

Pilot Project on the Introduction of Paddy Husk As an Alternative to Firewood for the Operation of Bakeries

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A pilot project on the conversion five bakeries to be operated using paddy husk as an alternative to fire wood in the Polonnaruwa District in Sri Lanka was launched by the Integrated Development Association (IDEA), with the supports of Global Environmental Facility (GEF), Small Grant Programme (SGP) of the UNDP.

Introduction

In Sri Lanka, firewood is being used as a fuel in more than 90% of bakeries and this fact has contributed to the felling of trees in a considerable scale. Table 1 indicates the extent of biomass fuel use in various industries in Sri Lanka.

Furthermore, some of the firewood supplied also originates from illegal

extraction from the state's forests. Sri Lanka has only about 23% of its forest cover left and it cannot afford to lose any more of it.

On the other hand, paddy husk discharged from rice mills, has also become a threat to the environment, especially in rice producing areas, where it is frequently dumped in public places.

Table 1 - The use of biomass fuel for industries in Sri Lanka

Industry	Amount of biomass fuel used ('000 Tons)/year
• Tea	455 (43.2%)
• Hotels and restaurants	164 (15.6%)
• Brick and Tile	150 (14.2%)
• Bakeries	99 (9.0%)
• Rubber	72 (6.8%)
• Coconut	51 (4.8%)
• Tobacco	13 (1.2%)
• Others	49 (4.7%)

(Source : Forestry Master Plan of Sri Lanka - 1995)

Figure 1 - Types of bakeries in Polonnaruwa District

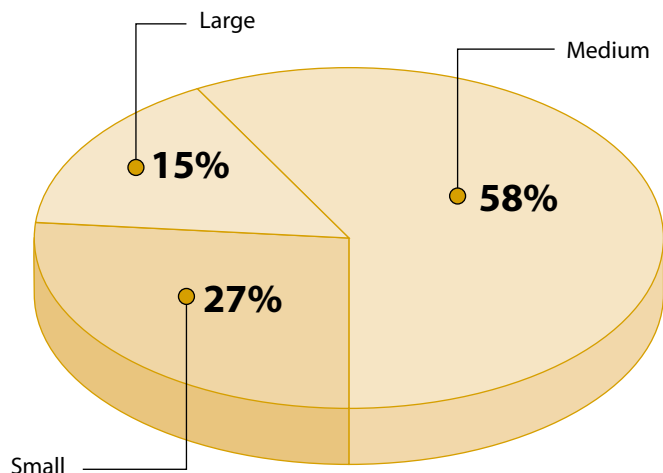


Table 2 - Amount of paddy husk discharged by rice mills Polonnaruwa district *

Amount of rice husk (kg)	Number of mills
• Less than 650	5
• Over 650 to 1300	5
• Over 1950 to 2600	15
• Over 1950 to 2600	10
• Over 2600	5

* this was determined by the sacks of rice husk discharged and one sack weighs on average 13 kgs

The Pilot Project

A pilot project to introduce paddy husk operated bakeries was first initiated when information was received on a bakery that used oven technology fueled by paddy husk as an alternative to fire wood. The technology would have two advantages: it would reduce the incidence of tree felling as well as solve the problem of accumulation of paddy husk to a considerable extent. With the above thought in mind, a visit was made to the bakery to study the technology and its advantages.

The inventor of this technology is Mr. Ekanayake Divulgane. His bakery is situated in Dehiattakandiya in Ampara district, which is also a rice producing area. He owns a medium size bakery and could accommodate 45 trays at a time to bake 540 loaves of bread. He has conducted many experiments over a period of five years be-

fore he perfected the technology. Mr. Divulgane has obtained patent rights for his technology but agreed to disseminate the technology as a service to the nation.

After discussions with Mr. Divulgane, IDEA submitted a concept paper

to the GEF/SGP and the National Steering Committee (NSC). They agreed to provide funds for a pilot project to convert wood fueled bakeries to ones fueled by paddy husk. The NSC was of the view that the project would contribute towards solving of problems associated with the lost of forest cover and paddy husk disposal.

A suitable project location was then decided in Polonnaruwa district. It is situated in the dry zone of Sri Lanka where most of the forests are legally protected areas (Forest Reserves, National Parks and Sanctuaries). The reduction of forest cover, which is mainly due to illegal felling in this district, is a constant threat to wildlife, especially the wild elephant. Polonnaruwa, a rice producing area, also has a problem in the disposal of paddy husk discharged from rice mills.

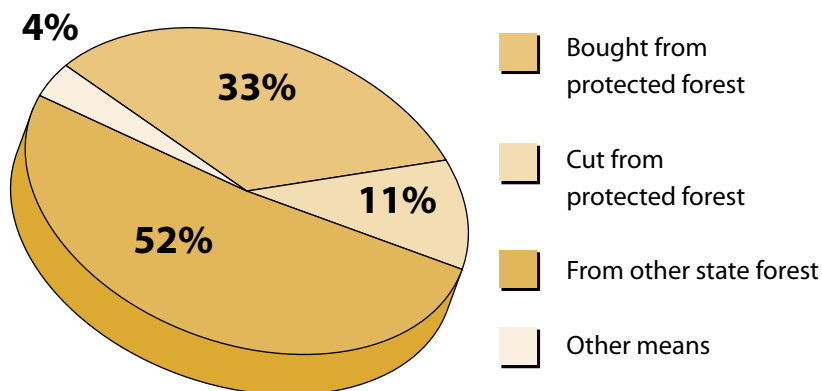
Baseline study

The first activity of the project was a base line study conducted in the Polonnaruwa district in order to determine:

- the number of bakeries and rice mills;
- their sizes, capacities;
- the amount of fire wood used by bakeries;
- the amount of paddy husk discharged from the rice mills.

The baseline study found that there were 60 bakeries in Polonnaruwa district. Figure 1 indicates the types of bakeries present in the Polonnaruwa

Figure 2 - Sources of firewood for bakeries in Polonnaruwa district



district.

Availability of fuel was also surveyed based on the study on the amount of rice husk discharged by the 60 rice mills found in Polonnaruwa district (Table 2).

The study also revealed that all the bakeries in Polonnaruwa district use firewood as fuel. The extent of firewood consumption of the bakeries is indicated in Table 3.

The firewood is obtained from various sources: purchased from those engaged in illegal felling of trees in protected forests; cut directly from protected forests; from other state forests; and from other sources such as private lands. A chart showing the sources of firewood used in bakery industry is shown in Figure 2.

Project Implementation

After the baseline study was conducted, a workshop was later held for 50 selected bakery owners within the district to create awareness on the new oven technology fueled by paddy husk. They were also taken on a field visit to observe and inspect the operation of Mr. Divulgane's bakery. 94% of the bakery owners who attended the workshop expressed their willingness to convert their wood fueled bakery ovens to paddy husk fueled ovens.

Table 3 - Amount of firewood used by bakeries (m3)

Amount per month (m3)	No. of bakeries
2 to 4	-
Over 4 to 6	-
Over 6 to 8	1
Over 8 to 10	8
Over 10 to 12	10
Over 12 to 14	2
Over 14 to 16	15
Over 16 to 18	7
Over 18 to 20	5
Over 20	12

Five bakeries considered suitable for conversion were selected out of those and three have been converted thus far. The conversion in the other two bakeries will be completed by the end of June 2001. The cost to convert a bakery oven is Rs. 50,000/= including the cost of equipment to be installed. Out of this cost, 50% will have to be borne by the project and the other 50% by the bakery owner.

The paddy husk oven introduced in the pilot project

Description of the paddy husk oven

The basic technology consists of a huller into which paddy husk is fed and an electric blower that blows paddy husk into the combustion chamber. In case of a power failure, two-wheeled hand tractor is used to power the blower. The floor and walls of the combustion chamber have also been further modified. Pipes are laid on the floor of the combustion chamber in order to evenly distribute the heat.

Operation of the oven

A little kerosene is sprayed on the paddy husk layer deposited at the bottom of to assist the start of fire. Operation usually starts at about 10.00 am when the fire is first started. In about one and a half hours the temperature of the combustion chamber rises to about 350° C. Then it is allowed to cool down to 300°C before the trays are inserted. The operation proceeds with three shifts of bread baking followed by about 8 shifts of other bakery products such as buns, cup cakes etc. After the bakery products are baked, the remaining heat is utilized to dry other commodities such as groundnuts, coriander etc. The operation goes on till about mid night.

Economy of the oven

A bakery oven fueled by firewood would require about 1.5 m³ of wood per day, costing around Rs. 600/=. The costs for firewood would be more expensive in wood scarce areas.

For a paddy husk fueled oven, the present cost of operation is only about Rs. 200/= per month for the electricity to power the motor. Mr. Divulgane uses a 3-horsepower motor for his bakery. However, a 2-horsepower motor would be adequate to run a blower that has new conversion features. This will again reduce the electricity consumption of the motor. Apart from that, the paddy husk is delivered free of charge by rice mill owners. About 250 bags of paddy husk can be transported in a medium sized lorry and

FIGURE 3. THE RICE HULL BREAD OVEN

