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EVALUATION OF TECHNOLOGY ADOPTION IN GROUP PROCESSING CENTRES OF TRIPURA

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Various technologies developed in rubber processing are being transferred to the group processing centres of Tripura. The extent of adoption of the technologies by these centres is discussed. Most of the group processing centres process latex into Ribbed Smoked Sheets (RSS) and some are selling latex to other entrepreneurs. Even though good infrastructure and trained personnel are available in all the centres, some deviations in processing from the recommended practices like dilution and sieving of the latex, dosage and mixing of the acid, thickness of the RSS, temperature of the smoke house, *etc.* were noticed in all group processing centres. Full capacity utilisation was found only in pre-winter months. The infrastructure made for making RSS remains unutilised in centres which are selling latex. Many centres are not grading the sheets before sale and most of them sell the sheets locally. The study underlined the necessity of refresher trainings and awareness programmes to follow the correct processing techniques involved in RSS processing.

Keywords: Evaluation, Group processing centres, Latex processing, North East

INTRODUCTION

Institutional inventions in India's natural rubber (NR) sector are focused mainly on the development of the rubber plantation industry and they are being transferred to the grass root-levels. One such grass root-level organisation in the Indian rubber plantation industry is Rubber Producers' Societies (RPS) which formed Group Processing Centres (GPC) in Tripura to enable better processing at minimum individual cost. Though various technologies are being transferred to the group processing centres, no attempt has been made to evaluate the extent of their adoption.

Rubber (*Hevea brasiliensis*) is generally cultivated in India in the hinterlands of the south west coast comprising Kerala State and the adjoining districts of Tamil Nadu. However, the agroclimatic conditions in North East India are unique and suitable for rubber cultivation (Cyriac, 1987). The rubber plantation in Tripura extents to 50070 ha with a production of 23280 t as on 2008-09 (Rubber Board, 2010). Tripura occupies first position in respect of area as well as production of NR among the north-eastern states and hence the present study was undertaken in Tripura with the objective of evaluating the extent of scientific processing techniques by the GPCs.

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About 75-80% of the crop obtained from rubber tree is in the form of latex and the rest is field coagulum or scrap rubber. Since latex gets spoiled by bacterial action, it has to be immediately processed into suitable forms of storage and marketing *viz.* sheet rubber, block rubber, crepe rubber, centrifuged latex, creamed latex and preserved field latex (Spence, 1936; George *et.al*., 2005). Latex can be converted into any of the above forms while scrap rubber can be converted only into crepe or block rubber. The most popular method of processing the latex is into Ribbed Smoked Sheet (RSS) which is simple and can be done by a trained tapper.

MATERIALS AND METHODS

The study was conducted in 35 GPCs in Tripura (Table 1). The various aspects taken into account in this study are, (1) infrastructure facilities established in the processing centre like availability of rollers, sheeting battery, dripping shed, smoke house, laboratory, store room, *etc.* (2) technical know-how/availability of trained personnel; (3) raw material procurement; (4) nature of sieving of the latex; (5) dilution of the latex; (6) capacity utilisation of the smoke house; (7) handling of the smoke house; (8) sheeting method (same day/next day); (9) concentration of the acid used and mode of mixing with the latex; (10) cleanliness (11) other chemicals in use; (12) sheet grading; (13) thickness of the sheets; (14) storing method and (15) mode of sale.

RESULTS AND DISCUSSION

Infrastructure of the group processing centre

Availability of infrastructure facilities like sheeting rollers or sheeting battery, dripping shed, smoke house, good storage place, availability of good quality water, *etc.* play an important role in producing good quality sheets (Kuriakose and Sebastian 1980). All the GPCs in Tripura have electrically-operated sheeting batteries. A dripping shed is necessary for keeping the wet sheets before loading into the smoke house. Since sheets are marketed as ribbed smoked sheets, smoke drying of the sheets is mandatory (Nair and Kumaran, 1980) and for this purpose, a smoke house of adequate capacity is required. Since the sheets are not marketed immediately after production they have to be stored at least for some period and for this purpose a well-ventilated store room is required. It was found that almost all the group processing centres were equipped with sheeting batteries, dripping sheds, smoke houses, *etc.*

Technical know-how

In India, 62% of NR is used by the tyre sector. In the present scenario, ordinary tyres are being replaced by more advanced radial tyres which require high quality NR. Though much expertise is not required for processing latex into RSS, the services of a person with knowledge in processing and the importance of the different steps involved are required for ensuring the quality of sheet rubber. Persons working in the GPCs were well trained in sheet processing either from training institutes like Rubber Board or from a well-maintained rubber estate.

Raw material procurement

The processing units can either get the raw materials at their site or they can collect the materials from the field and transport them to the production site. In all the GPCs

Table 1. **Group processing centres covered under the study**

Sl. no.	Name	Sl. no.	Name
1	Anandnagar	19	Rudhijala
2	Adivasi colony	20	Mohanbhog
3	Bamutia	21	Kukrania
4	Netaji Subash	22	Bairagi Bazar
5	Janmabhoomi	23	Dhanpur
6	Bageswari	24	K.K.Nagar
7	Kanchanmala	25	Barmura
8	Tulakona	26	Bastali
9	Ramakrishna (Madhuban)	27	Parasurambari
10	Bhagabhasa	28	Mirza
11	Purba Naogon	29	Arabind
12	Sreedurga	30	Tripureswari
13	Pallimangal	31	Rajarshi
14	Sriramakrishna (Brajpur)	32	Raikishori
15	Goutam Nagar	33	Alloycherra
16	Gopinagar	34	Garo colony
17	Purva Laxambil	35	Mahamaya
18	South Charailam		

studied, latex brought by the tappers was collected at the centre itself.

Sieving of latex

The latex brought to the processing centre has to be strained to remove unwanted dirt materials like bark pieces, dust, leaf particles, *etc*. It was found that only five centres out of 35 were practising the recommended double sieving system *i.e.* sieving the latex first through a No. 40 mesh and then through No. 60 mesh while others were following single sieving system through No. 40 mesh only. One of the reasons for this practice according to the GPCs was the clogging of the sieve due to pre-coagulation.

Dilution of the latex for sheet making

In order to get sheets of uniform quality, to streamline the dosage of coagulant and to get clear translucent sheets, 12.5 % is the dry rubber content (drc) recommended in the latex before it is mixed with acid. The drc of the latex collected from the tree varies from about 21 to 44% depending on the season and clone. Therefore, the latex brought to the processing centre has to be diluted to 12.5 % drc. In India, the average weight of a RSS is 500 g and four litres of diluted latex of 12.5 % drc will give a dry weight of 500 g. It was found that six centres out of 35 under study were not practising correct dilution procedure.

Capacity utilisation of smoke house

Efficiency in the utilisation of the smoke house is ensured by its full capacity utilisation since it reduces the unit cost of drying. It was found that 26 out of 35 centres are operating the smoke houses with full capacity utilisation only in pre-winter months. The under-utilisation of capacity is mainly due to the construction of high capacity smoke houses to accommodate the crop produced during pre-winter months, which is much more than the production in other seasons.

Handling of smoke house

Proper handling of the smoke house is an important factor for ensuring the quality of the sheet produced. Clean smoke house with carbon-free repers, proper movement of the sheets, temperature of the smoke chamber in the range of 40-60 ^{0}C, *etc*. are very important for maintaining the quality of sheets (Breymayer *et al.,* 1993). It was found that only 24 out of 35 centres under study were keeping the smoke houses properly. One of the reasons for this is excessive crop production during the peak season which makes handling difficult.

Sheeting method

The two types of sheeting techniques followed in sheet rubber processing are "next day" sheeting system and "same day" sheeting system. In "same day" sheeting system, more acid is added for coagulation resulting in wastage of acid and thereby enhancing the cost of production. In "same day" sheeting system, work can be completed on the day of tapping and the same tapper can attend the tapping work next day morning. The study showed that, in Tripura, all the GPCs were following "next day" sheeting system whereas "same day" sheeting is very common in traditional regions.

Concentration of acid

In latex processing operations, the coagulant commonly used is 300 ml of 0.5% formic acid (George *et al*., 1992). Over-

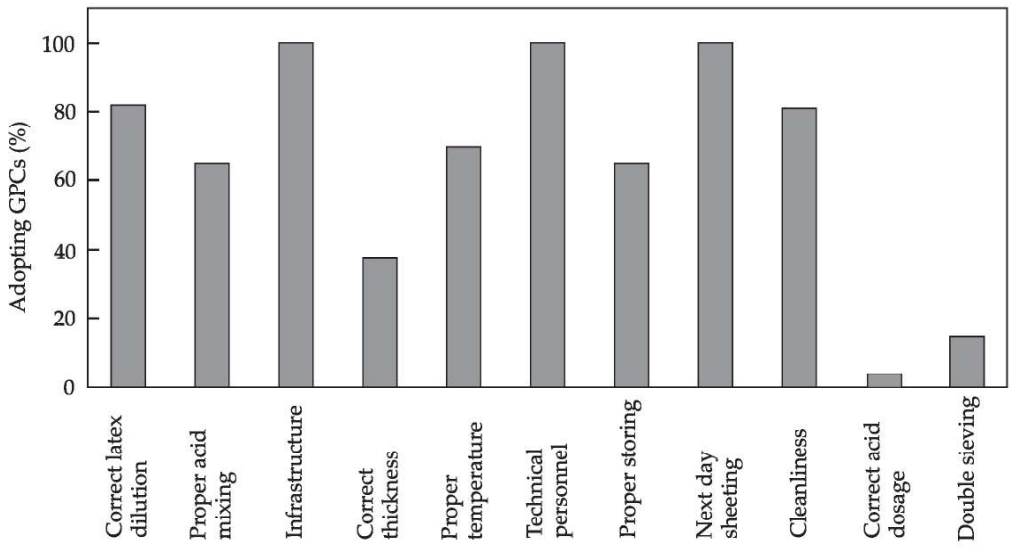

Fig. 1. Per cent of GPCs adopting recommended processing techniques

dosage of acid results in stickiness to the sheets and wastage of acid and under-dosage in incomplete coagulation and wastage of rubber. Therefore, usage of optimum dosage of acid is highly important for quality sheet production. It was found that 34 centres out of 35 were using higher dosage of acid than required. Proper mixing of the acid with the latex is also important to ensure uniform coagulation and good quality of sheets. Twelve centres were not mixing the latex properly with the acid which resulted in the coagulation at the point where acid falls and finally resulted in white spots.

Other chemicals

The common chemical used in sheet processing operation is formic acid which is used for coagulating the latex. However, other chemicals like sodium bisulphite, sodium sulphite, paranitrophenol, *etc.* are also used for special purposes. Sodium bisulphite is used for preventing blackening of the sheets due to atmospheric oxidation while sodium sulphite is used as an anticoagulant. Paranitrophenol is used to protect the sheet from mould growth. It was observed that none of these was used in the GPCs and the only chemical used for sheet processing in Tripura is formic acid.

Thickness of sheets

The recommended thickness for the sheet rubber is 3 mm. However, it was found that only 13 centres out of 35 were maintaining the correct thickness of the sheets and others were making slightly thicker sheets. One of the reasons for processing thicker sheets was the preset done in the sheeting battery by the manufacturers for easy rolling. Due to the large thickness, more time was required for drying, causing a hike in cost of drying and ultimately increasing the production cost.

Cleanliness of processing centre

Bacteria acting immediately on latex result in pinhead bubbles in clusters all over the sheets. Therefore, the processing centre, collection buckets and trays should be maintained clean. It was found that only 28 centres out of 35 were maintaining cleanliness in their processing operations.

Storing method

Rubber sheets produced are not marketed immediately and are stored for various periods by growers and dealers anticipating better price or due to other reasons while manufactures store rubber for ensuring sufficient stock for product manufacturing. If sheets are stored longer, the physical as well as the raw rubber properties are affected (Leelamma *et al*., 2005). Sheets are to be stored in well-ventilated rooms on wooden pallets. Sheets stored on the floor will absorb moisture from the floor due to the hygroscopic nature of NR resulting in mould growth and rapid decay (Cunneen, 1978). It was found that no GPCs were keeping the sheets on wooden pallets and 12 centres out of 35 were storing sheets directly on the floor. Others were keeping the sheets on polythene sheets.

Grading and sale of RSS

Rubber sheets are graded into six groups according to the *Green Book* specifications, *viz*. RSS IX, RSS 1, RSS 2, RSS 3, RSS 4 and RSS 5. Even though good

quality sheets were produced in the GPCs, grading was not practised and sale was mostly made locally.

Other observations

GPCs were established with the aid of Rubber Producers' Societies, Rubber Board and the State Government. Primarily all centres were constructed for processing latex into sheets. However, a large-scale rubber product manufacturing industry was established by a private group in Tripura which required around 50,000 L of latex every day. They approached the GPCs directly and indirectly and some of the GPCs started selling ammoniated latex to them. However, the sale of ammoniated latex was interrupted in between due to various reasons and many GPCs again started processing sheet rubber. The list of GPCs selling latex is shown in Table 2.

Table 2. **List of group processing centres selling latex**

Sl. no.	Name
1	Purbanaogaon
2	South Ananda Nagar
3	Sreedurga
4	Pallimangal
5	Purbalaxambil
6	Ramakrishna (Madhuban)
7	Sriramakrishna (Brajpur)
8	Kukrania
9	Barmura
10	Kanchanmala
11	Tripureswari
12	Rudhijala
13	Mirza
14	Alloycherra
15	Rajarshi
16	Arabind

CONCLUSION

The study revealed that most of the GPCs process latex into RSS and some sell latex as preserved field latex. Even though trained personnel and good infrastructure facilities are provided in all the centres, some deviations in processing from the recommended practices like dilution and sieving of the latex, dosage and mixing of the acid, thickness of the sheets, storing method, *etc.* were found. The study revealed that only 14% of GPCs were practising double sieving system, 82% were diluting latex correctly and 4% were using correct dosage of acid. Only 65% were properly mixing the acid with latex, 37% were making 3 mm sheets, 70% were giving proper temperature in the smoke house and 65% were storing the sheets properly. In 81% of the GPCs, processing was being done in clean conditions (Fig. 1). It was found that many GPCs were not grading the sheets before sale and most of them were selling the sheets locally. Chemicals like sodium bisulphite, sodium sulphite and paranitrophenol were not used. Full capacity utilisation was found only in pre-winter months. In centres where latex was sold, the infrastructure made for making sheets remained unutilised.

Our study indicates that the personnel attached to the GPCs need to undergo refresher trainings and awareness programmes to maintain the correct processing techniques involved in RSS processing. Before developing the infrastructure in the GPCs, it is important to have prior decision on the type of

latex processing to be undertaken in each GPC.

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