

SOUTH ASIAN ASSOCIATION FOR REGIONAL
COOPERATION

STATE-OF-THE-ART REPORT ON SELECTED
RURAL TECHNOLOGIES : FOOD PROCESSING
TECHNOLOGIES AND HANDICRAFTS
SRI LANKA

COMPILED BY
NATURAL RESOURCES ENERGY & SCIENCE AUTHORITY
OF SRI LANKA
MINISTRY OF SCIENCE, TECHNOLOGY & HUMAN
RESOURCES DEVELOPMENT

1995

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NA-51
not
necessary

FOOD PROCESSING TECHNOLOGIES

GROUP A : FOOD PROCESSING TECHNOLOGIES

Questionnaire

1. Role of indigenous food processing technologies in national economy
2. Name of the product:
 - 2.1 Brief description of the product
(Appearance, flavor, colour, texture, size, shape)
 - 2.2 Uses
(snack food, meal, drink, etc.)
3. Brief description of the method of processing and principle of preservation
 - 3.1 Method of processing
 - 3.2 Ingredients used
4. Recommended quality control procedures including hygiene
5. Any special procedures for preparing the food for consumption
6. Suitable types of packaging materials
7. Equipment Required:

Indicate expected scale of production using the size of equipment specified. Indicate quality control and packaging equipment where appropriate
8. Name and address of local suppliers/manufacturers/import agents for all equipment described

Cost Range :
9. Future perspectives of indigenous food processing technology in the respective countries (Ongoing R and D activities)
10. Key institutions involved in the development and promotion of food processing industries
11. Dissemination mechanism:
 - 11.1 Present modus operandi
 - 11.2 Planned activities

Note: SAARC Questionnaire for collection of information on the preparation of the State-of-the-Art Report on Selected Rural Technologies: Food Processing Technologies and Handicrafts prepared by the Royal Nepal Academy of Science and Technology (RONAST), Kathmandu, Nepal.

Chillie Powder
Curry Powder

1. Chillie powder and curry powder are commonly used in preparation of curries for the local diet of Sri Lankan people. It is so widely used that it is known as an essential commodity to the people of this country. Most of the ingredients used to make these products are grown islandwide on a seasonal basis. Therefore, processing technology of chillie and curry powder has an important role in the national economy because of the link between agriculture and rural industrial activity.

2. (i) Chillie powder
(ii) Curry powder

2.1 (i) Cleaned and dried ripe chillies of the genus Capsicum are ground to form a powder of characteristic colour ranging from red to orange, and having a sharp taste.

(ii) Curry powder is obtained by grinding coriander and cumin seeds with one or more spices and condiments as listed in section 3.2. There are two types of curry powder - with chillies and without chillies.

2.2 (i) Chillie powder is one of the common spices used in preparation of curries.

(ii) Curry powder is a common spice mixture used in preparation of curries.

3. 3.1 (Common to both chillie and curry powder)

Destoning and cleaning

↓
Drying

↓
Grinding

↓
Weighing

↓
Packing

3.2 (i) Chillies

Chillie Powder
Curry Powder

(ii) a.	Coriander	k.	Nutmeg
b.	Cummin seed	l.	Cardamom
c.	Chillie	m.	Caraway
d.	Pepper	n.	Dill
e.	Mustard	o.	Mace
f.	Dry ginger	p.	Curry leaves
g.	Turmeric	q.	Garlic
h.	Fenugreek	r.	"Rampe" (<u>Pandanus</u> <u>latifolia</u>)
i.	Cinnamon	s.	Lemon grass
j.	Cloves	t.	Mint

4. Fresh, ripe, clean ingredients should be selected. A supply of fresh water for washing and suitable type of drying method of spices and condiments to avoid contamination from dust and insects is needed for this type of industry. Care should be taken to avoid spreading of spice dust to the environment. Sanitary wear such as masks, eye glasses, gloves and head caps should be supplied to the workers. Cleaning of utensils and premises is essential at the end of the work. Procedures employed in the industry should comply with the Sri Lanka Standards Institution and Food and Drugs Act requirements.
5. No.
6. Air-tight glass containers,
Polythene.
7. Capacity 50 - 60 ton/yr
Grinder
Drying unit
Mechanical seiver
Weighing scale
Dust collector
Polythene sealer
8. 1. Chief Engineer,
Industrial Development Board,
615, Galle Road,
Katubedde,
Moratuwa.

Chillie Powder
Curry Powder

2. Somasiri Hullers,
112, Isipathana Mawatha,
Colombo 05.
3. Tissa Industries,
71, Sunethra Devi Road,
Kohuwala.

Approximately Rs. 400,000/-.

9. -
10. -
11. -

Cinnamon bark oil

1. Cinnamon, Cinnamomum verum, L is the most important spice in Sri Lanka, which has been known since several centuries. In addition to the bark which is the most important commodity, the plant provides two essential oils of commercial importance namely bark and leaf oil.

Cinnamon industry in Sri Lanka is very important industry among the rural community in many parts of the island specially in the southern coastal area. Extraction of cinnamon leaf and bark oils is indigenous to the south of the country. So, this industry plays a very important role in the rural population of the country. It also has great impact on the economy of the country.

Further, spices such as black pepper, clove, nutmeg and cardamom are also produced in the island. Processing of vanilla, coffee, and cocoa is also found to be a good income source among the rural sector.

2. Cinnamon bark oil

- 2.1 Characteristic aroma and flavor, pale yellow liquid
- 2.2 Food flavouring material, perfumery, baked products, sauces and pickles, confectionery, dental and pharmaceutical preparations.
3. 3.1 Extracted from cinnamon quills, quillings, feathering or chips. The traditional stills of about 50 kg capacity possess a still body built over a brick and mortar hearth with a direct fire heating arrangement. Material is packed into the still with water. Condenser tubes are immersed in static water tank. Florentine vessel collects the volatile oil-water mixture. The distillate at first separates into two fractions, lighter and heavier than water.
3.2 quills, quillings, feathering or chips
4. Quality control through Sri Lanka Standards Institution
5. Nil
6. Dark glass bottles, aluminium, tin, stainless steel or PVC containers.
7. A distillation Unit

Cinnamon bark oil

8. Mr. W.G. Jinadasa,
Kirindiele,
Meetiyagoda.

Rs. 75,000/-

9. Nil

10. Department of Export Agriculture
Ceylon Institute of Scientific & Industrial Research

11. 11.1 Findings are transferred to Asst. Directors and Extension
Officers of the Department of Export Agriculture through
Research Extension Dialogue, refresher courses and
training classes and then to farmers through Extension
Officers.

11.2 Nil

Cinnamon leaf oil

1. Ref. Cinnamon bark Oil
2. Cinnamon leaf oil
 - 2.1 Characteristic aroma and flavor, harsh odour, brownish yellow colour
 - 2.2 Food industry, perfumery, as a source of eugenol
3. 3.1 Extraction from the cinnamon leaves by steam distillation. The traditional still consists of a still body generally made of wood with a copper goose neck. Condenser tubes immerse in a static water tank. Steam is generated in a separate boiler fired with firewood. Five florentine vessels are used in a series to separate the oil.
 - 3.2 Cinnamon leaves
4. Through Sri Lanka Standards Institution.
5. Nil
6. Dark glass bottles
7. A distillation unit
8. Mr. W.G. Jinadasa
Kirindiela,
Meetiyagoda.

Rs. 85,000/-
9. Nil
10. Department of Export Agriculture
Ceylon Institute of Scientific and Industrial Research.
11. 11.1 Findings are transferred to Asst. Directors and Extension Officers of the Department of Export Agriculture through Research Extension Dialogue, refresher courses and training classes and then to farmers through Extension Officers.
 - 11.2 Nil

Cinnamon quills

1. Ref. Cinnamon bark Oil
2. Cinnamon quills
 - 2.1 Dried bark of the plant, light brown colour, characteristic sweet aroma and flavor.
 - 2.2 Food flavouring material, baked goods, sauces, pickles, confectionery, beverages, dental and pharmaceutical preparations.
3. 3.1 Stems about 1.2 - 5.0 cm in diameter are cut and leaves are detached. Cut stems are transported to the peeling shed. Outer bark is removed using a curved knife. The stem is rubbed briskly with a brass rod to loosen the inner bark. Inner bark is removed by using a small knife. Two cuts are made round the stem about 30 cm apart. Inner bark is carefully eased off the wood with the knife. The bark is detached in two halves, packed one inside the other until a 106.7 cm long quill is formed, and air dried.
 - 3.2 Nil
4. Through Sri Lanka Standards Institution.
5. -
6. Jute bags
7. No special equipment is needed except some hand tools
8. Nil
9. Nil
10. Department of Export Agriculture
Ceylon Institute of Scientific and Industrial Research
11. 11.1 Information is transferred to the Asst. Directors of the Department of Export Agriculture Extension wing through the Research Extension Dialogue. They transfer findings to the farmers through extension officers.
 - 11.2 Nil

1. -
2. Cured Cardamom
 - 2.1 Cured capsules of the plant Elettaria cardamomum, characteristic flavor and aroma, good green colour, bold capsules or seeds of the fruit.
 - 2.2 Food flavouring material
 3. 3.1 Matured (not fully) green capsules of the plant are harvested, washed and dried in artificial curing barns. This is done in the dark under carefully controlled temperature and humidity in the curing barn. Greenness should be retained to get a premium price.
 - 3.2 Washing in 2% Sodium Carbonate solution is practised some times.
4. Through the Sri Lanka Standards Institution
5. Nil
6. Black polythene, aluminium foils, (prevent from sunlight)
7. Efficient curing barns, (electric dryers)
8. Nil
9. Nil
10. Dept. of Export Agriculture
Ceylon Institute of Scientific and Industrial Research
11. 11.1 Findings are transferred to Asst. Directors and Extension Officers of the Department of Export Agriculture through Research Extension Dialogue, refresher courses and training classes and then to farmers through Extension Officers.

11.2 Nil

Dehydrated Fruit

1. In Sri Lanka a large variety of fruits such as pineapple, mango, papaya, jak etc. are available. Due to the seasonal nature, surplus yields go waste.
2. Dehydrated fruit
 - 2.1 Dehydrated fruit is a conserve of osmotically dehydrated and dried, product.
 - 2.2 Dehydrated fruits are incorporated in cakes, fruit yoghurt, toffees etc., used as candies and consumed directly.
3. Brief description of the method of processing and principle of preservation.
 - 3.1 Fresh ripe fruit
 - ↓
 - Washing
 - ↓
 - Peeling
 - ↓
 - Cutting
 - ↓
 - Dip in a series of sugar solutions
 - ↓
 - Drying
 - ↓
 - Packing
 - ↓
 - Finished product
 - 3.2 Fruits
Sugar
4. Fresh ripe fruits should be collected and washed in clean water to remove extraneous matter. Waste parts such as peels, seeds etc. should be removed and discarded. Hygienic and sanitary conditions should be maintained within the premises to avoid any form of contamination. Employees should wash their hands and wear masks, overcoats, head caps and gloves before entering the processing area. All utensils and premises should be thoroughly cleaned at the end of work.
5. Packed sachets should be kept in cool and dry place.
6. Depending on the storage period. Flexible laminated pack be used.

Dehydrated Fruit

7. Capacity 500 kg/8 hrs.
Fruit cutting machines
Stainless steel tanks
Dryer (electrically operated)
Sealing machine

8. 1. Chief Engineer,
Industrial Development Board,
615, Galle Road,
Katubedde,
Moratuwa.
2. Nerd Centre,
Ekala,
Ja-Ela.
3. Director,
Ceylon Institute for Scientific &
Industrial Research,
363, Bauddhaloka Mawatha,
Colombo 07.

Approximately Rs. 750,000/-.

9. -

10. -

11. -

Essential Oils

1. The role of this technology is to provide a simple method for recovery of essential oils from indigenous spices & other oil bearing plant material.
2. **Essential Oils**
 - 2.1
 - 2.2 For use in the flavour and fragrance industry
3. Local spices such as pepper, nutmeg, clove and ginger. Oil bearing plant material such as cinnamon bark and leaf, citronella and lemon grass.
 - 3.1 Raw material dry steam distill distillation and the separation of oil
4. Good post harvest practice, selection of good quality raw material drying under hygienic conditions, supervision of steam distillation, separation and packing of essential oils in recommended containers.
5. Drying should be carefully controlled. Otherwise valuable essential oils will be lost.
6. Essential oils should be packed in stainless steel or dark air-tight glass bottles.
7.
 - (a) A boiler for steam generation
 - (b) A suitable still body for packing the raw material
 - (c) A condenser system for efficient cooling
 - (d) Recommend stainless steel or glass containers for packing
8. Director,
CISIR,
363, Bauddhaloka Mawatha,
Colombo 07.

Rs. 200,000 - 300,000

Instant hopper mix

1. -
2. Instant hopper mix
 - 2.1 Dry cereal mixture when reconstituted gives a crispy edge and a soft centre called hoppers
 - 2.2 Meal
- 3.1 Dry blending of cereal flours and leavening agents
- 3.2 Cereal flours and leavening agents
4. Good manufacturing practice
5. Reconstitution with coconut milk followed by cooking
6. Polypropylene laminated to polythene
7. Grinding mill, Dry blending equipment
400 kg/day
8. -
9. Future perspectives are good
10. Ceylon Institute of Scientific & Industrial Research (CISIR), Horticultural Crop Research & Development Institute (HORDI), Industrial Development Board (IDB)
 - 11.1 CISIR transfers technology

Instant "kola kenda" mix

1. -
2. Instant "kola kenda" mix
 - 2.1 Dry cereal, legume and leaf mix. When reconstituted gives a herbal porridge
 - 2.2 Herbal drink
- 3.1 Dry blending
- 3.2 Cereal and legume flours, Dry leaves
5. Addition of required amount of coconut milk and boiling
6. Triple laminate
7. Grinding mill, Dry blending equipment
200 kg/day
8. -
9. Future perspectives are good
10. Ceylon Institute of Scientific & Industrial Research (CISIR),
Horticultural Crop Research & Development Institute (HORDI),
Industrial Development Board (IDB)
 - 11.1 CISIR transfers technology

Instant thosai mix

1. -
2. Instant thosai mix
 - 2.1 Dry cereal and legume mixture when reconstituted gives a pancake like structure of light texture, off white colour
 - 2.2 Meal
- 3.1 Dry blending of cereal and legume flours and leavening agents
- 3.2 Cereal and legume flours and leavening agents
5. Reconstitution with water followed by cooking
6. Polypropylene laminated to polythene
7. Grinding mill, Dry blending equipment
400 kg/day
8. -
9. Future perspectives for instant mixes are good
10. Ceylon Institute of Scientific & Industrial Research (CISIR), Horticultural Crop Research & Development Institute (HORDI), Industrial Development Board (IDB)
- 11.1 CISIR transfers technology

"Jaadi"

1. Jaadi is a highly nutritive fishery product that provides proteins, vitamins and minerals. It is more popular among lower income groups in the country as the technology of production is quite simple and easy to carry out, making this product relatively cheap compared to many other preserved fishing products. However it is not consumed in vary large quantities. In certain localities due to non availability of ice, power etc. for fish transportation, preservation and processing, "jaadi" is one of the commonly used preservation techniques.
2. "Jaadi"
 - 2.1 "Jaadi" is a highly salted, fermented fishery product consisting of partially hydrolysed fish flesh and organs immersed in a liquid exudate from fish. During the process of fermentation fish becomes hardened, there is formation of a liquid which is dark brown colour, and a fruity smell occurs. When the fermentation process is complete, a characteristic cheesy aroma and flavour can be commonly noted.
 - 2.2 Jaadi is popular among many due to its unique taste and flavor and is commonly used in preparation of curries and for frying.
3. Jaadi is a high-salted product consisting of partially hydrolysed fish flesh and organs immersed in liquid exudate from fish. A low pH is maintained by the addition of the ripe pod of the "goraka" plant (Garcinia gamboges). This pod contains several organic acids.
 - 3.1 The raw fish used are gutted and cleaned in seawater and then tightly packed in a suitable vessel with alternate layers of fish and salt/goraka mixture at a ratio of one part of above mixture to 3 parts of fish and the contents are sealed, or alternatively a weight is kept on the contents to ensure good contact of fish with the salt/goraka mixture during the fermentation process. The fermentated fish can be kept in good quality for nearly one year if care is taken to prevent contamination.
4. The raw fish used for jaadi making, packing container and other ingredients used for the preparation should be of sufficiently good quality to get a product of low microbial load and to prevent fungal and mold growth and maggot production. During the process of fermentation the liquid which is formed should be prevented from absorption into the clay containers. This is necessary to prevent the attack of

"Jaadi"

the product by fungi and maggots. The salt, fish and goraka should be mixed in the correct ratio and the contents should be sealed and tightly packed during the fermentation to prevent any contamination.

5. The jaadi curry can be prepared adding tumeric powder, chillie powder, paprica powder, coconut milk and cook for about 10 minutes without using goraka and salt as the product is high in salt content and acidity.
9. So far little has been done to improve the traditional method used, to yeild a product with better safety, stability in a pack acceptable consumers keeping up with the modern international requirements. Due to hazardous effects of chemical preservatives alternative bio-preservatives are gaining much acceptance among the health conscious consumer. To meet this goal work should be directed to develop safe fermented fish products in an alternative consumer pack which would enhance the quality in terms of appearance, shelf-life and convenience.
10. Institute of post harvest technology of National Aquatic Resources Agency (NARA).
Ceylon Institute of Scientific and Industrial Research

Jam

1. In Sri Lanka most of the commonly consumed food items like rice, grains, vegetables, fruits etc. are to a very great extent locally produced. Except for items like fresh fruits and vegetables most others need some degree of processing before they reach the ultimate consumer. Also in the case of produce which are of a seasonal nature conversion of surplus of such seasonal products into value added preservable form for future consumption calls for different food processing technologies. Food processing technology has a vital role to play in the overall economy since food processing activities are wide spread and they create an inseparable link between agriculture and rural industrial activity.

2. Jam

2.1 Jam is a conserve of boiled fruit and sugar packed in glass bottles or canned.

2.2 Jam is spread over bread and butter and used specially for children's breakfast or snacks in between meals.

3. 3.1 Fruits

↓
Making Pulp

↓
Weighing

↓
Add ingredients & mixing

↓
Heating to desired consistency
(104°C - 105°C)

Filling into bottles in warm state

↓
Sealing

↓
Pasting Labels

↓
Finished Product

Empty Bottles

↓
Washing and cleaning
Drying

3.2	Fresh Fruit pulp	1 Part
	Sugar	1 Part
	Citric Acid	0.1
	Pectin	0.1

4. Fresh fruits should be thoroughly washed in clean water and unwanted parts like peels and seeds should be removed. Hygienic and sanitary conditions should be maintained in the

premises. Employees should wash their hands and feet with soap when entering the processing areas. All utensils should be cleaned with fresh water. Producers in Sri Lanka should process their products to comply with Sri Lanka Standards Institution and Food Drugs Act requirements.

5. Containers should always be kept closed for protection from flies and ants.

Unsealed bottles and cans should be kept under refrigeration if not consumed within a day or two.

6. Glass bottles - (wide opening)
Cans

- | | | |
|----|---|----|
| 7. | Pulper | 01 |
| | Bottle sealer | 01 |
| | Heating vessels
(stainless steel) | |
| | Industrial Gas Burners | 01 |
| | Weighing scale | 02 |
| | Plastic basin | 02 |
| | Plastic buckets | 02 |
| | Thermometer | 01 |
| | Knives or cutting device
(stainless steel) | 03 |
| | Table 8' x 4') | 02 |

8. 1. Industrial Development Board,
615, Galle Road,
Katubedda.
2. NERD Centre,
Ekala,
Ja-ela.
3. Singer Sri Lanka,
Union Place,
Colombo 02.

Approximately Rs. 96,000/-..

9. -

10. -

11. -

Kitul Treacle

1. Kitul treacle is produced from the unfermented sap extracted from inflorescence of kitul tree (Caryota urens L) which is grown wildy in rural areas of Sri lanka. This value added product brings additional income to people in these areas.
2. Kitul treacle
 - 2.1 Kitul treacle is a viscous brownish fluid which is obtained by evaporation of the sap from the inflorescence of kitul tree. It has a characteristic odour and sweet taste.
 - 2.2 Kitul treacle is widely used in making traditional sweets and with curd as a dessert.
3. 3.1 Collection of unfermented sap
 - ↓
 - Straining
 - ↓
 - Heating to desired consistency
 - ↓
 - Filling into sterilized dry bottles in warm state
 - ↓
 - Sealing
 - ↓
 - Labelling
 - ↓
 - Finished product
- 3.2 Unfermented Kitul sap
4. Straining of the unfermented sap is essential to remove insects and unwanted floating matter. Hygienic and sanitary requirements should be maintained in the premises. All utensils should be cleaned thoroughly with warm water after work. Employees should wash their hands before entering the premises. The finished product should comply with Sri Lanka Standards for Kitul treacle.
5. Containers should always be kept closed for protection from insects and to avoid fermentation.

Once the bottle is open it should be kept under refrigeration to avoid fermentation.
6.
 - i. Glass bottles
 - ii. Cans

Kitul Treacle

7. Stainless steel tank (100 l) 01
 Brix meter 01
 Thermometer 01
 Industrial Burners & Gas 01
 Strainers 02
 Sealing machine 01
8. i. Industrial Development Board,
 615, Galle Road,
 Katubedde,
 Moratuwa.
- ii. NERD Centre,
 Ekala,
 Ja-Ela.
- iii. Samuel Sons and Company Ltd.,
 164, Messenger Street,
 Colombo 12.

Approximately Rs. 125,000/-.

9. -
10. -
11. -

Low Cost Weaning/Supplementary baby food

1. -
2. **Low Cost Weaning/Supplementary baby food**
 - 2.1 A powdered product, light brown in colour
 - 2.2 As a supplementary food for babies 4 months to 2 years and over
3.
 - 3.1 Cleaned, powdered and roasted product contained in laminated packet
 - 3.2 Rice, mungbean, ground nut and sugar
4. Formulated to conform to Codex Alimentarius Commission Standards for food & infants and children and related Code of Hygienic Practice
5. The food may be constituted in water or milk and cooked for approx 3 minutes over fire
6. Double laminated packing material
7. Specified equipment can produce 50-170 kg/per day
8. To be obtained from the CISIR as a complete package
Approximately - Rs. 600,000/-
9. Addition of vitamin and minerals
10. Ceylon Institute of Scientific & Industrial Research (CISIR)

Maldive Fish

1. Indigenous food processing technologies provide food to the nation and help in preventing malnutrition. It also provides employment to people and thereby strengthen the rural economy. Preservation offers people the availability of a preserved food which could be consumed during the off season for a particular product, specially highly perishable food such as fish. If produced under strict hygienic and controlled conditions these products may even have an export market.
2. Maldive fish
 - 2.1 The product is made from tuna loins which are spindle shaped; 15-20 cm long; hard texture, external surface is greyish and inner surface is reddish brown in colour; characteristic flavor.
 - 2.2 Used as a condiment in many Sri Lankan preparations
3. -
 - 3.1 The fish (skipjack tuna and other tuna varieties) is deheaded and gutted and then washed thoroughly. It is then cut horizontally. Salt is added to the surface of fish and inside the cut areas and kept for 30 minutes.

While the fish is being salted a fire is made inside the drum using some dry wood shavings. Then the salted fish is dropped into wire basket and the basket is dropped into the drum and covered well with a wet Jute sack. Fish is cooked as well as smoked for about 10 - 12 hrs or overnight.

Then the cut pieces are separated from the central bone and all small bones scales etc. are removed. The pieces are placed in the smoking box and box placed on the drum. Smoke could be generated using saw dust or coconut husk and it should be carried out for 2 - 4 hrs.

The smoked pieces are then rolled in ash & sun dried on a coir tray for 7-10 days. At night the pieces are kept in a closed box or room.

The dried product should be stored in a cool, dry & clean place. Insufficient drying leads to extensive mould growth. Storage in an unhygienic environment leads to extensive insect infestation.

- 3.2 Skipjack or Mackerel tuna as raw material
Salt
sawdust or coconut husk for smoking
coconut ash for coating

Maldive Fish

4. Good quality raw material should always be used
Sufficient drying is needed
The product should be stored in a cool, dry & clean place
5. The product can be used for direct consumption
6. Plywood boxes or Jute sacks
7. Oil drum
Firewood
Jute sack
Metal lid
Wire basket
Wooden box/lid
8. Described equipments can be manufactured locally

<u>Equipment</u>	<u>Cost</u>
Oil drum	Rs. 800.00
Metal lid	Rs. 500 - 650.00
Wire basket	Rs. 500.00
Wooden box/lid	Rs. 350 - 400.00
Jute sack	Rs. 10 - 15.00
Firewood	Rs. 2.50 (1Kg)

9. -
10. 1. Institute of Post Harvest Technology
National Aquatic Resources Agency
Crow Island, Colombo 15.
2. Industrial Development Board of Ceylon
615, Galle Road, Katubedda, Moratuwa.
11. -
- 11.1 1. Workshops with practical demonstrations
2. Leaflets on method of preparation
3. Poster and demonstrations at school and national level exhibitions.
- 11.2 -

Mung (green gram) Dhal, Tur Dhal

1. People in Sri Lanka have been accustomed to eating split legumes (dhal) for several generations. Further, legumes are a rich source of protein and hold a great promise in meeting the nutritional need of the malnourished in Sri Lanka. Most of these dhal are imported and utilize scarce foreign exchange. Local legumes like Mung dhal and Tur dhal can easily compete with maysoor and other imported dhal. To process local dhal the Rice Processing Research and Development Centre has designed and developed a low capacity legume dehulling and splitting machine for adoption at rural level. This dehuller has become popular as an income generating self employment agro-processing industry among rural population and a net income of SL Rs. 5000 - 7000 is obtained by an individual.
2. Mung (green gram) dhal, Tur dhal
 - 2.1 Mung dhal -Husked and split seeds, yellowish in colour having a smooth surface.
 - 2.2 Use as a meal
- 3.1 a) Mung dhal
 1. Cleaning green gram
 2. Scouring the seed coat using RPRDC grain dehuller
 3. Add 0.5% coconut oil (by weight) and mix thoroughly.
 4. Dry grains to the moisture content of 12% wet basis.
 5. Dehusk and split grains using RPRDC grain dehuller.
- b) Tur dhal
 1. Cleaning grains
 2. Soak grain in cold water for 4-6 hours
 3. Dry grains to moisture content of 12% (wet basis)
 4. Dehusk and split grain using RPRDC grain dehuller
- 3.2 No ingredients used.
4. Whole grains of green gram and tur dhal should be cleaned and dried.

Mung (green gram) Dhal, Tur Dhal

Dhal should be in grade 1 or 2 according to the quality specification of SLSI (Table 1)

Table i: Quality specifications for dhal of the Sri Lanka Standards Institution (Sri Lanka Standard 632:1984)

Quality parameters	Grade	
	1	2
Moisture, % by mass max.	12.0	12.5
Foreign matter, % by mass	0.5	1.0
Damaged grain, % by mass	1.0	2.0
Broken and Immature grain, % by mass	5.0	7.0

5. No
6. Jute sack, polypropylene, low density polythene
7. RPRDC grain dehuller
8. Director,
Rice Processing Research & Development Centre
Jayanthi Mawatha,
Anuradhapura,
Sri Lanka

Tel Fax 94-25-2344

Cost : SL Rs 36000.00
9. -
10. -
- 11.1 Popularization of the RPRDC Grain dehuller through the training and extension mechanisms of government organizations such as the RPRDC, Department of Agriculture, Agricultural Development Authority, Department of Agrarian Services, Department of Cooperative Development, Non Governmental Organizations, and Farmers organizations.
- 11.2 TV and Radio programmes and news items in daily papers

Natural Vinegar

1. The manufacture of natural vinegar from coconut toddy in Sri Lanka is a household industry from very ancient times, using traditional vat system. At present Desiccated Coconut Mills and Copra Factories discharge coconut water to the environment causing severe environmental pollution. Therefore, as an alternative source this waste can be converted into natural vinegar by the generator process minimizing environmental pollution. This product is accepted as a condiment internationally.

2. Natural Vinegar

2.1 Natural vinegar is a solution of acetic acid containing salts and extracted matter from the source material.

2.2 Use as a condiment for various food stuff, preserving Chutney, Pickles etc.,

3. 3.1 Coconut Water
- ↓
 - Strain
 - ↓
 - Adding sugar
 - ↓
 - Pasteurization
 - ↓
 - Cooling
 - ↓
 - Adding yeast
 - ↓
 - Fermentation
 - ↓
 - Racking
 - ↓
 - Recycling through the generator
 - ↓
 - Vinegar
 - ↓
 - Racking
 - ↓
 - Pasteurization
 - ↓
 - Bottling
 - ↓
 - Sealing
 - ↓
 - Labelling
 - ↓
 - Finish product

- 3.2 Coconut water
Sugar
Baker's yeast

4. Every source of infection such as manure heaps, decomposing materials in the factory premises should be removed as they act as the sources of wild organisms which can infect the raw materials and vinegar. Cleanliness is essential for the generators as they provide fine breeding places for insects which could reduce yields and capacities significantly. The floor of the factory should be covered with clean river sand according to the present excise regulations. Arrangements should be provided for entry of diffused day light and sufficient natural ventilation for the removal of stagnant air and fermentation gas. Analysis of every batch should be carried out according to Sri lanka standards for the natural vinegar.

5. Lids of containers should be made from corrosive resistant material. Containers should always be kept closed to prevent entering insects and to avoid over oxidation.

- 6. Glass bottles
P.V.C. bottles (Food grade)

- 7. Feeding vat 150 gal 01
- Generator 250 gal (with accessories) 01
- Receiving vat 150 gal 01
- Fermentation vat 150 gal 07
- Clarifying vat 150 gal 01
- Coconut fibre 100 kg
- Stainless steel tank (1 x 1 x 1m) 01
- Industrial Burners 02
- Industrial gas cylinders with accessories 02
- Centrifugal stainless steel pump 01
- Stainless steel sieves 50 mesh 02
- Muslin cloth -
- Stainless steel taps 02
- Thermometers (0 - 100°C) 02
- Plastic tubing (food grade) 10 m
- Glass tubing 01
- Rubber bungs 12
- Dial spring balance (0-50kg) 01

Natural Vinegar

Salter balance	01
Alcohol measuring equipment	01
Pipettes 10 ml	02
Burette 50 ml	01
Chemicals	

8. 1. Dinusha Industries
8/34, Beach Road
Wadduwa.

Approximately Rs. 300,000/-

9. -
10. -
11. -

Parboiled Rice - high quality

1. Rice is the staple diet of Sri Lankans. At present nearly 70% of rice in Sri Lanka is in the parboiled form and more than 40% of the required quantity of parboiled rice is produced at rural level. Parboiling at household level in rural paddy producing areas is done by immersing paddy in water and boiling for periods ranging 3 to 4 hours followed by sun drying. The main draw back of this method is incomplete parboiling which results in a product with high percentage of white bellies and poor milling qualities. The method also leads to loss of nutrient product in rice. To overcome these disadvantages an improved parboiling method has been developed by the RPRDC where pre-soaked paddy is steamed in a vessel constructed from empty diesel barrel. This method produces parboiled rice of high quality and the method has been widely accepted by the rural sector.

This method has become popular as an income generating self employment agro-industry among the rural farming population of Sri Lanka. This method has already been used by nearly 20000 farm families and each family earns monthly income of Rs. 2000 to 6000.

2. Parboiled Rice - high quality

- 2.1 High quality well milled parboiled rice, short/medium/long grain type, odourless and off white in colour
- 2.2 Staple food for Sri Lankans, use as a meal.
- 3.1 Improved method of rice parboiling consists of following stages
 - a) Paddy prior to soaking should be cleaned thoroughly.
 - b) When, loading paddy in to the soaking tanks the chaff which floats in the soaking water should be removed using a mesh.
 - c) After removing the chaff water should be drained off and the soaking tanks should be filled with fresh water.

Soaking time in water at -	for short grain type
ambient temperature	36 hrs
-	for long grain type
	48 to 60 hrs
 - d) The soaking water should be changed every 12 hours to eliminate any off odours occurring in rice.

Parboiled Rice - high quality

- e) Steaming pre-soaked paddy for 15 to 20 minutes depending upon the grain type in a steaming vessel designed by the RPRDC.
- f) Sun drying should be adopted. The steamed paddy should be immediately spread on the drying floor to a thickness of 0.5 to 0.75 of an inch.

3.2 No other ingredients used

- 4. a) Paddy used for parboiling should be well cleaned. Paddy should be in grade I or II according to the quality specification of the SLSI (Table I)

Table I Quality specifications for paddy of the Sri Lanka Standards Institution (Sri Lanka Standard 632:1984)

Quality parameters	Grade			
	1	2	3	4
Moisture, % by mass max.	14.0	14.0	14.5	15.0
Foreign matter, % by mass	0.5	1.0	1.0	2.0
Type admixture, % by mass	1.0	3.0	7.0	10.0
Damaged grain, % by mass	0.5	2.0	5.0	7.0
Immature grain, % by mass	0.5	2.0	3.0	4.5

- b) Clean water should be used for soaking
- c) Soaking water should be changed every 10-12 hrs.
- d) Rice should be in grade I or II according to the quality specification of the SLSI (Table 2)

Parboiled Rice - high quality

Table 2 Quality specifications for parboiled rice of the Sri Lanka Standards Institution (Sri Lanka Standard 633:1984)

Quality parameters	Grade			
	1	2	3	4
Moisture, % by mass max.	14.0	14.0	15.0	15.0
Foreign matter, % by mass	0.2	0.5	1.0	1.5
Type admixture, % by mass	0.2	2.0	6.0	10.0
Damaged grain, % by mass	0.5	2.0	4.0	7.0
Broken grain, % by mass	1.0	5.0	15.0	20.0
Paddy seeds, grains kg	nil	10	25	50

5. No

6. Jute gunny sacks, polypropylene sacks and low density polythene

7. RPRDC (Rice Processing Research and Development Centre) steaming Vessel

8. Director,
Rice Processing Research & Development Centre,
Jayanthi Mawatha,
Anuradhapura,
Sri Lanka.

Tel Fax 94-25-2344

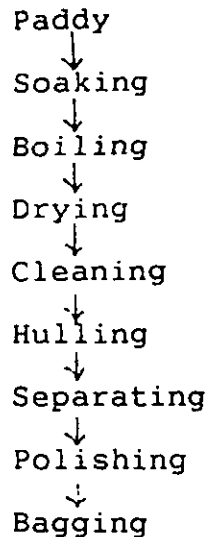
Cost : SL Rs. 1000 - 1500

11. a) Popularization of the RPRDC steaming vessel and improved parboiling practices through the training and extension mechanisms of government organizations such as the RPRDC, Department of Agriculture, Agricultural Development Authority, Department of Agrarian Services, Department of Cooperative Development, Non Governmental Organizations, and Farmers organizations.

b) TV and Radio programmes and news items in daily papers.

Parboiled Rice

1. Rice is the staple diet of the Sri Lankans.
2. Parboiled Rice
 - 2.1 Milled rice is a product of paddy after removing the husk.
3. Basically there are two methods of rice milling, viz, raw rice milling and parboiled rice milling. Parboiled rice is said to have the following advantages over raw milled rice.
 - (a) Higher volume of cooked rice per measure of parboiled rice
 - (b) Higher nutritional value
 - (c) Better keeping qualities
- 3.1 The different steps of the process are given in the flow chart:



There are two methods usually employed in parboiling paddy viz. the cold soaking method and the hot soaking method. In the cold soaking method, paddy is soaked in cold water for about 48 hours. It is then transferred to drums and steamed for a period of about 1/2 hour. The boiled paddy is then taken out and spread on the cement floor of the drying yard for sun drying. The boiled paddy should be dried until the moisture content comes down to about 15%.

In the hot soaking method paddy is straight away filled into the steel tanks and boiled in water for about 2 hours. The water is drained off below the level of the perforated bottom and the paddy is steamed for a period of about 1/2 hour. The paddy is then taken out and dried in the same manner as described above.

Parboiled Rice

Properly dried parboiled paddy will be then sent through the paddy cleaner so as to remove any extraneous matter. The cleaned paddy is then sent through the huller/sheller for removing the husk. The hulled paddy is then transferred to a separator where the unhusked paddy is sent back to the huller and the brown rice is fed into the polisher. The polished rice and the rice bran that come out of two different outlets in the polisher are collected and bagged separately.

Well dried rice is preserved in gunny bags.

3.2 Rice

4. Quality of the rice could be improved by
 - (a) Using paddy of good quality
 - (b) Correct processing viz. parboiling, drying and milling
 - (c) Adjusting the machines properly before commencing milling
 - (d) Using machinery of good quality and timely replacement of the worn out mill components such as rubber rollers, screws, etc.
5. Rice should be well boiled.
6. Generally packed in gunny bags or polythene bags in the case of small quantities.
7.
 1. Paddy cleaner with destoner 01
(with 2 HP motor)
 2. Rubber roll shellers (5 HP motor) 02
 3. Paddy separator (5 HP Motor) 01
 4. Polisher (10 HP Motor) 01
 5. Steaming fork 01
8.
 1. Jinasena Ltd.
4, Hunupitiya Road,
Colombo 02.
 2. Somasiri Huller Manufacturing
18, Parakum Avenue,
Kohuwala, Nugegoda.
 3. Tissa Industries,
71, Sunethradevi Road,
Kohuwala.

Approximate cost for Machinery (Rs. 950,000)

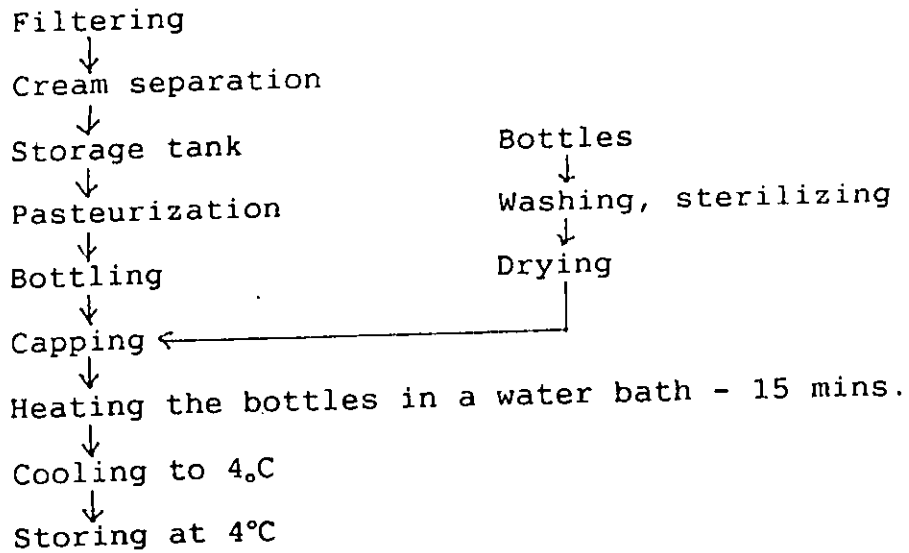
9. -
10. -
11. -

Pasteurized Milk
Sterilized Milk

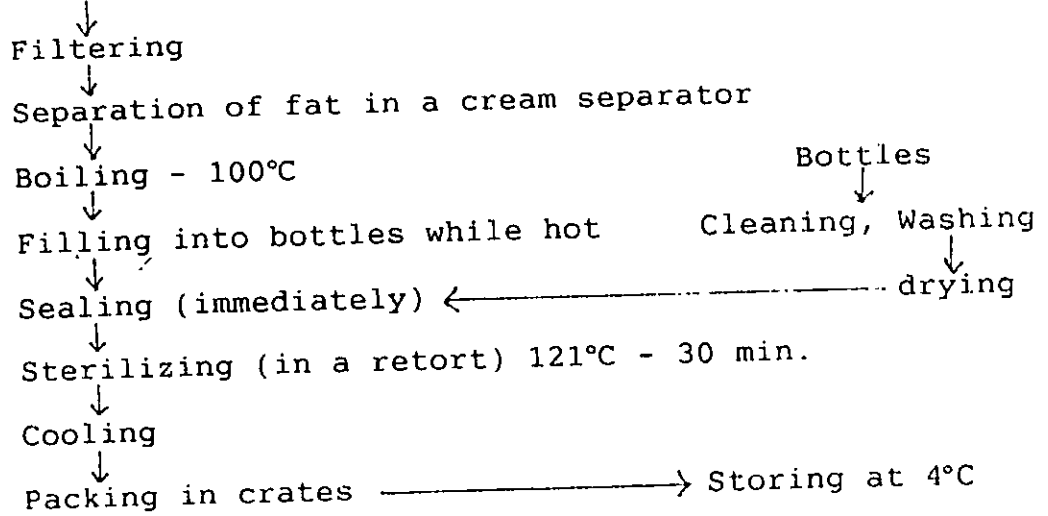
- There has been an increasing demand for milk and milk products during the recent years which could be attributed to the higher standard of living and health consciousness of people in Sri Lanka. In order to achieve this demand processing and preserving of milk has become essential due to its susceptibility to rapid spoilage and to prevent wastage of surplus milk in the processing areas due to lack of facilities to transport fresh milk within a minimum period of time to cities.
2. (i) Pasteurized milk
(ii) Sterilized milk
 - 2.1 (i) Pasteurized milk other than flavoured pasteurized milk is white or light cream in colour and free from abnormal taste or odour. It should be free from any added colour, preservative or other foreign substances. It should be filled in sanitized glass bottles, cans or any other suitable container and hermetically sealed.

(ii) Sterilized milk should have no evidence of scorching. No visible cream line or cream plug shall form in the milk within 5 days of preparation. Flavoured milk may be coloured with permitted colours laid down under the Food Act No. 26 of 1980 of Sri Lanka.
 - 2.2 Pasteurized/Sterilized milk is sold in its fluid state for direct consumption as sterilized milk a drink or for other domestic uses in houses such as cooking or processing into other milk products.

3.1 (i) Milk (quality checked)



(ii) Milk (quality checked)



3.2 Fresh milk

4. (i) Special attention must be paid to the quality of milk collected as it has a great influence on the quality of the finished product. In order to check the quality, small scale producers carry out simple spot tests such

Pasteurized Milk
Sterilized Milk

as Lactometer test (specific gravity), organoleptic tests (flavour, colour, taste and smell) to minimize the capital outlay for testing facilities. Methods of testing are given in Sri Lanka Standards SLS 735: part I, II, III, 1987 UDC 637.1, 3:543.71 and in specifications for milk raw and processed.

Good hygienic quality water supply is an essential requirement at all stages of processing plant. As milk is an excellent medium for proliferation of microorganisms, it is very important to follow strict hygienic practices to prevent entry of any microorganism or any form of dirt. These hygienic practices are based on methods recommended by organisations such as Sri Lanka Standards Institution, Department of Government Analyst etc.

All equipment should be thoroughly cleaned and sanitized at the end of production. The process of cleaning and sanitization can be physical, chemical or thermal or a combination of them. The method of cleaning will greatly depend on the type of surface to be cleaned and the type of soil to be removed.

5. (i) Containers should be stored under refrigeration at 4°C.
(ii) Containers should always be kept closed to avoid contamination.
6. (i) Bottles, Cans, Laminated polystyrene sachets.
(ii) Glass bottles, Metal cans, Plastic material
7. (i) 2000 litres/day
Milk tank insulated 2400 litres
Filter cloth with frames 02
Lactometer 02
Refrigerated farm tank 200 litres
Vat-Pasteurized 2000 litres
Simple vat 2000 litres
Milk weighing seals
Source of heat 3000 kw electric or industrial gas cooker.
Laboratory equipment conical flasks, test tubes, burettes, pipettes, glass-rods.

- (ii) Capacity 2000 l/day
- Chilling tank 2000 l
- Bottling unit
- Homogenizer
- Collecting tank complete with filter cloth 2000l
- Bottle coolers or cold rooms
- Aluminium cans 15
- Bottle Sterilizer (250 bottles/batch)
- Retort

- 8.
 - 1. IPC Ltd.,
12, De Kretser Place,
Colombo 4.
 - 2. Mr. K.K. Vadivel,
Suite 2/G05, BMICH,
Colombo 07.
 - 3. Chief Engineer,
Industrial Development Board,
615, Galle Road,
Katubedde, Moratuwa.
 - 4. Promoters Engineering Co. Ltd.,
575/7, Darley Road,
Colombo 10.

(i) Approximately Rs. 2.5 million.

(ii) Approximately Rs. 6 million.

- 9. -
- 10. -
- 11. -

Rice Flakes

1. Rice flakes is a traditional rice based food product in Sri Lanka obtained by pressing pre soaked rough rice after subjecting to thermal treatment. Traditional flakes are hard and thick. The process is time consuming. In order to overcome these drawbacks RPRDC has recently modified the traditional method and designed a small scale machine to produce rice flakes with crisp texture. The rice flakes produced using this method is thinner than the usual flakes available in the market. These flakes can be used as a breakfast cereal to subsidy wheat based products. The production of rice flakes can be popularized as an income generating self employment agro-industry among rural populations.
2. Rice flakes
 - 2.1 Rice flakes is a product of rice (red or white) with crisp texture, white or red in colour.
 - 2.2 Can be used as a breakfast cereal and snack food.
3.
 - a) Cleaning paddy (dry cleaning)
 - b) Washing to remove dust and mud particles.
 - c) Soaking 13-15 hours in water at ambient temperature.
 - d) Roasting of pre-soaked paddy in a clay pot with frequent stirring. Water should be drained off before roasting. Roasting should be carried out until the grains become puff.
 - e) Passing twice through adjustable rollers of the flaking machine
 - f) Removal of husk by winnowing manually or mechanically.
 - g) Shade or sun drying of rice flakes to reduce the moisture content to 13%.
4.
 - a) Paddy should be well dried and cleaned.
 - b) Preparation of rice flakes should be carried out under hygienic conditions.
5. No.
6. Low density polythene
7. RPRDC flaking machine

Rice Flakes

8. Director,
Rice Processing Research & Development Centre,
Jayanthi Mawatha,
Anuradhapura,
Sri Lanka.

Tel: Fax 94-25-2344

Cost : SL Rs. 35000.00

- 11.1 Popularization of the RPRDC Flaking machine and the improved method through the training and extension mechanisms of government organizations such as the RPRDC, Department of Agriculture, Department of Agrarian Services, Department of Cooperative Development and Non Governmental Organizations.
- 11.2 TV and Radio programmes and news items in daily papers.

Sheet Agar

1. Indigenous food processing technologies provide food to the nation and help in preventing malnutrition. It also provides employment to people and thereby strengthen the rural economy.
2. Sheet agar
 - 2.1 The product is 6" X 4" sheet, hard texture off white in colour and lustrous in appearance, characteristic flavour can be adjusted by adding different flavours.
 - 2.2 Can be used as an ingredient of preparation of sweets in food industry.
3. Raw material (Glacilaria sp.) is washed and dried in sunlight and washed again with clean water and dried. Repeat above steps for 2 - 3 days.

Washed dried seaweed is soaked in vinegar solution of pH 5 for 12 hrs. Then it is washed with fresh water until the acid is neutralized and then dipped in water at a weight ratio of 1:40 of sea weed : water and heated for 4 - 5 hrs. Then it is filtered through a cloth while pressing manually. The filtrate is poured into trays and left to set and frozen at -10°C for 24 hrs. After which the excess liquid is removed the agar spread on polythene sheets and dried in an oven at 40°C. Dried agar sheets are packed in polythene bags.
- 3.2 Raw material-sea weed (Glacilaria sp.)
Vinegar
Potable water
4. Raw material should be washed thoroughly with water till extraneous substances are removed. Sun drying should be done in a place free from dust.
5. Sheet agar cannot be consumed directly. Agar sheets are cut into small pieces and then boiled with water till agar particles are dissolved. Any flavour or milk or fruit can be added and then poured into a dish for setting the jelly.
6. Polythene or polypropylene bags
7. Hot plate
Filter cloth
Freezer
Oven
Metal trays
Polytene

8. -

9. -

10. Institute of Post Harvest Technology
National Aquatic Resources Agency
Crow Island, Mattakkuliya, Colombo 15.

Ceylon Institute of Scientific & Industrial Research
363, Bauddhaloka Mawatha, Colombo 07.

11.1 Poster & demonstrations at school and national level
exhibitions.

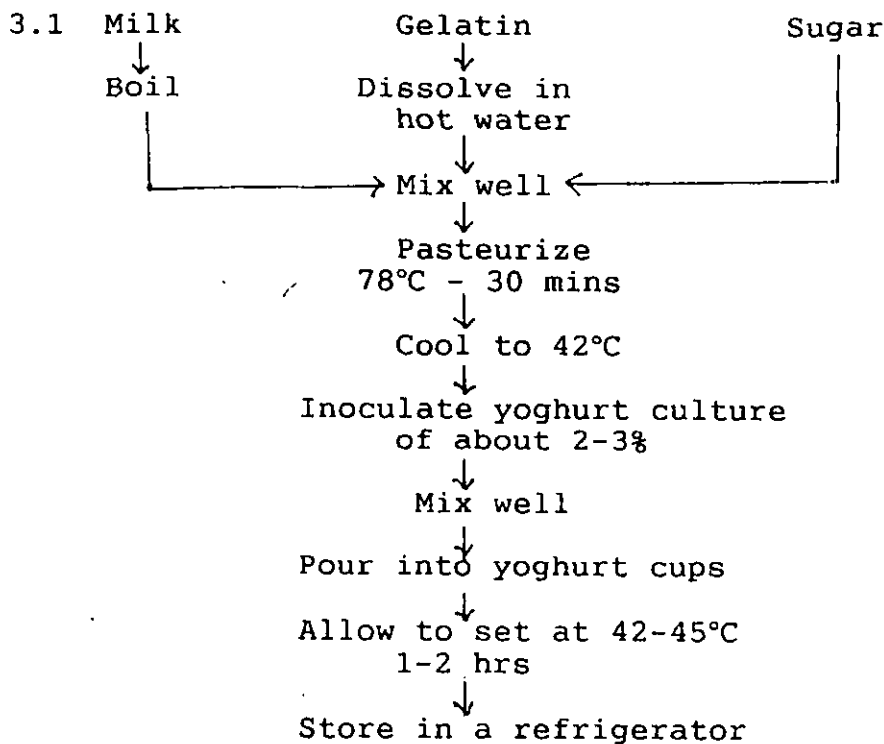
11.2 1. Workshops with practical demonstrations
 2. Leaflets on method of preparation

Vanilla Cured Beans

1. Among the spices produced in Sri Lanka, Cinnamon is the most important. Processing of vanilla, coffee and cocoa is also found to be a good income source in the rural sector.
2. **Vanilla cured beans**
 - 2.1 Cured beans are blackish brown in colour, with velvet like, shining surface, about 15 cm long, characteristic aroma and flavour.
 - 2.2 Food flavouring material, beverages
3. 3.1 There are several methods of processing, but they are characterized by four phases.
Matured beans are harvested.
 - (a) Killing or wilting to stop further vegetative development. It develops a brown colour.
 - (b) Sweating or rapid drying includes raising the temperature. Beans acquire a deeper brown colouration, become quite supple and development of aroma becomes quite perceptible.
 - (c) Slow drying in shade at ambient temperature
 - (d) Conditioning - the beans are stored in closed boxes for 3 months to develop the aroma and flavour.
4. Through Sri Lanka Standards Institution
5. Nil
6. Tissue papers, aluminium foils, wooden boxes
7. Nil
8. Nil
9. Ni.
10. Dept. of Export Agriculture, 1095, Kandy Road, Peradeniya.
11. 11.1 Findings are transferred to Asst. Directors and Extension Officers of the Department of Export Agriculture through Research Extension Dialogue, refresher courses and training classes and then to farmers through Extension Officers.
11.2 Nil

Yoghurt

1. There has been an increasing demand for milk and milk products during the recent years which could be attributed to the higher standard of living and health consciousness of people in Sri Lanka. In order to achieve this demand processing and preserving of milk has become essential due to its susceptibility to rapid spoilage and to prevent wastage of surplus milk in the processing areas due to lack of facilities to transport fresh milk within a minimum period of time to cities.
2. **Yoghurt**
 - 2.1 Yoghurt is a fermented milk product obtained from coagulation of milk by the growth of organisms of Lactobacillus bulgaricus and Streptococcus thermophilus. This product is packed mainly in plastic cups.
 - 2.2 Yoghurt is sold for direct consumption as a dessert or for other domestic purposes in homes such as cooking etc.,
3. Brief description of the method of processing and principle of preservation.



- 3.2 Milk (sterilized/pasteurized, powder/fresh milk)
Sugar
Gelatin

Yoghurt

4. Special attention must be paid to the quality of milk collected as it has a great influence on the quality of the finished product. In order to check the quality, small scale producers carry out simple spot tests such as Lactometer test (specific gravity), organoleptic tests (flavour, colour, taste and smell), to minimize the capital outlay for testing facilities. Methods of testing are given in Sri Lanka Standards SLS 735: PART i, ii, iii, 1987 UDC 637.1, 3:543.71 and in specifications for milk raw and processed.

Good hygienic quality water supply is an essential requirement at all stages of processing plant. As the milk is an excellent media for proliferation of micro-organisms, it is very important to follow strict hygienic practices to prevent entry of any micro-organism or any form of dirt. These hygienic practices are based on methods recommended by organisations such as Sri Lanka Standards Institution, Department of Government Analyst etc.

All equipments should be thoroughly cleaned and sanitized at the end of production. The process of cleaning and sanitization can be physical, chemical or thermal or a combination of them. The method of cleaning will greatly depend on the type of surface to be cleaned and the type of soil to be removed.

In addition to that the product should be comply with Sri Lanka Standards for Fermented Milk product (SLS 824: Part 2: 1989).

5. Yoghurt containers should always be kept closed under refrigeration.
6. Plastic cups with lids or aluminium foil polystyrene laminated with cardboard cups cartons lined with polyethylene.
Glass
Ceramic
7. Capacity 100 cups/day
Lactometer
Ladle
Incubator (electrically heated)
Thermometer (30 - 50°C)
Bottle cooler (upright)
Gas cooker (Industrial type)
Gas cylinder with accessories
Weighing scale
Pans, spoons etc.,

8.
 1. Chief Engineer,
Industrial Development Board,
615, Galle Road,
Katubedde,
Moratuwa.
 2. NERD Centre
Ekala,
Ja-Ela.
 3. Mr. K.K. Vadivel,
Suite 2/G05,
BMICH,
Colombo 07.
 4. IPC Ltd.,
12, De Krester Place,
Colombo 04.

Approximately Rs. 70,000/-.

This
page
not
necess-
ary.

HANDICRAFTS

GROUP B: HANDICRAFTS

Part 1

1.1 Country's Name : SRI LANKA

1.2 Indigenous industries and their Role in National Economy.

Indigenous industries presently existing in Sri Lanka with the rural base have served a major role as the backbone of the rural economy. These small and medium scale industries have been assisted and developed by the institutional structures established by the government for a long period. Sri Lanka National Design Centre (SLNDC) which was established in 1983 with the sole objective of preserving and promoting the handicraft industry in Sri Lanka has devoted itself to the constant task of creating new designs to satisfy the market needs in the local and export market. Further, SLNDC has provided technological knowhow and advanced skills development training assistance to craftpersons, craft communities and others who are involved in this industry during the past.

1.3 Prevailing industries based on Indigenous Technology.

	<u>Sector</u>	<u>Number</u>
1.3.1	Leather Crafts	40
1.3.2	Metal Crafts	692
1.3.3	Stone-carving	01
1.3.4	Wood-carving	444
1.3.5	Bamboo Works	22
1.3.6	Coral and shells	09
1.3.7	Grass/Straw Weaving	303

An industry such as leather has been now sophisticated to a considerable extent as they need advanced technology to compete in the export market.

1.4 Professional Associations, Government projects and Cooperatives related with the production based on indigenous technologies:

	<u>Sector</u>	<u>Name & Address</u>
1.4.1	Leather Crafts	
1.4.2	Metal Crafts	
1.4.3	Stone-Carving	
1.4.4	Wood-Carving	As per Annex 1
1.4.5	Bamboo works	
1.4.6	Coral & Shells	
1.4.7	Grass /Straw-Weaving	

1.5 Institutions involved in promotion of technology or products and their work procedure

	<u>Sector</u>	<u>Institutions (Name & Address)</u>	<u>Work procedure</u>
1.5.1	Handicrafts	National Crafts Council Gramodaya Folk Art Centre, Battaramulla	Training & handicraft promotion
		Sri Lanka National Design Centre No. 45, St. Michaels Road, Colombo 03	Advanced skills development training, technology and design develop- ment, and handicraft promotion
		Sri Lanka Handicrafts Board, Laksala Building, Colombo 01.	Marketing & handicraft promotion
		Industrial Development Board, Katubedda, Moratuwa	
		Department of Small Industries, Hemas Building, Colombo 01.	

1.6 Introduction of technologically and commercially viable sectors:

	<u>Sectors</u>	<u>Total production per year</u>	<u>Total Export</u>	<u>Generated Employment</u>
1.6.1	Educational Toys	Rs. 20 Mn	Rs. 15 Mn	
1.6.2	Montessori Aids	Rs. 5 Mn	Rs. 5 Mn	
1.6.3	Soft toys	Rs. 10 Mn	Rs. 7 Mn	
1.7	Specialities of individual sector (Specify the sectors individually and their specialities one by one)			

Part II

- 2.1 Indigenous Technology Topic : Handicrafts
- 2.2 Name of industry or proprietor(s): Sri Lanka Handicrafts Board
- 2.3 Location : 60, York Street, Colombo 01, Sri Lanka
- 2.4 Type of industry : Manufacturer, Exporter
- Individual Entrepreneurship : 2800
- Partnership -
- Cooperative - State Organization
- Private Ltd. -
- 2.5 Capital investment
- Fixed Capital SL Rs 147 Mn
- Running Capital SL Rs 41 Mn
- 2.6 Kinds of products and annual production
- | | <u>Products</u> | <u>Quantity</u> | <u>Production Cost (SL Rs)</u> | <u>Selling Price (SL Rs)</u> |
|-------|-----------------|-----------------|--------------------------------|------------------------------|
| 2.6.1 | Metalware | | 15 Mn | 20 Mn |
| 2.6.2 | Wooden | | 35 Mn | 50 Mn |
| 2.6.3 | Straw/Weaving | | 15 Mn | 20 Mn |
| 2.6.4 | Other | | 20 Mn | 35 Mn |
- 2.7 Production in Last Three years
- | | <u>Quantity</u> | <u>Value (SL Rs)</u> |
|-------------|-----------------|----------------------|
| - 3rd Year | - | 85 Mn |
| - 2nd Year | - | 96 Mn |
| - Last Year | - | 125 Mn |

2.13 Sources, Number and Status of Labour

<u>Type</u>	<u>Number</u>	<u>Skilled</u> Male/Female	<u>Semiskilled</u> Male/Female
Hereditary	1500	1250	250
Technical Training	1000 per year	1000	

2.14 Total Employment Generated : 3000

2.15 Consumption of Raw-Materials

<u>Items</u>	<u>Type/Name</u>	<u>Quantity</u>
Main Indigenous Raw-materials	Wood, Coconut, pulp, Fibre	
Allied Raw-Materials	Handloom - textile	
Notions (Auxiliary Materials)	Reed & Rushware	

2.16 Monthly Energy Consumption

<u>Type of Energy</u>		
Electricity	Kw/h	Electricity is being used by a few craftsmen who have modern workshops. Majority of craftsmen depend on manual power such as coco-charcoal and firewood.
Coal	Ton	
Oil	klt	
Firewood	Ton	

2.17 Season of Production

From Month To Month

Craftsmen engaged full time in the production of handicrafts work throughout the year. However the production is more during the months of March, April, August and September

1. Craftsmen's Association,
Madawala,
Kandy.
2. Jewellery & Carvers Association,
Nugawela.
3. Craftsmen's Association,
Matale.
4. Lacquerware Craftsmen' Association,
Matale.
5. Wood Craftsmen's Association,
Galle.
6. Sarvodaya EEDS,
26/2, Attidiya Road,
Ratmalana.
7. International Sama Foundation,
Sama Kala Nikethanaya,
634, Akurugoda,
Talangama South.
8. Central Council for Disabled persons,
P.O. Box 05,
Kinigama Road,
Bandarawela.
9. Swarnahansa Regional Centre,
Deduruoya,
Nikaweratiya.
10. Sri Lanka Association of Interior Designers,
115/2, Main Street,
Battaramulla.
11. Lanka Jathika Sarvodaya Sharmadana Sangamaya,
77, De Soyza Road,
Moratuwa.
12. Lanka Mahila Samithi,
2, UDA Building,
7th Floor,
Colombo 04.

13. Women's Chamber of Industry & Commerce,
101/1, Sir Marcus Fernando Mawatha,
Colombo.

14. Katpalam,
Pallmyrah Development Board,
244, Galle Road,
Colombo 4.