

QUESTIONS REGARDING THE LOCAL SUPPLY OF TEA CHESTS AND FIREWOOD FOR ESTATES

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That the financial stability and relative prosperity of Ceylon has depended for many years upon the Tea Industry nobody will deny. Apart from all political issues the tea industry is therefore entitled, in the common interest, to expect support from any other local industry which may serve its needs. Major industries often give rise to subsidiary undertakings which, working in unison, may make most useful contributions to the welfare of a country as an organised unit. Industrialisation in primarily agricultural countries is indeed a much sounder proposition when based on the needs of its primary industries rather than on wartime economy or purely secondary requirements selected at random. Successful competition with highly organised industrial countries without the aid of the kind of protection which merely "robs Peter to pay Paul" is however a matter of careful planning and foresight combined with rigorous supervision of standards of quality.

Two needs of the tea industry which offer great possibilities for local development are those of Tea Chests and Fuel. The tea industry may quite fairly call upon the Forestry Department and

the Department of Commerce and Industries for greater attention to its needs and the present moment seems an opportune one to indicate once more the directions in which assistance is urgently required.

What are the prospects of supply from local sources of suitable tea chests, either plywood or momi type, and what is the position with regard to firewood supplies either from forest reserves or from fuel blocks to be worked by estates and replanted with approved species? A recent statement in the local press gave the impression that the new plywood factory which was to have supplied tea chests will not fulfil this original purpose. The same report stated that the manufacture of momi type tea chests was to be undertaken at the same factory. The tea industry would welcome information about the quality of such momi type chests and also about the possible scale of supply.

The cost of firewood to up-country estates is mounting rapidly. In normal times firewood of good quality is easily the cheapest form of fuel available to the tea industry and imported fuels owe whatever popularity they possess to the organisation and efficient salesmanship of fuel importers.

In wartime, when the supply of imported fuels is uncertain, is the cost of firewood to be allowed to rise to the level of imported fuels? Have the possibilities of fuel shortages been envisaged?

Forestry in Ceylon no doubt presents its problems but there appears to be little reason why many of the difficulties in the way of local tea chest production and the provision of firewood for estate use should not be overcome.

TEA CHESTS

Taken in order, the main requirements for tea chests are:—

1. Strength and durability.
2. Freedom from taints and borers.
3. Lightness of weight and evenness of tare.

White woods make packages of rather better appearance than dark or coloured woods but this is not a really important point.

There are a number of Ceylon timbers which make very satisfactory tea chests. Samples of chests manufactured locally have been tested at the Tea Research Institute and have compared very favourably with imported chests of Japanese origin. Amongst these timbers is *Albizzia moluccana* grown in mid and up-country districts

as high shade for tea and where its growth is rapid without however deleterious effects upon the firm texture of the timber. Such rapidly growing species appear to offer possibilities for the establishment of stands of timber, specially for a tea chest industry, but at the present moment the main concern must be the amount of suitable material already available in accessible areas. The establishment of a plywood factory and the press reports regarding the proposed manufacture of momi type chests suggest that this question has been investigated and that considerable amounts of suitable species of timber are available.

Definite information about the position with regard to possible supplies of local tea chests would however be of considerable interest to the tea industry at the present moment, for many difficulties are being experienced in the supply of good quality chests and should the position in the Far East lead to a complete severance of trade relations with Japan the position might easily become very serious.

A policy of drift appears to have been followed in the matter of local tea chests and, once again, as in the last war of 1914-18 and the years of disorganisation immediately following the war, the local tea chest industry is being strangled by exploitation. While the price of chests is high, village carpenters make tea chests out of anything which comes to hand. Mr. F. P. Jepson in a report to the Director of Agriculture dated 1932 records a case of a local chest being constituted of six different species of timber including a piece of pine from an imported packing case. Most of the difficulties have been understood at least since 1922 for the Report of the Industries Commission, Sessional Paper I of 1922, contains many references to problems of the local chest industry. The report says: "Forestry is an industry which in a country like Ceylon should only rank second to agriculture in importance. This Island is the natural home of many valuable woods and it should be at least self-supporting in regard to timber used in various industries." Mr. P. M. Lushington's remarks in Sessional Paper XII of 1921 are also quoted "The forests have been drained to make revenue and very little has hitherto been spent on improvement and development."

Further quotations from Mr. Lushington are directly concerned with packing chests: "At present we are dependent upon other countries to the sum of Rs. 3,000,000 annually for tea box woods." Mr. Lushington states: "there is no need for Ceylon to go outside the country for her supply" and indicates on page 22 of his report (*vide above*) how the demand could be met locally.

The position in 1922 was summarised in the following words: "At present there are three distinct interests concerned in the manufacture of tea chests. The grower, (i.e., the Forestry Department), at least one middleman who manufactures the chest, and the user. There is no machinery for linking up these three classes, no organisation for ensuring (1) that the demands of users of tea chests can be completely supplied locally, and (2) that the tea chests are made in accordance with the requirements of the tea trade. The Forestry Department is indifferent to the demands for tea box woods and the manufacturer is indifferent to the requirements of the user. The result is that the Tea Traders accept the situation and import their tea chests from other countries." It is to meet such a situation that we advocate very strongly the establishment of a Bureau of Industry and Commerce. Without such a bureau we cannot see how the various sub-industries concerned in a simple large industry can be satisfactorily linked together.

The position in 1941 is much the same; the bureau which has now been established has failed to set up the machinery necessary to link together the three classes concerned in the manufacture of tea chests. A golden opportunity exists to establish a local tea chest industry if only on a small scale, but history is repeating itself and the low quality of chests now produced is bringing the local product into disrepute.

A rather different point of view was expressed by Mr. J. D. Sargent who wrote as Acting Conservator of Forests in 1919: "Tea Chests. This belongs to reforestation entirely, after selection of the most suitable species. These are not in sufficient quantity for the three-ply trade, and the fact that Ceylon contains no pure or gregarious forests of suitable species renders the collection of such timber expensive and prevents competition with the imported article. The remedy is reforestation in accessible areas with easy transport facilities."

Since 1919 there has been ample time for the establishment of suitable rapid growing species. The view seems, however, to have been adopted that considerable quantities of timber are available or else the plywood factory would not, presumably, have been built.

The general level of prices prevailing in the tea chest market should also widen the radius of economic accessibility referred to by Mr. Sargent whilst the importation of timber in the log could probably be relied upon to make up deficits in supplies until such time as suitable local timber is available in sufficient quantity at competitive prices. If a tea chest industry had been established as

recommended in the reports quoted, the tea industry would by now have had an assured supply of chests at a reasonable cost and, by reason of the revenue it provides, the tea industry should receive consideration of such needs as a matter of policy.

At this stage it is important to realise that the indifference of the tea industry to such local chests as have been produced has, in the main, been due to the very poor quality of the local product. Two main factors are responsible for this poorness of quality. They are local ignorance and prejudices about the most important matter of seasoning and careless exposure of timber to borer attack.

Soon after the outbreak of War Mr. C. B. Redman King, the Institute's Entomologist, and the writer together made a tour of some of the local production centres with the object of obtaining information for advisory purposes. It rapidly became obvious that although some merchants were producing sound articles the industry would soon fall into disrepute unless some control were exercised over the market as a whole, designed to eliminate chests made from unseasoned and borer infested timber.

Mention has already been made of the admirable report by Mr F. P. Jepson, Assistant Entomologist, Department of Agriculture, dated August 1932, made at the conclusion of similar investigations. The report is very detailed and full of useful information. The general conclusion which Mr. Jepson arrived at was confirmed almost exactly by our experience in 1939.

Borer infestation appears to take place mostly in the freshly felled log. The commonest types of borer are attracted by the sugary (simple carbohydrates) material in the moribund tissues of the log and, until this attraction is removed by seasoning, almost all timbers are susceptible to borer attack. Some woods appear to be particularly susceptible, and these together with other timbers unsuitable for other reasons are black listed in the reports quoted above. A number of species, however, after seasoning appear to lose their attraction for boring insects, presumably for the simple reason that the soluble foodstuffs have been removed and nothing but indigestible highly lignified material remains. Furthermore, incomplete removal of these sugary materials apart from attracting beetles is liable to give rise to mould growths on the timber and to attendant offensive odours arising from fermentation. Obnoxious products of fermentation are liable to remain in timber for considerable periods of time and to taint the contents of packages constructed from such badly seasoned materials.

Seasoning, according to the reports quoted and to our own observations does not appear to be taken very seriously in Ceylon. Ignorance or prejudice may result in the wrong choice of methods or indifference to quality may result in its neglect. At the present moment the latter course is the one most likely to be adopted by village carpenters interested in a quick turnover.

The seasoning of timbers to be utilised for simple purposes such as packing case construction does not appear to be a very complicated process. Judging from the reports available, the following sequence of events results in the production of satisfactory materials for packing cases:—

1. The freshly felled log should be peeled immediately after felling. This is apparently extremely important but most often neglected in Ceylon.
2. As soon as possible the dressed log should be transported to the nearest stream and *completely* immersed in running water. Logs left lying about are very subject to borer attack. This is the commonest stage of infection and probably the only one of economic importance. Felled logs usually have to await arrangements (and often flood water in rivers) for transport. It is during this time that they should be completely submerged to protect them from borer infestation and to obtain even seasoning. Stagnant pools are not suitable because of the accumulation of fermentable matter and the formation of obnoxious products liable to cause taints.
3. After floating or otherwise transporting to the saw mills logs should again be completely immersed to complete the seasoning process. Floating timber does not season properly. Eventually, the soluble materials are leached out completely from the timbers suitable for tea chest manufacture and the timber no longer attracts boring beetles to any marked extent.
4. After thorough drying the timber is ready for use. Planks after sawing should be thoroughly dried under cover but in a free flow of air.

More rapid methods of dissolving out the soluble carbohydrates also appear to be available and one method, apparently quite suitable, is to saw up the logs and steam the planks in airtight tanks. This is said to complete seasoning in a period of a few days only.

There appears to be plenty of information on the subject of seasoning and there are no doubt a number of people in the Island competent to advise on the matter. The main difficulty is one of supervision to ensure that nothing but the best seasoned and borer-free material finds its way into chests to be used for exporting tea. Any system of Government supervision must be in the forest, for inspection of made up chests though useful in preventing the distribution of inferior articles can be of little further use. The most radical solutions of the difficulties undoubtedly are to be found in Government owned or licensed saw mills and a system of trademarks enabling the tracking down of defaulters.

The authorities I have quoted are of the opinion that attention to seasoning would result in evenness of the tare of tea chests because the timber would be of even composition and would dry evenly. Obviously, chests made of several different species of timber must be eliminated entirely. A further point in this connection has been rather overlooked and should receive consideration. Difficulties sometimes arise in the Customs because of differences in weight between the tare marked on the chest and the Customs own measurement. This may be due to either rise of moisture content of the tea, the timber or both. Chests are commonly dried out before packing and are particularly liable to increase in weight after packing in wet weather if the drying out process has been too severe. It is common practice in Ceylon to season in brackish water and although salt hardens the timber it also makes it very liable to absorb excessive amounts of moisture and may give rise to considerable trouble between exporters and the Customs authorities. Table I shows figures obtained for weights of imported chests under various conditions.

TABLE I

Figures obtained with imported chests.

	Weight of chest
1	
(a) Large chest dry	18 lb. 8 oz.
(b) Large chest after storage in damp atmosphere (21 days)	19 lb. 4 oz.
2.	
(a) Large chest freshly made up	18 lb. 10 oz.
(b) Large chest after storage in dry atmosphere (21 days)	17 lb. 14 oz.

Finally, before passing on to the subject of fuels there are one or two aspects of the local tea chest industry which require special emphasis.

There has been a tendency for would-be inventors to seek ways and means of either killing borers in their galleries or rendering timber borer proof by impregnation with chemical agents. We have been approached to test methods of this nature. It must be fully realised that the mere presence of borer holes in tea chests imported into countries with stringent regulations is in itself sufficient to cause rejection of both chest and contents. Ceylon exporters have been warned by certain authorities that chests and tea will be thrown into the sea if borer infested material is sent to ports within their jurisdiction. Such authorities would not accept any statement to the effect that the borers had been killed by Mr. X's patent process. The so-called borer proofing is only likely to be a doubtful substitute for proper seasoning and any success in deterring borer attack might be nullified by trouble with fungus attack and taint, unevenness of tare and all the other difficulties arising from the use of unseasoned wood.

The same considerations are likely to apply to plywoods and it is quite probable that the presence of borer galleries in plywood chests would be regarded just as unfavourably as those in momi type chests.

This point is specially emphasised because plywoods made from Ceylon timber were recently submitted to us for tests. The plywoods were all quite free of odour and did not impart any taints to teas packed in them. The strength and appearance were quite up to the standard of most imported plywoods, but many were badly riddled with borer galleries as shown in the following table.

TABLE II

	1st	2nd	3rd	4th	5th	6th	7th	8th
	chest.							
1. Aridda	0	0	0	0	0	0	0	0
2. Del	25	15	11	30	24	22	19	12
3. Etamba	3	1	10	1	3	0	8	11
4. Kekuna	0	0	0	0	1	2	0	0
5. Katuboda	0	1	0	0	7	0	5	3
6. Keena	0	0	0	8	10	21	20	7
7. Kirehemibiliya	6	10	3	5	27	14	21	0
8. Malaboda	0	0	1	1	19	27	0	0
9. Thiniya	0	0	0	0	2	0	0	0

In conclusion, therefore, it is quite plain that the question of boring insects and seasoning must be taken seriously before a local tea chest industry can be developed. Suitable species of timber grow readily in Ceylon and much information is available both for planning immediate utilisation and for developments in the planting of future supplies. The industry must, however, be organised and a vigorous policy in connection with advisory and supervisory activities should be initiated as soon as possible.

Reasons have been given why such organisation must embrace the whole production process from the time the timber is felled.

FUEL

During 1936 a series of articles was published in *The Tea Quarterly* (Vol. IX) under the title of "Studies on Fuels for Tea Driers." The concluding paragraph of the fourth article of the series points out the value of locally grown firewood as a fuel for the tea industry. "While local industry can produce red gum or similar firewood at Rs. 4 per yard or until imported fuels are reduced considerably in price, firewood growing must be a sound economic proposition. The suggestion is ventured that insufficient attention has been given to this aspect of the tea industry and, in view of the closing of Government fuel blocks in many parts of the Island, a thorough revision of the local fuel growing industry is desirable."

A ready reckoner based on careful tests carried out in St. Coombs Factory was also published in this article and it is of interest to use this to compare the relative costs of heating air with firewood, oil and coal at the present moment.

Table III expresses the relative costs of firing by the various means at present available at St. Coombs Factory. In this table all the costs are expressed as multiples of firewood costs.

The ready reckoner enables similar figures to be worked out for any estate by a few simple calculations. At present costs the upper limits fall short of requirements but to supplement the table is only a matter of simple arithmetic.

Table III contains figures for coke which are worked out on the assumption that its heat value is roughly the same as coal. Coke was not used in our original tests but subsequent experience leads us to make this assumption. However, the cost of coal and coke is practically prohibitive so long as firewood is available. Oil at current contract price is approximately twice as expensive as firewood.

The firewood on which the comparison is based consists mainly of close textured, heavy species weighing about 650-700 lb. per air

dry yard. Obviously, light open-textured wood weighing only 400 lb. per yard would be just as expensive as oil if Rs. 4.00 per yard were paid for firewood having only half the weight of combustible matter in it.

TABLE III

Comparisons of Costs of Firing with various Fuels delivered at St. Goombs Factory.

Fuel	Cost of fuel	Cost of heating stove to working temperature.	Cost of heating air.
Firewood	Rs. 4 per yard (650-700 lb. air dry)	1.0 Taken as unit cost	1.0
Oil	43 cts. per gallon		
(a) Low pressure burner		2.2 units	3.3 units
(b) High pressure burner		2.2 "	4.6 "
Oil at contract price 37 cts. per gall.			
(a) Low pressure burner		1.9 "	2.8 "
(b) High pressure burner		1.9 "	4.0 "
Coal	Rs. 64.65 per ton	3.6 "	3.8 "
Coal and coke	(Coke at Rs. 46.25 per ton)		
(a) 3:1		3.3 "	3.5 "
(b) 2:1		3.2 "	3.4 "
(c) 1:1		3.1 "	3.3 "

When comparing the cost of firewood with other fuels it is therefore most important to state the weight per yard because the value of wood as fuel depends on weight. Light open-textured woods such as Toonah, Albizzia, Dadap, Rubber, etc., are all almost twice as expensive for fuel as Red Gum, Blue Gum, Acacia, up-country jangle firewood, etc., if the same rate per yard (air dried)

is paid irrespective of weight. Old gum trees may weigh up to 1,000 lb. per yard as compared to under 400 lb. for young albizzia or for rubber.

The evaluation of firewood by weight is however confused by the moisture content. Freshly felled firewood contains roughly 50 per cent moisture and on this account weighs considerably more (30 per cent more) than air dry fuel which contains only 20 per cent of moisture. Tests have shown that firewood split and stacked under cover (overhead only) will dry down to 20 per cent moisture in two months and that in very dry weather the moisture content will fall to 11 per cent in six months. The stable figure for moisture in firewood is however 20 per cent and it should always be dried down to this figure before use. Damp firewood causes low thermal efficiency, and trouble with condensation in the staves of the driers, which may lead to costly repairs. Finally, to obtain efficient combustion, firewood should be cut into short lengths of about one foot. This enables the grate to be covered evenly and the draught to be distributed evenly throughout the whole area of combustion. As many estates can now testify, the cost of a circular saw for cutting firewood into small pieces is saved on fuel economy in the space of two or three years according to the scale of working.

As we have pointed out before in *The Tea Quarterly*, the virtues of firewood as a fuel for tea driers are often lost sight of since there are not any very large organisations interested in its sale. One virtue, that of growing at our back doors, may however be brought home to us if the supply of imported fuels is seriously affected by the war. There are great possibilities in an organised local fuel industry but, like local tea chests, local fuel is inclined to be compared unfavourably with imported fuel owing to indifference to quality and lack of organisation. Firewood contractors are interested only in a quick turnover and the last cent of profit. Many up-country tea estates are forced to buy from firewood contractors working Government fuel blocks. The demand for firewood is increasing and the price is rising with the demand. In some districts it is difficult to buy firewood at all and it appears desirable that the whole question of fuel supply should be investigated with care and without delay.

Since the bulky nature of firewood is its chief drawback, tending to make transport costs rise out of all proportion to its cost of production and since the cost of transport is also steadily rising it is becoming imperative to organise supplies. The transport of any material containing 50 per cent of useless water is obviously uneconomical yet firewood contractors almost habitually supply freshly felled

firewood. The cost of transport is charged to the buyer and the contractor is indifferent to the fact that he is transporting 50 per cent water. Since the bulky nature may impede the fullest use of weight carrying capacity in transport, it is also obviously important that firewood should be cut into short lengths to facilitate packing. The contractor's main interest in this connection usually appears to be the fullest use of irregularities in shape and size in order to get the least possible amount of material into the measured yard. On account of these difficulties the quality of local fuels would be improved by the establishment of depots in fuel producing areas or at main distribution centres where fuel could be cut and air dried under rough cover before transporting to estates or other consumers. It would also be in the interest of a local fuel industry to sell light open-textured wood at a lower rate per yard than the denser species and gradually to eliminate them from firewood plantations.

The great advantage of locally produced fuel over imported fuel is that transport distances may be reduced by buying from the nearest source of supply. The greatest advantage should therefore be taken of the widespread distribution of jungle firewood and so long as reforestation with suitable species follows immediately on the cutting of the firewood there does not appear to be any real objection to the working of fuel blocks by estates willing to replant with approved species, by approved forestry methods.
