Prospects for Natural Rubber

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Is natural rubber losing the battle with synthetic rubber on the world market? Is there even a danger that synthetic rubber will completely replace natural rubber? Or will natural rubber always have superior qualities to the synthetic product? These questions are of vital concern to rubber planters.

Dr Colin Barlow presented a paper on this subject at the ANZAAS Congress in Port Moresby in August 1970. *The paper was subsequently published in* The Economic Record, *Vol.* 46, *No.* 116 (*December* 1970). *An abbreviated version of the paper is printed below. The co-operation of Dr Barlow and the Editor of* The Economic Record *in giving permission for the reprinting is gratefully acknowledged.*

NATURAL rubber is still undoubtedly the best all-round elastomer available, being particularly distinguished by high tear strength, resilience, and abrasion resistance; and by excellent heat dissipation properties. About 60 per cent of world production is exported as "Ribbed Smoked Sheet" (RSS), which is made through acid coagulation of latex followed by rolling into sheets and smoking to prevent deterioration. RSS is a good general-purpose rubber. A further 30 per cent of natural is exported as crepe, chiefly made from auto-coagulated or "scrap" rubber by appropriate dirt removal and drying procedures. This is also a general purpose material. Most of the remaining 10 per cent is exported as latex concentrate, obtained through centrifuging. Concentrate is employed for specialized purposes like foam rubber or extruded products manufacture.

The commonest synthetic rubber is SBR, a co-polymer of butadiene and styrene which are obtained from petro-chemicals. It comprises over half the synthetic manufactured, and is used for general purposes. Other synthetics are all tailored to specific uses. BR or polybutadiene rubbers have good abrasion resistance, resilience and heat dissipation properties, but poor tear strength and skid resistance. They are most suitable for heavy duty tyre treads in combination with natural or SBR.

Major Uses

The chief use for rubber, natural or synthetic, is in the manufacture of tyres. In Western Europe heavy truck tyres contain about 70 per cent of natural rubber and 30 per cent synthetic. For car tyres the proportion is reversed—30 per cent natural and 70 per cent synthetic. These relative proportions differ somewhat between the world's main consuming regions.

After tyres, the next most important uses are for foam products (mattresses and cushions) and footwear. These products contain roughly equal quantities of natural and synthetic rubber.

Production and Consumption

Production of all rubbers in the non-Communist world rose from 3.9 million tons to 6.6 million tons over the years 1960-1968. In 1960, the amounts of natural and synthetic rubber produced were roughly equal, whereas by 1968 natural rubber had dropped to 40 per cent of the total. The three big consumers, North America, Western Europe and the USSR together account for 73 per cent of the total rubber consumption of the world. There is great variability between these areas in the proportionate use of natural and synthetic rubber. In North America, natural rubber amounts to only 24 per cent of all rubber used, while in Western Europe, 42 per cent is of natural origin. It is interesting that the proportionate use of natural rubber in North America has declined only marginally over the last few years, probably because further substitution of synthetic is neither economically nor technically desirable.

In all countries for which statistics are available, the consumption of rubber is increasing, although there is great variation in the rate of increase. There seems to be no doubt that the total consumption of rubber will continue to rise, and that despite its proportionate decline natural will continue to occupy an important share of consumption increases.

Prospects in Competition

Important aspects of competition between natural and synthetic are now outlined. In many instances, there are good reasons to expect an improvement in the relative position of natural rubber.

1. *Production Costs.*

The introduction of high-yielding trees in West Malaysia has greatly reduced the production cost per lb of natural rubber, as shown in *Table* 1.

***Table* 1.—Estimated estate and smallholding costs in W. Malaysia**

Items	Estates with only high-yielding trees	Smallholdings	
		with only high-yielding trees	with only low-yielding trees
Yield (lb/acre)	1,100	1,064	503
Costs (U.S. cents/lb)			
Management	1.1		
Tapping and collection	5.1	5.9	8.9
Processing	1.3	2.3	1.7
Maintenance	1.0	0.8	0.8
Other	1.4	1.7	2.3
Total farm	9.9	10.7	13.7
F.O.B. and freight	2.0	2.0	3.0
Grand total	11.9	12.7	16.7

Notes.—The estate figures are budgeted estimates, based on recorded input and output levels, for units with *only* high-yielding material in the early years of tapping. The smallholding figures are taken directly from surveys of over 1,000 farms in 1963-1964.

Source.—Rubber Research Institute of Malaya (1970).

The grand total natural rubber production and dispatch costs of 11.9, 12.7 and 16.7 US cents per lb compare favourably with costs of around 18 cents per lb for comparable synthetic rubbers. Furthermore, there are prospects of reducing the natural rubber costs still further. Work on high-yielding trees is still continuing, and good yield capacities are being combined with other features such as resistance to wind and disease and better latex quality.

Yield stimulants applied to the bark to prolong the flow of latex have received much attention, and the recently introduced compound "Ethrel", or 2 chloroethyl phosphonic acid has achieved spectacular long-term average yield increases of over 100 per cent from renewed bark over wide areas of Malaysia. Compensatory fertilizer applications are recommended, but no ill-effects on trees have been noted yet.

Another big area of cost reduction is the development of new tapping procedures, requiring the tapper to make a longer cut every fourth day. This greatly decreases labour costs.

2. *Quality and Presentation.*

Grading of ribbed smoked sheet is a visual process, and results in a product lacking in uniformity. Furthermore, the sheets are exported from most countries as large unwieldly bales. In contrast, all synthetic rubbers are graded according to precise technical standards, and marketed in small compact bales.

The introduction of "Standard Malaysian Rubber" (SMR) has done much to overcome the grading problem, especially as it is associated with the production of "block rubbers".

Since 1960, several new processes have been designed for making "block rubbers", which replace individual smoked sheets and other products by material of homogeneous quality. These rubbers can be made from both latex and scrap, and lend themselves to the production of a series of rubber grades of strictly defined technical properties. The SMR scheme exploits this advantage. The new block rubbers are also well adapted to chemical modification. One example of this is the development of viscosity stabilized rubbers which, because of easier subsequent processibility, permit a 10 per cent reduction in end manufacturing costs. SMR rubbers now parallel the synthetic product in being marketed in 75 lb polythene-wrapped bales, grouped together in large specially designed pallets.

Conversion to new block rubber plants is proceeding on a massive scale in Malaysia, where 224,000 tons, or almost one-fifth of total production, was sent overseas in block form in 1970. Total block manufacturing capacity is rising rapidly, and the annual production rate is expected to exceed 750,000 tons by 1975. Indonesia and Ceylon have also begun to install block plants. As might be expected, these rubbers earn good premiums over the original grades, reaching 4 to 5 cents per lb in some instances. Both the Australian and New Zealand markets are showing keen interest in these new rubbers, and took 4,500 and 3,000 tons of SMR respectively in 1970. The overseas marketing of block rubbers is being pushed by an expanding group of technical advisers and salesmen. The Malayan Rubber Fund Board, which co-ordinated the introduction of the SMR scheme, now maintains central advisory offices in all the major industrial areas of the world.

3. *Adaptability to New Uses.*

Natural rubber is normally employed as a general purpose material, with certain special applications in items like heavy-duty tyres for which its properties are undoubtedly superior. In the past, synthetics have figured almost exclusively in new rubber use developments, which have often involved producing materials specially tailored for particular situations. The continued demand for natural rubber has thus depended on a rising consumption in traditional uses.

Great progress has recently been made in widening the manufacturing applications of natural rubbers. Most work here has been done by the Natural Rubber Producers' Research Association at Welwyn Garden City in England, a unit financed by the Malayan Rubber Fund Board. One big advance, for example, was the pioneering of low cost oil-extended natural rubber for use in winter tyre treads. The new treads, for which detailed manufacturing formulations were worked out, have been found to give 30 per cent more grip than the equivalent synthetic product.

Another important contribution has been the development of natural rubber for particular engineering uses such as conveyor belts and engine and bridge mountings. Appropriate vulcanization techniques to produce such rubbers have now been perfected. Work on a range of smaller new applications, individually of more limited impact, is also going on. A minor example is the establishment, by the Ceylon Institute of Scientific and Industrial Research, of natural rubber latex grafted with the styrene monomer as a film binder in emulsion paints.

It can be expected that this new trend will, subject to the other difficulties of quality and presentation being overcome, lead to a broadening of natural rubber uses. The difficulties of establishing sophisticated new rubber using techniques capable of widespread practical application should not, however, be underestimated. Apart from the intensive research process involved, manufacturers incur large costs in altering their raw material from one form of synthetic to another or to natural. They must be assured that the new developments hold long-term economic advantages.

4. *Prices.*

Prices of natural rubber have always fluctuated considerably, whereas synthetic rubber prices have remained fairly stable over the past ten years. Three major reasons for the fluctuations have been the difficulty of changing the supply of a plantation crop, the erratic demand springing from the unpredictable purchasing behaviour of the Soviet Union and China, and the considerable influence of short-run speculative forces, especially in Singapore. The most recent large fluctuation was from 17 U.S. cents per lb in February 1968 to 30 cents per lb in August 1969. In general, however, price fluctuations have lessened since 1950, probably due to the increasingly dominant role of synthetic rubber whose prices are altered little.

Means of lessening natural rubber's price fluctuations have frequently been considered. The most popular suggestion, an international buffer stock scheme, is probably out of the question. One obvious barrier would be the various political animosities between the rubber producing countries concerned. Although an Association of Natural Rubber Producing Countries was set up late in 1967, it is not thought likely to achieve much producer co-operation in practice. Despite this, action by individual governments to lessen fluctuations within their own areas may sometimes be helpful. The Malaysian Government's purchasing activities on the Singapore market in 1967-1968 helped counter the activities of speculators endeavouring to depress prices below the extremely low level they had already reached. The rubber stockpile thus formed was eliminated in a subsequent period of higher price.

5. *Political Factors.*

The major initial development of synthetic rubber was made necessary by the Japanese invasion of Malaysia and Indonesia. The continuing post-war instability of South-east Asia has kept alive fears of a similar occurrence, and has therefore justified the establishment of more synthetic rubber factories. Iron Curtain countries, aiming to be completely self-sufficient in rubber, have tended to use synthetic raw material in preference to natural rubber.

Practically every country has tariffs to protect its home industries against cheap foreign imports. This policy inevitably favours the synthetic rubber industry at the expense of the natural rubber industry. Already considerable pressure to reduce tariffs has been exercised through the U.N. Conference on Trade and Development.

An aspect which should be mentioned here is the captive market structure for a good proportion of synthetic rubber. According to a recent estimate, 44 per cent of U.S. synthetic capacity is owned by rubber fabricators, and a similar situation prevails in Western Europe and Japan.

6. *Other Substitutes.*

New forms of synthetic rubber possessing superior characteristics are sure to be developed in time, but the same may be said of natural rubber. Plastics also present a limited challenge to rubber. But so far there is no evidence that plastics will be able to replace rubber in tyres, and there is certainly not any serious alternative to the wheeled automobile. The production of tyres is likely to grow tremendously in the next decade, and this means a great increase in the use of both natural and synthetic rubber.

CONCLUSION

This brief review has shown that future prospects for natural rubber are still good, and certainly better than some pessimists with inadequate knowledge of this industry have been wont to predict. One important reason for this is the undoubted trend towards much increased consumption of rubber-like materials. The other major factor is the promised impact of new techniques developed in research. In these circumstances the rapid expansion planned in the Territory's smallholding rubber area would seem to be well vindicated. Rubber almost certainly has a superior outlook to most of the other large-scale export crops now being grown, and it is especially well-suited to peasant farmers due to its low working capital requirement and great flexibility in cultivation.

Pasture Notes

MR G. D. HILL, formerly an agronomist with DASF, has published a paper entitled "Improved Pastures for Papua and New Guinea" in the *Papua and New Guinea Agricultural Journal*, Volume 22, No. 1 (1970).

These notes summarize currently available information on pastures in Papua New Guinea. They discuss special Papua New Guinea problems, including storage of seed in lowland conditions, possible need for fertilizers and their efficient use on pastures. Grasses and legumes which will maintain forage production during the dry season are discussed.

A comprehensive list of pasture grasses and legumes which have been tried in Papua New Guinea is included with recommendations as to the environment to which they are best suited. Brief information is given on suggested methods for sowing pastures. There is also a discussion of different grazing management practices.