CONTRIBUTIONS FROM THE RUBBER RESEARCH SCHEME, CEYLON

NOTES ON THE APPEARANCE OF SAMPLES OF SMOKED SHEET AND BLANKET CREPE FROM ESTATES

T. E. H. O'BRIEN, M.Sc., A.I.C.,
CHEMIST,
RUBBER RESEARCH SCHEME, CEYLON

SAMPLES of smoked sheet and blanket crepe were provided recently by a large number of Ceylon estates for the purpose of an investigation of variability of plasticity. This investigation is being carried out by the London Branch of the Research Scheme at the Imperial Institute, but before being despatched to London the samples were carefully examined from the point of view of appearance, and it is considered to be of interest to record the conclusions which were reached with regard to the general standard of appearance of the rubber. For the information of the superintendents who kindly provided the samples it should be stated that it will be a considerable time before the results of the plasticity tests are available. Variations in plasticity develop during storage and the samples will therefore be stored at the Imperial Institute for 6 months before the tests are started. There will then be a further period of at least six months before the investigation is completed.

SMOKED SHEET

A total of 204 samples was received, but a small number arrived too late to be included in the present classification which refers to 195 samples.

General Attractiveness.—The samples were divided into 3 grades representing the general attractiveness of the rubber, without taking into consideration the presence of specific defects which are mentioned later; the result of the classification being as follows:

Good	140 samples	72 %
Medium	48 samples	24·5%
Bad	7 samples	3·5%

It was considered that sheets classified as "good" would secure a ready sale at full market price and in some cases at a small premium. The "medium" sheets would find a less ready market, which is a matter of importance when an excess of the commodity is available and this, in some cases, would lead to disposal at a slight discount. The "bad" sheets were distinctly below the market standard of appearance.

These samples can be regarded as fairly representative of Ceylon estate smoked sheet and it is very satisfactory that the output from nearly 75% of the estates can be classed as attractive in appearance. The samples classed as "medium" would also in most cases have been in the higher class if a little more care had been taken in manufacture, and this could be done without any material increase in cost of production. Some of the common reasons for rejection of samples were:—uneven smoking, dark reaper marks, light reaper marks, uneven shape, grit and other foreign matter in the rubber, uneven and pitted surface. It is true that (with the exception of grit) these defects have no relation to the quality of the sheets, but the fact remains that rubber is sold on appearance, and when supplies are plentiful it is only natural that the buyer will give preference to the rubber which appears to have been most carefully prepared.

Bubbles.—The number of sheets affected with bubbles was as follows:

Slight	26	13·5%
Medium or bad	7	3·5%

In most cases of "slight" bubbles the defect was due to fermentation at the edges of the sheet, and could be avoided by more careful washing of the pans and troughs, or if necessary by the use of disinfectants.

"Rust" and Mould.—Eight of the sheets were affected with rust and in only three cases was it severe. Some years ago rust was one of the most common defects of Ceylon smoked sheet, but ceased to be a source of trouble when its cause was understood and suitable precautions were taken to prevent its development.

The samples were not tested for resistance to mould, and only a few samples which were stored at the laboratory during wet weather developed the defect. Immunity from trouble with mould can be secured by means of paranitrophenol at a cost not exceeding 0·175 cents per pound of rubber, and the use of this chemical can be regarded as an economy on any estate where conditions of preparation, transport or storage lead to trouble with this defect.

Stickiness.—Smoked sheet is not often penalised on account of surface stickiness, but it is of interest to record that the samples which were examined showed very material differences in this respect. From experiments which are at present being carried out by the Research Scheme it appears that the occurrence of surface stickiness in smoked sheet depends on the balance between smoke and heat in the drying house. Sheet dried at raised temperature without smoke is distinctly sticky and the higher the temperature of drying, the greater the density of

smoke required to prevent the development of stickiness. There is also another type of stickiness due to the sheets "sweating" which arises from lack of ventilation in the smokehouse.

The degree of stickiness was judged by the feel of the sheets and the result of the classification was as follows:

A	Non-sticky	103	53 %
B	Slightly sticky	66	34 %
C	Medium ,,	16	8 %
D	Very ,,	9	4·5%
E	Almost tacky	1	0·5%

Class A and B can be regarded as normal and satisfactory. Class C and D would be likely to cause comment by the brokers. The sheet in Class E was distinctly below the standard of first grade rubber.

Size, thickness, colour and marking.—It is only to be expected that the samples would vary materially in these factors, which are governed largely by the equipment available, such as type of machinery and pans, smokehouse dimensions, etc.

Size.—The size of the sheet is not unimportant in relation to economy of packing space, the ideal being that the sheet should just fit the packing chest, *i.e.*, should be approximately 23 ins. × 18 ins. A sheet of this size weighing 1½ lb. is very suitable in thickness for efficient drying. In many cases wide sheets cannot be prepared owing to unsuitable reaper spacing or the use of narrow rollers, but care should be taken that the sheets are of the correct length. Packing is then fairly economical if the extra width of the chest is occupied by sheets packed on edge. Sheets which are longer than the chest are particularly uneconomical, as they must either be trimmed, with loss of first grade rubber, or doubled over which interferes with packing.

The sample sheets were classified according to length, with the following results:

Less than 21 inches	77	39·5%
21-24 inches	91	46·5%
More than 24 inches.	27	14·0%

The saving which can be effected by economical packing may vary from 0·1-0·2 cents per lb. for rubber sold locally, to 0·5 cents or more if the rubber is sold in distant markets.

Thickness.—Thin sheets dry rapidly but it may not be economical from the point of view of hanging space and handling to make them very thin. Also a thin sheet gives an impression of weakness, and requires heavier smoking to give the same colour as a thicker sheet more lightly smoked. On the other hand the time of drying increases disproportionately if the sheet is too thick.

The thickness of the sheets was calculated from the dimensions and weight of the samples in terms of weight (in grams) per square foot. The figure varies slightly according to the pattern of the marking roller but gives a fairly satisfactory index of thickness. It is considered from recent experiments that a thickness of 225-250 grs. (8-9 ounces) per square foot is a suitable average for rapid drying and good appearance.

The thickness of the samples examined is summarized as follows:

Thinnest sheet	173 grams per square foot.	
Thickest sheet	372 grams per square foot.	
Thin sheets (less than 225 grs. per sq. ft.)	19	10%
Medium sheets (225-300 grs. per sq. ft.)	131	70%
Thick sheets (more than 300 grs. per sq. ft.)	38	20%

(A few sheets were not measured owing to unusual pattern of the marking roller).

Colour.—The colour required in smoked sheet depends largely on the taste of the buyer, and a sample which is considered too dark by one broker may well be rejected as too light by another who is buying for a different market. Generally speaking, a well smoked sheet is to be preferred as being more resistant to mould.

The sample sheets were roughly classified according to colour, but the classification is influenced by the prevailing "fashion" in colour. Sheets classed as medium colour would probably have been regarded as too light a few years ago.

Light	22	11·5%
Medium	105	53·5%
Dark	60	31·0%
Very dark	8	4·0%

Pattern of marking roller.—Generally speaking, the small pattern produced by a spiral roller with close grooves is most pleasing in appearance and most useful in hiding roughness and other defects in the sheet, but from a number of the samples it was evident that sheet with wide marking can also be very attractive if the marking is distinct and the rubber clear and smooth.

The primary object of marking the sheets with a pattern is to increase the rate of drying by exposing a greater surface area to the air. An average smoked sheet is approximately $\frac{1}{8}$ inch thick on the ridges and it follows that the most suitable type of marking from the point of view of efficient drying, is such that the sheet is divided into a series of ridges $\frac{1}{8}$ inch thick and $\frac{1}{8}$ inch wide, with narrow furrows between the ridges. The proviso

should be made that if the furrows are too narrow and deep, water may lodge in them and give rise to "rust." A marking roller which is in use at the laboratories has grooves $\frac{1}{8}$ inch wide and deep with $\frac{1}{8}$ inch between the grooves and produces a sheet of attractive appearance and good drying properties. In the finished sheet there are 5 ridges per inch, the ridges being approximately $\frac{1}{8}$ inch wide, while the furrows are slightly less than $\frac{1}{8}$ inch wide.

The presence of a pattern on smoked sheet also reduces the tendency of the sheets to stick together when packed, sheets marked with narrow ridges having less tendency to stick than those with broad ridges. Sheet with large spaces between the ridges is uneconomical for packing, and this is a material point in comparing the amount packed per chest on different estates.

The pattern of the sample sheets was measured with the following results:

Close marking (5-6 ridges per inch)	101	67·5%
Medium marking (4-4$\frac{1}{2}$ ridges per inch)	18	12·0%
Wide marking (less than 4 ridges per inch)	8	5·5%
Diamond marking	23	15·0%

(Total examined 150 sheets).

SUMMARY

In general it may be concluded that about 75% of Ceylon estate smoked sheet, as represented by the 200 samples attains a high standard of appearance. A further 20% could probably be brought up to this standard by increased care in preparation. In the case of the remaining 5%, it is likely that reorganisation of methods of preparation, and improvement of equipment are required.

BLANKET CREPE

It is usually considered that the manufacture of good quality blanket crepe is easier than the preparation of good quality smoked sheet, and in conformity with this view it was found that the differences in the appearance of the samples of blanket crepe were less marked than were found in the samples of smoked sheet.

Colour.—The chief aim in preparation of blanket crepe is to secure a good colour, but it is not easy to compare the colour of various samples without making allowance for factors such as the thickness of the rubber and the age of the sample at the time of examination. It was also unfortunate that a proportion of the samples were supplied soon after the resting period when the colour of the rubber is abnormal; and several planters queried whether such samples could be regarded as suitable for the purpose of plasticity tests. Evidence is available regarding the changes in plasticity when new cuts are opened and a suitable adjustment can be made for such samples.

There were indications that some of the samples had deteriorated in colour much more rapidly than others.

The colour of the 114 samples was roughly judged as follows:

Pale	10	9·5%
Medium	66	63·0%
Off	11	10·5%
New cuts	18	17·0%

The above classification does not include 9 samples which had been in store for several months and were noticeably off-colour. It is considered that the pale and medium samples were up to the market standard, and in fact in some cases the "medium" samples were more attractive in appearance than those classified as "light." The "off" samples would probably sell at a small discount. Five of the samples appeared to be machine dried and of these one was classified as "medium" and the other four as "off."

Five samples had a slight streakiness which is frequently a cause of trouble in marketing blanket crepe.

Hardness.—There were very material differences in the hardness of the samples. Generally speaking, the market prefers a hard gristly crepe, but it is probable that the average manufacturer's requirements would be better met by a comparatively soft crepe, especially if this is reflected in improved plasticity. Experiments carried out by the Research Scheme (R.R.S. Bulletin 49 p. 7) indicate that machine-dried crepe and crepe blanketed in hot rollers have improved plasticity.

The samples were classified as follows:

Very soft	2*	2·0%
Soft	21	18·5%
Medium	54	47·5%
Hard	26	22·5%
Very hard	11	9·5%

* machine dried.

Texture of Rubber and Size and Thickness of Pieces.—The type of rolling to which the samples had been subjected in the blanketing process differed materially. Rolling in a machine with even speed pinions, operated at a comparatively low speed, tends to produce a smooth, evenly marked product. On the other hand a machine with a large difference in speed between the two rolls, especially if operated at high speed, results in uneven marking which is less attractive in appearance.

The width of the samples naturally varied considerably. A number had been rolled in wide machines and were of the correct size to fit the packing chest, but of the others a proportion were

not of a convenient width for packing. When the rubber is blanketed in a 15-inch machine it is preferable to fit hoppers to reduce the rolling width to $10\frac{1}{2}$-11 inches so that the sheets of rubber can be packed side by side in the chest. The proportion of samples which were of suitable width for economical packing was approximately 65%.

The thickness of the rubber also varied considerably. Generally speaking, the preparation of thick blanket saves time in rolling and is more economical for packing, but tends to make the rubber appear darker in colour. The thickness of the samples was calculated as weight (in grams) per square foot. Hitherto a thickness of 16 ounces (454 grams) per square foot has been regarded as an average for Ceylon blanket crepe, but judged by this series of samples the average is somewhat higher viz., 18 ounces per square foot. The result of the examination was as follows:—

Less than 400 grams per sq. ft.	24	21·0%
400-600 grams per sq. ft.	71	62·0%
More than 600 grams per sq. ft.	17	15·0%
Lace crepe	2	0·2%

Thinnest sample 261 grams per sq. ft.
Thickest sample 914 grams per sq. ft.

SUMMARY

The conclusion reached from examination of the 114 samples of blanket crepe is similar to that for smoked sheet, viz., that a large proportion of the samples attain a high standard of appearance. It is difficult to give precise figures for the crepe samples as the appearance depends so largely on colour, which deteriorates during storage. It can however be estimated roughly that 85% of the samples were good, 10% indifferent, and in the remaining cases that re-organisation of manufacture is required.

In a number of samples the general appearance could have been improved considerably by greater care in blanketing.