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EXPERIENCES IN THE TRANSFER OF OUTDOOR STORAGE TECHNOLOGY AMONG EXTENSION WORKERS AND USERS IN THE PHILIPPINE GRAINS INDUSTRY

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ABSTRACT

The strategies of technology transfer of two outdoor storage technologies, the Volcani Cube[®] (Israeli technology) and the local sealed plastic enclosure (Australian technology) for use under Philippine conditions were considered. Deterioration and loss of large quantities of grains during and after harvest are major concerns in the local grain industry. Inadequate storage facilities expose grains to natural elements and pests. One of the interventions to curb losses was the introduction of these two technologies after they were found to be economically and technically feasible and socially acceptable in the Philippines. These technologies were introduced in 1997. The Volcani Cube is a heat-welded 0.833 mm thick polyvinyl chloride (PVC) plastic liner with zipper and tension straps. It has varying capacities of 5, 10 and 20 tonnes. The sealed local plastic enclosure is also heat-welded 0.4 mm PVC with a capacity of 6 tonnes. Both technologies are now being promoted in the grain industry. They can adequately protect dry paddy and corn from insects, rats, birds and rain water damage for three months. The outdoor storage technology is an alternative storage technique adaptable both at on-farm and off-farm levels, which can be used by farmers' cooperatives and small-scale grain millers and handlers. Major technology transfer activities conducted include the provision of a linking mechanism to credit facilities, information and educational campaign, dissemination through tri-media (audio, visual and printed forms of communication), technology demonstration and forum, training of end-users and extension workers, industry assistance and industrial extension. A total of 200 units of the outdoor storage technology have been set up nationwide under a special industry assistance project.

RATIONALE

Research and Development (R&D) studies have greatly increased in number over the past decades, but if these do not translate into usable forms and reach the intended users, they remain ineffective. Results of these studies should be disseminated and transferred to the target users and facilitators of such usage but it is a sad fact that

voluminous R&D results are left on shelves and in workshops collecting dust and rust. These vast resources are just wasted inputs if not put to use for development. It is only when appropriate technologies resulting from R&D are utilized by the intended-users that the funds invested in agricultural research are justified.

The Bureau of Postharvest Research and Extension (BPRE) of the Philippines Department of Agriculture is mandated to undertake both technology generation and delivery on postharvest technologies. In its almost 20 years of R&D work in the agricultural sector BPRE has transferred to the grain industry its designs of facilities, machines and equipment on postharvest. BPRE employs a variety of delivery and transfer modalities to reach the users and agricultural extension workers in the Philippine grain industry. One of the technologies that has been transferred is the outdoor storage technology (OST) which comes in two types: the 'Volcani Cube[®]', and the locally manufactured plastic enclosure. These technologies were offered in response to the problem of deterioration and loss of large quantities of grain during and after harvest, largely because inadequate existing storage facilities expose grain to natural elements and pests.

Both these technologies were introduced in 1997 after they were verified to be economically viable, technically feasible and socially acceptable under Philippine conditions. The objective of this paper is to document our experience in the transfer of these OSTs to users and extension workers in the grain industry.

Description of the technologies

The Volcani Cube is a heat-welded 0.833 mm thick polyvinyl chloride (PVC) plastic liner with zipper and tension straps. It has varying nominal capacities of 5, 10 20 tonnes as well as larger capacities.

The locally made sealed plastic enclosure is also heat-welded 0.40 mm PVC with a capacity of 6 tonnes. Both technologies are now being promoted to the grain industry.

These two technologies can adequately protect dry paddy and corn from insects, rats, birds and rain water damage for three months. The OST is an alternative storage technique adaptable both at on-farm and off-farm level, which can be used by farmers' cooperatives and small-scale grains millers and handlers.

Technology transfer modalities

BPRE has mapped out a number of technology transfer modalities to hasten the utilization of these technologies (Table 1). The following were the major technology transfer modalities being employed:

two landscape pages for Table 1

Table 1

A. Provision of linking mechanism to credit facilities

Credit facilities under the Land Bank of the Philippines (LBP) have been made available for the acquisition of OST for farmer cooperatives. In 1998, in collaboration with the LBP, the Bureau conducted a series of seminars for would-be adopters of OST in the southern Philippines, specifically in Bukidnon, South Cotabato and Davao Provinces (Table 2).

TABLE 2
Areas in which the technology forum has been conducted

| Province/s covered | Date conducted | No. of participants |
|---|--------------------|---------------------|
| Davao City, Koronadal, South Cotabato, Bukidnon | November 1998 | 150 |
| Agusan del Norte | September 14, 1999 | 60 |
| | September 15, 1999 | 60 |
| Iloilo | December 3, 1999 | 63 |
| Isabela | June 18, 1999 | 80 |
| Aurora | February 1999 | 60 |
| Tarlac | April 12, 2000 | 85 |
| Davao del Sur | May 16, 2000 | 80 |
| Davao Oriental | May 18, 2000 | 66 |
| Davao del Norte | May 19, 2000 | 80 |
| Leyte & Southern Samar | July 19, 2000 | 80 |
| Northern Samar and Biliran | July 20, 2000 | 62 |
| Bulacan | August 22, 2000 | 70 |
| Bohol and part of Cebu | August 29, 2000 | 50 |
| Negros Oriental and part of Cebu | August 31, 2000 | 50 |
| Total | | 1,096 |

B. Information, education and communication (IEC) material

Production: To create awareness and sustain interest in the OST, IEC materials were produced. These IEC materials were distributed to grain traders, millers, farmer cooperatives, agricultural extension workers and industry stakeholders. Five thousand flyers, primers and operational manual on the OST were reproduced and distributed.

C Mass media use

The general public was also informed about the OST. Media, such as daily newspapers, agricultural journals and magazines, radio broadcasts and press releases

were used to disseminate information on the OST and create awareness on the technology among the general public.

D. Other extension methods

Information dissemination through mail: Information was also disseminated through the mail to major grain growing areas in the Philippines (Region II and III). Special targets were the traders, millers and other grain handlers who are direct would-be users of OST.

Technology forum *cum* demonstration: A one-day technology forum *cum* demonstration of the OST is one of the current extension and technology transfer methods being employed. This activity started in 1998 and has already reached a total of 1,096 participants in 21 provinces of the Philippines (Table 2). The participants are local agricultural extension service personnel such as the provincial and municipal agricultural offices, agricultural technicians and farmer cooperatives. All of the 78 provinces of the Philippines are targeted for holding this technology forum. BPRE provides information material to participants at each forum. A demonstration of the OST is usually carried out by a subject-matter specialist. After the demonstration an open forum follows.

Technology clinic for agricultural engineers: A total of 89 agricultural engineers stationed at local government units (municipal and provincial) were trained in the operation and maintenance of the outdoor storage technology. They were trained for five days on how to set-up, maintain and manage the OST. These engineers backstopped BPRE in setting-up the OST at the field level.

Skills training for trainers and end-users: Skills training for both trainers (extension workers) and end-users were conducted on site. Beneficiaries of OST grants such as farmers cooperatives were trained in setting up the technology. The skills training series were done at the site where the technology was to be set-up. Similarly trainers were also trained to teach other recipients. The trainers included subject matter specialists from BPRE. All recipients of OST under the 'industry assistance for acquisition of postharvest facilities' clause were trained in setting-up, maintenance and management of the OST.

E. Postharvest facility grant

The OST was distributed to beneficiaries in a grant-like scheme. Farmer cooperatives which are qualified under the program can avail themselves of OST. A farmer cooperative must have a surplus of at least 200 bags of paddy or corn for storage per season, a trading business in grains, and must have a good financial standing. A total of 162 Volcani Cubes and 334 local plastic enclosures have been distributed already (Table 3). Based on the latest monitoring survey, of the 68 units of OST monitored, 46% were utilized, 10% underutilized and 30 percent not utilized (Table 4).

F. Technical assistance to institutional users

The actual setting-up of larger capacity Volcani Cubes was done at the National Food Authority (NFA), the food agency of the government. Nineteen stacks were set up in 16 NFA warehouses nationwide for milled rice, paddy and corn starting April to September 2000 (Table 5).

TABLE 3
List of 'Outdoor Storage Technology' recipients (As of December 1999)

| Region | No. of beneficiaries | | | No. of Coops monitored | % monitored |
|--------|----------------------|-----|-------|------------------------|-------------|
| | VC | LPE | Total | | |
| CAR | 1 | 2 | 3 | - | |
| I | 13 | 26 | 39 | 2 | 5 |
| II | 23 | 46 | 69 | - | |
| III | 37 | 74 | 111 | 22 | 20 |
| IV | 24 | 48 | 72 | 11 | 15 |
| V | 12 | 24 | 36 | 8 | 22 |
| VI | 3 | 6 | 9 | 3 | 33 |
| VII | 2 | 4 | 6 | 2 | 22 |
| VIII | 3 | 6 | 9 | 3 | 33 |
| IX | - | - | - | - | - |
| X | 19 | 38 | 57 | - | - |
| XI | 16 | 32 | 48 | 16 | 33 |
| XII | 7 | 12 | 19 | 1 | 5 |
| ARMM | 4 | 8 | 12 | - | - |
| CARAGA | 4 | 8 | 12 | - | - |
| Total | 168 | 334 | 502 | 68 | 14 |

Institutional Recipients: BPRE=7 units VC and 6 units LPE
NFA=20 units
Casecnan=5 units
Total=32 units VC & 6 units LPE

TABLE 4
Monitoring results for 'Outdoor Storage Technology' (As of December 1999)
(out of the 68 units of OST monitored)

| Degree of utilization | No. of units | Percentage |
|-----------------------|--------------|------------|
| Utilized | 31 | 46 |
| Under utilized | 11 | 16 |
| Were not utilized | 26 | 38 |
| Total | 68 | |

G. Industrial extension

Transfer of technology to the industrial sector is also being done under the Bureau's 'Industrial Promotion Program'. BPRE also select accredited manufacturers to fabricate the outdoor storage technology. One manufacturer in Manila fabricates the local plastic enclosure. Accreditation of other manufacturers is on-going.

TABLE 5
Utilization of Volcani Cubes (As of September 2000)

| NFA offices | Commodity | Day sealed | No. of stacks | Setting | Status |
|-----------------------------|---------------|-------------------|---------------|---------|------------------------|
| Marbel, South Cotabato | Milled rice | April 15, 2000 | 1 | Outdoor | On-going |
| | Milled rice | | 1 | Outdoor | On-going |
| | Milled rice | | 1 | Outdoor | On-going |
| Isulan, Sultan Kudarat | Milled rice | April 15, 2000 | 1 | Indoor | Issued after one month |
| Tagum, Davao Norte | Milled rice | April 18, 2000 | 1 | Indoor | On-going |
| Iligan City, Lanao Norte | Milled rice | | 1 | Outdoor | On-going |
| Kidapawan City, Cotabato | Milled rice | | 1 | Outdoor | On-going |
| Iloilo City, Iloilo | Milled Rice | | 1 | Indoor | On-going |
| Tagbilaran City, Bohol | Milled rice | | 1 | Indoor | Issued |
| Tacurong Sultan, Kudarat | Palay (paddy) | July 14, 2000 | 1 | Outdoor | On-going |
| Banay-Banay, Davao Oriental | Milled rice | July 18, 2000 | 1 | Outdoor | On-going |
| Digos, Davao Sur | Milled rice | July 19, 2000 | 1 | Outdoor | On-going |
| Malaybalay, Bukidnon | Milled rice | July 22, 2000 | 1 | Outdoor | On-going |
| Trento, Agusan Sur | Palay (paddy) | July | 1 | Outdoor | On-going |
| Tandag, Surigao Sur | Palay (paddy) | July | 2 | Outdoor | On-going |
| Surigao City, Surigao Norte | Milled rice | July | 1 | Outdoor | On-going |
| Isulan, Sultan Kudarat | Corn | | 1 | Outdoor | |
| Bayombong, Nueva Vizcaya | Palay (paddy) | September 1, 2000 | 1 | Outdoor | On-going |

CONCLUSION AND RECOMMENDATION

Research and development results can be effectively transferred to the industry and marketed by employing different modalities. For the OST, major technology transfer strategies include both personal and mediated communication, agricultural and industrial extension.

The overall impact of the OST transferred to the industry which is the ultimate yardstick of technology generation has yet to be measured.

Governmental financial support should focus on the transfer of technology and its eventual use in agriculture and industry should be sustained.