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Postharvest Institute for Perishables

POSTHARVEST PROGRAM IN ECUADOR

POSTHARVEST ISSUES IN ECUADOR

Preliminary Examination

by

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POSTHARVEST PROGRAM IN ECUADOR

Preliminary Findings and Recommendations

I. INTRODUCTION

USAID/Ecuador requested the Postharvest Institute for Perishables to examine three areas of interest to the Mission with a view towards determining if support from PIP was required. The three areas of interest were:

- a) community canning systems,
- b) small on-farm storage systems for perishable crops, and
- c) small scale agro-industrial opportunities.

In addition, following the visit by Ing. Salto of the Technical University of Ambato (UTA) to the University of Idaho, additional discussions were scheduled to determine areas of mutual interest for possible collaboration. This report, which follows the points noted above within the institutional context of ongoing GOE and AID projects, lists recommendations for further programs. It is the judgement of the author that there are areas within the GOE/AID projects where PIP could play a role.

Briefly summarized, there are simple on-farm storage systems available that are not being used in the project area today. There also appears to be scope for simple solar dryers, using the prototype developed by PIP staff. Canning lines for community use or for small scale agro-processors requires more investigation but the minimum conditions of power, water, access to markets, and a growing production base appear to be met. Tin cans are readily available in the market, eliminating one of the bottlenecks commonly found around the world. The Technical University of Ambato is aggressively mounting a research and extension program and should be utilized as a project resource. Their program and the mandate of PIP are closely related and a collaborative program should be encouraged.

II. AID/GOE PROJECTS RELATED TO POSTHARVEST ISSUES

There are two GOE/AID projects in which PIP may play a supporting role.

The first is an aggressive Integrated Rural Development (IRD) program to increase production and improve the standard of living in rural areas.

Seventeen sites have been identified and AID is supporting two: Salcedo and Quimiag-Penipe. An Integrated Rural Development Secretariat is the principal governmental entity (reporting to the President) to manage and coordinate the involvement of GOE agencies involved in implementation of the program. Operating units have been established in each area, staffed by officials from various agencies, e.g., Ministry of Agriculture, National Development Bank, Social Welfare Agency. Project components supported by AID include support for the institutional framework, physical

infrastructure (roads and irrigations), and planning and investigation for implementation. The project is in its fourth year and many activities are accelerating. An evaluation of the project is underway and one of the key issues is the need for extension of the Project Activity Completion Date (PACD).

The second project, Rural Technology Transfer System is designed to support the interchange of science and technology between the United States and Ecuador. Title XII institutions in the United States are expected to play an implementation role in the project. The principal GOE institution is CONACYT (Consejo Nacional de Ciencia y Tecnología). The Technical University of Ambato is participating in the RTTS project.

III. FINDINGS

Even this cursory visit to IRD sites was sufficient to determine that rural families within the IRD areas have serious postharvest losses. Part of the problem stems from the success of GOE programs to improve conditions in rural areas. The recent completion of the road to the village of Puculpala, for example, was reported to be the catalyst for farmers to begin to produce more cash crops -- fruits and vegetables. When markets were only accessible by high cost animal and human transport, there was insufficient incentive to produce these higher valued crops. The diversification that is now evident on farmers fields has not been accompanied with information on how to reduce the postharvest losses. At present, all produce has to be marketed or consumed immediately after harvest with the expected result that prices at harvest time are always the lowest during the year. Because the farmers are not experienced in the production of these new crops, there appears to be a lack of knowledge of the most basic practices for reducing postharvest losses.

A. The Marketing System

There is frustration on the part of project staff and producers in their dealing with the market system. As in most countries, the spread between what the farmer receives and the retail prices in the marketplace is perceived to be excessive. It is difficult to say at this time if there are excessive profits but my observations during this short visit tell me that it is unlikely.

In fact, the marketing system appears to be well established with specialists at various points in the marketing chain -- wholesalers, retailers, truckers. One retailer in the central market in Ambato spoke of potatoes passing through several (3 or 4) hands before they reached her. Grading, by size at least, takes place for some products at the farm and different sized products carry substantial premiums for the "right" size. The price for small plums was two-thirds that of the larger size. A similar price difference was reported for potatoes of different size/varieties. Small potatoes, called the "poor man's" potato, are the cheapest.

Access to the market is not only a matter of transport. In the case of Puculpala, buyers go to the neighboring village. But when I asked farmers about using their own transport to take their goods to the urban market (to receive a higher price), they reported that it was not allowed. Wholesalers bar entry to farmers to this market. This is not an uncommon occurrence. In Pakistan the wholesale markets were also controlled by wholesalers and only members of the "club" were permitted entry.

Added to a price difference for "quality" is the seasonal price swings that occur over the course of the year. As the price is sensitive to supply and demand conditions, it is normal to expect, in economies where storage and processing are not well established, very high differences between prices in times of abundance (harvest) and scarcity (the period prior to harvest).

How to improve the position of the farmer vis-a-vis the marketing system is very difficult. Beyond initial and obvious interventions - first and most important is cheap transportation (roads) - the manipulation of the marketing system to serve better the small holder has remained an illusive goal. From available evidence, several characteristics of traditional marketing systems seem to hold. I would be surprised if conditions in Ecuador were not similar.

1. Traditional marketing systems are very well established with specialists at various points in the chain.
2. The marketing system may be high cost (margins higher than found in developed economies) because of: a) high cost of transport, b) lack of efficient storage and processing facilities to extend shelf life, and c) high product losses, especially with perishable products.
3. The system is very competitive with many buyers and sellers and price is highly responsive to supply conditions.
4. Margins will be high (due to high costs) but will be competitive, i.e., they could not be lower without buyers suffering losses.
5. Marketing is highly risky, time consuming, and requires large amounts of operating capital.
6. Public agencies cannot compete with or completely control traditional marketing systems.

If the system is competitive then small producers must find ways to improve their position vis-a-vis the system. Arguing for a larger share of the retail price cannot work if it means a reduced margin for the buyer when the buyer is already working at competitive levels.

There are basically three options open to producers. First, increase the size of the lot offered for sale and grade and sort the produce. If several farmers pool their offering to the market and grade and sort their produce, they are reducing the cost of collection and they should be able to gain some of this. Second, if farmers can bring their produce to market in the off-season, they will receive a higher price. This requires storage facilities where the cost of holding inventories and the value of losses in storage are less than the price premium gained in the market. This is a gamble that the price will rise and assumes that the farmer is willing to take on the risk formerly held by the wholesaler. The third option is to change the product through processing. If the farmer can add value to the product then that value can be captured by him.

B. Product Options

The three options have been discussed during this visit. IRD staff is contemplating adding collection centers to the community centers and possibly arranging sales to nistor cooperatives or retail stores in retail areas. If sales can be arranged then they should be done. This will be strongly resisted by established wholesalers, the ones currently providing goods to these retail outlets.

Collection centers are a way for producers to capture some of the value added in the marketing chain. But one such center, located on the outskirts of Ambato, testifies to the difficulty one can expect. This center is an empty building and was reported to be that way always. A collection center appears to be feasible only if one of two conditions can be met. The first is if wholesalers agree to come to the center to buy. The advantage to the buyers is that collection costs can be reduced and they can then pay a higher price for the product. The second condition is to tie the collection center directly to a buyer such as an exporter or a processor. If one of these two conditions is not met, then, I fear that any new collection center will share the same fate as the one in Ambato.

The second option deals with holding the produce off the market until prices rise. Although it is possible through variety selection to space the production cycle -- early and late maturing varieties -- the discussion here focusses on ways to maintain product quality in storage and minimize losses. It should be recognized that the options discussed below have important nutritional implications as well. The producer has the option of selling or consuming the products he or she stores. In the case of perishable commodities with a rigid production cycle, it can mean the difference between having some or none of the product during periods of scarcity. The techniques discussed below are scaled for on-farm use and are designed to meet consumption or small scale commercial uses.

- a) Root cellars: This technology was very common in the United States and is still practiced in some areas. Essentially a root cellar is a place where the product is protected from major changes in ambient temperature and humidity. Placed below ground level (dug into a hillside) with simple means of providing ventilation and maintaining humidity, a root cellar provides a low cost way to store such perishable crops as potatoes, carrots, and apples. If electricity is available (as it is in the IRD areas), then more sophisticated ventilation and humidity control methods can be applied. The attached publication (4, c) describes low cost storage systems for potatoes with power assisted ventilation and humidity control.
- b) Solar dryers: Drying products is a time tested technique for preservation. A heat source (the sun) and protection from insects are basic requirements. PIP has developed a solar dryer which has an auxiliary heat source that is easy to build and maintain. (See attached brochures, 4, a). It has been tested and modified in the Philippines and Indonesia and found to be operational. The auxiliary heat source is especially important in locations where rains coincide with harvest.

The third option to increase the price received by farmers is processing. This requires a higher degree of training and education on the part of the operators. Two options are discussed here: home canning and small-scale commercial or community canning.

Home canning is a continuing practice in the United States and is a means of processing that is directed primarily towards home consumption, not for the market. Time and temperature are critical requirements for the home canner and different products require different treatments. Errors in home canning can result in tragedy for the family as improperly prepared foods can be contaminated with toxins that can disable or even kill. Pressure cookers, a reliable heat source, and glass jars are basic requirements. The high cost of jars and the need for a steady, reliable heat source raises questions about the utility of this technique for farm families in the project area. More thought and investigation has to be done.

At a higher level small canning lines are available where the container can be jars, cans, or retort packages. There are different manufacturers, but one line which appears to offer versatility, low cost, and appropriate scale was developed by Ball Canning Company and turned over to a foundation. (Information attached 4, e.)

In the context of the IRD project and other AID-supported activities to encourage agro-industrial expansion, this type of small canning line may be feasible. There are several factors to consider:

1. At the Puculpala site, electricity and water are available. This should be true at other sites as well.
2. Tin cans are manufactured in-country and would appear to be the container of choice.
3. There is reported demand for canned fruits and vegetables in-country especially in the larger cities.
4. The Technical University of Ambato could provide continuing technical support.

The final determination of feasibility of small canning systems requires several steps. One of the steps would be testing the system on a pilot basis. Two possibilities appear now.

The first is at the community center level. This is first because the community center is the focal point for the IRD project. It does not mean that it is the best way to proceed. One of the most serious problems to deal with, wherever such a unit is tested, is the management requirement. Someone has to be in charge and a committee is not known for efficiency.

If tested at the community level, then farmers could bring produce to the center and pay for the service in-kind, that is, leaving behind a portion of the processed goods to cover operating costs. The community center would then sell this product. There is little doubt that the volume of product will not be sufficient in the early phases to keep unit costs down. Additional produce would have to be acquired from surrounding farms. Placing the unit at a higher level of organization (farmer federation) could solve the volume problem but complicate the management problem at the same time.

The second alternative would be to identify an entrepreneur. In exchange for the canning equipment the owner/operator would have to agree to establish formal, binding purchase agreements with individuals or groups of farmers in the project area. Part of the agreement should be an extension package of improved technology to farmers to produce the required quality and quantity for processing. Apple production, for example, could be increased with adoption of pruning techniques and pesticides. The costs of such an extension program, a necessary ingredient to permit smaller farmers to have access to the market, could be supported by the IRD staff and AID.

The three options described above will become more important as the IRD project progresses. The postharvest problems can only intensify as the irrigation water becomes available and farmers adjust their cropping system to this new resource. As farmers will be paying for this water, it becomes more critical to deal with postharvest problems in order that farmers can realize sufficient cash income to meet higher operating expenses.

IV. THE TECHNICAL UNIVERSITY OF AMBATO

Discussions between UTA and PIP at the University of Idaho started in December, 1983. These discussions focused on the research work underway at UTA under the CONACYT project. I think there is an opportunity to broaden the discussions to include not only the research program, but also a possible technical supporting role in the IRD project. There is very close correlation between the research and proposed extension program at UTA and the technical requirements of the IRD project in the postharvest area. They are located between the two AID supported IRD sites providing easy access to the project areas.

They have identified a program for the department to complement their basic instructional and research program. This program has three basic components:

1. To measure crop loss in areas around Ambato.
2. To identify and test technologies to reduce losses.
3. To transfer the technology to users.

Some of these activities have already started. Very importantly, the staff is interested in action programs beyond the confines of the University. This was confirmed by the Rector of the University. In a brief review of the program and discussions with staff, I can make the following observations.

- a) The University should be a repository on technical information on postharvest practices. If administratively feasible, a linkage between IRD and the University (and by extension, the AID, IRD and CONACYT projects and other agro-industrial initiatives) should be established.
- b) Their actions to better relate research to problems in the area can only improve performance. Especially noteworthy is the review of eight commodities including marketing channels and product losses through the marketing chain.
- c) They have basic lab equipment but report that more is needed.
- d) I cannot identify any specific training needs or additional staff requirements. They would seem to be weak in economic and financial analysis but the answer may not be the addition of an economist. As a research body, one always seeks to increase the number of staff with graduate degrees. They are working in a very complicated field where the skill to transform the complexities of food science into practical alternatives requires a high degree of training.

The strongest recommendation I can make at this time deals with current plans to carry out surveys on the marketing chain. There are alternatives to the survey proposed by the UTA staff. One that PIP would like to support is described in the attached report (4, b), "Approach to the Study of Postharvest

Problems". The methodology in this report stresses an understanding of the practices related to product handling as a prerequisite to estimation of product losses and an identification of technologies to reduce losses. The emphasis is to understand the setting in order to make judgments, and conduct further analysis about the economic feasibility of technologies for loss reduction. The report, for example, describes the marketing chain for chinese cabbage in Taiwan. The outer leaves are used as packing material until the cabbage reaches the final distributor. Only then they are removed. This could be described as a "loss" (the weight is reduced) until one considers that the alternative -- a box for the cabbage -- would cost more than the weight loss.

In conclusion, there are many actions taking place related to postharvest problems: storage and handling, processing, and marketing. These problems will become more acute as success with current GOE and AID projects is attained.

V. RECOMMENDATIONS

Components of the GOE/AID supported rural development programs in Ecuador are confronted with problems associated with postharvest management to reduce losses and provide a higher return to small holders. The problems range from on-farm storage and processing through the marketing chain to the consumer. Increasing processing for increasing shelf life and reducing seasonal price variations require innovative and appropriate solutions which will, in most cases, require adaptive research in-country. The requirements of the Ecuadorean marketplace, translated by private entrepreneurs into business decisions, require technical support to create viable and profitable business enterprises. These entrepreneurs, ranging from private small holders to multiple ownership operations (corporations to cooperatives) are the final action agents in development.

The initial elements are falling in place: the IRD project to improve the infrastructure in rural areas (roads, water, extension), an Ecuadorean university interested and actively becoming involved in research and outreach programs, and strong AID/GOE support of agro-industrial expansion are all examples of the progress being made.

PIP and the University of Idaho can play a small, but significant role in this process. I strongly recommend that steps be taken to define a collaborative postharvest program between the Technical University of Ambato and the University of Idaho through PIP. The program should follow the lead already established by UTA: identification of significant postharvest problems, development or adaptation of technologies to treat the problem, and an outreach program to serve users of the technology.

The collaborative program should be structured with strong linkages with the IRD project, serving a support function to IRD staff. Such a program would also be consistent with the objectives of the Rural Technologies Transfer System project in that ties between UTA and the University of Idaho, a Title XII land grant university, would be established. In addition, it could offer a mechanism for collaboration between private food processing firms in Idaho and neighboring states and similar firms in Ecuador.

I recommend that the collaborative program be developed through a process of several steps. The initial step should be a small team from PIP to address, with staff from UTA, a specific scope of work related to a) on-farm storage and processing, b) commodity marketing studies under preparation by UTA, and c) feasibility of small-scale canning lines for use by community centers or small processing firms.

At the same time more discussion among GOE, AID, UTA, and PIP on the scope and content of a collaborative agreement between the two universities would take place. This would include possible exchange of information, faculty interchange, training programs, extension programs (such as the "Masters of Food Preservation for Rural Women").

If the basic recommendation is accepted by AID and GOE agencies, then a detailed plan of work can be prepared. I estimate, subject to discussions in Idaho, that a program could be initiated this spring, in time to meet UTA's deadline for the eight commodity studies. Specific itineraries and budgets will have to be prepared.

The University of Idaho is committed to a responsive program in international development and looks forward to continuing discussion on a collaborative approach to solving postharvest problems around the world.

ANNEXES

1. STATEMENT OF PIP OBJECTIVES

The Postharvest Institute for Perishables (PIP) is a non-profit institute within the College of Agriculture of the University of Idaho. PIP is supported by a grant from AID. The mandate of PIP calls for research and outreach to support developing country institutions (public and private) working in the field of postharvest loss reduction of perishable (non-grain) crops. The Cooperative Agreement (AID/DEAN-CA-0265) with AID encourages Mission/PIP collaboration to address specific postharvest problems within AID-supported programs. These collaborative programs are facilitated through amendment of the Cooperative Agreement (buy-in). In most cases PIP is able to share a portion of the cost of Mission requested work.

2. ITINERARY: Program set up by Joseph Beausoleil, USAID/Ecuador

February 19: Arrive Quito, initial briefing

February 20: Travel to Riobamba, IRD project site
(one of two supported by AID)

Discussions with IRD staff: Ing. Guillermo Terán, Chief of IRD operational unit, located at Quimiag (12 km from Riobamba)

Travel to Puculpala accompanied by Rosario de Morales, promotora of the Ministry of Agriculture (8 km from Quimiag). Discussions with community leaders and producers.

February 21: Travel to Ambato, Technical University of Ambato. Discussions with Ing. Saltos, Associate Dean (subdecano), Darrell McIntyre, USAID/Ecuador, and Dr. Garcés, Rector of the University.

Return to Quito:

Discussions with Mission staff

February 22-23, preparation of report, Quito

February 24, debriefing, depart Quito.

3. PERSONS CONTACTED

Joseph Goodwin, RDC, USAID/Quito
Joseph Beausoleil, USAID/Quito
Darrell McIntyre, USAID/Quito
Paul Fritz, Deputy Director, USAID/Quito

Dr. Luis Anabal Garcés, Rector
Technical University of Ambato

Ing. H. Anibal Salton, Associate Dean
Technical University of Ambato

Ing. Guillermo Terán, Director
Executive Unit, IRD, Quimiag

Lic. Rosario de Morales, Promotora
Ministry of Agriculture

4. PUBLICATIONS (attached)

Drafted by: R. Curtis: gw
0550C: 02-28-84