

Studies on Polybag Collection of Latex

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Introduction

Tapping and collection accounts for a major part of the cost of natural rubber production. In our country, it is estimated to be around 40% of the total cost. Therefore, less labour intensive methods of harvesting is one among the various methods available to reduce the cost of production. The present work on polybag collection was thought of in this connection.

The idea of collecting natural rubber latex in polyethylene bags is not new. In Malaysia, it was studied as early as in 1969 (1) and a workable method suggested. They have reported that its implementation would depend largely on local circumstances governing each case. In our country, the method has not been practised so far. As a preliminary step, a study was conducted at the RRII to assess the feasibility of this method. Emphasis was given to study the influence of the method of crop collection on the quality of rubber.

In the case of tapping, the task assigned to a tapper is 300-400 trees per day and normally he completes the tapping in 2 to 3 hours. Subsequently the tapper collects the latex and transports it to the collection centre/factory. If the latex is not collected daily but only once in a month or so, the task size per tapper can be considerably increased.

When latex is collected in polybags and allowed to remain on the tree it undergoes spontaneous coagulation to form a lump. The latex from subsequent tappings also gets collected and coagulated in the bag itself. The lump thus formed in the bag can be periodically collected and processed into crepe or block rubber. As the bags are almost completely sealed chances for contamination are minimum. The coagulum collected can be processed into a fairly top quality rubber.

Method of Study

The collection bags were made of polyethylene and easily fabricated by heat sealing. Lay flat heat sealed bags of 35 mm x 25 mm manufactured out of 200 gauge sheets, readily available in the market were made use of. The bags could conveniently hold up to 4 litres of latex and had enough strength to bear the weight of the latex. The open sides of the bags were sealed using a heat sealer and holes were provided by cutting the top corners for insertion of a wire stirrup. A circular perforation of 15 mm diameter to insert a spout to carry latex into the bag was provided at about 50 mm below the top edge of the bag. On the tree a helical spring was tied around between the tapping pannel and the spout under sufficient tension so as not to be displaced due to the weight of latex in the bag.

The bag with the wire stirrup was hung on the circular spring with the spout leading into the bag. Rain water seeping into the bags during rainy season need be prevented. Both the conventional skirt type polythylene rain guards and tapping shades were used for the above purpose.

On the first tapping day latex gets collected in the bag and slowly undergoes spontaneous coagulation. In all cases coagulation was found to be complete by the next day. Once spontaneous coagulation sets in, the bacterial population in the bag would be much higher and therefore latex from the subsequent tappings got coagulated much faster. After a definite number of tappings ranging from 5 to 20 tappings, the bags containing the coagulum were collected and brought to the factory and soaked in water. The polythene bags were stripped off manually and the rubber coagulum was processed as crepe and dried at room temperature. Processing of the coagulum as block rubber was also attempted. A control sample was also prepared by coagulation of freshly collected latex from the same field using formic acid.

The raw rubber properties of the samples were measured as per the relevant BIS test methods (2). The results are given in Tables I and II. Curing characteristics of the rubber samples were assessed in a gum

Table-II
Raw Rubber Properties (Crumb)

Property	Control	5 Days	10 Days	2 P-Acid-Treated	
				5 Days	10 Days
Dirt content %	0.010	0.010	0.013	0.019	0.012
Volatile matter %	0.203	0.52	0.38	0.45	0.32
Nitrogen %	0.44	0.31	0.35	0.25	0.25
Ash %	0.16	0.25	0.28	0.30	0.36
Po	43	57	63	52	56
PRI	67	77	59	77	77
Mooney viscosity 80 ML (1+4) at 100°C		102	105	100	105
Acetone extract %	2.61	2.46	2.48	2.28	2.21

It is again seen that dirt content and volatile matter of the polybag collected rubber are more or less comparable to those of the control. Nitrogen content is found to decrease slightly. Although a progressive reduction in nitrogen content was expected as the number of tapping days for collection was increased, this was not observed in the first trial (Table I). A reduction in nitrogen content is attributed to the bacterial decomposition of proteins into soluble products. Here also ash content, plasticity and

Mooney viscosity of the polybag collected rubber are found to be higher than those of the control samples. Although the reduction in PRI is only an apparent one, as indicated above, an attempt was made to improve PRI by soaking the crumbs in 0.5% phosphoric acid solution for 2 hours.

The treatment is found to improve PRI as seen in Table II. Acetone extract of the sample is found to be not influenced by the method of collection. The curing characteristics of the compounds prepared from

polybag collected rubber (formulation given in Table III) and the physical properties of the vulcanisates prepared are given in Tables IV and V.

Table-III
Gum Stock Recipe
(IS 7449-1981)

Natural rubber	100
Stearic acid	0.5
Zinc oxide	6
MBT	0.5
Sulphur	3.5

Table IV
Properties of the Compounds

Property	Control	5 Days	10 Days	15 Days	20 Days
Mooney scorch at 120° C (Min)	12.25	7.00	7.00	8.50	7.75
Optimum cure time at 150°C (Min)	14.5	10.50	10.00	10.00	9.50
Modulus at 300% elongation (MPa)	1.71	1.88	1.73	1.65	1.75
Tensile strength (MPa)	15.1	17.2	17.0	1.69	17.3
Elongation at break %	762	807	871	886	903
Tear strength (kN/m)	26.7	28.4	27.9	28.3	27.7

Table V
Percent Changes in Tensile properties after Ageing
(Aged at 70° c for 96 Hrs)

Property	Control	5 Days	10 Days	15 Days	20 Days
Modulus at 300 % elongation	+ 32	+17	+31	+45	+42
Tensile strength	— 26.5	33.5	—15.2	—17.8	12.3
Elongation at break	— 4	—20	—4	24	—26

It is observed that the polybag collected rubber is faster curing than the control. Both Mooney scorch and optimum cure time are found to be lower in the case of the polybag collected rubber. The faster curing behaviour of the polybag collected rubber is also evident from the rheographs. It is believed that some of the protein decomposition products in the rubber act as vulcanisation accelerators thereby making the rubber faster curing when the same recipe is used. This situation could be advantageously used for reducing the

accelerator dosage if the vulcanisation behaviour of the rubber is made known to the compounder. The tensile strength of the polybag rubber vulcanisate is found to be slightly better than that of the control. The other properties of the vulcanisate are found not influenced much by the method of collection of latex.

Acknowledgements

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References

1. Chang Wai Pong, N.M. Pillai and Chin Peng Sung, Planters Bulletin. 104, 165, 1969.
2. BIS 3660-72. Bureau of Indian Standards, New Delhi. 1972.
3. BIS 7499-81 Bureau of Indian Standards, New Delhi. 1981.
4. BIS 3400-71 Bureau of Indian Standards, New Delhi. 1971.

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SWASTIK RUBBER FINANCES TO BE RESTRUCTURED

The Board for Industrial and Financial Reconstruction (BIFR), after considering the proposal to restructure the sick unit of Swastik Rubber Products Ltd (SRPL) has declared after two sittings that it is in the 'public interest to restructure the finances of SRPL'.

Disclosing this Mr Ashok Muthanna, the Managing Director of SRPL informed that despite improvement in production and turnover, the unit was not showing any sign of earning a profit because of the huge interest burden. Turnover had touched Rs. 8.5 crores for March ending this year. The company also had enough orders on hand to keep production going for the next 10 months. But even then the company would not be able to either declare a dividend or repay the deposit and debenture holders

because of the huge interest payment which formed up to 12 per cent of the income leaving no surplus with which to pay the other claimants.

In the circumstances the company had approached BIFR to consider its restructuring so that its liabilities are reduced. The Industrial Development Bank of India (IDBI) which had been entrusted with the task of preparing a package of reliefs will be submitting its report to BIFR which if approved will be communicated to all parties concerned for their views and comments. The package will be finalised after 60 days of hearing the views. 'By September 1988 there should be some good news for all connected with SRPL' Mr. Muthanna said.