

Part A
Annex 8 Formats for Project Completion Report

Project Completion Report – Summary Sheet (1)

NARDF Reference Number:	407/2006/2007		
Project Title:	Increasing Productivity of Potatoes through Verification and Promotion of True Potato Seed (TPS) Technology		
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Collaborating organisations:	National Potato Development Program, Khumaltar, Lalitpur 2. Nucleus Seed Potato Centre, Nigale, Sindhupalchok 3. District Agriculture Development Office - Jumla and Humla 4. Vegetable Crops Development Directorate, Khumaltar		
Start Date:	September, 2007	End Date:	December, 2009
NARDF Funding Envelope:			
NARDF Priority area:			
Original budget		Actual expenditure:	

1. Researchable constraint/problem the project aimed to address

The productivity of potato is very low in Karnali Zone. Occurrence of diseases and pests, lack of good quality seed, poor agronomic practices are attributed to it. Unavailability of good quality seed is the major factor, as the transportation of bulky seed is too expensive. Hence, it is paramount to produce good quality seed so as to address these problems. Seedling tuber production through TPS and transplanting technology could be the best alternative for those areas. Use of quality seed and proper crop management practices could certainly reduce the problem of diseases and pests. Thus, this project focused on introduction of TPS technology for quality seed and ware potato production with emphasis on efficient crop management practices. Furthermore, producing good quality seed by themselves helps the district to become self sufficient in good quality seed potatoes. As a consequence, potato production is expected to increase by 50% once farmers' extensively use TPS derived planting materials.

The total area and production of potato in Humla and Jumla district is 2745 ha and 23000 MT respectively (MOAC, 1999). The productivity of 8.37 t/ha is far below the national average of 13.5 t/ha. It is obvious that farmers' are utilizing 4117 MT of seed potato (@ 1500 kg/ha) to plant 2745 ha of land. It is disappointing to note these food deficit districts burying huge amount of food in the soil as seed. On the contrary, seed requirement could be reduced by half by using TPS derived planting materials. In fact, 750 kg of seedling tuber is sufficient to plant one hectare of land (PRP, 2005). Thus, 2058 MT of seed tuber could be saved if TPS technology is introduced. In terms of money, this amounts to a total saving of Rs.120 million per annum. Additionally, transportation and storage cost is

also be saved. Obviously, lower productivity is mainly attributed to low quality potato seed. The basic seed produced through pre-basic seed (tissue culture) has not yet reached remote regions because of poor transportation facilities. Therefore, TPS technology is the best alternative technology for solving the problem of seed potato in the remote regions. Furthermore, TPS hybrid lines that are available in the country have shown better performance in productivity and diseases tolerance. Therefore, introduction of TPS technology is very necessary for Karnali region, and this proposal is primarily an initiation to address this issue. Initially, adoption of any new technology requires farmers' evaluation, so technology verification study with season-long training helps in participatory evaluation and adoption of this technology.

2. Target group/users

Small farmers of the project sites are the direct beneficiaries and the fringe residents are the indirect beneficiaries. Women farmers, who are directly involved to enhance their family's socioeconomic status, became the main clients who were tried to be empowered through season-long trainings.

This project gave top priority to empower socio-economically weak and deprived members of the community. Most of the *Dalit* and *Janajati's* are generally small landholders, who were partially employed. So efforts were directed to enhance their livelihoods through intensive farming of this crop that has comparative advantage. Concurrently, this opportunity helped to enhance their livelihood options. Therefore, the main target groups of this project were small landholders and marginal farmers.

3. List of key results/recommendations arising from the research

By the end of project period, TPS technology package was evaluated and verified in four project sites. The production and productivity of potato increased considerably. Participating 100 core farmers are serving as resource persons for disseminating TPS technology. More than 600 peripheral farmers sensitized TPS technology. Two rustic stores were constructed and operated so as to strengthen seedling tuber production, storage and distribution activities. These results are:

1. TPS technology package evaluated and verified in 4 sites.
2. Altogether 100 farmers of 4 sites transformed into resource persons for sustainable TPS technology.
3. It has been estimated that more than 1500 farmers of the project sites are using healthy seed.
4. Two rustic stores constructed and operated by farmers groups.
5. More than 600 farmers of the periphery sensitized TPS technology.
6. Production and productivity of potato in the site increased.

4. Dissemination of results and prospects for adoption

Use of degenerated seed and primitive husbandry practices are the major factors inhibiting potato productivity in these remote districts. In fact, concerted efforts to address these problems are lacking. Conversely, TPS technology, which is rather intensive but has higher production potential, was new to this area. This new technology not only enhances productivity but also helps in reducing seasonal underemployment, and adding to the livelihood options to some extent.

As participant farmers themselves evaluated and verified this benign technology practically, their confidence and management skills are strengthened. Owing to this, rate of adoption as well as the demand for TPS and ST increased. Farmers will intensify seed production so as to exploit this "marketing" opportunity. Thus, continuation of TPS activities, DL storage facilities and post project follow-ups will increase environmental and economic benefits, thereby ensuring availability of quality seed in the district. It is envisaged that by the end of the project more than 1500 farmers became aware of this technology. Consequently, it can be estimated that productivity has increased in the project site, whereas the aggregate productivity of the districts will increase.

Technicians facilitated the farmer's groups in evaluating TPS technology mainly through season-long training. Each participant can exploit the potentials of TPS technology in their own farm by applying knowledge and skills, which they acquire through demonstration and trainings. Later, participants are

encouraged to facilitate the technology evaluation process. Supervision, monitoring and evaluation were done by central as well as district level collaborators. Problems and constraints that crop-up during the implementation phase were solved through participatory approaches. Farmers' field days was organized in each district to disseminate the results to the stakeholders and peripheral residents.

5. Indicators of potential future impact [list up to five indicators, based on current knowledge]

- By the end of project period, TPS technology package was evaluated and verified in four project sites.
- The production and productivity of potato have increased due mainly to the use of clean seed.
- Moreover, seed requirement have cut down through the use of TPS.
- Farmers started to adopt TPS technology to produce Seedling Tubers, and 1 kg TPS was distributed to them.
- Initially, these core farmers served as resource persons for disseminating and sustaining TPS technology.
- Around 600 peripheral farmers have been sensitized to adopt TPS technology.
- Two rustic stores were constructed and operated so as to strengthen seedling tuber production, storage and distribution activities.
- On aggregate, production and productivity of potato in these districts is envisaged to increase. .

6. Lessons learned

The project proposal was prepared for the promotion of TPS technology in remote high mountain districts of Nepal where availability of good quality seed is major limiting factor in potato production. Due to far distance of project implementation organization and project sites, not only the project became expensive but our organization faced trouble to send project team in field timely. It was thought earlier that the project team orient the DADO staffs properly for effective implementation but transfer of district level technicians and their efficiency created the problem. Therefore, handle of project in sites of long distance is also a problem to run effectively.

Project Completion Report, Summary Sheet [2]

7. Project Leader's Ratings of Project Achievements/Success

Description	Rating	Note
<p>1.1 Reconnaissance, Site selection and base line survey</p> <p>A reconnaissance was conducted by a joint team comprising PT, DADO and VDC members to identify appropriate wards suited to attain the project output. Then a base line survey was carried out to explore socio-economic situation, infrastructure, farming system, disease and insect profile, indigenous knowledge and skills using PRA tools. Secondary data were collected from DADO.</p> <p>1.2 Workshops (preparatory/orientation)</p> <p>Workshop was organized in each district to orient the staffs of DADO, participant farmers and other stakeholders. Efforts were made to delineate the roles and responsibility of the concerned stakeholder. Participant farmers in particular developed detailed plan of action for the smooth implementation of the program.</p> <p>1.3 On-farm Participatory Technology Evaluation & Verification</p> <p>Production of high quality seed and ware potato through the use of TPS was</p>	3	Refers to activity completion, input availability, budget management, collaboration and participation of the

<p>demonstrated, evaluated and verified.</p> <p>1.3.1 Participatory Technology Verification Study for seedling tuber production</p> <p>Each participating farmer verified this technology by planting TPS in 15-20 m² area on their farm. This enabled them to acquire knowledge and skills in producing ST from TPS. In the second year, same procedures followed; farmers produced ST by themselves from the TPS provided by the project.</p> <p>1.3.2 Technology Verification Study (TVS) for ST evaluation for ware potato production</p> <p>In the first year, two TVS were conducted in each site. Seedling tubers were compared against local seed/practices for producing ware potatoes. But in the following year, each participant utilized their own previously produced ST. The size of the TVS was one <i>ropani</i> of land, which were divided into two sub-plots to compare the practices.</p> <p>2.1 Season-long training for participating farmers</p> <p>A total of 15 training per site were conducted in the first year and 7 training in second year. It was based on focussing on discovery based learning system, which involved close observation on crop growth characteristic, and its interactions with biotic and abiotic factors in the field. DADO staffs and other experts were the trainers and facilitators. These trainings provided complete evaluation of the technology and crop management skills to the farmers. It has been expected to these participating farmers will serve as resource persons for disseminating this technology in the district. The major topics were appended below;</p> <ul style="list-style-type: none"> • Importance of potato, scope and utilization of TPS • Integrated crop management; decision making process. • Agronomic practices - seed, soil and fertilizer management • Plant protection, post harvest technology • Low cost diffused light stores - rustic store <p>2.2 Construction and operation of Small Scale Low-cost Rustic store</p> <p>In the first year, a total of 2 rustic stores were constructed in both districts for demonstration purpose. Seedling tubers produced in the project sites were retained as seed and stored in them. The cost of construction was borne by the project. Upon completion these were handed over to the seed producer groups in sites.</p> <p>3.1 Preparation of technical guidelines/manuals:</p> <p>To launch the project effectively, technical guidelines on utilization of TPS for ST production, and ST techniques for ware production was published and distributed to the officers, field level technicians, participatory and other interested farmers of the project and peripheral area.</p> <p>3.2 Supervision, monitoring and evaluation:</p> <p>The coordinator, project team members and collaborators performed monitoring and supervision tasks as per need. However, a bi-monthly, monthly, quarterly, half-yearly and annual schedule was followed.</p> <p>3.3 Farmers Field Day:</p> <p>A field day was organized in each site at the end of the season. The results were presented to the farmers of periphery, various stakeholders and other</p>		<p>target group during implementation</p>
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<p>interested people. This sensitized farmers on TPS technology, and encouraged them to use good quality seed for potato production.</p> <p>3.4 Preparation of reports and publication:</p> <p>Preparation/submission of reports was done as guided by NARDF rules and regulations.</p>		
<p>Output Delivery</p> <p>1 TPS Technology evaluated and verified</p> <p>The site was identified by baseline survey and analysis of secondary data obtained from various line agencies prior to launching of the project. The workshops were provided to orient to the officers and field level technicians of DADO office. Technology for producing high quality seed potato, and ware potato production were evaluated in farmers' field. These activities are envisaged to enhance stakeholders' confidence on the TPS, thereby inspiring farmers to adopt this benign technology. Moreover, peripheral residents also became aware of this technology and use quality seed produced in the sites in the subsequent year.</p> <p>2 Management efficiency and productivity enhanced</p> <p>The season-long trainings concentrate on studying plant growth characteristics followed by participatory discussions. The trainer/facilitators trained the farmers about the technology. This training not only provides opportunity for farmers' to evaluate this technology but also strengthens their skills to manage and produce potato crop efficiently. The results of the TVS was disseminated to the stakeholders and interested peripheral inhabitants through workshops and field days respectively. In addition, publication on TPS technology package was widely circulated. Seedling tubers produced by participating farmers' were retained and stored in the rustic stores. It was distributed as source seed in the subsequent years.</p> <p>3. Verified technology widely disseminated and adopted</p> <p>Seedling tubers produced by participating farmers was made available to interested farmers of the project area as well as to the fringe residents. Technical guidelines was published and distributed to the officers of DADO, field level technicians, participatory farmers and other interested persons. Distribution of TPS continued as a post-project or a follow-up activity. It was made available to farmers through DAD office.</p>	3	Refers to planned outputs and OVIs in the Logframe, including the development of clear recommendations for broader dissemination
<p>Uptake and adoption:</p> <p>By Farmers: A total of 100 farmers, who received season long training during both year of project implementation and they also involved in technology verification and evaluation through demonstration, hence they transformed to resource persons of the TPS technology. Besides, farmers of periphery of sites observed crops and activities of the project and they are also sensitized to the technology. This situation created to adopt the technology.</p> <p>By dissemination agents: Field technicians handled the programme activities of the project under the supervision of horticulturists and project team members that created the confidence build up in TPS technology.</p> <p>By scientists/Officers: Horticulture Dev officers and other technical officers became close familiar with the technology by doing together with project team members that helps in dissemination of the technology.</p>	B	

Part B

Annex 9: Main Project Completion Report

1. Background

Humla and Jumla districts in Karnali region are the most hard-hit food deficit areas in Nepal. Its geography, remoteness and rudimentary transportation infrastructure are the main factors impeding food production and supplies. Although farming is the main occupation in Karnali, its productivity is very low due to low level of technology adoption. As a result, low income, poverty and malnourishment is rampant among the people of this region. Nevertheless, there are many opportunities to meet this chronic challenge. Obviously, concerted efforts are needed to enhance food security, which in turn would help in reducing malnutrition and poverty. This can be achieved by increasing the productivity of the food crops. It is also important to introduce low cost crop production technologies that have comparative advantage. Contextually, Potato is one of them. In fact, potato is a staple non cereal food crop of the region but the productivity is very low. Unavailability of good planting material in terms of quantity and quality is one of the major problems. Moreover, it is infeasible to transport large volume of seed potatoes from outside, as the poor state of the infrastructure aggravates the cost. Thus, the best solution is to produce quality seed in the region itself. In this regard, introduction and scaling up of true potato seed (TPS) technology helps to solve most of the problems related to potato production. Production of good quality seed potatoes through TPS provides several benefits; it not only increases availability of quality seed, which at present is either scarce or expensive, but also saves huge quantity of potatoes that are used as seed. The quantity saved there from could ultimately be consumed as food. Utilizing comparatively cleaner production environment, seed production technology through TPS could be a boon for the farmers of Humla and Jumla districts.

Verification of the technology in farmers' field through participatory evaluation process empowers farmers' towards adopting this technology. Hence, this project focuses on technology verification study (TVS) of seedling tuber production through TPS, and ware potato production from seedling tuber. Season-long training, which emphasizes interaction among the farmers and facilitators, contributes towards solving technical problems and refining the evaluation process. In the first year, project focuses on TVS of seedling tuber (ST) production by all participating farmers and few TVS of ware potato production through ST, and in the second year, focus will be given on TVS of ware potato production using the ST produced by them in the previous year. Distribution of TPS will be continued as a post project or follow-up activity.

2. Research / development implementation performance

1.1 Reconnaissance, Site selection and base line survey

A reconnaissance was conducted by a joint team comprising PT, DADO and VDC members to identify appropriate wards suited to attain the project output. Then a base line survey was carried out to explore socio-economic situation, infrastructure, farming system, disease and insect profile, indigenous knowledge and skills using PRA tools. Secondary data was collected from DADO, DDC, VDC and other sources.

1.2 Workshops (preparatory/orientation)

Workshops were organized in each district to orient the staffs of DADO, participant farmers and other stakeholders. Efforts were made to delineate the roles and responsibility of the concerned stakeholder. Participant farmers in particular developed detailed plan of action for the smooth implementation of the program.

1.3 On-farm Participatory Technology Evaluation & Verification

Production of high quality seed and ware potato through the use of TPS was demonstrated, evaluated and verified.

1.3.1 Participatory Technology Verification Study for seedling tuber production

Each participating farmer verified this technology by planting TPS in 15-20 m² area on their farm. This will enable them to acquire knowledge and skills in producing ST from TPS. In the second

year, same procedures follow; farmers produced ST by themselves from the TPS provided by the project. This enhanced their capacity and confidence towards adopting this technology.

1.3.2 Technology Verification Study (TVS) for ST evaluation for ware potato production

In the first year, two TVS were conducted in each site. Seedling tubers were compared against local seed/practices for producing ware potatoes. But in the following year, each participant utilized their own previously produced ST. The size of the TVS were one ropani of land, which will be divided into two sub-plots to compare the practices.

2.1 Season-long training for participating farmers

A total of 15 training per site were conducted in the first year and 7 training in second year. It was focused on discovery based learning system, which involves close observation on crop growth characteristic, and its interactions with biotic and abiotic factors in the field. DADO staffs and other experts were the trainers and facilitators. These trainings provided complete evaluation of the technology and crop management skills to the farmers. In the long run, these participating farmers served as resource persons for disseminating this technology in the district. The major topics were appended below;

- Importance of potato, scope and utilization of TPS
- Integrated crop management; decision making process.
- Agronomic practices - seed, soil and fertilizer management
- Plant protection, post harvest technology
- Low cost diffused light stores - rustic store

2.2 Construction and operation of Small Scale Low-cost Rustic store

In the first year, a Rustic store was constructed in each district for demonstration purpose. Seedling tubers produced in the project sites were retained as seed and stored in them. It is envisaged that provision of this facility inspired farmers to produce large quantity of seed, which in turn would help increase potato productivity.

The cost of construction was borne by the project. Upon completion, it was handed over to the seed producer group in each site. .

3.1 Preparation of technical guidelines/manuals:

To launch the project effectively, technical guidelines on utilization of TPS for ST production, and ST techniques for ware production was published and distributed to the officers, field level technicians, participatory and other interested farmers of the project and peripheral area.

3.2 Supervision, monitoring and evaluation:

It is an on-going and regular activity. The coordinator and collaborators performed monitoring and supervision tasks as per need. However, a bi-monthly, monthly, quarterly, half-yearly and annual schedule was followed.

3.3 Farmers Field Day:

A field day was organized in each site at the end of the season. The results were presented to the farmers of periphery, various stakeholders and other interested people. This sensitized farmers on TPS technology, and encouraged them to use good quality seed for potato production. On the other hand, participant farmers developed strong confidence to adopt this technology.

3.4 Preparation of reports and publication:

Preparation/submission of reports was done as guided by NARDF rules and regulations.

3. Situation regarding delivery of outputs/results

Low income, poverty and malnourishment are rampant among the people of Humla and Jumla districts in Karnali region. Although farming is the main occupation in Karnali, its productivity is very low due to

low level of technology adoption.. Nevertheless, there are many opportunities to meet this chronic challenge. Obviously, concerted efforts are needed to enhance food security, which in turn would help in reducing malnutrition and poverty. This can be achieved by increasing the productivity of the food crops. It is also important to introduce low cost crop production technologies that have comparative advantage. Contextually, Potato is one of them. In fact, potato is a staple non cereal food crop of the region but the productivity is very low. Unavailability of good planting material in terms of quantity and quality is one of the major problems. Thus, the best solution is to produce quality seed in the region itself. In this regard, introduction and scaling up of true potato seed (TPS) technology helps to solve most of the problems related to potato production. Production of good quality seed potatoes through TPS provides several benefits; it not only increases availability of quality seed, which at present is either scarce or expensive, Therefore, the project was designed to supply quality seed by producing seedling tubers in Humla and Jumla districts. The expected outputs were : TPS Technology evaluated and verified, Management efficiency and productivity enhanced, and Verified technology widely disseminated and adopted

The site was identified by baseline survey and analysis of secondary data obtained from various line agencies prior to launching of the project. The workshops were provide orientation to the officers and field level technicians of DADO office. Technology for producing high quality seed potato, and ware potato production were evaluated in farmers' field. These activities are envisaged to enhance stakeholders' confidence on the TPS, thereby inspiring farmers to adopt this benign technology. Moreover, peripheral residents also became aware of this technology and use quality seed produced in the sites in the subsequent year.

The season-long trainings concentrate on studying plant growth characteristics followed by participatory discussions. The trainer/facilitators trained the farmers about the technology. This training not only provides opportunity for farmers' to evaluate this technology but also strengthens their skills to manage and produce potato crop efficiently. The results of the TVS was disseminated to the stakeholders and interested peripheral inhabitants through workshops and field days respectively. In addition, publication on TPS technology package was widely circulated. Seedling tubers produced by participating farmers' were retained and stored in the rustic stores. It was distributed as source seed in the subsequent years.

Seedling tubers produced by participating farmers was made available to interested farmers of the project area as well as to the fringe residents. Technical guidelines was published and distributed to the officers of DADO, field level technicians, participatory farmers and other interested persons. Distribution of TPS continued as a post-project or a follow-up activity. It was made available to farmers through DAD office.

4. Prospects for the adoption of the new technology and achievement of purpose

Use of degenerated seed and primitive husbandry practices are the major factors inhibiting potato productivity in these remote districts. In fact, concerted efforts to address these problems are lacking. Conversely, TPS technology, which is rather intensive but has higher production potential, is new to this area. This new technology not only enhances productivity but also helps in reducing seasonal underemployment, and adding to the livelihood options to some extent.

As participant farmers' themselves evaluate and verify this benign technology practically, their confidence and management skills are strengthened. Owing to this, rate of adoption as well as the demand for TPS and ST will increase significantly. Farmers will intensify seed production so as to exploit this "marketing" opportunity. The core farmers alone are expected to produce more than 10 tons of TPS planting materials. Thus, continuation of TPS activities, DL storage facilities and post project follow-ups will increase environmental and economic benefits, thereby ensuring availability of quality seed in the district in future. It is envisaged that by the end of the project 1500 farmers have started to adopt this technology. Consequently, productivity will double (9.0 MT/ha) in the project site, where as the aggregate productivity of the districts has increased considerably.

Technicians facilitated the farmer's groups in evaluating TPS technology mainly through season-long training. Each participant has expected to exploit the potentials of TPS technology in their own farm by applying knowledge and skills, which they acquire through demonstration and trainings. Later, participants have encouraged facilitating the technology evaluation process. Supervision, monitoring

and evaluation was done by central as well as district level collaborators. Problems and constraints that crop-up during the implementation phase have been solved through participatory approaches. Farmers' field days were organized in each site to disseminate the results to the stakeholders and peripheral residents.

5. Key indicators of potential impact identified by project stakeholders

- Production and productivity increased by 15% in the districts.
- TPS technology package evaluated and verified in 4 sites by the year 2008
- 100 farmers transformed into resource persons for sustainable TPS technology by 2008
- At least 1500 farmers of the project site used healthy seed by end of the project by 2009.
- Two rustic stores of constructed and operated by the year 2008
- About 600 farmers of the periphery sensitized to adopt TPS technology by the end of 2009.
- Production and productivity of potato in the site increased.

6. Proposed follow-up

Verification of the technology in farmers' field through participatory evaluation process empowers farmers' towards adopting this technology. Hence, this project focused on technology verification study (TVS) of seedling tuber production through TPS, and ware potato production from seedling tuber. Season-long training, which emphasized interaction among the farmers and facilitators, contributes towards solving technical problems and refining the evaluation process. In the first year, project focused on TVS of seedling tuber (ST) production by all participating farmers and few TVS of ware potato production through ST, and in the second year, focus was given on TVS of ware potato production using the ST produced by them in the previous year. The project was handed over to District Agriculture Dev Offices and they have to continue the program because they have committed for continuation. Distribution of TPS has continued as a post project or follow-up activity.

7. Lessons learned

The project proposal was prepared for the promotion of TPS technology in remote high mountain districts of Nepal where availability of good quality seed is major limiting factor in potato production. Due to far distance of project implementation organization and project sites, not only the project became expensive but our organization faced trouble to send project team in field timely. It was thought earlier that the project team orient the DADO staffs properly for effective implementation but transfer of district level technicians and their efficiency created the problem. Therefore, handle of project in sites of long distance is also a problem to run effectively.

NARDF Technical Paper Series Report

Abstract

The sites of two districts, i.e., Chandannath and Lamra of Jumla and Simikot and Bargaon of Humla, were identified by baseline survey and analysis of secondary data obtained from various line agencies prior to launching of the project. The orientation workshops were provided for orientation to the officers and field level technicians of DADO office. Technology for producing high quality seed potato, and ware potato production were evaluated in farmers' field. These activities are envisaged to enhance stakeholders' confidence on the TPS, thereby inspiring farmers to adopt this benign technology. Moreover, peripheral residents also became aware of this technology and use quality seed produced in the sites in the subsequent year.

The season-long trainings concentrated on studying plant growth characteristics followed by participatory discussions. The trainer/facilitators trained the farmers about the technology. This training not only provided opportunity for farmers' to evaluate this technology but also strengthened their skills to manage and produce potato crop efficiently. The results of the TVS were disseminated to the stakeholders and interested peripheral inhabitants through workshops and field days respectively. In addition, publication on TPS technology package was widely circulated. Seedling tubers produced by participating farmers' were retained and stored in the rustic stores. It was distributed as source seed in the subsequent years.

Seedling tubers produced by participating farmers was made available to interested farmers of the project area as well as to the fringe residents. Technical guidelines was published and distributed to the officers of DADO, field level technicians, participatory farmers and other interested persons. Distribution of TPS continued as a post-project or a follow-up activity. It was made available to farmers through DAD office.

1. Introduction

It is very vital to sensitize farmers towards scaling-up potato production technology through verification and participatory evaluation techniques, so that adoption of TPS technology will enhance productivity of potato in the project sites. This project was launched in Jumla and Humla districts of Karnali Zone. In the first year, two potato growing pockets were selected in each district, which were the sites of the project. There were four sites in two districts. Prior to project implementation, a baseline survey was carried out in coordination with DADO, DDC and concerned VDC for selecting appropriate sites in each district. Subsequently, workshops organised in both districts where stakeholders developed detailed plan of action including the operational calendar. Orientation part also be included in the workshop. For scaling-up TPS production, Technology verification study (TVS) for producing seedling tuber were launched in the field of 25 farmers in each sites; where as TVSs for seedling tubers performance were conducted in the field of 2 farmers' in each sites. Similarly, 15 seasonal trainings were carried during the crop season in each site. Technical staffs of the District Agriculture Development Office (DADO) took responsibility for conducting training activities, and were conducted as per the procedures of Farmers Field School. These seasonal trainings mainly focused on On-farm Participatory Technology Evaluation and Verification. Study demonstrations and trials so designed enabled farmers' to assess and identify best technology suited to their needs. Moreover, it helped in complete evaluation of TPS technology on participatory basis, as primary methodology of training are based on participatory discussion, interaction with resource persons, analysis of plant growth characters, interaction of crop with other ecological factors, comparative analysis etc. Preparatory workshop and training enhanced facilitation skills of the DADO staffs. National Potato Dev Programme took the overall responsibility of the project. At the central level, National Potato Development Program, Potato Research Program and Nucleus Seed Potato Centre provided technical support. Similarly, project collaborators were responsible for project implementation, monitoring and supervision at field level. Rustic store were constructed in each district, and the seedling tuber produced in first year was stored for utilizing in the corresponding year.

In second year, project emphasized TVS for ST performance, but the number of seasonal trainings

were reduced by half. TPS was distributed only to the participating farmers who were trained in the first year. Other activities and process remained the same in second year.

2. Materials and methods (conceptual framework, data, model, methodology)1 ?

Methodology is given below activity wise :

1.1 Reconnaissance, Site selection and base line survey

Stationery materials and survey materials are needed for Survey. A reconnaissance was conducted by a joint team comprising PT, DADO and VDC members to identify appropriate wards suited to attain the project output. Then a base line survey will be carried out. Secondary data will be collected from DADO, DDC, VDC and other sources.

1.2 Workshops (preparatory/orientation)

Workshop was organized in each district. Papers related to programme activities were presented in workshops. Discussion was made and various responsibilities were divided to collaborators, PT and participants. Presentation materials and stationeries were used in workshops.

1.3 On-farm Participatory Technology Evaluation & Verification

1.3.1 Participatory Technology Verification Study for seedling tuber production

This activity was designed as nodal demo for learning of technology and participatory verification of the technology. Major demonstration was comparative study which comprises three subplots of one Ropani land. Seedling tubers, basic seed and local were planted in those sub plots. Another demonstration was seedling tubers production demo which was 25 square meter sized plots. Like wise other demonstrations were varietal trials and PBS demo. Different planting materials, manure and fertilizers, pesticides and other required inputs materials were the used materials for this activity.

1.3.2 Technology Verification Study (TVS) for ST evaluation for ware potato production

Each participating farmer verified this technology by planting TPS in 15-20 m² area on their farm. Various input materials and TPS were the used materials for this activity.

2.1 Season-long training for participating farmers

A total of 15 training per site will be conducted in the first year and 7 training in second year. Chief and Horticulture Dev Officers of concerning DADO, ASC chief and project team members were the resource persons to conduct the training and interactions. It was organised in fields at various growth stages of potato crop.

2.2 Construction and operation of Small Scale Low-cost Rustic store

In the first year, a Rustic store will be constructed in each district for demonstration purpose. Local materials like, stones, mud, wooden materials were used to construct rustic stores. Technicians of district technical offices helped in designing and construction of rustic stores. Rupees 35000.00 was made available by the project to each rustic store.

3.1 Preparation of technical guidelines/manuals:

To launch the project effectively, technical guidelines on utilization of TPS for ST production, and ST techniques for ware production will be published and distributed to the officers, field level technicians, participatory and other interested farmers of the project and peripheral area.

3.2 Supervision, monitoring and evaluation:

The coordinator and collaborators performed monitoring and supervision tasks as per need. However, a bi-monthly, monthly, quarterly, half-yearly and annual schedule will be followed.

3.3 Farmers Field Day/Final workshop:

A field day was organized in each site at the end of the season. The results were presented to the farmers of periphery, various stakeholders and other interested people.

3.4 Preparation of reports and publication:

Preparation/submission of reports will be done as guided by NARDF rules and regulations.

3. Results & Discussion

1 TPS Technology evaluated and verified

1.1 Reconnaissance, Site selection and base line survey

A reconnaissance was conducted by a joint team comprising PT, DADO and VDC members to identify appropriate wards suited to attain the project output. Then a base line survey was carried out to explore socio-economic situation, infrastructure, farming system, disease and insect profile, indigenous knowledge and skills using PRA tools. Secondary data were collected from DADO, DDC, VDC and other sources.

1.2 Workshops (preparatory/orientation)

Workshop was organized in each district to orient the staffs of DADO, participant farmers and other stakeholders. Efforts were made to delineate the roles and responsibility of the concerned stakeholder. Participant farmers in particular developed detailed plan of action for the smooth implementation of the program.

1.3 On-farm Participatory Technology Evaluation & Verification

Production of high quality seed and ware potato through the use of TPS was demonstrated, evaluated and verified.

1.3.1 Participatory Technology Verification Study for seedling tuber production

Each participating farmer verified this technology by planting TPS in 15-20 m² area on their farm. This enabled them to acquire knowledge and skills in producing ST from TPS. In the second year, same procedures followed; farmers produced ST by themselves from the TPS provided by the project. This helped to enhance their capacity and confidence towards adopting this technology.

1.3.2 Technology Verification Study (TVS) for ST evaluation for ware potato production

In the first year, two TVS will be conducted in each site. Seedling tubers were compared against local seed/practices for producing ware potatoes. But in the following year, each participant utilized their own previously produced ST. The size of the TVS was one *ropani* of land, which will be divided into two sub-plots to compare the practices.

2. Management efficiency and productivity enhanced.

2.1 Season-long training for participating farmers

A total of 15 training per site were conducted in the first year and 7 training in second year. It focussed on discovery based learning system, which involves close observation on crop growth characteristic, and its interactions with biotic and abiotic factors in the field. DADO staffs and other experts were the trainers and facilitators. These trainings provided complete evaluation of the technology and crop management skills to the farmers. In the long run, these participating farmers served as resource persons for disseminating this technology in the district. The major topics were appended below;

- Importance of potato, scope and utilization of TPS
- Integrated crop management; decision making process.
- Agronomic practices - seed, soil and fertilizer management
- Plant protection, post harvest technology
- Low cost diffused light stores - rustic store

2.2 Construction and operation of Small Scale Low-cost Rustic store

In the first year, a Rustic store was constructed in each district for demonstration purpose. Seedling tubers produced in the project sites were retained as seed and stored in them. It is envisaged that provision of this facility inspired farmers to produce large quantity of seed, which in turn would help increase potato productivity.

The cost of construction was borne by the project. Upon completion, it was handed over to the seed producer group in each site. .

3. Verified technology widely disseminated and adopted

3.1 Preparation of technical guidelines/manuals:

To launch the project effectively, technical guidelines on utilization of TPS for ST production, and ST techniques for ware production was published and distributed to the officers, field level technicians, participatory and other interested farmers of the project and peripheral area.

3.2 Supervision, monitoring and evaluation:

It is an on-going and regular activity. The coordinator and collaborators performed monitoring and supervision tasks as per need. However, a bi-monthly, monthly, quarterly, half-yearly and annual schedule was followed.

3.3 Farmers Field Day/Final workshop:

A field day was organized in each site at the end of the season. The results will be presented to the farmers of periphery, various stakeholders and other interested people. This sensitizes farmers on TPS technology, and encourages them to use good quality seed for potato production.

On the other hand, participant farmers developed strong confidence to adopt this technology.

3.4 Preparation of reports and publication:

Preparation/submission of reports was done as guided by NARDF rules and regulations.

5. Conclusion and implication

The project emphasized on transfer of TPS technology to the farmers of two remote districts of Karnali zone. Various tools of technology transfer were applied simultaneously, for example trainings of various levels, demonstrations, mini trials of varieties etc. After two years of project implementation participating farmers became resource persons about TPS technology. Major objectives of the project concentrated on replacement of seed stock in farmer's fields and seedling tubers produced from TPS were the alternative to replace farmer's seed stock. Therefore, a complete package of TPS technology was taught by using various extension tools in project sites. Reduction of seed volume which provides the advantages in seed transportation as well as storage is a prime objective of TPS technology. Thus this technology is fit well in remote region of the country. The project has achieved those purposes but still continuous follow up is necessary.

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