total of 6545 kg Basic Seed (BS₂) of Janak Dev, Khumal Ujjal, Desire, Khumal Seto 1, Kufri Jyoti, Cardinal and Khumal Upahar varieties were produced by different CBSP Groups and Cooperatives during F.Y. 2020/2021 (Table 2.4). Similarly, a total of 192696 kg Improved Seed (BS₄) of Khumal Bikas, Janak Dev, Khumal Ujjal, Desire, Khumal Seto 1 and Cardinal varieties were produced by different CBSP Groups and Cooperatives during F.Y. 2020/2021 (Table 2.5).

A total of 3799 kg Basic Seed (BS₁) of Desire, Khumal Bikas, Janakdev, Cardinal, Khumal Ujjal, Jumla local, Khumal Ujjal, Khumal Upahar and Kufri Jyoti Varieties were produced by different CBSP Groups and Cooperatives of respective CBSP sites during F.Y. 2021/2022 (Table 2.6). Likewise, a total of 15422 kg Basic Seed (BS₂) of Desire, Jumla Local, Cardinal, Khumal Ujjal, Khumal Seto 1, Kufri Jyoti and Khumal Upahar varieties were produced by different CBSP Groups and Cooperatives of respective CBSP sites during F.Y. 2021/2022 (Table 2.7). Similarly, a total of 23288 kg Basic Seed (BS₃) of Desire, Janakdev, Cardinal, Khumal Ujjal, Khumal Upahar, Khumal Seto 1 and Kufri Jyoti varieties were produced by different CBSP Groups and Cooperatives of respective CBSP sites during F.Y. 2021/2022 (Table 2.8). Thus, a total of 42509 kg of Basic Seed of potato with different generation produced by different CBSP Groups and Cooperatives during F.Y. 2021/2022 (Table 2.9) which is enough to conduct seed production program on 21 hectares of land for next season.

Discussion

Basic seed of recommended potato varieties produced by different CBSP Groups and Cooperatives were stored at various rustic stores will be used for seed multiplication for at least 5-6 years. Seed replacement rate (SRR) in

CBSP sites has increased significantly through efficient and standard seed multiplication, storage and distribution system. CBSP is cheapest and successful approach for sustainable seed potato production. Potato varieties released by NARC helped to increase production and supply of quality seeds at grass root level has increased potato production in the country. Participation of the multi- stakeholders in potato research and development create enabling environment to realize the interest of each actor in a coordinated way.

Table 2.1. Basic Seed (BS₁) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2019/2020

CBSP Sites	Quantity (Kg)							Total
	Janak Dev	Khumal Ujjal	Desire	Khumal Seto 1	Kufri Jyoti	Cardinal	Khumal Upahar	
Nayabazar, Ilam	60	80	30		40			210
Purano Dwara, Lamjung		44			15	55	36	150
Salija, Parbat	46	27		4	26			103
Dhorpatan, Baglung	150	62		75	75			362
Jinabang, Rolpa			20	20		20		60
Dillichaur, Jumla			325	235				560
Total	256	213	375	334	156	75	36	1370

Table 2.2. Basic Seed (BS₃) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2019/2020

CBSP Sites	Quantity (Kg)						Total
	Janak Dev	Khumal Ujjal	Desire	Khumal Seto 1	Cardinal		
Nayabazar, Ilam	15790	880					16670
Purano Dwara, Lamjung	9025	307	4280		1750		15362
Salija, Parbat	18356			2496			20852
Dhorpatan, Baglung	3900	200	750		2650		7500
Jinabang + Ranka, Rolpa	7388		4610	450	4938		17386
Patarashi, Dillichaur, Jumla			840	4562			5202
Total	54459	1387	10480	7508	9338		83172

Table 2.3. Basic Seed (BS₁) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (Kg)							Total
	Jumla local	Khumal Ujjal	Desire	Khumal Seto 1	Kufri Jyoti	Cardinal	Khumal Upahar	
Nayabazar, Ilam		274	100		183			557
Purano Dwara, Lamjung		200	80		125			405
Salija, Parbat			19		41	21	25	106
Dhorpatan, Baglung		160	110			160		430
Jinabang, Rolpa			30		130			160
Ranka, Rolpa			4		24			28
Dillichaur, Jumla	312		329	57				698
Gatlang, Rasuwa		18	8		240			266
Bindawashini, Achham		176	479		243			898
Total	312	828	1159	57	986	181	25	3548

Table 2.4. Basic Seed (BS₂) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (Kg)							Total
	Janak Dev	Khumal Ujjal	Desire	Khumal Seto 1	Kufri Jyoti	Cardinal	Khumal Upahar	
Nayabazar, Ilam	680	320	200		180			1380
Purano Dwara, Lamjung		400				600	200	1200
Salija, Parbat	360	30		21	30			441
Dhorpatan, Baglung	600	240		120	120			1080
Jinabang, Rolpa			72	102		70		244
Dillichaur, Lashi, Jumla			1600	600				2200
Total	1640	990	1872	843	330	670	200	6545

Table 2.5. Improved Seed (BS₄) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2020/2021

CBSP Sites	Quantity (Kg)						Total
	Khumal Bikas	Janak Dev	Khumal Ujjal	Desire	Khumal Seto 1	Cardinal	
Nayabazar, Ilam		84000	2650				86650
Purano Dwara, Lamjung		12650	1101	7930		2187	23868
Salija, Parbat		23450			9450		32900
Dhorpatan, Baglung		4400	300	850		3400	8950
Jinabang Rolpa		8695		7516	1385	8883	26479
Ranka, Rolpa		4223		1539		187	5949
Dillichaur, Jumla				1354	6402		7756
Gatlang, Rasuwa	61		83				144
Total	61	137418	4134	19189	17237	14657	192696

Table 2.6. Basic Seed (BS₁) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (kg)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam		320				10		330
Purano Dwara, Lamjung				600				600
Shalija, Parbat	150						30	180
Dhorpatan, Baglung				100				100
Jinabang, Rolpa	180	140			500			820
Ranka, Rolpa	210							210
Dillichaur, Jumla	462							462
Gatlang, Rasuwa				700				700
Bindawashini, Achham	129		119	149				397
Total	1131	460	119	1549	500	10	30	3799

Table 2.7. Basic Seed (BS₂) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (Kg)							Total
	Desire	Jumla local	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	560			560			590	1710
Purano Dwara, Lamjung	200			800			700	1700
Shalija, Parbat			50		75		100	225
Dhorpatan, Baglung	1200		1500	1300				4000
Jinabang, Rolpa	300						500	800
Ranka, Rolpa	37						128	165
Dillichaur, Jumla	1019	967				239		2225
Gatlang, Rasuwa	50			250			400	700
Bindabashini, Achham	1532			675			1690	3897
Total	4898	967	1550	3585	75	239	4108	15422

Table 2.8. Basic Seed (BS₃) of recommended varieties of potato produced by different CBSP Groups & Cooperatives during F.Y. 2021/2022

CBSP Sites	Quantity (Kg)							Total
	Desire	Janak Dev	Cardinal	Khumal Ujjal	Khumal Upahar	Khumal Seto 1	Kufri Jyoti	
Nayabazar, Ilam	400	1500		500			350	2750
Purano Dwara, Lamjung				3000	800			3800
Shalija, Parbat		1000		100		50	150	1300
Dhorpatan, Baglung		6000		1600		1300	1500	10400
Jinabang, Rolpa	300		300			400		1000
Dillichaur, Jumla	2120					1918		4038
Total	2820	8500	300	5200	800	3668	2000	23288

Table 2.9. Basic Seed of recommended varieties of potato produced by different CBSP Groups and Cooperatives for three consecutive years (2019/2020 - 2021/2022)

Type of Seed	Quantity (Kg)			
	2019/2020	2020/2021	2021/2022	Total (Kg)
Basic Seed I (BS ₁)	1370	3548	3799	8717
Basic Seed II (BS ₂)		6545	15422	21967
Basic Seed III (BS ₃)	83172		23288	106460
Basic Seed IV (Improved)		192696		192696
Total	84542	202789	42509	329840

Conclusion

Despite four decades of endeavor towards potato Research and Development, progresses are not significant. National annual seed replacement rate (SRR) is only 14 % and national average productivity is 16.73 t/ha. Adoption of improved varieties is low due to high seed rate requirement (2000 kg/ha), low rate of seed multiplication (1:8), high degree of seed degeneration and production of low proportion of seed-sized tubers (25-50 g). About 50% potato growers are growing locally available poor quality degenerated seed tubers for many years without replacement. The main beauty of CBSP approach is that it is cost effective, has good community participation and empower the disadvantaged groups. So, integration of all these approaches could be the most effective for participatory technology development, verification and dissemination of sustainable seed potato production and marketing at community level. Availability of quality seed potato could be increased significantly by

production of seed tubers utilizing naturally virus free areas of various high-hills/mountains of Nepal through CBSP approaches and storage of seed tubers under low-cost storage system (Rustic stores).

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