

Development of On-Farm Potato Seed Tuber Production and Marketing Scheme: A Farmer-to-Farmer Volunteer Report

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**Development of On-Farm Potato Seed Tuber
Production and Marketing Scheme**

A Farmer-to-Farmer Volunteer Report

Submitted to

United States Agency for International Development (USAID)

**Amhara Micro-Enterprise Development, Agricultural
Research, Extension and Watershed Management (AMAREW)**

Amhara Regional Agricultural Research Institute (ARARI)

**Amhara Micro and Small Enterprise and Industry
Development Agency (AMSEIDA)**

Amhara Cooperative Promotion Agency (ACPA)

**Ethiopia Federal Ministry of Agriculture and Rural
Development**

**Amhara Regional Bureau of Agriculture and Rural
Development (BoARD)**

Submitted by

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12 June 2006

EXECUTIVE SUMMARY

Assignment Number: AMAREW 04.1/2006 Joseph F. Guenther

Name of Host Organizations: Amhara Micro-Enterprise Development, Agricultural Research, Extension and Watershed Management (AMAREW) Project, Amhara Regional Agriculture Research Institute (ARARI) Amhara Micro and Small Enterprise and Industry Development Agency (AMSEIDA), and Amhara Cooperative Promotion Agency (ACPA), Ethiopia Federal Ministry of Agriculture and Rural Development, and Amhara Regional Bureau of Agriculture and Rural Development (BoARD)

Dates of Assignment: 18 May – 5 June 2006

Scope of Work Objectives: AMAREW 04.1/2006 Joseph F. Guenther

1. Establish the relationship between seed potato quality and market outlets
2. Assess the feasibility of community-based seed potato enterprises
3. Develop strategies for small potato growers to access high quality seed potatoes
4. Develop strategies to safeguard seed potato quality
5. Determine optimal links between breeding centers and seed potato producers
6. Evaluate potential seed potato marketing strategies
7. Evaluate opportunities to expand community-based seed enterprises

Recommendations:

1. Continue to promote clean seed and suitable varieties
2. Continue efforts in storage development and management
3. Continue community-based programs, Development Agents (DAs) involvement and cooperative development
4. Develop a color-coded seed identification system
5. Develop seed potato planting packs
6. Contact Technico

Expected Impacts:

1. Increased potato yields
2. Reduced potato production costs per unit
3. Increased consumption of potatoes
4. Enhanced potato quality
5. Subsistence to market transition
6. Export and processing markets
7. Reduce price valleys
8. Use existing entities
9. Enhanced grower cooperative market power

12 June 2006

HOST OPERATION

The Ethiopian potato industry is an important part of the country's agricultural economy. In the highland areas I saw numerous potato fields. I also observed large amounts of potatoes being sold in village markets, urban markets, wholesale markets, retail markets and in restaurants.

I visited potato farms in Gojo (Jeldu Woreda), Injabara (Banja Shekudad Woreda), Gumet Valley (Sekela Woreda), Gasay (Farta Woreda) and other locations. These growers ranged from subsistence farmers to market farmers to farmers who specialize in seed potatoes. Some growers were planting clean seed of blight-tolerant varieties, while others were planting poor seed of mixed, unsuitable varieties. All seemed enthusiastic about clean seed and varietal improvement.

One grower in Gojo -- Guta Gudissa -- owned both a ware potato storage and a diffused light storage (DLS) for seed potatoes. At harvest his large potatoes were put into the ware storage where they could be kept, with the aid of cool, night-time air, for up to four months. The smaller potatoes went into the DLS, which is designed to let in some light, greening the seed potatoes and allowing them to be stored up to eight months.

Guta and other growers have been assisted in their efforts to improve their potato growing enterprises by the Holetta Agricultural Research Center (HARC). They serve their communities as successful role models for others who want to improve their farming practices. In the Gumet Valley six growers were provided by the USAID funded AMAREW project with seven varieties of blight tolerant seed potatoes in the spring of 2006. They agreed to develop DLS facilities and to return from their harvest the amount of seed given them. The number of growers and the volume of seed will be expanded in the future, helping the farmers establish specialized seed potato farms and a cooperative to assist in marketing.

Supporting Ethiopia's potato growers is an impressive research and extension system. The organizations seem well-organized and dedicated to helping farmers become more efficient and increasing the food security of Ethiopia's citizens.

I visited with potato research and extension experts at the federal, regional, zone, and Woreda levels. I was impressed with the expertise and enthusiasm of those I met. The Development Agents (DAs) seem to play a vitally important role in working with individual growers.

PROBLEMS

I detected no problems with the potato research and extension system. As I see it, some serious problems that Ethiopian potato growers face fall into two categories: (1) production risk and (2) price risk.

Production risk is the possibility of low yields and/or poor quality. Weather and pests are the main factors affecting production risk. Hail, too little rain and too much rain can reduce potato yields and quality. Pests such as late blight, bacterial wilt, weeds and potato tuber moth (PTM) were also mentioned by Ethiopian growers as serious risks in potato production.

Price risk is the possibility of market growers selling at unprofitable prices. This often happens at harvest time with perishable commodities, especially when the overall harvest is abundant and growers do not have access to adequate storage facilities.

Transportation is another factor that can influence price risk. This is a problem in remote areas that are a long distance from major markets. One agricultural expert in Bahir Dar showed me price data in which Bahir Dar potato prices were at times quadruple the prices in Sekala Woreda, a food deficit area.

A lack of alternative market channels can also contribute to price risk. Ware markets and seed markets are the traditional channels available to Ethiopian growers. With cleaner seed, improved varieties and more storage capacity, processing and export market channels could become available.

During my visit Dr Eshetu Mulatu and I met with Dr Marvin Ludwig and Ato Nahu-Senay Araya who are from Rotary International. They are developing plans to organize a non-profit entity that would build a potato dehydration factory in Injibara. The organization would make a product that would be marketed to disaster relief organizations. This could provide an exciting opportunity for potato growers in the area provided that producers access to quality seed is increased.

CAPACITY TO SOLVE PROBLEMS

I was impressed with the people I met in both the public and private sectors. I am confident that they have the capacity to solve problems.

The agricultural experts and growers I met unanimously talked about the importance of three things: (1) clean seed, (2) blight-tolerant varieties and (3) potato storage. The research and extension people understand the technology underlying all three factors.

The research and extension people also understand technology transfer. They talked about demonstration plots and demonstration storages. They were also happy to discuss early adaptors as well as the incentives and the psychology of changing cultural practices.

Guta Gudissa, the Gojo seed potato grower, is one shining example of how an innovative grower can adopt new technology and demonstrate his success to other farmers. He said that he entered the potato business because he heard a story about potato growing opportunities on an Ethiopian agricultural radio program. Perhaps he can someday be on the same program to tell his story.

A striking example of the understanding of the importance of clean seed potatoes of the right variety came from my visit with Dr Getachew Alemayehu, Director General of the Amhara Regional Agricultural Research Institute (ARARI). He said that his father is a farmer who sold some of his oxen to be able to buy clean seed potatoes. Since oxen are an extremely important part of the Ethiopian farmer's operation, the story indicates that Ethiopian farmers understand the main problem and how to solve it.

RECOMMENDATIONS

A summary of the goals written in my scope of work are:

1. *Establish the relationship between seed potato quality and market outlets*
2. *Assess the feasibility of community-based seed potato enterprises*
3. *Develop strategies for small potato growers to access high quality seed potatoes*
4. *Develop strategies to safeguard seed potato quality*
5. *Determine optimal links between breeding centers and seed potato producers*
6. *Evaluate potential seed potato marketing strategies*
7. *Evaluate opportunities to expand community-based seed enterprises*

I attempted to keep those issues in mind when I collected information from three sources: (1) potato experts, (2) potato growers and (3) potato markets. Based on the collection of information and my knowledge of the potato industry I have the following recommendations.

1. *Continue to promote clean seed and suitable varieties*
2. *Continue efforts in storage development and management*
3. *Continue community-based programs, DA involvement and cooperative development*
4. *Develop a color-coded seed identification system*
5. *Develop seed potato planting packs*
6. *Contact Technico*

The first three recommendations are simply to continue to emphasize the things that are already being done on the project. I think that these efforts are very important to the successful development of a high-quality seed potato production system as well as an improved potato industry in general. Recommendations four through six are covered in more detail below.

Develop a color-coded seed identification system

Producing high quality seed is an issue that is widely recognized as important throughout the Ethiopian potato industry. My recommendation is to provide a system to preserve the identity of the high-quality seed potatoes. Without an identification system, high quality seed potatoes could get confused with ordinary or low quality seed.

Even worse, under the current market structure high quality seed could get mixed in with poor seed and not only lose its identity but also lose its usefulness. I have observed Ethiopian seed potato markets and have seen how traders mix together seed potatoes purchased from different growers. Diseased tubers are mixed with disease-free tubers. Varieties are also mixed.

What is needed is a system that provides an incentive to keep the best seed separate. High quality seed potatoes should be labelled so that the buyers and sellers can preserve its identity and realize its full value.

My idea is to develop a three-color seed potato classification system. Based on similar systems elsewhere I suggest that Blue be the color of the best, then Red followed by White, but maybe other colors of importance in Ethiopia would be better. Seed potatoes that pass the criteria would be labelled with a color tag on which is written the following information: (1) variety, (2) month/year of harvest, (3) grower name or cooperative name and (4) location where grown.

I envision two categories of criteria for the seed potato identification program: (1) practices and (2) measurements. Example criteria for the practices are:

	<u>Blue Tag</u>	<u>Red Tag</u>	<u>White Tag</u>
Field generation	Year 1-2	Year 3-5	Unknown
Crop rotation	3 year	2 year	2 year
Isolation	20 m	15m	10m
Roguing	Negative	Negative	Positive
Diffused light storage	Yes	Yes	No
Follow extension practices	All	Most	Most

Field generation refers to the generations of the seed stock that is out among growers. For example the seed potatoes produced this year by growers in the Gumet Valley project are in the generation one category. Limiting the Blue Tag and Red Tag seed generations would allow for a flush-out system, whereby older stocks more likely to be infected with diseases are replaced with new, clean stocks

The crop rotation criterion requires growers to follow a three-year rotation on the seed potato field to qualify for the Blue Tag. That means that for the previous two years potatoes could not have been planted in that field. For Red and White Tags only the previous year could not have been potatoes. This would reduce the risk of disease carry-over in the soil and crop debris and avoid mechanical mixture from volunteer plants.

The isolation criterion requires at least a 20 meter gap between all edges of a Blue Tag seed potato field and another potato field. The standard is relaxed to 15 meters for red tag and 10 meters for white tag. This criterion provides a distance barrier that reduces the risk of disease transmission and mechanical mixture at harvest from another field.

The negative-selection roguing practice consists of removing diseased and off-variety potatoes from the seed potato field. Positive roguing is the practice of identifying and harvesting only the best plants in the field for seed potatoes.

Diffused light storage is the technology that allows light to green the seed potatoes, produce robust and healthy sprouts with less apical dominance and prolong their storage life. It could be required for Blue Tag and Red Tag seed, but perhaps not for White Tag.

The Extension pack booklet used by extension development agents (DA) is the source for the last criteria. The idea is that seed potato growers must follow all the recommended practices to qualify for the Blue Tag and most of the recommended practices for Red and White Tags.

Perhaps the initial development of the seed identification system would consist only of the practices criteria. Later the program could be strengthened by including measurement criteria. Suggested criteria to begin a discussion are:

	<u>Blue Tag</u>	<u>Red Tag</u>	<u>White Tag</u>
Variety mix	<2%	<4%	<6%
Severe virus diseases	<1%	<2%	<5%
Y group viruses	2%	4%	6%
Rhizoctonia	2%	4%	6%
Blackleg (Erwinia)	2%	4%	6%
Volunteers	2%	4%	6%
Tuber damage	<2%	<4%	<8%
Tuber size	30-60 mm	wider range	not restricted

The variety mix criterion is important to discourage growers from mixing lots in storage, transport or handling. The disease criteria could have separate criteria for each disease of concern and/or another overall disease standard. The Ethiopian Quality and Standards Authority has a set of seed potato standards that could be used as a starting point. Those standards include severe virus diseases, Y group viruses, rhizoctonia and blackleg as listed above but with different tolerance levels.

The purpose of the volunteer criteria is to reduce the risk of disease carry-over and variety mix from previous potato crops. The crop rotation criterion in the practices list also helps reduce this risk, but the same problem is also addressed here in the measurement criteria.

The tuber damage criterion is on the list because damaged seed potato tubers are less productive and can harbour diseases. Damage can come from Potato Tuber Moth larvae, weed roots, rodents, use of inappropriate lifting tools, and rough handling.

The tuber size criterion is included to place the optimal size range seed potato tubers into the Blue Tag seed category. A wider range could be allowed for Red Tag. With not

restrictions in the White Tag category all of a seed grower's production could be tagged if other criteria are met. The Blue Tag tuber size criteria listed above is merely a guess that needs additional analysis.

Including the 'measures' criteria requires more effort than the 'practices' criteria alone but both require that someone evaluate the seed potatoes entered into the program. I suggest that extension Development Agents become the certification people. They know the growers, the recommended practices and the diseases.

Under a mission of improving seed potato and ware potato production the DAs could be encouraged to take on the additional responsibilities of education and certification under the new color-coded certification scheme. There has to be an appropriate desk at the Regional BoARd that guides and takes care of seed certification issues. Perhaps the DAs in Gumat Valley could be asked to serve in that role on a trial basis before expanding to other places.

The DAs could teach the growers about the new certification procedures, help them with application forms, tags and other procedures. This would be quite helpful for the growers who can not read. The DAs could also conduct the field and storage inspections required to complete the certification process.

The Peasant Associations (PA) and grower cooperatives could also be involved in education and establishing seed category criteria. Actual inspection and certification would best come from people who do not have a financial interest in the seed potatoes being evaluated.

Develop seed potato planting packs

During my time in Ethiopia I saw farmers transporting planting packs to their farms. The planting packs are provided through government distribution points for maize and other grains. The packs contain materials needed to plant a crop including seed, fertilizer and perhaps some plant protection materials. Farmers pay a fee, which can be financed with a 25% down payment and the balance due after harvest.

I had seen similar planting packs available to growers in South Africa, but they are not available in Ethiopia. When I met with Dr Getachew Alemayehu, Director General of the Amhara Regional Agricultural Research Institute (ARARI) I asked him about the possibility of potato planting packs. He said that might be a good idea but there were three issues of concern: (1) seed potatoes are more perishable than grain seed, (2) seed potatoes are bulky to transport and (3) seed potatoes are expensive because of the large volume of planting material involved.

After meeting with Dr Getachew I thought about what he had said and discussed alternative ideas with Dr Eshetu Mulatu. We came up with another idea – seed potato planting packs.

The idea is to provide seed potato growers with materials needed to plant a certified seed potato crop. Included in the pack would be Blue Tag or Red Tag seed potatoes, fertilizer, possibly plant protection materials and a written list of recommended production practices for the growers who can read. Extension DAs could help teach the practices to those farmers who can not read.

We discussed the minimum size for the seed potato planting packs and decided to recommend 20 kg of seed potatoes. That is the capacity of vented plastic crates that Dr Eshetu used to transport seed potatoes into the Gumet Valley. The plastic crates may be better than bags during transport because they might provide better protection for the tenders sprouts of seed potatoes coming out of DLS. Cost may be a consideration that would make bags a better choice.

The crates are re-usable and could provide advertising opportunities for cooperatives or regions. For example, Gumet Valley growers could purchase crates all of a particular color and put designs, logos and written information on the crates. Buyers would either return the crates or agree to use them again for the next crop. The crates could provide not only a way to preserve the identity of the seed but also a means to enhance the group's reputation and market demand.

At typical planting rates in Ethiopia, the seed potato packs would contain enough material to plant a ten meter by ten meter plot of land. This is 100 square meters, or 1/100 of a hectare. While that might seem small, the crop produced from a 1/100 hectare plot could be impressive.

With good growing conditions and proper management the 20 kg crate of blue tag seed potatoes could produce a harvest of 10, 15 or under ideal conditions perhaps 20 crates of seed potatoes. Growers who are able to meet the seed potato certification standards would harvest a significant amount of valuable seed that they could sell and/or re-plant. Farmers would come to realize the importance of high quality seed and the value that can be produced from a 1/100 hectare plot. They would also realize that growing certified seed potatoes requires intensive management of small, high-value plots.

Contact Technico

Farmer-to-Farmer volunteers have the opportunity to provide names of contacts who can help in the future. Before travelling to Ethiopia I contacted Technico, an Australian firm with global operations in high-tech seed potato production. Email correspondence with founder Peter Waterhouse, CEO David McDonald and Ghassan Kidess, Technico Business Development Executive – Middle East & North Africa was encouraging. Mr Kidess said that “Ethiopia has the potential to be a good place to produce seed potatoes in Africa because of the high altitude.”

Technico is a for-profit company that is not in the business of providing aid, but it is interested in Africa. The firm has developed a patented process that involves tissue culture, mass production of uniform-size minitubers (Technitubers®) and field

production practices that lead to high-quality seed potatoes produced at a low cost and in a much shorter time period than with conventional seed potato multiplication practices.

I think that contacting Technico could have four possible benefits. First is the Technitubers themselves. The Ethiopian agricultural research system plans to expand tissue culture capabilities but Technitubers may provide an alternative, superior product. While the Technitubers would not be free, perhaps future projects could provide funding.

Second, Technico could provide valuable advice to a country that desires to improve its seed potato industry. Technico has had success in other developing countries and has production facilities in China and India. The company also has operations in three African countries – Egypt, Algeria and South Africa.

Third, Technico might provide an avenue for access to potato varieties suited for the conditions in Ethiopia. Mr Ghassan said that some Indian varieties might do well in Ethiopia.

Fourth, a contact with Technico might allow Ethiopia to plug into a global potato network that might open future opportunities. Technico's clients include major global potato processing firms.

During my seminar we discussed how to proceed with a Technico contact. It was agreed that I would continue to stay in touch with Technico on behalf of Ethiopia and that Dr Eshetu and Dr Getachew would be the key in-country contacts.

Since Technico has worked with local firms in other developing countries, including India, it would be useful to identify Ethiopian firms that are currently in the seed business for other crops. Perhaps Technico would be interested in exploring opportunities to link with Ethiopian private firms already involved in agriculture. The long-run viability of an improved seed potato industry depends on the involvement of private farmers and firms.

ACTIONS

My first three recommendations do not call for additional action. I recommended that the USAID funded AMAREW project continues to emphasize the three areas that I saw as quite important. The other three recommendations do require some action. During my seminar there was discussion about what to do next.

My fourth recommendation was to develop a color-coded seed potato identification system. Implementing this recommendation would require administrative approval to have extension DAs involved in the process and an enthusiastic leader to develop the program. I suggest that Eshetu Mulatu be asked to take on the additional responsibility of providing the leadership.

My fifth recommendation was to develop seed potato planting packs. I think that this is of secondary importance to other recommendations. First, the seed identification program should be developed to establish a system, allow farmers to have enough time to learn about and to have the first Blue Tag seed on the market before seed packs are developed. Perhaps a couple of years is needed to allow farmers time to become better aware of the value of clean seed and understand the integrity of the system.

During my seminar we discussed how to proceed with a Technico contact. It was agreed that I would continue to stay in touch with Technico on behalf of Ethiopia and that Dr Eshetu and Dr Getachew would be the key in-country contacts.

ANTICIPATED IMPACTS

I expect that the following impacts are likely to occur with the development of the Ethiopian seed potato industry.

Increased potato yields

Potato yields are most often measured as the average quantity harvested per unit of land. In the Amhara National Regional State (ANRS) in northwest Ethiopia potato yields averaged 8 metric tonnes per hectare (mt/ha) in 2003-04. Within ANRS administrative zones the yields ranged from a low of 7 mt/ha in South Gonder to 14 mt/ha in East Gojam (unpublished report cited in scope of work).

The ANRS average yield is below Ethiopia's national average yield of 10.5 mt/ha. According to FAO, Ethiopian potato yields have increased from a level of about 8 mt/ha in the mid-1990s.

Potato yields can also be measured in terms of the amount of potatoes harvested per unit of seed potatoes planted. In the ANRS region a typical seeding rate is two metric tonnes per hectare. Since growers harvest, on average, 8 mt/ha the ANRS seed yield is four. That four to one ratio also means that 20% of the potatoes planted in ANRS are not used for consumption but are put back into the ground as seed.

According to FAO the world wide share of the potato crop that is used as seed is about 11%. The trend is downward from about 18% several decades ago. The ANRS seed yield is well below the current world average.

By either measure of yield the ANRS yields are low by world standards. In spite of low yields potatoes are an important part of farm production and food consumption. I expect that the successful implementation of an on-farm seed potato program will raise yields substantially.

Reduced potato production costs per unit

I expect that increased potato yields will reduce potato grower production costs per kilogram. Although costs per hectare could go up due to higher priced seed potatoes, I think that the increased productivity of the improved seed potatoes would more than offset seed costs.

In ANRS research plots potato yields have reached levels of 40 mt/ha. Although average grower yields are not expected to approach that level, that research yield is much higher than what growers achieve. Although closing that gap completely is not realistic I expect that improved seed potatoes could increase yields substantially. An increase in yield would reduce costs per mt accordingly.

Increased consumption of potatoes

When the price of something goes down people buy more of it. I think that increased yields would reduce potato prices and Ethiopians would eat more of them. Prices would come down for two reasons.

First, increased yields would put more potatoes on the market even if there are no changes in plantings. Second, growers would likely respond to higher yields by increasing plantings, contributing even more to total supply and downward price pressure.

With increased yields growers would face lower prices, but those who use high-quality seed potatoes would likely make more money. The increased yields would reduce costs per unit by enough to more than offset lower prices. The profit margin could be greater at a lower price with high yields than at a higher price at low yields.

Among subsistence farmers who consume all or most of the potatoes they grow, I also expect an increase in potato consumption. With higher yields they would have more to eat for their families and they would be more likely to make the transition from subsistence farming to market farming.

Enhanced potato quality

In addition to better yields, better seed also means better quality. I observed an abundance of small potatoes in the Ethiopian markets. They were being offered at a price discount. With better seed I expect that the size profile would improve and growers would be able to produce more of the higher-valued large potatoes.

I also expect that the new seed potato program would decrease the share of potatoes that are damaged due to disease or other pests. This would mean that a larger share of the crop would sell for higher prices. It would also mean that a larger share of the crop would actually be sold for consumption. The seriously damaged potatoes that don't make it to market are a problem that would be reduced.

Subsistence to market transition

Improved yields and quality are likely to have positive impacts on both subsistence farmers and market farmers. Due to better seed potatoes alone I think that some subsistence farmers who previously consumed the entire crop within the family would have excess potatoes to sell. That is, if they had access to improved seed. With the community-based emphasis of the program that could be facilitated.

I also think that as subsistence farmers become more aware of the value of improved seed and blight-tolerant varieties, they will have a strong incentive to not only acquire some of the better seed but also to increase potato plantings. This combination of better technology, community based programs and economic incentives would help some subsistence farmers to become market farmers.

Export & processing markets

The increased yields, improved quality and lower prices that would result from a successful seed potato improvement program would open doors to export and processing market channels. Ethiopia does export some potatoes into Sudan and Djibouti. Expansion of those markets and opening of other markets could occur in the future.

Potato processing is likely to come soon to the community of Injibara. Dr Eshetu and I met with two people from Rotary Club who plan to form an entity that will process dehydrated potatoes on a site they have acquired in Injibara. They plan to market some of the dehydrated product to disaster aid programs.

Ato Nahu-Senay Araya of Addis Ababa and Dr Marvin Ludwig of the US met with us to explain their plans. We discussed the need for high-quality seed potatoes as an important input for growers to produce the high-quality potatoes needed to supply to processing factory.

Reduced price valleys

Many Ethiopian growers and potato experts told me their concerns about periods of low ware potato prices. These occurred at harvest time when supplies were abundant and storage capacity very limited. With many growers putting potatoes on the market, prices go down. That happens in other countries and with other agricultural products as well.

The emphasis on building potato storage capacity, if successful, would dampen price fluctuations and reduce the depth of price valleys at harvest time. With an increased number of growers who have storage, there would be less of a rush to sell at harvest and less negative price pressure.

Use existing entities

One strength of the AMAREW project and Ethiopian agricultural extension is the emphasis on local entities, such as the extension development agents. The recommendations in this report do not include any suggestions to create new government entities or employees.

I suggest that the strength of the local, community based effort be used to implement a color-coded seed potato identification system. The involvement of extension DAs and Peasant Associations would be critical to the success of the scheme. That requires approval and support from the ANRS extension administration.

Grower co-op market power

A community-based seed potato development program could lead to the development of successful potato-based cooperatives. The six Gumet Valley growers who are involved in the seed potato project this year might be the beginning of such a cooperative. The program will be expanded with the next crop, providing an expanding group of growers interested in high quality seed.

A seed potato growers' cooperative could provide opportunities for its members that they could not explore themselves as individuals. For example, a seed potato growers cooperative could implement quality control and promotion programs that would create high demand for their seed potatoes. They could also arrange for efficient transport and handling. They could share resources to build diffused light storage facilities. They might also arrange for contracts that would provide price stability for both buyers and sellers.

SUMMARY CHART

Problem	Recommendation	Action steps	Who will carry it out?	Timeline	Anticipated impacts
Poor quality seed potatoes	Continue AMAREW's emphasis on seed potato quality	Follow current program	Personnel involved in AMAREW project	Duration of project	Improved seed potato quality, increased yields, better quality, reduced costs, increased consumption
Planting of unsuitable varieties	Continue AMAREW's emphasis on blight-tolerant varieties	Follow current program	Personnel involved in AMAREW project	Duration of project	Increased use of blight-tolerant varieties, less risk of crop loss, higher yields, better quality, reduced costs
Low storage capacity for seed potatoes	Continue AMAREW's emphasis on diffused light storage (DLS)	Follow current program	Personnel involved in AMAREW project	Duration of project	Increased use of DLS, reduced storage losses, improved seed potato vigor, increased yields
Low storage capacity for ware potatoes	Continue AMAREW's emphasis on expanding ware storage capacity	Follow current program	Personnel involved in AMAREW project	Duration of project	Increased ware storage capacity, reduced storage losses, improved quality, reduced price valleys, increased consumption
Need for community-based seed potato programs	Continue AMAREW's emphasis on local involvement	Follow current program	Personnel involved in AMAREW project	Duration of project	Local involvement in seed potato programs that will last beyond duration of project, potato cooperative development
Lack of a seed potato identification system	Implement a color-coded seed potato identification system	Develop standards, protocol and personnel	AMAREW under leadership of Dr Eshetu Mulatu	Duration of project	Less mixing of seed, improved seed quality, enhanced incentive to produce high-quality seed
Lack of seed potato planting packs	Develop a seed potato planting pack system	Contact people leading potato research program at HARC and Adet	Unknown	Duration of project	Increased capability of farmers to become high-quality seed potato growers
Need for outside expertise in seed potato systems	Cultivate contact with Technico, a global high-tech seed potato firm	Initiate a dialogue with Technico's Ghassan Kidess	Joseph Guenther, Eshetu Mulatu, Getachew Alemauehu	Duration of project	Potential access to the world's latest seed potato technology and varieties

CONTACTS

I was met at the Addis Ababa airport on 20 May 2006 by Dr Eshetu Mulatu, Training Advisor and FTF Coordinator, AMAREW Project, 61, Bahir Dar, Ethiopia, phone 251-(0)58-220-1430, Fax 251(0)58-220-2555, Email eshetumulatu@yahoo.co.uk. Also meeting me was Lule Gebrehiwot, Addis Ababa, phone 251-91-169-5296, Email gebrehiwotL@yahoo.com.

Listed below are the contacts I made in chronological order of meeting.

05/22/06	Mr. Desta Asfaha, owner of several wholesale stores Other ware potato wholesalers and retailers Location: Piazza Market, Addis Ababa
05/22/06	Mr. Mulugeta Fikru, ware potato wholesale marketer Mr. Zeynu Jemal, ware potato wholesale marketer Location: Emmanuel Market, Addis Ababa
05/22/06	Mr. Ibrahim Hussein (Bureau Head, briefly) Mr. Yonas Menamo, Extension team leader for reliable moisture areas Mrs. Simret Kifleyesus, Horticulture extension expert Location: Extension Department, Federal Bureau of Agriculture and Rural Development, Addis Ababa
05/23/06	Mrs. Atsede Solomon, Acting potato research program coordinator Mr. Kassa Getu, Plant biotechnology research project coordinator Location: Holetta Agricultural Research Center
05/23/06	Farmer Guta Gudissa and his wife Zenebech Berhanu Farmer Guduma Diribsa and his wife Kibnesh Hailu Location: Gojo, Jeldu Woreda
05/25/06	Dr. Getachew Alemayehu, Director General Location: Amhara Regional Agricultural Research Institute (ARARI), Bahir Dar
05/25/06	Vegetable retail traders (potatoes, carrots, beets, tomatoes, onions, etc.) Location: Bahir Dar Regional Fruits & Vegetable retail Market
5/26/06	Several farmer sellers Location: Tilily area seed and ware potato market
05/26/06	Mr. Belew Dagnachew, Fruits and Vegetables expert at Woreda BoA Mr. Taye Tibebu, Crop production & protection expert at Woreda BoA Mr. Ateka Aychew, Extension agent for crop production in Gumet watershed Mr. Abebaw Wubetu, Extension agent for livestock in Gumet watershed Mr. Minyichil Dagnaw, Extension agent for natural resource in Gumet watershed Mr. Fekadu Mulu, potato seed grower farmer Priest Mezgebu Mihret, potato seed grower farmer Location: Sekela Woreda Bureau of Agriculture and Gumet watershed farmer based potato seed production project
05/26/06	Mr. Shitu Mekonen, Extension team leader Mr. Yetsedaw Aynewa, Fruit & vegetable expert Location: Banja Shekudad woreda Bureau of Agriculture, Injibara
05/26/06	Mr. Asfaw Beyene (farmer) and Mrs Abune Worknesh (farmer's wife) Location: Akayita Gashena PA in Banja Shekudad Woreda
05/27/06	Seed and ware potato traders, farmer sellers Location: Gasay and Kimir Dingay main potato markets in Farta Woreda
05/30/06	Mr. Lantyderu Tesfaye, Acting Zonal BoA head Mr. Tarekegne Shiferaw, Crop Production & Protection Expert Mr. Mare Addis, Agriculture and natural resource team leader Mr. Kebede Arega, Food Security Officer Location: West Gojam Zone Bureau of Agriculture and Rural Development (BoARD), Bahir Dar

	<p>Also Rotary Club officials: Mr. Ato Nahu-Senay Araya of Addis Ababa Dr Marvin Ludwig of the US</p>
05/31/06	<p>Representatives of hosts, AMAREW project partner institutions and AMAREW Project staff Dr. Getachew Alemayehu, Director General for ARARI Dr. Alemayehu Asefa, Deputy Director General for ARARI Dr. Enyew Adgo, Director of Natural Resources division at ARARI</p> <p>Mr. Lantiyderu Tesfaye, Acting West Gojam Zonal BoARD head Mr. Tarekegne Shiferaw, Crop Production & Protection Expert Mr. Mare Addis, Agriculture and natural resource team leadr, Mr. Kebede Arega, Food Security Officer and all AMAREW Project senior staff) Location: AMAREW headquarters, Bahir Dar</p>
06/02/06	<p>Dr. Belay Demissie Location: Addis Ababa</p>