EXPLORING THE POSSIBILITIES OF UTILISING AGRICULTURAL WASTE FOR INCOME GENERATION IN THE RURAL AREAS

By

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Introduction

INTRODUCTION

"India lives in her villages; any revolution for the improvement of the life of the people therefore, should start in the villages"

- Mahatma Gandhi

Agriculture is the backbone of the national economy in India. Agriculture not only supplies food for the masses, but also provides several raw materials for the industries (Santhanam, 1978).

India is rich in her natural resources. However, one of the major obstacles to our economic growth has been under utilization of the resources of the country.

With the advent of science and technology revolution in the country, the productivity and production pattern of several crops are undergoing enormous changes. There is a logical link between the use of raw materials and the production of waste and this inevitably leads to the question of recycling (Skit, 1979).

Scientists and technologists have been realising of late, the immence economic potential of a variety of agricultural wastes which were hither to unutilised- Patel and Pandy (1979) and Patel (1980). Economists suggest that all available natural resources including agricultural wastes and byproducts should be put to optimum use.

Waste recycling is the process of transferring waste into new products in such a manner that the original matter may lose its identity and in turn become useful products. Ramachandran (1977).

Waste recycling is of paramount importance to achieve the national objective of improving the quality of life, by augumenting the resources and safeguarding the environment. The new concept of securing and recycling of renewable waste is gathering momentum both in the industrial and agricultural spheres (Colombo,1975).

The identification of waste materials and their effective development and economic use, would greately add to the overall availability of physical resources in different sectors of our economy. These efforts will also create employment opportunities in rural areas where agricultural wastes have to be recycled (Royce, 1979).

While advocating the development of village industries, Gandhiji considered that these would not only banish rural poverty but also would help to convert waste into national wealth.

Employment problem in the country is becoming serious, as there is no up-to-date remedy for it, through the present

trend of industrialisation (Kumari Bandopadhyaya, 1972). When efforts are made to put to better use, the various kinds of agricultural wastes by recycling them and thereby turning waste into ultimate wealth, employment potentials are also generated (Patel and Pandy, 1979).

Waste includes crop residues, plant and animal wastes, waste from slaughter houses, canning industries and grain houses. Rural wastes generally comprise of agri-cultural and animal wastes. These can be broadly classified into 5 groups.

a. Crop byproducts and wastes
b. Fruits and vegetables byproducts and wastes
c. Animal byproducts and wastes
d. Tree (forest) byproducts and wastes
e. Fish and marine byproducts and wastes

(Saxena, 1975).

As the principal activity in our villages is agriculture, an attempt should be made to explore the vast untapped potential of agricultural wastes. If proper steps are initiated to develop appropriate technology and organisation, this area will provide employment opportunities in rural areas to tens of thousands of people and create wealth out of waste - Devadas, (1979) and Muniandi (1984).

Science and technology play an important role in fostering rural development. Consequently, a high priority

would have to be accorded to the introduction of appropriate technology in rural areas to improve agriculture as well as agro-based industries. Further, these agro-based industries are important sources of productive employment for the rural population (Deolankar, 1984).

Since the available information on the type of agricultural waste occuring in the rural areas and the method of their utilisation is scanty, this study has been undertaken to

1. Findout the types of agricultural wastes available in a selected rural area

and 2. Explore the possibilities of utilising the same to provide employment opportunities to the rural poor.

Review of Literature

II. REVIEW OF LITERATURE

The literature available on this topic are discussed under the following headings:

A. Need for Waste Recycling in the field of Agriculture

B. Utilisation of different Agricultural Wastes and Byproducts

and C. Agencies involved in Research on the Utilisation of Agricultural Wastes and Byproducts.

A. Need for Waste Recycling in the field of Agriculture:

Mother nature has many surprises for us in store. A wise tackling and patient probing would yield many wonderful and useful things (Kallapur, 1974).

Agriculture being the largest industry in the country, is the source of livelihood for over 70 per cent of the population. Prosperity of agriculture can foster the prosperity of the Indian economy. It contributes nearly 40 per cent of the net national product, provides livelihood to 60 per cent of the total working force and accounts for nearly 35 per cent of the country's exports (India, 1983).

The significance of Indian agriculture arises from the fact that it has been the source of supply of raw materials to our leading industries. Cotton and jute textile indust-

-ries, sugar, vanaspathi and plantation all these depend on agriculture directly. Despite this, it provides raw materials for a number of agro-based industries which together account for 50 per cent of income generated on the manufacturing sector in India (Dutt and Sundaram, 1982).

The nation is making concerted efforts to modernize agriculture and enhance production, through application of science and technology. As a result of endeavouring for increased production of main products, the proportion of byproducts and wastes in terms of weight and volume also increases simultaneously. While the main products are profitably utilised, the waste and byproducts often pose a problem of disposal, storage and pollution. Profitable utilization of the wastes and byproducts would generate more income and help to reduce the problems of disposal and pollution in the countryside - Dharwar (1973) and Shinde (1980).

The waste problem should be tackled effectively for the following reasons:

1. It is nuisance to public health - waste causes discomfort, debility, disease and death
2. It is an eyesore to the easthetic sense of man. Waste marrs the beauty of the lands - creates

an unsightly appearance, abnoxious odour and blackens the areas.

3. It occupies a large space competing with man for the limited space available.

4. It hits the economy of the nation.

5. It degrades the natural resources; contaminates water and air, and

6. It involves social and political implications.

(Royce, 1979).

Waste has become a part of one's life. Waste is any matter whether liquid, solid, gaseous, or radioactive which is discharged, emitted or deposited in the environment in such volume, constituency or manner asto cause an alternation of the environment (Mark,1971).

Waste is an unwanted or discarded materialrising out of man's normal community activities, which is rejected or left worthless. Waste may be substances harmful to man and his environment but could also be beneficial to him - Rangawala (1975), Park and Park (1976) and Devadas (1979).

Waste recycling is an answer to draw out utilisable waste materials for checking environmental pollutionand

positive manner offers the possibility of returning the excess to beneficial use as opposed to the traditional methods of waste disposal and relocation (Loehr, 1974).

Nothing is waste in this world. All the unused products can be recycled by making appropriate products which can be profitably used. This will not only increase the productivity of the country, but also give more income to the farmers who, at present, are not able to cope with the increased cost of inputs for their agricultural operations (Sivanappan and Balasubramanian, 1980).

Agricultural waste includes crop residues and plant wastes. Rural wastes generally comprise of agricultural waste. Wastes and byproducts as - Saxena (1975) classify, come from crops, trees, animals, fish and marine products and fruits and vegetables.

The following are the major crop wastes that could be profitably used for income generation. (National Committee on Science and Technology, 1974).

1. Cotton wastes / byproducts:

The cotton irrigated area is mostly concentrated in the states of Punjab, Haryana, Gujarat, Tamilnadu and Rajasthan.

The main wastes/byproducts arising from cotton are cotton stalks and cotton leaves and other plant parts. It is reported that in U.S.S.R. cotton stalks are chopped to convenient size, pressed and packed in bales and transported to the consuming mills which process them into strawboard, paper etc. Several useful chemicals could be prepared out of the wastes of the cotton plants.

2. Jute Waste/byproducts:

The wastes and by products of jute are jute stick and jute leaves. The scope of utilisation of jute stick and other wastes is in the fields of pulp and paper and board industries both at village level through a series of cottage industries and at higher level through capital intensive industries.

3. Sugarcane wastes and byproducts:

Bagasse is one of the most important byproducts of the sugarcane industry. The utilisation of bagasse is in the form of fuel, pulp and paper manufacture as raw material and because of high protein content, bagasse is a potential source for furfurol.

Bagasse ash can also be used for the preparation of glass.

4. Coconut wastes and byproducts:

The coconut palm not only supplies substantial quantity of food but also provides raw materials for a number of important industries. The crop is of high economic importance to the states of Kerala, Tamilnadu, Andhra Pradesh and Karnataka. There are many industries which directly (or) indirectly depend on coconut palm. The soap, vanaspathi and perfumery industries utilise coconut oil. The coir industry which utilises coconut husk, is earning considerable foreign exchange for the country. There are a number of wastes / byproducts such as coconut husk, pith, shell, stem, leaves etc. The coconut shell can be used for the manufacture of fancy articles, preparation of coconut charcoal, activated carbon, coconut shell flour, furfurol etc. The coconut coir waste can be used for the preparation of insulation boards.

5. Arecaunt wastes and byproducts:

Arecaunt is an important crop of Karnataka, Tamilnadu, Kerala and Assam. The wastes and byproducts available from this crop are arecanut husk, sheath and leaves.

The husk can be used for making low density fibre boards and high density hard boards. Mixed with bamboo

and jute pulps, wrapping paper could also be prepared. The husk fibres can be blended with coir for making matresses. The sheath can be converted into plates and cups.

6. Banana Waste:

The main waste product of banana is banana stem (Pedangle). The trees are cut down after the harvesting of the fruits and thrown away in at least 80 per cent of the cases. The stems thus thrown away contain useful fibre suitable for the manufacture of fancy articles, spinning and weaving carpets, cordage useful for ordinary purposes, stuffing and paper pulping for craft paper, insulation boards etc.

At present banana fibres are available in three qualities. The first quality silken in appearance is suited for the manufacture of fancy articles. The second quality is suited for the manufacture of yarn, carpets and mattings where there is scope for employment of a number of persons. In the case of both of these classes of fibres, their extraction is done immediately after the harvesting of the fruits. The third quality fibres are used for filling. The process involved is simple. The stems as soon as possible after harvesting of the fruits

are cut into lengths of about 1.5 metres, then split into strips of about 5 cms in breadth and dried on the spot itself. This reduces the weight of the stems to about seven per cent and a very much smaller space suffices to store them. Transporting even over long distances to a convenient place does not cost much.

Industrial consultants indicate that over the next few years proper utilisation of agricultural by-products and wastes would give us processed goods of the value of Rs.2000 crores (Sampathrajan, Vijayaraghavan and Swaminathan,1980).

Hence, an integrated programme involving both agriculture and industry in improving the economic condition of the rural population is of peramount importance and social obligation on the welfare state (Iyer,1980).

C. Agencies involved in Research in the Utilisation of Agricultural Wastes and Byproducts:

Fibre industry occupies a major share of rural industries, by the Khadi and Village Industries Commission. From 1969-70, experiments have been made by the Directorate of Fibre Industry of the KVIC to use the fibre obtained from banana stem for weaving table mats, preparing purses

and making bags etc. The results have been very encouraging. These products are very well received wherever they are put up for sale and foreigners are attracted by them and these articles are now being exported (Oza, 1975).

2. Jute Technological Research Laboratory (JTRL):

Experiments at the Jute Technological Research Laboratory (JTRL), Calcutta have shown that banana and pine apple leaf fibres have good textile properties, superior to jute fibres in some respects. It is estimated that banana plantation can yield about two lakh tonnes of fibre annually, though only a small quantity is actually extracted manually or mechanically and is used in the cottage industry for making ropes, hand bags and other fancy items (Kumar, and Bandopadyaya, 1972).

The JTRL in collaboration with the Bombay based Cotton Technological Research Laboratory (CTRL) has successfully spun blankets from cotton and jute wastes. The blended blankets have strength and thermal insultation comparable to pure cotton blankets.

3. Council of Scientific and Industrial Research (CSIR) and the Indian Council of Agricultural Research (ICAR):

The laboratories under the guidance of CSIR and ICAR have developed and perfected the technology and techniques for the profitable utilisation of fibres available from the crops, the advantage of which should now be taken by the District Industries Centres in various districts in the country. This would, in the ultimate analysis result into more employment in the rural and semi-urban areas, economic and profitable utilisation of by products to generate more income and help reduce the problems of pollution (Patel, 1981).

4. Indian Central Arecanut Committee, Gauhati:

The work done under the scheme sponsored by the Indian Central Arecanut Committee at the Gauhati University (ICAC) and the Forest Research Institute (FRI), Dehra Dun have clearly shown the possibilities of making low denisty fibre board and high density hard board from arecanut husk. Pilot plant studies carried out at the FRI, Dehra Dun showed that brown wrapping paper can be prepared from the arecanut husk if mixed with bamboo and jute pulps. This arecanut husk fibres can be used in the manufacturing of rubberised mattresses similar to rubberrised coir mattresses or it can even be blended with coir.

5. Central Food Technological Research Institute (CFTRI):

Rice Bran Oil:

The CFTRI and Jadavpur University have evolved a couple of new methods to extract oil from the rice bran (the brown coating on the grain) which at present is used as animal feed or burnt as inferior fuel. This oil is very popular in Burma, Thailand, and other countries of South East Asia. Whatever bran oil produced in India today is used up by the soap industry (Majumdar, 1978).

Leaf cups and plates:

With the availability of abundant raw materials from forests and agricultural products and with the continued consumptions of the leaf cups a new idea was developed to make leaf plates and cups through improvements in dimensional stability, appearance, shape, finish and hygienic quality.

The CFTRI, Mysore has developed a machine that makes leaf cups and plates in various sizes and shapes, the products being more uniform and of better quality than the ones made manually.

Dry leaves, barks and the like are soaked in water to make them just pliable. A leaf is placed on the base plate symmetrically above the die opening. The pedal is

is pressed down and held in this position for a few seconds. The dies, heated electrically or by a kerosene blow lamp or biogas burner, convert the leaves into uniform shape and size in the first stroke. The second stroke cuts off the extra leaf. This operation not only dries and sets the leaf, but also destroys the surface micro organisms, making the leaf cup plate hygienic. After it is removed from the die, the leaf plate is allowed to cool for a few seconds and then stacked and rested. These are packed in polythene bags for sale. (The Hindu, Feb. 20, 1985).

Methodology

III. METHODOLOGY

The procedure for this study involved the following steps:

A. Selecting the Area for the Study

B. Identifying Resources for Income Generation

C. Motivating the Community

D. Selecting the Projects

E. Getting the Technical Know How

F. Designing the Machinery

G. Standardising the Procedure

H. Arranging for Financial Help

I. Initiating the Projects

J. Arraning for Marketing

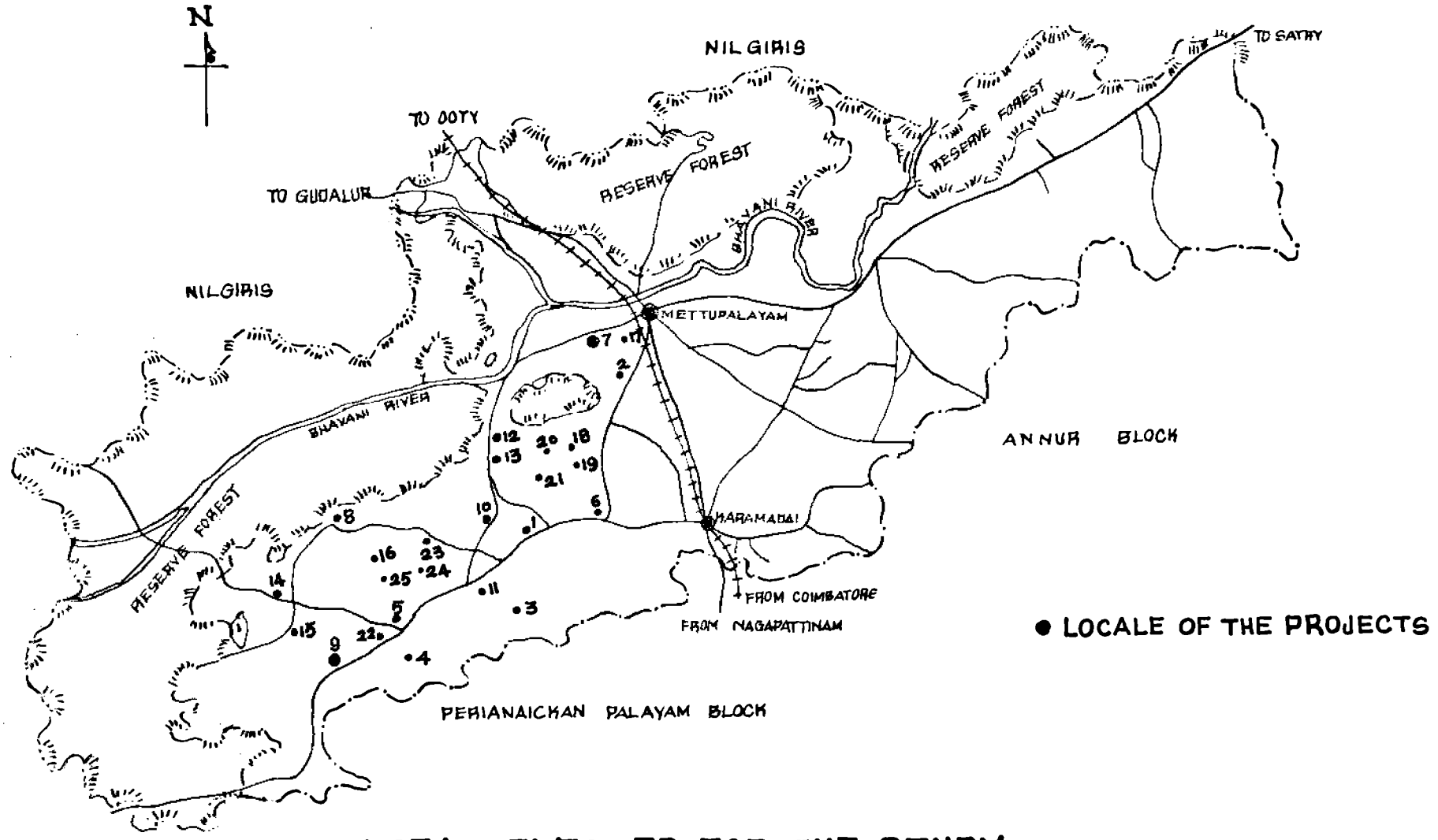
and K. Evaluation of the Projects.

A. Selecting the Area for the Study:

As a land mark of their Silver Jubilee Celebrations, Sri Avinashilingam Home Science College for Women, Coimbatore had adopted 25 villages in the remote Karamadai Panchayat Union, Coimbatore District for Integrated Development (Figure, 1).

Science Clubs had been established in these villages to serve as forums for dissemination of useful messages to the community. Therefore, these villages were selected for this study.

MAP OF KARAMADAI PANCHAYAT UNION COIMBATORE DISTRICT



AREA SELECTED FOR THE STUDY

Figure.1

1. Marudur
2. Dasampalayam
3. Bilichigoundanoor/Pattakaranoor
4. Seeliyur/Panappalayam
5. Dayanur
6. Pungampalayam
7. Ramaiyagoundenpudur
8. Irularpathy
9. Tholampalayam pudur/Osur
10. Devanapuram
11. Kanuvaipalayam/Bujanganoor
12. Theakkampatti
13. Kendepalayam
14. Velliangadu
15. Muthukaloor
16. Kiddempalayam
17. Wellspuram
18. Thottadasampalayam
19. Kurumbanur
20. Kurumthamalaipudur
21. Kaliappanoor
22. Salaiyur
23. Kuranur
24. Medur
25. Nanjegoundenpudur

B. Identifying Resources for Income Generation:

Initiating income generating activities, using indigenous resources with special reference to agricultural byproducts and wastes was among the various activities planned for the 25 villages.

A survey was conducted in all the 25 villages to locate the major crops cultivated in the area and agricultural wastes and byproducts. The schedule given in Appendix I was used for this data collection. Table I gives the details of agricultural wastes and byproducts available in the area.

TABLE I

AGRICULTURAL WASTES AND BYPRODUCTS AND THEIR UTILISATION

S.No.	Crop	Waste/Byproducts	How utilised at present
1.	Coconut	Coconut shells, leaves fibre etc.	Fuel, broomsticks
2.	Sugarcane	Sugarcane bagassee	Fuel
3.	Paddy	Paddy stalks, crop waste	Cattle feed, fuel
4.	Ladys finger tomatoes, brinjal chillies	Stalks	Cattle feed, fuel
5.	Cotton	Stalks	Fuel, cattle feed and manure
6.	Cholam	Stalks	Fuel, cattle feed
7.	Banana	Banana stem, leaves	Manure cattle feed
8.	Groundnut	Stalks, husk etc.	fuel, cattle feed
9.	Ragi	Stalks and stem	Cattle feed, fuel
10.	Arecanut	Sheath, husk	Sheath for eating food or packing butter

It was noted that the agricultural waste and by products were either put aside to be composted or used as fuel or cattle feed. No organised form of utilisation was observed.

C. Motivating the Community:

The idea of utilising agricultural wastes and by products for initiating economic projects was put forth in the Science Club meetings frequently conducted by the Home Science Extension Faculty of Sri Avinashilingam Home Science College. The leaders and members of the Science Clubs were educated on the various possibilities of utilising agricultural waste and by products available in their villages or nearby areas.

D. Selecting the Projects:

The leaders and the members of the Science Clubs in Ramegowndanpudur and Tholampalayampudur showed interest in making use of Areca Sheath and Banana waste respectively for income generation, owing to the availability of these raw materials in the nearby areas. (Figures 2 and 3) Therefore, the following two projects were selected.

1. Leaf plate making with Areca Sheath
   - Ramegoundanpudur

and 2. Extraction of fibre from banana stem
   - Tholampalayampudur.

BANANA GROVE AND WASTE

Figure. 3

E. Getting the Technical Knowhow:

The literature published by the Department of Science and Technology were consulted to understand the procedure for making the leaf plates and extraction of banana fibre and also to get to know research work done in this field by other organisations.

This effort facilitated the investigator to get a few addresses where similar research work was conducted. A visit was made to the Central Food Technological Research Institute (CFTRI), Mysore, Karnataka State, to observe the machinery designed by the Processing Department of the Institute, for production of leaf plates and cups. There was only one lady in Mysore who had obtained the patent for the machinery and was making leaf plates. She was interviewed to get details about the profitability of the project. It was noted that the products made were on good sale in big restaurants in the city.

As for banana fibre, visits were made to the following places:

1. Fibre Zonal Training Centre,
   Khadi and Village Industries Commission,
   Nadathara, Trichur-680751
   Kerala State.

2. Training Cum Production Unit (Fibre)
   Khadi and Village Industries Commission,
   Chiyyaram, Trichur-680007,
   Kerala State.

The training cum production programme for extraction of banana fibres and their profitable use in terms of handi crafts and fabric for export, were observed.

After two initial visits by the investigator, two members from Tholampalayampudur who evinced interest in initiating this project were also taken to these places to get first hand knowledge and training in the use of the equipment and extraction of the fibre. These members were convinced about the feasibility of the project in their own areas.

F. Designing the Machinery:

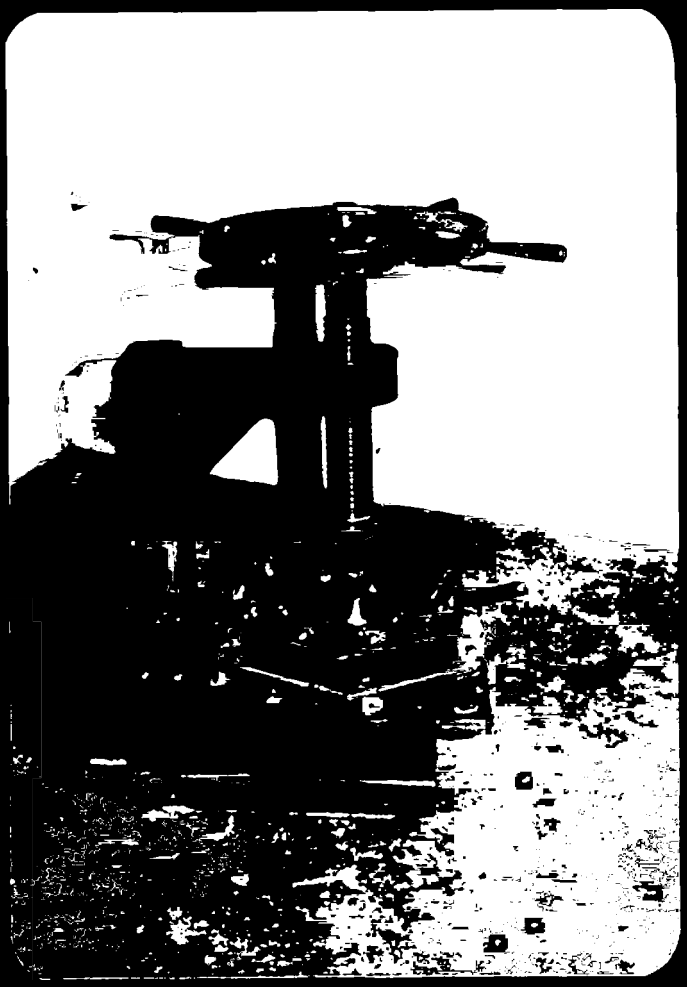
1. Leaf Plate Making:

The cost of the machinery patented by CFTRI amounted to be Rs.6000. The two ladies of Ramegoundanpudur who were willing to initiate the project were not prepared to take loan for the project beyond Rs.3,000/- since they did not want to take risk initially. Therefore, the idea of purchasing the machinery was dropped. Instead, a local dye maker, owner of "Sakthi Fabs" was approached, who came forward to make the machinery with one or two sets of dyes within Rs.2500/-. Therefore, he was entrusted with the responsibility of fabricating the machinery.

The machinery made of iron fabricated for leaf plate making (Figures 4a and 4b) consists of a top die and a cutting blade attached to a pressing wheel (similar to the steering of an automobile) through a screw rod. It is fitted to a stand with nuts. The bottom die is attached to the bed again fitted with the stand for support. The bed has a heating coil also which has a connecting wire and plug.

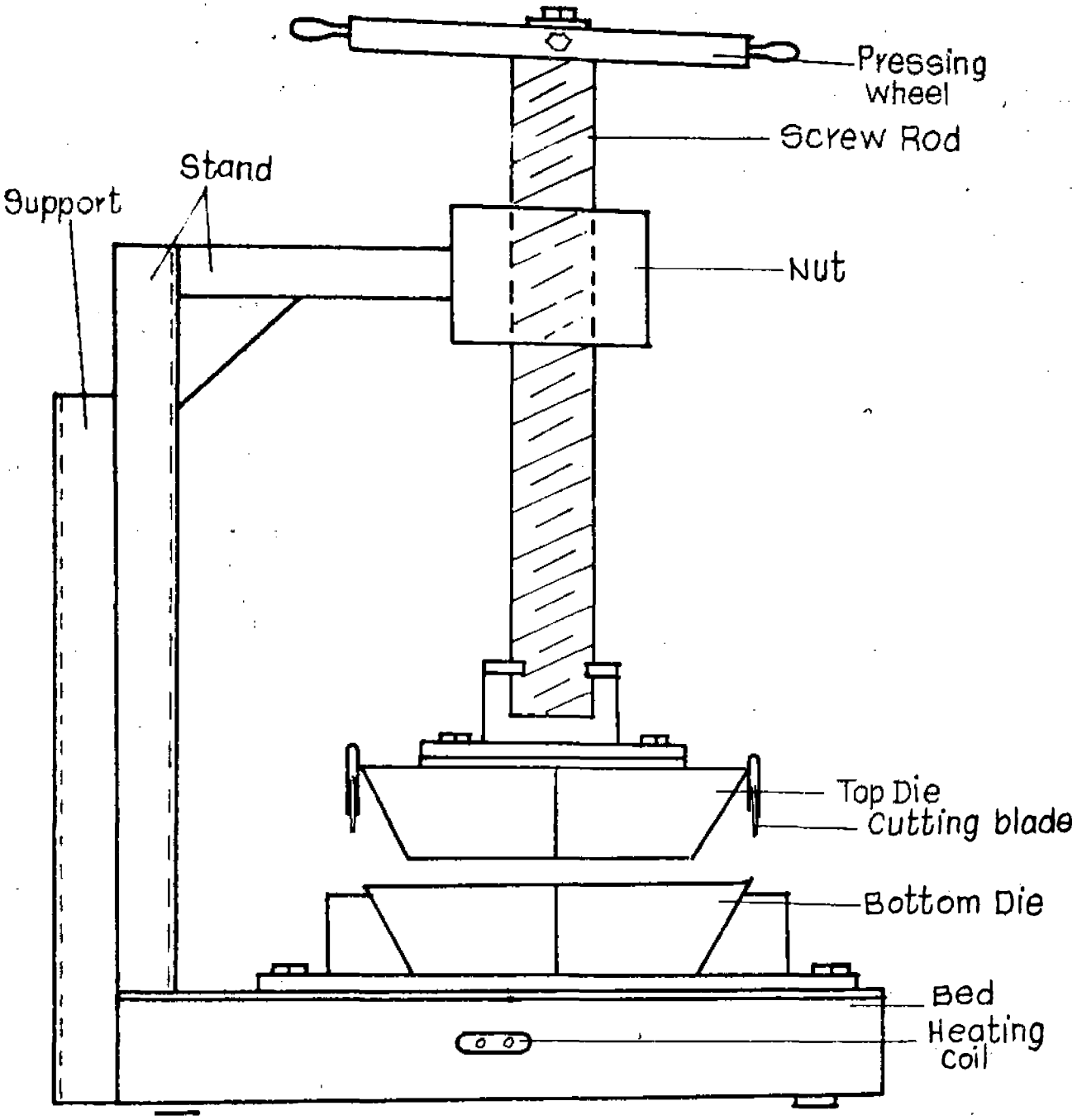
By rotating the pressing wheel clockwise, the screw rod is moved down. The damp areca sheath placed over the bottom die is pressed to shape and edges cut with the help of the cutting blade attached to the top die. The heater mechanism attached, heats the sheath pressed, to retain the shape and dry the plate simultaneously. By rotating the pressing wheel anticlockwise, the screw rod is moved up, thus releasing the leaf plate made.

The areca leaf ice cream spoon pressing machine (Figures 5a and 5b) again made of iron consists of a sturdy iron stand with a bed at the bottom to which the bottom die is attached. The top die and cutter are connected to the guide operated by a long handle with spring arrangements at the top to enable easy movement of the handle up and down to press the areca sheath into ice cream spoons.



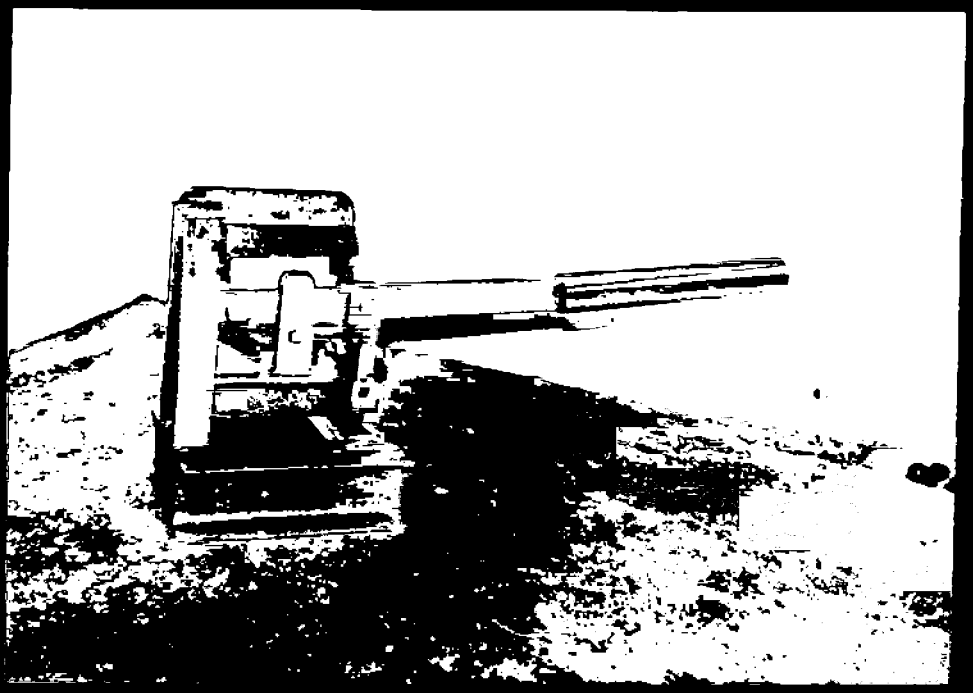
LEAF PLATE MAKING MACHINE

Figure.4.a



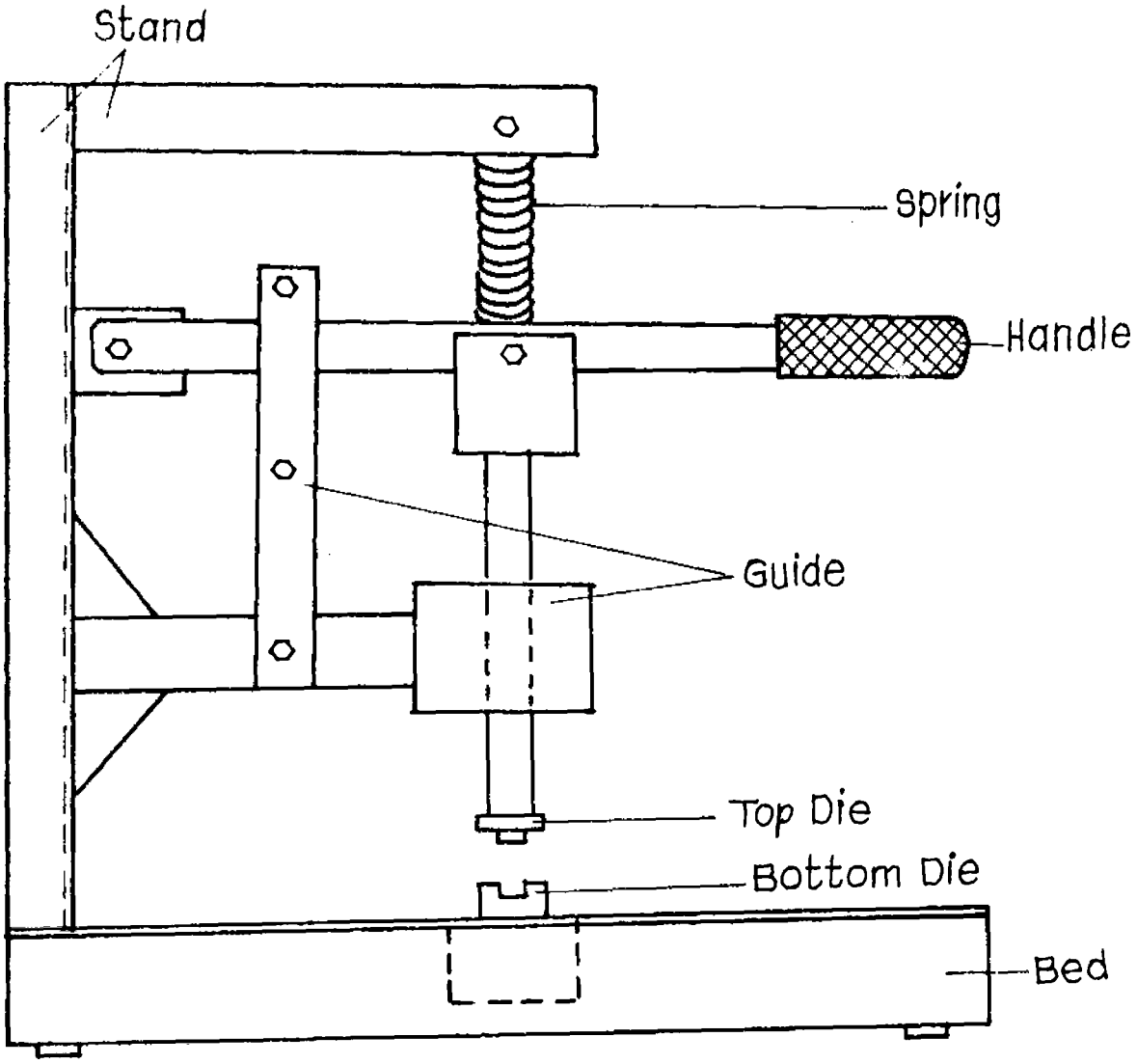
ARECA LEAF PLATE PRESSING MACHINE

Figure. 4.b



ARECA LEAF ICE-CREEM SPOON MAKING MACHINE

Figure.5.a



ARECA LEAF ICE-CREEM SPOON PRESSING MACHINE

Figure. **5.b**

2. Extraction of Banana Fibre:

Figure 6 shows the hand operated blade for banana fibre extraction. The sharp iron blade of 6 cm length and 6 cm width is attached to a wooden handle. Five sets of these blades (each costing only Rs.5/-) were procured from the Fibre Zonal Training Centre, Nadathara, Trichur, Kerala State.

The fibre is extracted from the banana stems, through mechanical scrapping with the blades.

G. Standardising the Procedure:

1. Leaf plates making:

After the initial trials, the procedure for leaf plate making was standardised as follows:

a. Selection of sheath:

Since the end product depends on the quality of the areca sheath, this step is considered very important. Contacts were established with the owners and contractors of the arecanut groves in order to pick up glossy, wide and long areca sheath as they fall from the trees. Care is taken to avoid fungus attacked sheath.

b. Drying:

After purchasing quality sheath in bulk, they are dried in shade, to facilitate storing and to prevent fungus conta-

BANANA FIBRE EXTRACTOR

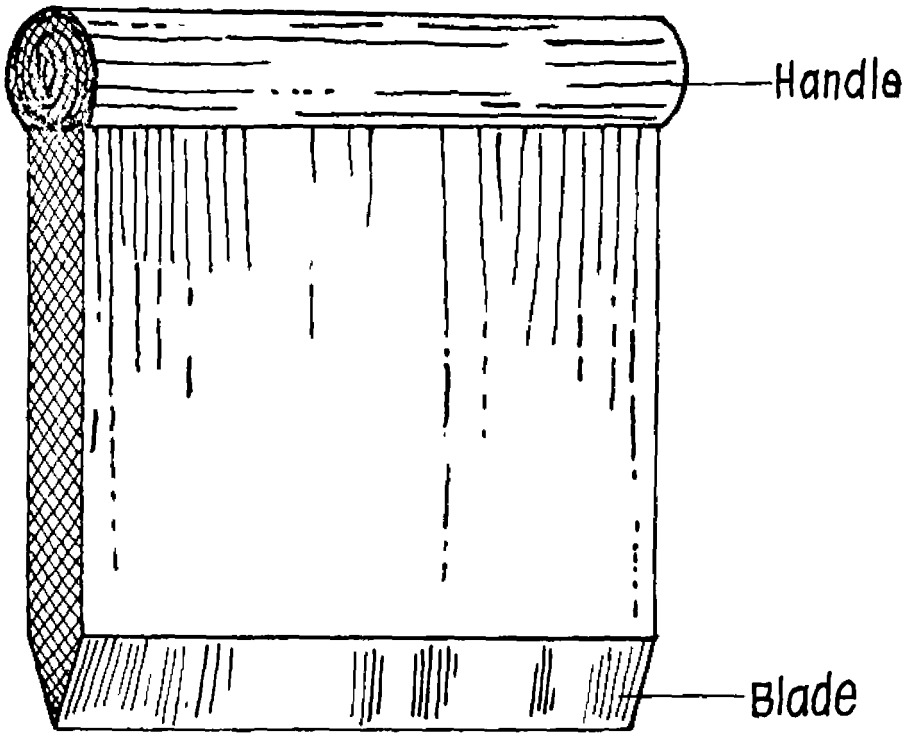


Figure. 6

mination. Care is taken to avoid over drying, making the sheath brittle. The dried leaves are bundled in gunny bags and stored.

c. Soaking:

At the time of making the plates, the required quantity of sheath are taken out and dipped in water for three to five minutes to make the sheath pliable (Figure 7). They are then wiped with a clean cloth to remove dust or dirt.

d. Cutting:

The sheath are cut into two or three pieces to be of adequate size to be fed into the machine. The damp cut sheath are stored in polythene bags, to avoid drying before use.

e. Pressing the sheath into plates:

The sheath cut to size are then placed on the lower die of the machine and pressed by the upper die to make the plates (Figure 8).

f. Drying the plates:

After taking out the plates, the edges are trimmed if necessary and dried in shade (Figure 9). After drying,

CUTTING AND SOAKING THE ARECA SHEATH

Figure.7

THE WOMAN OPERATING THE MACHINE

Figure. 8

DRYING AND ARRANGING THE PLATES

Figure.9

the plates are arranged one over the other and a heavy weight kept on the top, to enable the plates to retain shape.

g. Storing:

The plate thus made are stored in card board boxes to be sent for marketing.

2. Ice Cream Spoons:

These are prepared from the waste portions of the sheath after making the plates. The waste portions are dipped in water and pressed in the machine (Figure 10). The spoons made are dried in shade and stored in polythene bags until sale.

3. Banana fibre extraction:

a. Removing the sheaths from the stem:

After collecting adequate number of banana stem from the farms, first the outer layers are removed. Then the inner sheath are peeled out from the stems from which fibre would be extracted.

b. Cutting the sheath:

The sheath peeled out are cut into pieces with 40 to 60 cm in length and 6 to 10 cm in width, for easy operation.

ARECA SPOONS MAKING

Figure.10

c. Extracting the fibre:

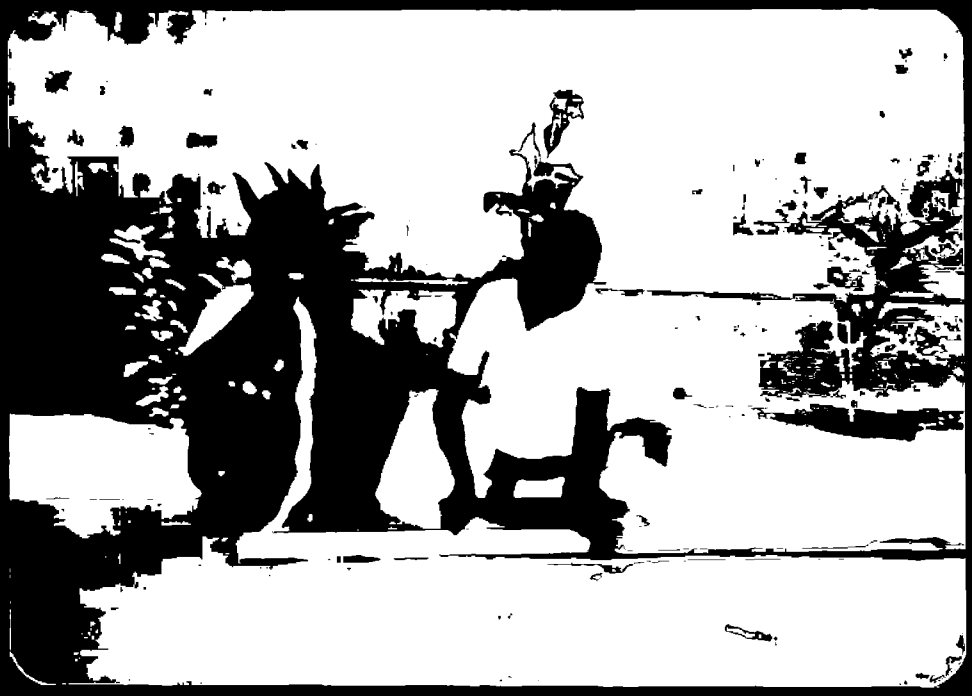
Each piece is placed on a plank or table of adequate length and breadth to accommodate the piece. The outer side ie. the back of the piece is kept resting on the plank/table. By holding the piece with the left hand, the pitch, flesh, juices and other materials are scrapped away, using the steel blade (Figure 11). The operator either sits on the ground with plank in front or sidways, placing the plank on the bench or at a raised level. If a high table is used, the operator stands and extracts the fibre. After a few forward movements with the blade, attractive, soft, shining fibres are taken out.

d. Drying the fibres:

Immediately after extraction, the fibres are dried in shade, bundled and stored for further use.

H. Arranging for Financial Help:

The Syndicate Bank, Mettupalayam was approached for financial help for areca leaf plates and the Indian Overseas Bank, Karamadai, for banana fibre extraction, owing to the nearness of these banks for the respective villages. The project proposals were worked out and modified after consulting the bank managers.



EXTRACTING THE BANANA FIBRE

Figure.11

The District RuralDevelopment Agency (DRDA) Coimbatore District, was contacted for inclusion of the above projects in the plan of work for Karamadai Block, for the year 1985-'86 to enable the parties to obtain subsidies for the project under the Integrated Rural Development Programme.

I. Initiating the Projects:

1. Leaf plate making:

Financial help to the tune of Rs.3000 was arranged for the leaf plate project (Rs.2,500 for machinery and Rs.500 as working capital). Sanction has also been accorded by the DRDA and Block authorities to offer a subsidy of Rs.1000 to the two women undertaking this project. ~~is located in their own households.~~

2. Banana fibre extraction:

Efforts are under way to arrange for loan and subsidy to the party willing to initiate this project. The financial help is pending for want of certain clarifications from the applicant and delay in getting the quotations from the manufacturer of the machinery in Kerala State. In the meantime, with the help of the hand extractor, trials have been made to extract fibre from the three major varities of banana available in this area.

J. Arranging for Marketing:

1. Areca sheath plates and spoons:

The proprietors of leading hotels and major restaurants in Coimbatore city, renowned dealers of consumer items such as 'Spencers' and manufacturers of ice creams were approached for help in marketing the leaf plates and spoons from areca sheath. There was an enthusiastic response to this novel idea of areca sheath plates and spoons which was totally new to the public of Coimbatore City. Trial orders were obtained.

With persistent efforts, it is hoped that orders to the tune of 2500 plates per month would be obtained.

2. Banana fibre:

Initially, arrangements have been made to send the banana fibre extracted to the Fibre Training Cum Production Unit, KVIC, Chiyyaram, Trichur, Kerala. Plans are under consideration to start at a later period a production unit in the area itself to make handicrafts etc.

The All India Handicrafts Board, Madras has been approached for financial, technical and marketing help to start such a unit.

K. Evaluating of the Projects:

The projects undertaken were evaluated in terms of:

1. Evaluation of the finished goods

and 2. Economic viability

1. Evaluation of the finished goods:

a. Areca Leaf Plates/Spoons:

Ten experienced homemakers were selected and requested to asses the leaf plates and spoons using a rating scale prepared (Appendix V).

b. Banana Fibre Extracted:

Three varieties of banana were commonly available in the selected villages namely "Robusta" "Rasthali" and "Poovan". Sample fibres were extracted from all the three varieties and taken to the Fibre Zonal Training Centre, KVIC, Nadatharam Trichur, Kerala, for grading.

2. Economic Viability:

The economic viability of the projects were worked out taking into account the cost of machinery and other inputs, loan and subsidies available and interest rates as well as manufacturing cost to be incurred in the villages. Only modest proposals were worked out on part time basis and as cottage type of industries.

Results and Discussion

IV. RESULTS AND DISCUSSIONS

The results of this project are discussed under the following headings:

A. Evaluation of the Finished Products

and B. Economics of the Projects

A. Evaluation of the Finished Products:

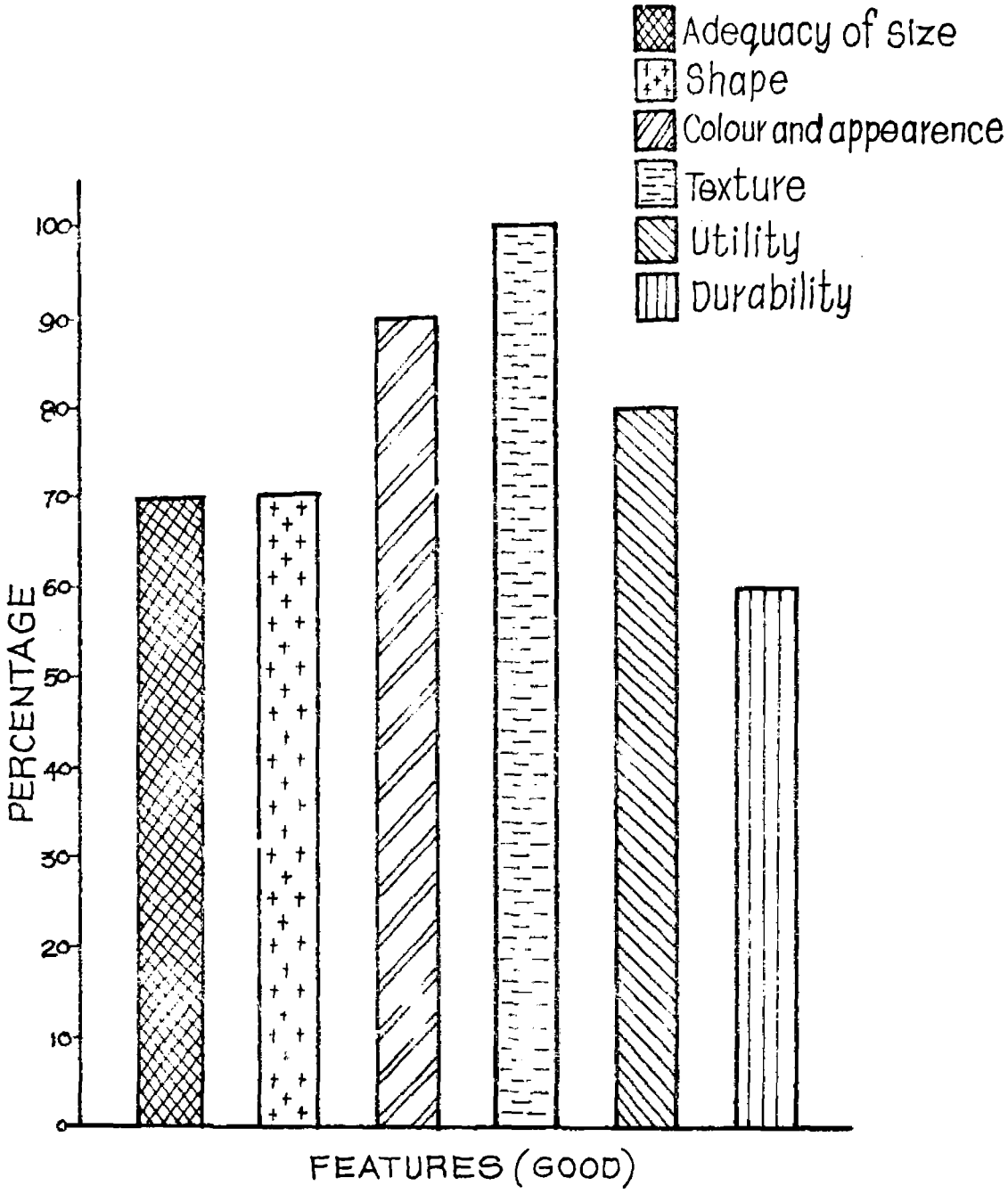
1. Leaf Plates/Spoons:

Table II and figure. 12 gives the ratings given by the 10 home-makers on the areca leaf plates and spoons.

TABLE II

RATINGS OBTAINED FOR ARECA LEAF PLATES AND SPOONS

S.No.	Aspects of Evaluation	Criteria and Number stating		
		Good	Fair	Poor
1	Adequacy of size	7	3	-
2	Shape	7	3	-
3	Colour and appearance	9	1	-
4	Texture	10	-	-
5	Utility	8	2	-
6	Durability	6	4	-



EVALUATION OF THE ARECA LEAF PLATES AND SPOONS

Figure.12

In general, there was a positive response to this noval idea of making areca leaf plates and spoons. None disliked the products totally. However, the initial hesitation to adopt a new product was reflected in the varied responses obtained,expressing doubts against durability, utility, adequacy of size etc.,

Trial sales are required on a wider basis to popularise this product to promote marketing.

2. Banana Fibre:

Table III gives the grading of the fibres extracted from the varieties of banana available in the selected villages.

TABLE III

GRADING OF THE FIBRES FROM THE BANANA VARIETIES AVAILABLE

S.No.	Name of the variety	Grades given by the experts	Utility
1	'Robusta'	I quality	Suitable for fabric and handicrafts
2	'Rasthali'	II quality	Can be utilised for handicrafts
3	'Poovan'	III quality	Can be used for handicrafts and as filling materials

The quality of the fibres determined the price fixation. The prices ranged from Rs.10 to 15 per kg. of fibre. It was encouraging to note that two of the three varieties of banana available in the selected villages were of first quality and would fetch good economic returns.

B. Economic of the Projects:

1. Leaf Plate Making:

The economics of the areca leaf plate project was worked out based on the trials made. It was observed that the two women who initiated the project could make 200 plates per day working for 6 to 8 hours per day. The ice cream spoons could be prepared simultaneously, without involving additional time. Thus, five days were required to make 1000 plates. Therefore, the manufacturing cost for 1000 plates was calculated for five days' work. The details are given below:

Bank loan obtained:

Cost of machinery	= Rs. 2500-00
Working capital (for six months)	= Rs. 500-00
Total	= Rs. 3000-00

Loan	= Rs. 3000-00
Subsidy	= Rs. 1000-00
Loan to be repaid	= Rs. 2000-00

Rate of interest = 4.5 per cent

Repayment period : 3 years

Manufacturing cost for 1000 leaf plates:

		Rs.P.
a. Raw materials (500 areca sheath) @ Rs.20 per 100 sheath		.. 100-00
b. Wages for two women @ Rs.10 per head per day for five days ((10 x 2 x 5))		.. 100-00
c. Overheads:		
(i) Electricity (25 units) @ 60 paise per unit	Rs.15.00	
(ii) Rent for building	Rs.10.00	
(iii) Transport of raw materials	Rs.25.00	
(iv) Transport of finished goods for marketing	Rs.25.00	
(v) Depreciation on equipment at 10%	Rs. 5.00	
		.. 80.00
Total		= 280-00

Selling Price for 1000 plates and spoons:

		Rs. Ps.
@ Rs.45 per 100 plates for 1000 plates	:	450-00
@ Re. 1 per 100 spoons for 5000 spoons *	:	50-00
Total	:	500-00

Sale returns	Rs. 500-00
Manufacturing cost	Rs. 280-00
Gross Income from 1000 plates and 5000 spoons	Rs. 220-00

Assuming that marketing is available atleast for 2500 plates every month, the monthly profits were calculated thus:

		Rs.Ps.
Sale Returns for 2500 plates	:	1250-00
Manufacturing cost for 2500 plates	:	700-00
Gross Income	:	550-00
Capital and interest to be repaid to the bank per month	:	100-00
Profit per month (for two)	:	450-00
Profit per head per month	:	225-00

* After making two plates from one sheath, atleast 10 spoons could be prepared from the waste portions. Therefore, when 500 sheaths are used to make 1000 plates, 5000 spoons could be prepared.

Thus the project would fetch a profit of not less than Rs.225 per head per month even with modest estimates, after taking the labour charges and meeting all other expenses and repaying bank loans.

2. Banana Fibre Extraction:

The economics of the banana fibre extraction project was worked out on the trials made and in consultation with the Principal, Fibre Zonal Training Centre, KVIC, Nadathara, Kerala. Only a modest proposal involving only two (one organiser and one helper) has been worked out. It is assumed that on an average, 20 days' work per month is provided, besides collection of banana stems and transport of finished products. The quantity of fibre to be extracted was calculated to be 100 kg per month.

Bank Loan:

	Rs.P.
Cost of Machinery (Raspador with 3HP Electric Motor and accessories)	: 6000-00
Working capital for six months	: 1000-00
Total	: 7000-00
Loan	: 7000-00
Subsidy under IRDP	: 2330-00
Loanto be repaid	: 4670-00

Rate of interest = 4.5 per cent
Repayment period = Three years.

Production cost per month:

			Rs.P$.
a. Raw materials Re. one per quintal for 6 quintals per day and 120 quintals per month		:	120-00
b. Wages for one helper @ Rs.10 per day 20 days a month (10x20)			200-00
c. Overheads:			
	Rs.P.		
(i) Electricity	50-00		
(ii) Rent for building	30-00		
(iii) Transport of raw materials	50-00		
(iv) Transport of finished goods for marketing	60-00		
(v) Depreciation on equipment 10%	50-00	:	240-00
	Total	:	540-00

Sale value per month:

Quantity of fibre to be extracted : 100 kg/month

Sale value @ Rs.11 per kg (11 x 100)	:	1100-00
Production cost	:	540-00
Gross Income for the organiser	:	560-00
Capital plus interest to be repaid to the bank	:	150-00
Profit for the organiser	:	410-00
Say	:	Rs.400 p.m.

Thus the project, even under modest estimates would enable the person to get Rs.400/- per month. from waste materials available in the areas. Furthermore, the wasted pulp, sheath etc., could be composted and sold to add to the income of the organiser.

Summary and Conclusion

V. SUMMARY AND CONCLUSION

This maiden effort was undertaken to identify agricultural wastes and byproducts available in Karamadai Panchayat Union, Coimbatore District and explore the possibilities of utilising the same for income generation.

Areca Sheath Plates and Spoon making and Banana Fibre extraction were the two projects ultimately initiated in Ramegoundanpudur and Tholampalayampudur respectively. The projects were chosen, based on the prevalence of raw materials, availability of expert advice and technical know how, scope for marketing, novelty in the ideas and response from people to initiate the same.

The machineries for preparation of areca sheath plates and spoons were designed and fabricated with the help of a local die maker. The simple equipment for extracting the banana fibre was purchased from Kerala and used.

Bank loans and subsidies were made available under IRDP. The projection of areca sheath plates and spoons has already been started functioning while trials have been completed for the banana fibre extraction project.

The end products namely the areca sheath plates and spoons were evaluated by selected homemakers. On the

otherhand, the fibres extracted from the different varieties of banana were taken to the Fibre Zonal Training Centre, KVIC, Nadathara, Trichur, Kerala, for grading.

A ready market for banana fibre was available in Kerala for making handicrafts and weaving fabrics. Marketing facilities were explored for the areca sheath plates and spoons with the star hotels, restaurants and leading consumer stores in Coimbatore and trial orders obtained.

Findings:

1. The evaluation of the areca sheath plates and spoons by the homemakers revealed that they ~~homemakers~~ were ready to try these in their households.

2. The grading of the fibres extracted from the three varieties of banana available in the selected villages point out that 'Robusta' and 'Rasthali' could be classified as the first quality fibres while that from 'Poovan' variety was of third quality. The first quality fibres were suitable for weaving fabrics and making handicrafts and the third quality fibre fit for making handicrafts and use as filling material.

3. The areca sheath plates and spoons making project would enable the two women engaged in the project to obtain a profit of Rs.225 per head per month after meeting all expenses including their own labour charges of Rs.10 per head per day, and repayment of loans with interest. Thus this project is a novel venture, converting the traditional areca sheath into attractive plates and spoons.

4. The banana fibre extraction project would fetch a profit of Rs.410 per month to the organiser after meeting the production cost and paying back the loan amounts. Additionally, compost manure could be prepared from the wasted pulp, sheath etc., This project again proved to be economically viable and feasible for the rural arecas selected, where the raw material is abundantly available.

Suggestions:

The District Rural Development Agency should come forward to encourage such economic projects under the IRDP.

Training programme in the use of agricultural wastes and byproducts should find support under the programmes

such as TRYSEM (Training of Rural Youth for Self Employment), DWACRA (~~DEVELOPMENT~~ Development of Women and Children in the Rural Areas) etc. which aim at making the rural population economically independent.

Banks should also agree to fund such efforts by the rural youth under the various self employment schemes in operation.

The Khadi and Village Industries Commission should also include these endeavours in their programmes of priority and in their marketing efforts.

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Appendices

APPENDIX I

SCHEDULE TO ELICIT INFORMATION REGARDING DIFFERENT TYPES OF AGRICULTURAL WASTES/BYPRODUCTS AND THEIR UTILISATION IN THE SELECTED AREA

Village :

S.No.	Crops Cultivated	Wastes/byproducts	How they are being utilised

APPENDIX II

RATING SCALE TO EVALUATE ARECA LEAF PLATES AND SPOONS

S.No.	Aspects of Evaluation	Criteria and number stating		
		Good	Fair	Poor
1.	Adequacy of size			
2.	Shape			
3.	Colour and appearance			
4.	Texture			
5.	Utility			
6.	Durability			