LEAGUE FOR INTERNATIONAL FOOD EDUCATION

Kenton L. Harris
American Association Cereal Chemists/L.I.F.E.
Project on Post Harvest Grain Losses
7504 Marbury Road
Bethesda, Maryland 20034
Telephone 301-320-3765

PEACE CORPS COSTA RICA GRAIN STORAGE PROJECT REPORT

Submitted to Juan Coward, Costa Rica Associate Peace Corps Director/ Agriculture

Prepared by The League for International Food Education

Team Members: Theodore Granovsky, Ph.D.
Carl Lindblad
Robert Morris, Ph.D.

BACKGROUND

The Costa Rican Consejo National de Produccion (CNP) placed a request through Juan Coward of Peace Corps Costa Rica for the recruitment, training and placement of eight volunteers to work in a new small farm storage project. The CNP is a Costa Rican government organization responsible for the purchase, storage, and resale of basic grains produced in Costa Rica (maize, rice, millet and beans). The general CNP goal for the requested PCV's is to assist small farmers in improving their grain drying and storage practices such that better quality grain will be sold to the CNP and the farmers in turn will receive higher prices for their grain.

The League for International Food Education (L.I.F.E.) is a Washington, D.C. based, non-profit organization funded primarily through the Office of Nutrition, Development Support Bureau, USAID. L.I.F.E. is a consortium of nine U.S. scientific and professional organizations

united together to provide information and assistance in solving technical problems in nutrition, food technology and child feeding programs in developing countries. The attached brochure gives more details of L.I.F.E. and its functions. One of L.I.F.E.'s projects, funded through USAID, is to develop and test an internationally acceptable methodology for assessing post-harvest grain losses. As such, the L.I.F.E. Grain Loss Project has been in active cooperation and communication with all major development organizations working in this area.

Mr. Coward, who visited Washington, D.C. in January, 1978, requested a briefing from L.I.F.E. on available technical assistance resources for the programming, training and on-going technical supervision of the CNP-requested PCV's. During the three days of his contacts with L.I.F.E. and through sub sequent communications, arrangements were made to secure a mission to Costa Rica by a team of L.I.F.E. Grain Loss Project consultants.

The L.I.F.E. team spent April 22-29, 1978, in-country to accomplish the following three objectives:

1. Set forth proposed activities and job descriptions for the requested PCV's
2. Outline Volunteer recruitment criteria and training needs
3. Outline the various technical assistance needs of the project and relevant resource organizations which could be called upon to respond to these technical assistance needs.

The L.I.F.E. team travelled to two regions in Costa Rica: Pacifico Sur, on the southern coast near the Panama border; and Pacifico Norte, somewhat inland in the area of the city of San Carlos. These are two of the five possible areas where volunteer placement is under consideration.

Both areas have high rainfall and two major cropping seasons. In Pacifico Sur most farmers contacted were recent "colonists" who had been given government-sponsored credit for the purchase and cultivation of abandoned banana plantation land. These farmers are challenged by cultivation and storage in a climate and area often unfamiliar to them. In both areas, the crops under consideration were principally maize and beans.

Drying and storage methods consist of a variety of traditional and more modern techniques. Drying is done largely in the field before harvest and particularly in the case of beans, solar drying is done on canvas tarpolins before and at irregular intervals during the storage period. Storage of maize takes place principally in covered wooden bins in or near the home, or in open weave bags under the shelter of the home roof. Beans are stored shelled, often with pulverized plant and pod material mixed in for insect control, and placed in open weave bags. Less frequently beans are stored in metal 55-gallon drums which can be sealed.

In both areas visited, post-harvest loss prevention can be broken down to the following general, though not all-inclusive categories:

1. Field standing losses due to birds, rodents and other animals
2. Inadequate pre-storage drying with resultant losses due to fungi and insects
3. Insect, rodent, and fungi losses during storage.

PROJECT DESCRIPTION

The overall purpose of this project is to involve eight PCV's in identifying:

1. Local, small farmer grain storage problems (principally maize, with lesser emphasis on beans and rice).
2. Appropriate, practical storage methods which reduce post-harvest losses
3. Extension of these improved storage methods to area small farmers
4. Secondary volunteer activities will be in the extension of improved basic grain cultivation procedures.

PROJECT JUSTIFICATION

The project plan set forth in this report and the consequent technical approach is based on the following factors:

1. There exists a variety of small farmer post-harvest drying and storage practices in areas visited. Some of these methods appear to be more successful in loss prevention than others.
2. Particularly in areas where newly-settled "colonists" comprise much of the small farmer population,

locally evolved, relatively successful post-harvest practices are not well known to the "colonists." Observation and rudimentary analysis of the varied methods utilized in any area will point to which, if any, of the local methods prevent losses most satisfactorily. This measure of success is not solely technical. It must include practical cultural and economic considerations.

3. Various appropriate post-harvest technologies exist which are not currently known or used in the areas visited. Such technologies should be carefully considered and systematically tested for practical and technical viability in the areas served by volunteers. Those "improved" and local technologies which are most successful in loss prevention should be cautiously introduced to small farmers through a carefully planned and monitored extension effort.
4. On-going observation of technology test-trials and extension efforts will serve to continually refine and improve both the post-harvest technologies and the extension mechanism.

PROJECT OBJECTIVES

Months 1 - 6:

Survey 75-100 local small farmers selected at random from a plotting map using the CIGRAS model for random selection and survey questionnaire in order to identify progressive farmers, common

drying and storage methods. Collect insects encountered from 50 small farm storage sites. Insect specimens will be sent to CIGRAS for identification. Volunteers will, as a secondary activity, advise on basic grains cultivation practices with contacted farmers.

Months 6 - 12:

1. Participate in in-service training session for planning and initiation of demonstration and extension presentations on improved drying and storage.
2. Set up drying and storage demonstration sites in the volunteer's region.
3. Take moisture content samples from grain at doubling, at harvest, after drying and at monthly intervals during storage from five progressive farmers and five non-progressive farmers. Samples will be sent to CIGRAS for analysis of aflatoxin presence. Samples will be replaced with grain supplied by the CNP.
4. Make a collection of grains damaged by birds, rodents, insects and fungi.

Months 12-18

1. Continue 3 and 5 above taking moisture samples.
2. Further refine and continue demonstrations.
3. Place five metal bins of 8-10 quintal capacity with progressive farmers (bins to be manufactured in San Jose).
4. Supervise improved grain drying and fumigation.
5. Experiment with cheaper and/or more effective drying tarps, experiment with darkened staining or drying patios, etc.

Month 14 Participate in two-three day seminar to:

1. Review and evaluate activities.
2. Identify most effective appropriate storage technologies.
3. Develop two-year plan for continued storage activities in present locale.
4. Write job description and make two-year plan for PCV's in new areas.
5. Evaluate potential for local manufacture of appropriate storage technology, including metal bins, drying and other relevant equipment.

Months 18-24

1. Develop extension materials with L.I.F.E. coordination for area-wide dissemination.
2. Continue refinement and demonstration of improved storage practices.

RECRUITMENT CRITERIA

Trainees should have some Spanish background (0+/1 minimum) with farm background (4-H, FFA or direct farming experience) and/or agricultural training at high school or post-high school level.

TRAINING

Pre-Service

1. (Five days) Basic grain cultivation practices to include planting, fertilization, cultivation, seed certification and improved and local grain varieties. Visit to CIGRAS with introduction to grain storage principles and practices.
2. (Two days) Basic grain storage principles including interrelationship and control of moisture content, insects, rats, mice, and birds, mold and fungi. Visit to CNP for presentation and discussion of project objectives.
3. (One day) Damage identification techniques for rodent, bird, insect and fungi losses.
4. (One-two days) Use of post-harvest survey/questionnaire including random sampling and random selection of farmers, random grain sample selection and transport, and principles and use of moisture meters.
5. (Two-three days) Review of common Costa Rican harvest, drying and storage practices, including doubling, above fire storage, wooden bins, drying tarps, drying patios, insecticides available and the common and/or proper use, insect identification with second field visit to CIGRAS laboratory.
6. (One-half day) Principles and philosophy of appropriate technology, including cost, construction, maintenance, utility and cultural factors.

In-Service Training (end of first six months)

1. Review storage principles, i.e., relative humidity, moisture, migration, etc.
2. Review of common drying practices taken from survey.
3. Review of common storage practices as per survey.
4. Plan demonstrations of most successful practices suitable to individual PCV sites as revealed through evaluation of parts 2 and 3.
5. Discussion of application of Appropriate Technology Principles to encourage PCV's to think of design needs for cost, practicality, etc., where new technologies are proposed. Is it practical? Can farmers procure, use, maintain after PCV involvement?
6. Discussion of demonstration methods and techniques and common demonstration problems.
7. Review of function of moisture meter.
8. Review of random sampling techniques.
9. Discuss collection and mounting techniques for pest-damaged corn ears and beans.
10. Explain and discuss sample selection techniques from ten farm sites and sample transportation logistics.
11. Discuss insecticide use and proper dosage and possible extension methods to encourage proper insecticide use.

14-Month Training Session

1. Test for knowledge of proper use of insecticides and dosages (fumigant and contact insecticides).
2. Plan further appropriate technology experiments.
3. Plan logistics of five metal bin placement.
4. Review accomplishments.
5. Develop and discuss a two-year PCV plan.
6. Write job descriptions for next group of PCV's.

SITE SELECTION

Each PCV should be placed within one day's travel to at least one other storage PCV in order to facilitate collaboration and shared learning during the project's early evolution. This strong recommendation is given with acceptance of the desireability of placing individual PCV's far enough from each other to foster an independent volunteer experience.

A PCV site should be carefully investigated in or near at least one of the more isolated Indian tribes. The information and experience derived from these indigenous cultures should be very enlightening in identifying and assessing the various forms of traditionally evolved storage methods. These methods should be carefully studied for potential generalization in other parts of Costa Rica, particularly where newly-arrived "colonists" are unfamiliar with local climate, local storage problems and locally available methods of addressing those problems in drying and storing grain.

TECHNICAL ASSISTANCE

The Peace Corps Costa Rica Grain Storage Project has available to it a wide variety of technical assistance sources. These should be fully utilized on an on-going basis, but particularly in the early evolution of the project.

The various technical assistance sources available locally include, among others, the Consejo National de Produccion (CNP), the Grain and Seed Research Center of the University of Costa Rica (CIGRAS), and the Center for Human Potential (CHP). Other non-local technical assistance resources include L.I.F.E. and the Group for Assistance on Grain Storage (GASGA) which is composed of United Nations Food and Agricultural Organization, English, French, Canadian, Belgian, Australian and American member institutions. GASGA assistance through any of its member organizations can be requested through the secretariat at the Tropical Stored Products Institute, Tropical Stored Products Centre, London Road, Slough, Berks SL3 7HL, England.

L.I.F.E. assistance can be requested at 1126 16th Street, N.W., Room 404, Washington, D.C. 20036. The L.I.F.E. Grain Loss Project considers this Peace Corps Grain Storage Project to be one of important potential and, as such, encourages any further utilization of its resources in the project's further development and evolution.

Once staging and pre-service training have taken place, one possible alternative to maintain active communication with and utilization of the technical assistance sources could be achieved by appointing

or electing one PCV as the Technical Assistance Liaison. The PCV with the most extensive and relevant agricultural experience would likely be the best choice here. However, commitment, interest, social skills and communication logistics should also be considered.