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PRODUCT DIVERSIFICATION FOR THE TEA INDUSTRY

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The Tea Industry of Sri Lanka is largely export-orientated because more than 90% of its production is destined for foreign markets. The form in which tea from Sri Lanka is presented to foreign buyers is, naturally, as black tea which comes in several grades each with specific characteristics. It is not safe for an industry of this magnitude to depend entirely on the sale of one variety of tea because this makes the industry vulnerable to market trends which may veer away from black tea. It is therefore desirable that Sri Lanka should attempt to produce in substantial quantities other forms of tea so that the industry may be cushioned from price fluctuations to which a single commodity may be subject.

CTC TEA

Let us briefly survey the forms of tea which Sri Lanka can produce. The black tea of Sri Lanka is what is called orthodox tea. One important form of black tea which is not classified as orthodox tea i sthe CTC tea which is produced in increasing quantities by East Africa and certain parts of India. CTC manufacture is favoured when a large rush of crop is experienced because the CTC machine, though comparatively difficult to maintain, nevertheless has a large output per hour and can, therefore, cope with large crops. The climatic pattern in many parts of North India is such that there is only one cropping season extending perhaps from 6 to 8 months. During the rest of the period there is no plucking. Unlike in Sri Lanka where cropping extends throughout the year the machinery in these areas has to cope up with a large rush during the cropping season. This has forced the development of CTC machinery. We in Sri Lanka do not have the great necessity to produce CTC teas because of our climatic conditions. Nevertheless it is apparent that if we continue to be based on othodox manufacture a sizeable market which is now serviced by CTC teas may be lost to Sri Lanka. It is admitted that the CTC manufacturing process is primarily meant for teas which do not have much aroma. Nevertheless it is desirable for Sri Lanka to produce appreciable quantities of CTC tea in order to enter this market and perhaps get better prices than foreign CTC tea because of high quality with which Sri Lanka teas are associated.

GREEN TEA

In most parts of China and in Japan green tea is the favourite beverage. Unlike black tea which is fully fermented, green tea is unfermented and has a characteristic taste which is appreciated by the Chinese and Japanese people and people in the northern areas of India and elsewhere. There is no sizable export of green tea from China or Japan and indeed there appear to be good prospects of exporting green tea particularly to Japan who with her rapid industrialization would find it extremely difficult to produce green tea. Some years ago two estates embarked on green tea manufacture but the products were not up to the specifications required by the Japanese markets and manufacture of Japanese green tea appears to have been abandoned because the prices offered for green tea were much lower than for black tea.

Dispite these setbacks it appears worthwhile to pursue the Japanese green tea market in the future by manufacturing green tea which would appeal to the Japanese consumers.

In the manufacture of green tea two methods are employed to stop or arrest fermentation. In the Japanese method the leaves are steamed rapidly to deactivate the enzymes. In the Chinese method of preparation the leaves are panned or heated by contact with a hot metal surface in order to deactivate the enzymes. The TRI has facilities to produce green tea of the Japanese variety and in a few months time a Green Tea Fixation Machine gifted by the Peoples' Republic of China will be installed at St Coombs. It is hoped to prepare commercial quantities of the Chinese variety of green tea in order to acquire the know-how for the manufacture of Chinese green tea, and study market preferences.

OOLONG AND BRICK TEA

Intermediate between the fully-fermented black tea and the unfermented green tea is a variety of partially-fermented tea called Oolong tea. The study of this variety of green tea has not been started in the TRI since the market possibilities appear insignificant. In many parts of Tibet and China tea is preserved in the form of highly compressed bricks for ease of transport and storage. There are no technicalities involved in manufacturing brick tea but here again the volume of the market has to be ascertained if these teas are to be manufactured in Sri Lanka.

SCENTED TEA

In many countries whenever the delicate aroma of tea cannot be easily produced there is a trend to produce scented tea, in which certain delicate flavours already present in the tea are accented. The addition of aroma totally foreign is also practiced. An example of the former in the addition of oil of bergamotte whose main constituent is found in small amounts in black tea. The Scandinavian countries seem to prefer this type of scented black tea. On the other hand tea scented with essential oils of flowers such as Jasmine is also appreciated particularly in China, Japan and in Indonesia. These aromas are foreign to tea but the combination appears to be desired by a selected clientele. The manufacture of such scented tea presents no problem and the TRI has prepared a wide variety of scented teas with traditional lemon or orange flavour, jasmine flavour and also totally new teas based on Ceylon spices and essential oils such as cinnamon, betel and cardomom. It is hoped that these exotically-scented teas might appeal to the connoisseurs of scented teas.

INSTANT TEA

In contrast to the presentation of tea in the form of rolled leaves, black or green, scented or otherwise, some western markets seem to prefer instant tea because the time-consuming ritual of brewing tea appears irrelevant to the fast modern society. Market surveys clearly show that the United States market would demand more of instant tea. Instant tea comes in two types, hot-soluble and cold-soluble. The hot-soluble variety should reproduce as far as possible the characteristic aroma and taste of a cup of tea brewed in the conventional way. However, processing difficulties are enormous and there is a substantial difference in quality between a cup of hot instant tea and the traditionally brewed cup. This limitation in processing has actually tended to create consumer resistance to instant teas of all forms. The cold-soluble instant tea is preferred during the summer months to be consumed as iced beverages. Here the lowering of temperature prevents the consumer from sensing the delicate aromas characteristic of tea because the low temperature suppresses the volatility of the delicate oils which impart to tea its characteristic flavour. In order to

overcome the absence of tea volatiles which contribute the aroma it has become the practice to scent cold-soluble instant tea with other acceptable aromas which are sufficiently volatile at low temperatures to create a pleasant sensation of odour. Consequently, aroma retention is less important in cold-soluble instant tea because imparting a desired scent such as lemon *etc* is reasonably easy. However, in the manufacture of a tea soluble at low temperature certain valuable constituents which give tea its characteristic astringency and taste are lost thereby giving the cold-soluble instant tea a taste not easily recognizable as tea. The TRI has developed and patented certain processes for the manufacture of cold-soluble instant tea which preserve the characteristic taste of tea even in iced beverages. It is expected that these processes will be exploited on a commercial scale in the near future.

TEA BAGS

The poor quality of instant teas hitherto marketed, has forced tea vendors into the manufacture of tea in bags which represents a compromise in convenience between instant tea and black tea. Tea bags which may be made of specially-processed paper or nylon may be used to brew a quick cup of tea without the inconvenience of having to strain the tea leaves away as the bag is discarded after brewing. As a result of the slow rate of diffusion of the tea extract through the paper bag it is necessary for the bag to contain tea having a large area to volume ratio. Such teas are mostly CTC tea and tea dust. It is this growing tea bag market for which the CTC tea is specially favoured. The advent of tea bags reduces the quantum of tea required for brewing a cup by roughly 20%. Furthermore, tea dust and often refuse or stalky tea which can be hardly classified as tea are included in the contents of the bag which are hidden from the consumer. The development of the nylon tea bag appears to hold promise for good-quality tea because the nature of the tea contained within the nylon bag is immediately evident to the consumer. The increasing usage of nylon tea bags should be particularly advantageous to Sri Lanka because dust and refuse cannot be used in these bags.

TEA CIDER

A refreshing alcoholic beverage can be prepared by fermenting sugar using a composite culture of two micro-organisms, *Saccharomycodes ludwigii* and *Bacterium xylinum*. The organism complex utilizes amino acids and vitamins from tea liquor for its growth. The product compares very favourably with apple ciders and champagne perrys.

CARBONATED TEA

Apart from instant tea, carbonated tea also seems to have a limited foreign market. Within Sri Lanka prospects for bottled carbonated tea appear rather dim for the reason that the cost of bottling and transport and distribution forms a very large fraction of the price paid by the consumer for the bottled beverage. Further, manufacturers of carbonated beverages usually have their equipment geared to fill

the desired quantity of carbonated water into bottles already containing a syrup, after which the bottle is sealed. If, therefore, Sri Lanka is to make inroads into carbonated tea markets the magnitude of which is at present not yet ascertained it would be necessary to manufacture tea concentrates or tea essences for export. If there is in Sri Lanka a sufficiently large industry manufacturing instant tea then such concentrates or essences can be easily prepared during the course of manufacture of instant tea powder.

TEA SEED OIL

Apart from tea-based products it would be desirable to obtain as many by-products from tea in order to make the tea industry of Sri Lanka more profitable. It is therefore useful to discuss the possibilities of by-products from tea. In the first instance great interest has been shown in the export possibilities of tea seed oil. In general there is a world shortage of edible oil and tea seed oil has a premium because its composition is close to that of olive oil and is desirable from dietectic point of view as it is an unsaturated oil. The manufacture of tea seed oil however, requires the production, collection and processing of tea seed to recover the edible oil. Here we encounter several difficulties. In the first instance conditions required for the production of vegetative harvests and the production of seed are mutually exclusive. Consequently one cannot expect any substantial production of tea seed, from tea in plucking. It would be necessary to allow tea bushes to grow to seed if it is necessary to produce tea seed. It is also necessary to collect the seeds immediately after fall because prolonged contact with the soil would lead to spoiling. Assuming such difficulties in collection are solved the next problem which arises is that of extraction of the oil. The oil content of the seeds of *Camellia sinensis* which is grown exclusively in Sri Lanka is as low as 15%. Consequently after de-corticating and drying, the tea seed kernel has to be subjected to solvent extraction processes in order to recover the edible oil. This process can be quite tricky as the presence of moisture would lead to the formation of stable tea seed oil emulsions due to the presence of saponins in the tea seed cake. From estimates of the availability of tea seed from tea plants allowed to grow into seed bearers it would appear that the quantity of oil which could be recovered from tea seed bearers is as low as 112 lb per acre which seems hardly profitable even at a price of Rs 6000 per ton of tea seed oil whereas tea in plucking even if neglected would yield an income of Rs 1200 in foreign exchange.

It appears feasible, however, to grow another species, namely, *Camellia sasanqua* in tea lands which are considered marginal and suitable only for grasses and forest trees. In such land growing of *C. sasanqua* might be useful from the point of view of augmenting our sources of edible oils. The process of manufacture of oil from the seeds of *C. sasanqua* is simply by expelling because the oil content is more than 40%. In summary, prospects for tea seed oil production appear to be dim unless the large-scale cultivation of *C. sasanqua* is pursued.

CAFFEINE

Another by-product of tea which is often discussed is the manufacture of caffeine. Synthetic caffeine is priced around $5 per kg and is used largely in pharmaceuticals and in certain beverages where the caffeine gives the desired 'kick'. In view of the aversion of the developed countries to synthetic products and in view of the increasing cost of fuel for chemical processing industries it is possible that caffeine prepared from natural sources such as tea waste would indeed have a substantial premium in price over the synthetics. Current methods of manufacture of caffeine from tea waste permit the recovery of caffeine to the exclusion of the tea polyphenols in tea waste thereby reducing the profitability of any process, which sets out to recover caffeine from tea waste. Moreover the loss of solvents in such recovery processes is substantial. The TRI has recently developed a process which enables simultaneous recovery of caffeine as well as valuable tea constituents which may be used in the preparation of tea essences or tea concentrates. It is hoped to establish the economics of this process on a pilot plan scale in the future in order to advise industrialists who would be interested in the manufacture of caffeine and tea concentrates or essences from waste tea.

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