CHAPTER 4
LOCATION, CULTIVATION AND PROCESSING

Introductory

Most of the advanced countries of the world established their industries in the nineteenth century haphazardly with little reference to the availability of resources and transport or to the social implications of industrialism. The Smithian principle of international division of labour took account principally of the natural resources, capital and markets of the leading industrial nations of the world and an era of free trade and enterprise in an expansive world. The orthodox theory of freedom of enterprise and laisser-faire and global division of labour is now superseded by Weber’s theory of industrial location as the basis of economic planning.

In highly industrialized countries like England and the U.S.A. the major part of the population is urban while in India a vast majority of the people live in villages and their main occupation is agriculture. There is hardly any liaison between agriculture and industry in India. Agriculture as an occupation uses little of what is produced by industry. This is clearly undesirable from the point of view of balanced growth. There is a
clear case for the dispersal and movement of industries from the overgrown coastal and central towns into the heart of agricultural regions.

So far as the tea industry is concerned, its location in Assam, West Bengal, Tamil Nadu and Kerala has been mostly due to the availability of vast areas of suitable land and favourable climatic conditions. Scientific cultivation on plantation scale has enabled India to achieve yield levels that are the highest in the world, thus becoming the best exemplifier to the peasant sector of the Indian economy of what modern scientific cultivation is. In the area of employing modern technology in the processing of tea, India stands second to none in the world.

A LOCATION OF THE TEA INDUSTRY

I Tea-Growing Areas of the World

The tea plant, "Camellia Sinensis",\(^1\) is not exacting

\(^1\) Tea has, by different botanists, been called by the following variety of names: Thea sinensis, Thea olearia, Thea chinensis, Thea sinesis, Thea thea and Camellia oleosa. Those are the names of C. sinensis (continued)
in its soil requirements, and is grown as far north as
the 45th parallel and from sea level up to 7,000 ft. or
even higher. Because of its hardy nature, the tea plant
can grow under widely varying geographical conditions.
But it requires plenty of sunshine and a more or less
evenly distributed rainfall throughout the year. It
thrive best and gives the highest yields in a humid
tropical climate such as that of the rainy plains of
Brahmaputra or the Western Ghats of South India or the
hilly regions of Ceylon.

The tea plant does not come into full bearing for
six to seven years after planting and, in some regions,
full maturity of the plant requires even a longer
period. The plant may live a hundred years or more but
after about fifty years, yields decline fairly sharply
and, therefore, it pays to replant rather than continue
plucking the old bushes. If left alone, the plant would

* var. sinensis f. parvifolia. There are besides C. sinensis
var. sinensis f. macrophylla and C. sinensis var. assamatica
and C. irrawadiensis, with a number of alternative names
for each. Any practical gardener would know at a glance
the difference between a camellia and a tea plant, but one
can understand that it must be much more difficult for a
botanist. (J.M. Scott, The Tea Story, Heinemann, London,
1964, p. 67.)

2 Scientists at Tocklai Experimental Station have found
from experiments that the yield declines after about 25
years from planting. (Report of the P.C. Borooah Committee
on the Tea Industry, Government of India, New Delhi, 1968,
p. 33.)
grow into a tree 15 to 20 feet high, but its height is kept down to 3 or 4 feet by frequent pruning. The bushes cannot be left unplucked, as is the case with coffee or cocoa. Plucking of the leaves at regular intervals is indispensable. This is necessary in order to obtain the growth of the young shoots and leaves used for tea manufacture.

Although about nine-tenths of the world output of tea comes from Asia, favourable climatic conditions and suitable soil for the cultivation of tea are also found in the tropical regions of Africa and Latin America. Location of an industry in a particular region may be due to many reasons. However, in the case of tea, the prime factors have been the availability of extensive land and favourable climatic conditions.

In Asia, tea is grown in India, Ceylon, Indonesia, Japan, China, Taiwan, Viet Nam, Iran, Turkey and the

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3 "The most obvious reason for the distribution of industries and people is the disposition of natural resources...... Simple and direct relations to natural resources, however, do not take us far in accounting for most locations. The reason is that economic interrelations between different industries and firms play such an important part in shaping the pattern of location as well. Even in the absence of any initial difference at all,..... patterns of specialization and concentration of activities would inevitably appear in response to economic, social and political principles." (E. M. Hoover, The Location of Economic Activity, McGraw-Hill Book Co., New York, 1948, p. 3.)
U.S.S.R. The tea-producing regions in Africa are Kenya, Uganda, Tanganyika, Malawi, Nyasaland and Mozambique. In Latin America, the tea-producing countries are Argentina, Brazil and Peru. Mauritius, New Guinea, Fiji and Martinique also produce some tea. The share of Africa in the world output has increased from 2 per cent before the Second World War to about 5.8 per cent in 1968. There is every reason to believe that for many more years the share of Africa in world production of tea will continue to increase. There may well be further expansion in Latin America, although Latin America is predominantly a coffee-growing area.

II Tea-Growing Areas of India

The tea-growing regions of India are in the monsoon belt. In North India, the tea-growing regions are to be found mostly in two States viz., Assam and West Bengal. These two States derive their rainfall mostly from the north-east monsoon. In South India, the States that grow tea are Kerala, Tamil Nadu and Mysore. It is grown on the moist slopes of plateaus of the Western Ghats which get their rainfall mostly from the south-west monsoon. The climate and soil of the tea-growing areas vary very much and hence there are wide variations in
productivity and cultural practices. However, all these areas have climate and soil which are favourable for the cultivation of tea. Assam particularly has a very favourable climate for tea cultivation. The region has a hot moist climate where the thermometer in the shade never exceeds 95°F and never falls below 55°F, where there is never any long drought but where the rain falls at reasonable intervals throughout the year, where the annual average rainfall aggregates 100 to 130 inches, where morning fogs are not uncommon, where the sun shines hot in an atmosphere perfectly free from dust, where at no season hot wind is felt, and where light penetrating rain is more common than furious downpours. These are the conditions that make a good tea climate.

III North-East India

The five tea-growing areas of North-East India lie in a triangle, the apex of which is in Sadiya in Assam. The five areas are:

(i) The Assam Valley
(ii) The Surna Valley or Sacher

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### 1967

<table>
<thead>
<tr>
<th>Region</th>
<th>Area (in acres)</th>
<th>Production (in million lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darrang</td>
<td>27,628</td>
<td>34.1</td>
</tr>
<tr>
<td>Goalpara</td>
<td>2,030</td>
<td>12.7</td>
</tr>
<tr>
<td>Kamrup</td>
<td>2,417</td>
<td>6.2</td>
</tr>
<tr>
<td>Lakhimpur</td>
<td>5,923</td>
<td>74.9</td>
</tr>
<tr>
<td>Nongping</td>
<td>4,101</td>
<td>13.2</td>
</tr>
<tr>
<td>Sibsagar</td>
<td>4,074</td>
<td>42.6</td>
</tr>
<tr>
<td>Cachar</td>
<td>30,019</td>
<td>31.6</td>
</tr>
<tr>
<td>Tripura</td>
<td>2,770</td>
<td>2.7</td>
</tr>
</tbody>
</table>

**Total** 124,124  190.3
The Assam Valley is a level plain hundreds of miles long surrounded by high mountains. The eastern part of the Valley is ideal for tea cultivation. The tea areas of Cachar in Surma Valley are in long narrow valleys extending up to Surma or Barak river. A peculiar feature of the tea district of Tripura is that it suffers from drought from time to time, with the result that plantations have to suffer heavy losses.

The following are the tea-growing areas of Assam by revenue units:

(i) Goalpara
(ii) Cachar
(iii) Howgong
(iv) Kamrup
(v) Darrang District
(vi) Lakhimpur
(vii) Sibsagar
(viii) Tripura

The tea plantations of West Bengal are found in
Darjeeling, Dooars and Terai. Those in Darjeeling are located at altitudes ranging from 1,000 ft. to 6,000 ft. The plantations of Dooars and Terai are often visited by floods because this long strip of land adjacent to the Himalayas is in many places intersected by a number of hill streams.

The revenue units where the tea estates of West Bengal are located are as follows:

(i) Siliguri Sub-division of Darjeeling District
(ii) West Dinajpur
(iii) Gooch-Behar
(iv) Kurseong Sub-division of Darjeeling District
(v) Kalimpong " " "
(vi) Sadar " " "
(vii) Jalpaiguri

Located in the North-East Monsoon belt as they are, the tea-growing areas of Assam and West Bengal receive heavy rainfall, though the actual rainfall varies from one tea-growing area to another. The average rainfall of the tea-growing areas of Assam and West Bengal is about 100 inches. Dooars and Terai get as much as 140 to 160 inches of rain, whereas Darjeeling gets about 120 inches. Not only the rainfall and its distribution round
the year but also the temperature during the drought periods, if they occur, affect tea culture. In Cachar, an occasional dry spell can cause considerable damage to the crops. Here, the temperature during the drought season is higher than in other parts of Assam. Hurricanes, sometimes accompanied by hailstorms, blow during the months of March and April bringing in their wake heavy losses to the estates.

There are three other regions in North India where tea is grown, but on a much smaller scale. They are Ranchi, Dehra Dun and the Kangra Valley. These regions are widely separated.

(i) Ranchi

Ranchi is in Bihar State and the tea estates of Ranchi are situated in the plateau region of Chhota Nagpur. The region is not quite well suited for cultivation of tea because of the poor quality of the soil.

(ii) Dehra Dun

The tea plantations of Dehra Dun are situated in the valley between the Himalayas and the Siwalik Hills. The yield per hectare is not as bad as that in Ranchi and not as good as in Assam. The soil here resembles that of
Assam. Most of the green leaves are converted into green tea and sold in Amritsar and Calcutta.

(iii) The Kangra Valley

The Kangra Valley lies in the foothills of the Himalayas in the Punjab. The tea estates of this region are in a weak economic condition because the yield per hectare is low on account of climatic conditions. The climate is too cold and the rainfall is unevenly distributed. The leaves are converted into green tea and sold in Amritsar.

Mandi in Himachal Pradesh, Almora and Garhwal in Uttar Pradesh also produce small quantities of tea.

IV South India

The tea-producing areas of South India are spread over the plateaus and slopes of the Western Ghats. The Nilgiris District of Tamil Nadu is an important tea area. The estates of this district are located at altitudes between 5,500 and 7,000 ft. While that is so in the two taluks of Coonoor and Ootacamund, the estates of Gudalur Taluka are situated at lower altitudes.5

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MAP 5
KERALA

1947

<table>
<thead>
<tr>
<th>District</th>
<th>Area</th>
<th>Population (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannanore</td>
<td>1.29</td>
<td>14</td>
</tr>
<tr>
<td>Palghat</td>
<td>1.13</td>
<td>6</td>
</tr>
<tr>
<td>Kozhikode</td>
<td>2.95</td>
<td>64</td>
</tr>
<tr>
<td>Trichur</td>
<td>2.55</td>
<td>8</td>
</tr>
<tr>
<td>Ernakulam</td>
<td>1.55</td>
<td>40</td>
</tr>
<tr>
<td>Trivandrum</td>
<td>1.07</td>
<td>15</td>
</tr>
<tr>
<td>Quilon</td>
<td>3.91</td>
<td>42</td>
</tr>
<tr>
<td>Kottayam</td>
<td>26.43</td>
<td>269</td>
</tr>
</tbody>
</table>

Total: 38.24

481
The Malabar-Wynaad tea areas of Kerala State are situated between the Malabar Coast and the Nilgiris District. The average altitude is about 3,000 ft. Though the quality of the tea produced in this region is not as good as that of the tea of the areas at higher altitudes, the quantity produced is considerable.

The tea estates of Coimbatore District of Tamil Nadu are situated on the Anamallai Hills and Cardamom Hills of the Palghat gap. The average elevation is about 4,000 ft. The soil and climate are suitable for the cultivation of tea.

The Kanan Devan tea estates are situated higher up on the hills of Kerala at an average elevation of about 5,000 ft. In the Peermade plateau of Central Kerala, the tea plantations are situated at an average elevation of about 3,000 ft.

Mysore State is mainly a coffee-producing region. However, the whole of Mysore State (Coorg, Hassan and Chickmagalur) has a small tea area of about 1,861 hectares.\(^6\)

The following are the tea growing-areas of South India by revenue units:

Tamil Nadu:
(i) The Nilgiris District
(ii) Kanya Kumari District
(iii) Tirunelveli District
(iv) Coimbatore District
(v) Madurai District

Kerala State:
(i) Peermade District
(ii) Meenachal Kanjirapally Taluka
(iii) Changanacherry Taluka
(iv) Ernakulam District
(v) Trivandrum District
(vi) Quilon District
(vii) Cannanore District
(viii) Kollam District
(ix) Trichur District
(x) Palghat District
(xi) Devikulam Taluka
(xii) Udupancholai Taluka

Mysore State:
(i) Coorg District
(ii) Hassan District
(iii) Chickmagalur District
While about half the tea estates of South India were planted about the middle of the last century with seeds from Assam, the rest is old China hybrid. Generally, South Indian teas are noted for their flavour mainly because of the high elevation at which the estates are and the slow growth of the tea bushes.

V  Area, Production and Yield

The area, production and yield per hectare in the different tea-growing States are shown in Table 23:
<table>
<thead>
<tr>
<th>State</th>
<th>Area (in hectares)</th>
<th>Production (in million kgs.)</th>
<th>Average Yield (in kgs, per hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>174,130</td>
<td>190,888</td>
<td>1,096</td>
</tr>
<tr>
<td>West Bengal</td>
<td>86,393</td>
<td>98,188</td>
<td>1,136</td>
</tr>
<tr>
<td>Tripura</td>
<td>5,479</td>
<td>2,342</td>
<td>536</td>
</tr>
<tr>
<td>Bihar (Ranchi)</td>
<td>476</td>
<td>0.056</td>
<td>118</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>1,972</td>
<td>0.685</td>
<td>347</td>
</tr>
<tr>
<td>Punjab (Kangra)</td>
<td>3,763</td>
<td>0.835</td>
<td>222</td>
</tr>
<tr>
<td>Himachal Pradesh (Mandi)</td>
<td>420</td>
<td>0.034</td>
<td>81</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>33,943</td>
<td>46.837</td>
<td>1,380</td>
</tr>
<tr>
<td>Mysore</td>
<td>1,836</td>
<td>2.162</td>
<td>1,178</td>
</tr>
<tr>
<td>Kerala</td>
<td>39,241</td>
<td>42.132</td>
<td>1,074</td>
</tr>
<tr>
<td><strong>Total - India</strong></td>
<td><strong>347,653</strong></td>
<td><strong>384,759</strong></td>
<td><strong>1,107</strong></td>
</tr>
</tbody>
</table>

The yield per hectare is the highest in Tamil Nadu (1,380 kgs.) and the lowest in Mandi (81 kgs.). As between Himachal Pradesh (Mandi) and Punjab (Kangra Valley), the latter has a slightly higher yield, though it is less than that in Uttar Pradesh. The yield per hectare in Kerala (1,074 kgs.) is somewhat lesser than that in Tamil Nadu (1,380 kgs.) and is more or less the same as in Assam (1,096 kgs.) and West Bengal (1,136 kgs.)

The main difference between North India and South India is that in the former tea is not manufactured throughout the twelve months in the year, whereas in the latter it is manufactured the year round, although the quantity of green leaf picked per hectare may vary from one part of the year to another.7

**B CULTIVATION**

(Raising and Maintaining of Tea Plants)

From the very beginning tea has been cultivated on a plantation scale. The small units are of later origin. Economy of scale requires the estates to be large in size.

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7 During the winter months (December to February) the tea bushes in North India enter a dormant stage and leaf growth is restricted.
The small units are concentrated mostly in South India. Though the number of small units in India is large (8,292 in 1968) the area covered by them and their total production are negligible.

I Methods of Planting

Once the land has been prepared, the pattern of planting and spacing will have to be decided. If the land is somewhat flat, the plants are planted in square, rectangular or triangular pattern, the spacing between the plants being such as to allow them, when they mature, to cover the ground and at the same time leave sufficient space for workers to pluck the leaves, weed the field, etc. The principle followed is that the coverage must be such as to keep the soil in good condition without excessive dessication. The Tooklai Experimental Station advocates "hedge planting" which is, nowadays, being adopted increasingly. Hedge planting requires that the plants should be planted in rows with about two feet spacing between two bushes in the row. The advantage of hedge planting is that a large number of bushes can be planted on an acre of land with more continuous plucking points. Besides, if ever plucking, weeding, manuring, etc., should be mechanized, hedge planting will be of immense use. 8

If the estate is situated in the hilly regions, contour planting is undertaken with a view to minimise soil erosion.

Once the pattern of planting has been decided upon, holes are dug, seedlings are removed from the nurseries and put in the holes. The process of transplantation requires great care.\(^9\) The age of the seedling may differ

\(^{9}\) Transplantation has to be done very carefully, for if the seedlings are badly handled in this process, they seldom survive the great shock of change in their embryonic position and environment. Excessive rain prior to transplantation or during the time of transplantation is not desirable as it makes the soil clayey. Good rain at night with sunny or cloudy weather in the day would be ideal. When the seedling is put into the hole, it should be so placed that the tap-root is not bent or doubled up. The collar should remain on a level with the surface of the soil; in fact, the seedling should remain at the same depth in the plantation as it was in the nursery. If it has been well uprooted from the nursery, without any disturbance in the position of the roots, it will be well and truly laid in its new habitat.

Some days after transplantation, it is found occasionally that a seedling has shed all its leaves and only its bare stalk remains. This is very remarkable as the tea plant is evergreen and retains its leaves even in the winter. The explanation of this phenomenon seems to be that the seedling has received a severe shock by transplanting and is unable for a time to support evaporation from the leaves which drop off in consequence. After a short struggle for existence young leaf buds appear on the stalk of the plants at the axils. If there is continuous drought after transplantation, watering of the tender plants may be necessary. (H. H. Ghosh, The Sphere of Tea, Industry Book Depot, Calcutta, 1933, pp. 92-97.)
from six months to eighteen months depending upon climate and weather. Vegetative propagation with the help of selected clones is becoming popular in recent years.

II Pruning

To promote the lateral growth of tea bushes, the plant is cut when it has reached some height. Thereafter, the bush is pruned periodically so that its height may not be more than 2½ ft. to 4 ft. Pruning, by enabling the plant to grow laterally, helps continuous production of tender leaves. In other words, it helps the bush yield a larger crop of leaves. Pruning is done only in the cold weather when the plant is hybermating. At this time the growth is not vigorous.

There are many theories regarding proper pruning, but they serve no useful purpose, as scientific pruning cannot be done by estate labour on a large scale. It is not possible to have scientific pruning done to, say, 250,000 plants, the normal number in a 100-acre (40 hectare) unit. When a gardener prunes his favourite fruit tree, he may bestow on it a lot of care; but when millions of bushes have to be pruned during the two cold months (between the middle of November and January), the operation is bound to be rough. Light, medium or heavy pruning must, however,
be indicated for sections of the estate, according to the age and condition of the bushes. The pruning knives should be sharp, for blunt ones will wrench off rather than cut clean the twigs and branches.

In the Nilgiris District, which is a hilly region, plants are pruned at intervals of three to eight years, whereas in the plains districts, the pruning cycle is usually shorter.

III Soil Conservation

Soil conservation assumes great importance in the hill districts where the rainfall is heavy. Heavy rainfall in such regions causes the top soil to be washed away. Constant soil erosion is responsible for depriving the soil of its fertility. To conserve soil in the tea plantations contour planting is undertaken. In some cases terracing is done. Since weeding loosens the soil and helps soil erosion, surface weeding has become popular.

IV Manuring

Systematic manuring is of utmost importance to get good yield. Nowadays, agricultural chemistry demands that proper analysis of the soil should be made to ascertain if
the plant at a particular stage of its growth requires
manuring and, if so, what the chemical constituents of
the manure ought to be. The well-managed estates of
India apply manure in accordance with the available
scientific knowledge. While the South Indian estates,
in general, prefer potash, nitrogen and phosphorus, those
of North India use mostly ammonium sulphate. Nitrogen is
necessary because it enables the plant to yield an
abundant supply of green leaves. The supply of nitrogen
in the soil is supplemented to some extent by the fallen
leaves of the shade trees.

Manure must be applied not too close to the stem of
the plant, but about a foot from it where lie the rootlets
by which the plants feed. Generally, a round (or a rectangular)
trench about nine inches wide and six inches deep and a
foot away from the stem is dug. In the trench manure is
put and covered with soil. If the plants are young, the
trench should be narrower and the depth less.

Manuring in many of the smaller estates is not
scientific, perhaps, because of the cost involved. Where
they apply chemical fertilizers, the quantity applied is
inadequate. To get the best yield and make the estates
remunerative it is imperative to use the right type of
manure in adequate quantities.
Pest Control

The tea plant is exposed to a variety of destructive pests and diseases. The mosquito bug (*Helopeltis*) is a pest that can cause considerable damage to the tea plant. Dusting with DDT has proved to be an effective remedy in the quest for eradicating the bug. The short-hole borer, the mites, the thrips and the root-knot eelworm are some other pests. Remedies for all these pests have been discovered by the Tocklai Research Station and the Scientific Department of the United Planters' Association of Southern India (UPASI).

The various parts of the tea bush are susceptible to a number of diseases and blights and unless they are detected and controlled before it is too late, they can devastate parts of, or even the whole plantation. Scientific research in this direction is being carried on at a fairly rapid pace in the tea research stations; but there is sufficient scope for further research.

While the larger among the Indian tea estates have the means to carry adequate quantities of pesticides and

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10 Please refer Appendix 1 for further information.
fungicides, the small units are at a definite disadvantage in this regard. The owners of very small units neglect the disease when it affects one or two plants with the result that they are unable to do anything when the disease begins spreading fast. Co-operative action among the small growers may help control the pests and diseases. For a group of small units an expert may be appointed and it shall be his business to tour the estates at regular intervals and advise the estate-owners about the best method of controlling the pests and diseases. The co-operative tea factories, which have been recently established with the avowed object of helping the small growers, may very well undertake this work.

VI Plucking of the Leaves

Botany teaches the planter that the tea bush, like all other plants, breathes through its leaves and that when the plant begins to flush, the new leaves cannot be roughly, severely or improperly treated. Crude plucking is resorted to by inexperienced pluckers, especially when there is no proper supervision over them. Besides, because the amount earned during the day depends on the number of kilograms of leaves plucked, labour sometimes resorts to coarse plucking. Then there is the commercial
consideration. Planters, in order to increase their earnings in the short-run, may allow coarse plucking. That proper plucking is essential for maintaining the estate in a trim condition needs no emphasis.

With the showers, the tea bushes begin to flush. Tender bright green leaves sprout gradually all over the bushes. The second flush is recognised as "the growth from the axil between a leaf and the stalk of the first flush". The number of flushes in a year varies from one estate to another depending as it does on climate, soil, pruning methods, application of fertilizers, etc. Generally, in the plains the season of flushing is longer than in the hills.

The finest tea is obtained from the bud, the leaf next to it yields tea that is not so fine and the leaves further away produce the coarser teas. In fine plucking, only the bud and one leaf are selected, in medium plucking the bud and two leaves; and, in coarse plucking the bud and three or more leaves are taken. This is shown in the following diagram:
They must be taught, checked and punished if they do wrong; and then it will be done more or less right, but perfection is not attainable."

Experience will ultimately teach the planter the proper time and method of harvesting his crop, a very important operation in this industry. But in the meanwhile, he must pluck only the strong or high shoots that are ready, leaving alone the new or weak growth for future picking. To fulfil all these conditions, however, the manager or his first assistant must go round the estate every morning during the periods of harvesting and instruct the overseers (who do the actual work of supervising the men, women and children engaged for plucking) as to the procedure that should be adopted.

VII Replanting and Extension

The life of tea plants is conditioned by hereditary and environmental factors. Therefore, it is rather difficult to say with exactness the normal age of tea plants. In Thaishola Tea Estate there are plants which are aged over a hundred years, and still they have been giving fairly good yields. Many of the older estates, which

12 Thaishola Tea Estate is in Ootacamund Taluka of Nilgiris District.
were planted sixty or seventy years ago, have plants which give normal yield. However, like any other plant, the tea bush also has a certain span of life and, after a certain age, the yield begins to decline. Hence the need for replanting. In well-managed estates, the old and aged plants are uprooted and replanted with new ones.

Table 24 shows the age-groups of Indian tea estates:
<table>
<thead>
<tr>
<th>States</th>
<th>Below 10 Years</th>
<th>10 Years to 25 Years</th>
<th>26 Years to 60 Years</th>
<th>Above 60 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>24,648.88</td>
<td>29,603.33</td>
<td>74,930.11</td>
<td>29,848.10</td>
</tr>
<tr>
<td>West Bengal</td>
<td>10,681.70</td>
<td>7,937.36</td>
<td>35,173.68</td>
<td>28,289.19</td>
</tr>
<tr>
<td>Tripura</td>
<td>885.83</td>
<td>607.53</td>
<td>3,382.64</td>
<td>-</td>
</tr>
<tr>
<td>Bihar</td>
<td>1.00</td>
<td>1.20</td>
<td>298.07</td>
<td>230.39</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>4.91</td>
<td>4.05</td>
<td>827.04</td>
<td>1,216.28</td>
</tr>
<tr>
<td>Total N. India</td>
<td>36,042.38</td>
<td>37,803.87</td>
<td>115,161.24</td>
<td>59,584.46</td>
</tr>
<tr>
<td>Kerala</td>
<td>2,161.21</td>
<td>2,396.06</td>
<td>25,442.75</td>
<td>6,743.09</td>
</tr>
<tr>
<td>Madras</td>
<td>5,039.96</td>
<td>2,121.35</td>
<td>23,000.89</td>
<td>2,781.21</td>
</tr>
<tr>
<td>Mysore</td>
<td>30.25</td>
<td>16.38</td>
<td>1,732.52</td>
<td>-</td>
</tr>
<tr>
<td>Total S. India</td>
<td>7,231.42</td>
<td>4,533.79</td>
<td>53,176.16</td>
<td>9,504.03</td>
</tr>
<tr>
<td>Total All India</td>
<td>43,273.80</td>
<td>42,337.66</td>
<td>168,337.40</td>
<td>69,088.76</td>
</tr>
</tbody>
</table>

Note: Figures in brackets indicate the percentage.

It is seen from Table 24: (a) that the area with tea bushes below 10 years is relatively low in all the tea-growing States; (b) that such area is much less in South India as compared with North India; (c) that the maximum acreage is under the age-group of 26-63 years; and (d) that the acreage under tea bushes of above 60 years is quite considerable.

The figures in columns 2 and 3 show the area of tea where the bushes are less than 25 years old. From this, the acreage "extended" and the acreage "replaced" will have to be deducted to arrive at the acreage "replanted". Table 25 shows the area extended and replanted separately:

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13 The planting of tea on additional land is "extension". Planting of new plants on the same soil is "replanting". When an additional land is planted in lieu of an equal area of old tea which is uprooted, it is "replacement". Under the International Tea Agreement, "extensions" and "replacements" were not allowed. Today, this distinction is not of much significance.
<table>
<thead>
<tr>
<th>Year</th>
<th>Extensions (in hectares)</th>
<th>Replacements (in hectares)</th>
<th>Replantings (in hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949-50</td>
<td>3,155.12</td>
<td>523.28</td>
<td>1,344.19</td>
</tr>
<tr>
<td>1950-51</td>
<td>1,571.27</td>
<td>302.35</td>
<td>1,509.01</td>
</tr>
<tr>
<td>1951-52</td>
<td>2,375.92</td>
<td>276.46</td>
<td>1,537.28</td>
</tr>
<tr>
<td>1952-53</td>
<td>2,166.83</td>
<td>150.00</td>
<td>1,189.70</td>
</tr>
<tr>
<td>1953-54</td>
<td>1,546.78</td>
<td>239.72</td>
<td>844.40</td>
</tr>
<tr>
<td>1954-55</td>
<td>2,322.11</td>
<td>549.85</td>
<td>1,418.05</td>
</tr>
<tr>
<td>1955-56</td>
<td>655.01</td>
<td>264.03</td>
<td>2,004.72</td>
</tr>
<tr>
<td>1956-57</td>
<td>354.21</td>
<td>430.80</td>
<td>2,494.46</td>
</tr>
<tr>
<td>1957-58</td>
<td>1,952.28</td>
<td>755.29</td>
<td>2,399.97</td>
</tr>
<tr>
<td>1958-59</td>
<td>2,109.32</td>
<td>590.08</td>
<td>2,434.33</td>
</tr>
<tr>
<td>1959-60</td>
<td>2,316.83</td>
<td>526.00</td>
<td>1,886.86</td>
</tr>
<tr>
<td>1960-61</td>
<td>1,713.47</td>
<td>352.77</td>
<td>1,781.87</td>
</tr>
<tr>
<td>1961-62</td>
<td>1,852.20</td>
<td>393.18</td>
<td>1,607.48</td>
</tr>
<tr>
<td>1962-63</td>
<td>2,284.84</td>
<td>401.13</td>
<td>1,571.26</td>
</tr>
<tr>
<td>1963-64</td>
<td>3,135.38</td>
<td>411.62</td>
<td>1,755.64</td>
</tr>
<tr>
<td>1964-65</td>
<td>3,960.15</td>
<td>551.14</td>
<td>2,024.66</td>
</tr>
<tr>
<td>1965-66</td>
<td>3,494.73</td>
<td>510.45</td>
<td>1,937.56</td>
</tr>
<tr>
<td>1966-67</td>
<td>3,328.88</td>
<td>459.83</td>
<td>1,629.07</td>
</tr>
<tr>
<td>1967-68</td>
<td>2,960.81</td>
<td>474.63</td>
<td>1,307.11</td>
</tr>
</tbody>
</table>

In general, replanting in South India has been lesser than in North India, probably, because replanting on steep hill slopes requires a considerable amount of digging which, in turn, leads to soil erosion. The question of evolving a better method of replanting on hill slopes has been receiving the attention of tea research institutions.

Replanting is necessary not only for the purpose of maintenance but also for raising the productivity of the estate. Experiments conducted at the Tooklai Experimental Station have proved that with proper selection of seed material for replanting, the yield per hectare could be increased.

The cost of replanting varies from one tea district to another. According to an experienced Scientific Officer\(^\text{14}\) the cost of uprooting one hectare of old tea bushes planted 4½ ft. x 4½ ft. triangular and replanting with new seed 5 ft. x 2 ft. and maintaining the young area for three years will cost in Assam Valley approximately Rs. 9,200. The United

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Planters' Association of Southern India has estimated the expenditure on replanting between Rs. 5,300 and Rs. 9,000 per hectare. According to the Indian Planters' Association, Jalpaiguri, the cost of new planting is around Rs. 6,200 per hectare. These estimates, it may be noted, do not include the cost of land, buildings for labour, tea factory, supervision charges, etc. The cost of replanting in the Nilgiris and Darjeeling is high because of the hilly nature of the terrain. 15

High cost is perhaps the most important impediment to replanting. Besides, it is difficult to get quality seeds. Again, if a large number of estates take to replanting at the same time, the quantity of seeds available will not be sufficient to match the demand. Therefore, it is important to make quality seeds available in adequate quantities and at reasonable prices.

Production Programme — Replanting and Extension

In considering the projection of production programme for tea in the country, it is necessary that we should take

15 Cost of replanting has risen considerably since 1956 when the Plantation Inquiry Commission submitted its Report.
into account the world supply and demand position during the next few years. The FAO has been examining the likely production and consumption of tea and has estimated that world production (excluding centrally planned economies) of in 1975 would be of the order 1,285 million kilograms. In this connection it may be noted that the production target for India was scaled down to 420 million kilograms from 450 million kilograms which had been fixed earlier. It is not unlikely that other producing countries may similarly have to scale down their targets and thus it is likely that the estimates of the FAO, which are based to a large extent on declared programmes for increasing production, will need further revision. In view of the large scaling down of the production target by India and also in view of the possible slowing down of the rate of growth by other producing countries, we may take the figure of world production of tea in 1975 at 1,250 million kilograms. For India the Tea Board has set a production target of 460 million kilograms for 1973-74.

Although India is the largest producer of tea in the world, her annual rate of growth is only in the region of 1.7 per cent, whereas the average rate of growth for the entire world (excluding mainland China and the U.S.S.R.) works out to about 3 per cent.
In order to make the industry economic, it is necessary to increase its productivity as well as its total production. Of course, quantitative increase should not be at the expense of quality. India's production over the years has been increasing, though not at the same pace as that of many of her competitors. During the period 1956-66 production of tea increased from 308.7 million kilograms to 376.5 million kilograms which works out to about 22 per cent. The area under tea also has expanded during this period but not in the same proportion and available figures reveal that the rate of expansion in North India is approximately 2 per cent annually of its acreage, while in South India, it is only a small fraction which is negligible. India's achievement in the field of production is thus to a large extent the result of improved yield per hectare on account of increased inputs, consolidation of existing areas and the introduction of high-yielding planting material.

The rate of new planting so far achieved has not been quite satisfactory and needs to be undertaken at a higher rate. The general aim should be at the rate of 3 per cent, as recommended earlier by the working group and also endorsed by the Tea Finance Committee, in the form of replanting and replacement and/or new extensions
In October, 1968, the Government of India announced a replanting subsidy scheme. According to the scheme, a replantation subsidy at the rate of Rs. 3,500/- in the plains and Rs. 4,500/- per hectare on the hills will be granted to such of those estates which apply.

The new scheme of the Government suffers from the following limitations:

(i) The average cost of replanting a hectare of tea at current costs is much more than the subsidy. It is around Rs. 10,000/- per hectare. Hence, not many estates may go in for Government subsidy for purposes of replantation.

(ii) Extensions and replacements are not eligible for subsidy. It is a well known fact that replacement is better than replanting from the point of view of production. The bushes on an uprooted area will not yield as much as those on virgin soil.

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(iii) Only those estates which have tea plants of fifty years and above are eligible for the subsidy. But, now, it is a matter of common knowledge that the economic life of tea bushes is 40 years. This is corroborated by the Tocklai Experimental Station.

Depreciation Allowance and Replanting

There seems to be a general reluctance to undertake replantation and extension on the scale required, though these are the most important activities to be undertaken if the production targets are to be achieved. It is essential, therefore, that this reluctance on the part of planters must be overcome. Government policy needs to be so shaped as to provide a healthy impetus to a programme of replanting and extension. One of the important things that can be done is to provide for a depreciation allowance on tea plants.\(^{17}\)

\(^{17}\) Under Section 32 of the Indian Income Tax Act, business entities are permitted to reduce for the purpose of taxation their gross profits by depreciation allowances which are granted on certain specified assets. The amount of permissible depreciation is computed by applying rates prescribed by the law to the written-down value (i.e., original cost minus depreciation allowed to-date) of an asset; but the total amount of depreciation can in no case exceed the original cost of an asset.

(continued)
The Tea Finance Committee of 1964 recommended a development allowance equal to 50 per cent of the expenditure on planting in new areas and 40 per cent on replanting, in computing the income of the tea estate for purpose of Central Income Tax and State Agricultural Income Tax. But this recommendation suffers from the limitation that the concession is available only when replanting or extension actually takes place. In order to apply for development, the industry should have built up adequate funds.

Since 1965, in accordance with the recommendations of the Tea Finance Commission, the replanting costs are charged to revenue and a development allowance is granted as a concession. But, it is wrong to consider the development allowance as a substitute for depreciation allowance. The tea plant is a wasting asset; the bush

Development rebate was introduced in 1955 as an inducement to capital formation in plant and machinery. Over the years, the benefit of development rebate has been extended to cover certain other industries like hotels and tea plantations, and the rates of rebate have varied for different industries.

The existing provisions have been criticised by the Boothalingam Committee on Rationalisation and Simplification of Tax Structure. The Committee has recommended the abolition of development rebate which leads, in its opinion, to the misuse of capital. It has also recommended writing-up the value of all physical assets by 20 per cent for the purpose of computing depreciation. (Economic and Political Weekly, Bombay, March 7, 1970, pp. 451-457.)

18 Refer pp. 310-31 of this dissertation.
becomes debilitated after a certain period. It is argued by some that at no time, right from the beginning of the industry, tea has been treated as entitled for depreciation allowance. It is true that from the beginning tea has been treated as not entitled to depreciation allowance; but it should be noted, however, that during those days it did not matter because 60 per cent of the taxable income did not attract agricultural income tax. Besides, the tax on the remaining 40 per cent of the income was considerably lower.

The principle of depreciation has been accepted by the Tariff Commission in the case of rubber. For the reason that no depreciation has been allowed in the past, the Commission took for purposes of depreciation the current replacement cost as distinct from the original cost of planting and provided for a rate of depreciation at three per cent per annum taking into account the economic life of the rubber tree. The per acre distribution arrived at in this manner was spread over the average yield and an element of depreciation related to output was devised. The same principle may be followed in the case of tea, for there is no essential difference between the rubber tree and the tea plant.
For purposes of arriving at the depreciation allowance, for instance, the replanting cost may be taken as Rs. 10,000/- per hectare. The economic life of the tea bush may be taken as 40 years. The average yield per hectare may be taken as 1,140 kgs. On this basis, the depreciation allowance may be fixed at Rs. 22/- per 100 kgs. This amount should not be subject to income tax of any type and there may be periodical checks by Government to find out if the depreciation allowance had been utilized for developmental purpose.

The depreciation allowance will provide an ideal source for replanting, extension and other developmental projects.

Availability of Land for Extension and Replacement

In addition to the problem of finance the tea industry is faced with the problem of availability of suitable land for extensions and replacements because of the legislative enactments of the Governments of the principal tea-producing States.

(a) West Bengal: The West Bengal Estate Acquisition Act (1953) empowers the State Government to resume lands within the grants earlier made by the Government itself
on the plea that such lands are surplus to the requirements of the estates. Since these lands are required for the economic viability of the estates, the industry is greatly perturbed over what the future holds for them.

(b) Assam: When the Assam Fixation of Ceiling on Land Holdings Act (1956) was passed no specific criterion was laid down for determining the extent of land held for purposes of ancillary cultivation of tea. The Revenue Department of the Assam Government used the agreed formula of 1:2 for the purpose of exemption under the Act, the underlying principle being that land fit for cultivation, extension and replacement is not taken away from the tea estate concerned. The Government of Assam is now proposing to introduce an amendment to Section 2(c) (i) of the Act which specifically provides "that not more than twice the area under actual tea plants shall be deemed to be for ancillary purposes." It may be noted that the 1:2 formula referred to in the amendment, which had been agreed to by the industry, is now out-of-date and should not be rigidly adhered to. In the context of the production target set by the Tea Board (460 million kgs. of tea to be achieved by 1973-74), the 1:2 formula should not be regarded as representing the optimum requirement of land for a progressive tea estate.
(a) **Kerala:** The land ceiling legislation of Kerala State restricts the reserves that can be held to 20 per cent of the existing area under crop. There are many estates which have no reserves at all. Some have less than 20 per cent and a few have more than 20 per cent. The net result is that the area which can be extended will be far below the 20 per cent limit imposed by the State Government.

(d) **Tamil Nadu:** In Tamil Nadu, there are at least three separate enactments affecting tea plantations and their reserves. (i) Under the Madras Private Forests (Assumption and Management) Act, any reserve now held by a tea estate can be taken over by the Government. (ii) Under the Madras Preservation of Private Forests Act, no estate can clear its reserves for extending tea cultivation and no new estate can be established as administratively the powers are so dispersed that many years may be wasted in going through the procedures of seeking a sanction and then failing to get it. (iii) Under the Madras Hill Stations Preservation of Forest Act, even shade regulations become a matter for procedure for seeking and getting sanction each year in each individual case.
It is clear that these enactments of the principal tea-growing States is not conducive to expansion and development of the industry. The least that the Government of India should do is to convene a conference of representatives of tea-growing States and lay down a well-considered policy in regard to acquisition of lands. The Governments of the tea-producing States may be required to consult the Tea Board where land is proposed to be resumed. The principle underlying all resumption should be that tea plantations have enough reserve lands for extensions and for other ancillary purposes. Lands within an estate should in no case be resumed, for it creates difficulties regarding rights of passage and goes against the integrity of estates. In addition, no land should be resumed before giving the estates a reasonable time limit within which they may be required to use it for productive purposes.

The Tea Board has discussed the proposed amendment to the Assam Fixation of Ceiling on Land Holdings Act and has suggested that the amendment should provide the State Government with discretionary powers to allow an estate to retain more land for ancillary purposes than what the 1:2 formula would permit, if it is satisfied
that such retention is necessary for development. That is as it should be, for it would not be correct to prescribe any specific ratio between area under tea and reserves held for ancillary purposes, because there may be cases of estates requiring more land for expansion than what the ratio would allow.

The plantations of the Nilgiris District produce quality teas. The policy of the Government should not come in the way of development. On the contrary, where possible Government reserves in the vicinity of tea estates must be made available to the latter for purposes of development. Similarly, forest preservation laws should not come in the way of shade regulation measures and bona fide cases of extension and replacements.

C PROCESSING

According to an old Chinese philosopher Ts'ai Hsiang, "the essence of enjoyment of tea lies in the appreciation of its colour, fragrance and flavour." 19

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the weather is suitable, the leaves are left to be
withered naturally. If natural wither is not possible,
hot air is forced over the withering racks. Withering
removes a good deal of moisture and the leaves become soft
and placid like leather gloves. In the plains districts
of North-East India, the withering sheds are located a
little away from the factory building and withering is
done by the natural circulation of atmospheric air. In
Darjeeling and the hill districts of South India, where
the atmospheric temperature is generally low, the withering
lofts are usually built over the factories so that the
heated air from the dryers of the factory can be conducted
order
into lofts and circulated over withering racks in that
the green leaves might get withered.

Drum and Tunnel withering which are popular in
North India have not been introduced in the Nilgiris, as
these are not suited to the climatic conditions in the
latter. The continuous withering machine which withers
tea leaves with conditioned air on a slow moving tray

(ii) saving of time, and (iii) increased capacity of
withering lofts ... The time taken must naturally depend
on the quality and condition of the leaf, the thickness
and temperature of the air, but under favourable
conditions, a good cold limp wither can be obtained in
six to ten hours. In wet weather it may require from
twelve to sixteen hours." (H.H. Ghosh, The Sphere of Tea,
op. cit. p. 138.)
Alternating and reversible withering fans are popular in the Nilgiris.  

(2) Rolling

From the withering racks the soft leaves pass to which the rolling machine breaks the leaf cells and releases the juices and enzymes which give tea its characteristic flavour.

The tea rolling machine generally consists of a rotating table with a brass or hard-wood surface on which there are usually certain protuberances. Superimposed on the rotating table is a large container usually made of brass, open at the top and bottom, through which the withered leaf is fed into the machine on the table. In most cases, the container also rotates. The pressure to which the leaves are subjected between the container and the table are adjustable.

When the leaf juices ooze out, a process of oxidation (generally known as fermentation in the industry) begins

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and the leaf changes its colour and releases the aroma that is characteristic of tea. The degree of rolling required depends on the condition of the wither and the requirements of manufacture.

Describing the chief object of rolling, Mr. Claud Bald observes as follows in his book, *Indian Tea*. 22

"The chief object of the process described as rolling is to burst the cells in which the juice of the leaf is stored; this has to be done by bruising or macerating the leaf without actually tearing it into shreds. The cells being burst open, the juice is liberated and flows over the surface of the leaf so that subsequently when dried, the water only being evaporated, the extractive matter remains on the surface ready to be dissolved at once, on the application of boiling water."

(3) Roll-breaking

From the roller tea emerges as twisted lumps. These lumps are put through roll-breakers. Roll-breakers are in essence sieves with large meshes subjected to mechanical vibration. The well-rolled finer particles which get through the sieve of the roll-breaker are removed and the coarser material is again put through the rolling

machine and the process repeated. The rolled leaf finally leaves the roll-breaker to the fermenting room.

(4) Oxidation or Fermentation

The oxidation which started in the rollers is completed in the fermenting room. Here, the leaves are spread on cement or tiled floor (sometimes on glass floors) in a cool, damp atmosphere. Some factories are using trays or shelves placed in a cabinet, resembling an almirah, with a fan working in front of it to ventilate the trays. In modern times, rotating drum-like machines are used. The leaves undergo a further chemical change through the absorption of oxygen and take on a bright copper colour. It is this process of oxidation which distinguishes the "black teas" from "green teas". The time required for fermentation, depending as it does on a number of factors, may vary from twenty minutes to an hour.

Fine leaves and early flushes ferment rapidly. Therefore, they are spread in layers of about two inches thick. Coarse leaves and late flushes take a longer time to ferment and, therefore, they are spread in layers of about four inches thick. This is done to induce
fermentation by the warmth of the layer. As a rule, rapid fermentation indicates good quality of the leaves. The temperature of the fermenting room should not be allowed to go above 85°F.

Fermentation during the monsoon and winter seasons posed a serious problem for many Nilgiri tea estates. Passing of steam in pipes in the fermenting room to raise the temperature to the required degree did not always meet with success and resulted in the teas being under-fermented. Enthused by the success achieved in Ceylon in injecting oxygen to the room to speed up fermentation, the estates of Nilgiris have now introduced this novel method with great success. The injection of oxygen accelerates fermentation and produces bright liquors.23

(5) Drying or Firing

The purpose of drying is to arrest further oxidation. The manufacture of tea has improved vastly by the introduction of drying machines. Their main functions are to dry the fermented leaves by subjecting them to constant and uniform heat, which may be controlled in

cases of emergency; also inside these dryers the leaves are turned over at regular intervals. The leaves are dried evenly and thoroughly without getting scorched. The automatic tea dryer consists of a large iron box inside which the leaves spread on trays travel slowly from top to bottom while a continuous blast of hot dry air is forced into the box. Careful regulation of the temperature and of the speed at which the trays move is the main factor in successful drying.

"Green tea" is not given the withering treatment. Immediately after the leaves are plucked from the tea bush, they are put into a large steamer and heated. This process softens the leaves and makes them fit for rolling. The juices are prevented from oxidation. The leaves are then rolled again and again until they become crisp. They remain green.

"Oolong Tea" is a compromise between black tea and green tea. The leaves are oxidised, but partially. They turn a greenish brown.

(6) Grading

With the help of sorting machines, the manufactured tea which comes out of the dryer is sorted and graded. The
sorting machines are basically mechanical sieves which keep on vibrating as a result of which tea particles of different sizes are separated. The longer particles are sometimes cut into smaller pieces by cutting machines before they are graded. The grading of tea has reference only to the size and appearance of the processed leaf and not to quality or flavour. The two main grades are (a) the leaf grades, and (b) the broken grades. The more important leaf grades are known to trade as "Orange Pekoe", "Pekoe" and "Pekoe Suchong". The broken grades are known as "Broken Orange Pekoe", "Broken Pekoe", "Broken Pekoe Suchong", "Fannings" and "Dust". The names and grades are based on tradition and custom and do not have any other significance. It may be noted that "Dust" and "Fannings" are used to indicate the size of black teas. While "Dust" is made of very fine particles of tea, "Fannings" are a little bigger in size.

The following description of the various grades will show their characteristic features: 24

(i) Orange Pekoe: The leaves are long, thin and wiry and sometimes contain the yellow tip or bud leaf.

(ii) **Pekoes**: The leaves are shorter and not so wiry as Orange Pekoe, but the liquors generally have more colour.

(iii) **Souchongs**: The leaves are bold and round and they yield more colour.

(iv) **Broken Orange Pekoes**: This grade contains leaves smaller than any of the leaf grades and usually the yellow tips are present. The liquors have good colour and strength and form the mainstay of the blend.

(v) **Broken Pekoes**: The leaves are slightly larger than Broken Orange Pekoe with a little less colour in the cup. This grade is also used as a filler.

(vi) **Fannings**: They are much smaller than Broken Orange Pekoe or Broken Pekoe. The main virtues of fannings are quick brewing and good colour in the cup.

(vii) **Dust**: The term 'dust' has nothing to do with the dust on floor, window sills, etc. It is the name of the smallest grade produced. This grade is useful for quick brewing and strength of tea. It is used only in blends of similar sized leaf, generally for catering purposes.
(7) Packing

After tea has been sorted and graded, the stalks and foreign matter, if any, are removed. Then comes packing for despatch. The container used for packing is plywood chest with aluminium foil lining. Generally chests measuring 19"x19"x24", which carry about 48 kgs. of the leaf and the broken grades, are used as containers. Dust and Fannings are usually packed in smaller chests which can take about 40 kgs. Packing machines for vibrating the chests are used in order that packing may be tight. Finally, the marks for identification of the origin and the contents in the chests are stencilled on the packages. The teas are now ready for the market.

New Methods of Manufacture

The orthodox method of manufacture involves these seven processes. Some of the factories are now using the C.T.C. machines, the Legg-Cutter, the Rotorvane and the Chaff-Cutter. In the C.T.C. method, the C.T.C. machine is used for disintegrating the leaf. In the Legg-out type of manufacture the sequence of steps is planning of steaming, centrifugation, rolling and drying. The final grading and packing are common to all types of manufacture.
A very interesting variety of tea which is extensively used in Tibet and some parts of the U.S.S.R. is known as "Brick Tea". The product may be briefly described as very cheap and coarse teas which, with small twigs, have been compressed into blocks. The chief centre of the industry is Ssu-chuan in Western China. Very little care is exercised in the plucking process. The chief object of the cultivator is to obtain a good weight of the product with as little trouble as possible, and hence the first six or seven leaves are roughly stripped from the twigs or, as is more generally the case, the twigs, to a length of perhaps twelve inches, are literally reaped from the plant. There is no withering or regular fermentation process; the twigs and leaves are at once heated in thin iron pans for a few minutes, and then tied up in bundles and sacks and taken away to the factories or "hongs" where the material is piled in heaps and allowed to ferment. After being dried in the sun, the tea is sorted into grades, when it is steamed and finally pressed into a yellow brick-shaped mould by means of a heavy rammer;

it is often necessary to mix the chopped twigs with a paste made from glutinous rice in order to make them adhesive. In three or four days, the bricks would have become quite hard, and, after being stamped with the maker's name or device, are wrapped in paper and made into strong packages for transport to Tibet and other consuming centres.

III Blending

The quality and appearance of tea varies from one tea-producing district to another, from estate to estate and likewise from month to month. Blending of various types and grades is essential to make the best use of the available supplies and to maintain constant standards. 26 The object of blending is first to arrive at formulas which will cater to individual or popular tastes. Having decided upon blends to suit the requirements of the public, the blender has to select from the teas available in the market those that are necessary to maintain the various blends at the correct standard. It is, therefore, 26

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essential that teas be supplied to the market with unvarying quality both in regard to leaf appearance and liquor qualities. This is comparatively a simple matter in countries such as the United Kingdom where original teas can be stored for long periods without deterioration, but in India the climate is such that it is against storage for more than a few weeks. Therefore, blenders try to obtain the same result without the help of stocks carried over from different seasons of the year.

From the point of view of the producer, blending is of great importance. It enables him to dispose of many teas which would otherwise not be acceptable to consumers on account of their undesirable leaf appearance. Physical blending is carried out by many firms in large mechanical drums. Where drums are not used, fairly efficient mixing can be done on specially cleaned factory floors.

From the point of view of the producer, blending is of great importance. It enables him to dispose of many teas which would otherwise not be acceptable to consumers on account of their undesirable leaf appearance. Physical blending is carried out by many firms in large mechanical drums. Where drums are not used, fairly efficient mixing can be done on specially cleaned factory floors.

**Packing**

Packing is undertaken mainly to provide the consumer a guarantee of fair weight and quality. Distributors

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compete to maintain their good name. The most efficient form of container for the finest quality blends is the tin. However, a high degree of efficiency can also be reached by packing in cartons or packets. These are usually lined with pliofilm, aluminium foil or grease-proof paper. The advantage of efficient packeting is that tea is kept fresh on the shelves of the grocer without being exposed to the atmosphere. Besides, there is no need to touch the tea with hand, right from the time it leaves the factory till it reaches the consumer.

D QUALITY OF TEA

The product of each of the main tea-producing countries of the world has a national characteristic, and each district within each country produces a different variety of tea. For instance, Assam is famous for its strength and body. Darjeeling has a flavour of grapes — muscatel and raisin. The tea from the Ura district of Ceylon is pungent while that from the Dimbula side of the island is flavoury... and so on. But the flavour from each district is not constant throughout the year or season. Spring teas are quite different from autumn teas,
dry-season teas from wet. Says J.M. Scott, 28 "There are about 6,000 tea estates within the various tea-producing districts of the world. The product of each is individual, differing even from an estate only a mile away, just as vineyards do; and each varies with the season, even with each flushing and plucking. If there has been any difference in manufacture that also modifies the taste."

Quality is of utmost importance in the marketing of any commodity. The importance is all the more in the case of tea in the marketing of which there is very keen competition.

I Types of Tea Produced in India

The types of tea produced in India may be broadly classified under the following heads:

(i) Teas of Dooars and Terai
(ii) Teas of Darjeeling
(iii) Teas of Assam
(iv) Teas of Cachar
(v) Teas of South India

**Dooars and Terai**

The bulk of the tea produced here is marketed in the United Kingdom. The very heavy qualities of dull liquoring types after the second flush can be utilized as little more than fillers in large blending establishments and it is only in countries where the predominant taste is for Indian tea that Dooars and Terai can be used throughout the year.

**Darjeeling**

One of the finest varieties of tea is produced in Darjeeling District of West Bengal. The flavour of the teas produced in Darjeeling resembles that of grapes — muscatel and raisin. Although the finer grades of Darjeeling tea realise high price in international markets, the marketing of the heavier weight tea of the rainy season, which does not possess the characteristic flavour of the finer varieties, is a problem. To overcome this problem estates have been trying to lower the cost by stepping up production. But this is no solution to the problem because it adversely affects the second flush and the autumnal quality for which Darjeeling teas are famous.

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Assam

The second flush teas of Assam are famous all over the world. But the teas of Assam of the rainy season are in demand mostly in the United Kingdom. Assam teas of leaf grade without stalk are in demand all the twelve months of the year in Europe. The tippy grades are received well throughout the year in Iran and Eire. The U.S.A. is not interested in tea of Assam produced during the rainy season other than from the best districts of that State. The autumnal Assam teas are popular in the U.S.A., Australia and New Zealand.

Cachar

The teas of Cachar are for the greater part of common varieties. They are in demand mostly in the United Kingdom.

South India

South Indian teas resemble those of Ceylon a good deal. Hence they are in demand wherever Ceylon teas are being sold. It is particularly so when the prices of South Indian teas are a little lower than those of Ceylon. Some of the estates of the Nilgiris District (e.g., Prospect Tea Estate, Non-Such Tea Estate, etc.) produce very fine quality teas. The teas of this district as
well as those of Travancore are preferred in the U.S.A. and Canada, especially the finer variety. Teas grown at lower altitudes are sold in Australia and New Zealand.

II Quality and Manufacture

Broadly speaking, there are two methods of manufacturing tea, the wither and the non-wither methods. The wither method itself can be of two types viz., the ordinary and C.T.C. types. Thus, there are three types of manufacture:

(1) The C.T.C. \} wither type
(2) The ordinary \}
(3) The non-wither (tobacco cut) type

(1) In the C.T.C. method of manufacture the withered tea is passed through a special machine (C.T.C.) which provides a brownish leaf which yields a coloured liquor. Consumers like coloured liquor. This method seems to yield the best results in the manufacture of quality leaves grown in Upper Assam.

30 The Legg - cut type of manufacture involves the following sequence of steps: planning of steaming, centrifugation, rolling and drying.
(2) The wither (ordinary) method results in hard well-rolled leaves which are in demand the world over. Planters in their eagerness to reduce the cost of production allow tea of this description to be somewhat stalky. But it will be in their own interest if they produce stalk-free teas.

(3) The non-wither type of manufacture results in dry leaf which is flaky. It has the advantage of brewing quickly. Though in most countries non-wither teas are looked upon with disfavour because of their poor keeping qualities, the blenders of the United Kingdom gave considerable support to it before the Second World War.

III Factors Determining Quality

The term 'quality' refers to certain desirable characteristics which tea-tasters are able to identify. 31

31 "At a tasting session a large number of teas — several hundred in the course of a day — are tasted. A tenth of an ounce of dry leaf — the weight of a sixpenny piece — is infused for exactly six minutes (sometimes five) and decanted into a cup. The pot is then turned upside down and the used leaves piled in the lid. A sample of dry leaf is displayed beside them."

"Picture a long room with a north light like a studio, for the accurate appreciation of colour is vital. The teas are arranged in columns of three — at the back of a row of tins containing several ounces of each tea in
Important among them are:

(a) briskness and brightness
(b) pungency
and (c) strength and body.

(continued)

dry form, in the middle row heaps of infused leaves, and in the front row the steaming cups. The dry leaf is examined visually to note the colour, twist, evenness of grade, presence or absence of dust or stalk; it is touched with the fingers to test crispness; then a little is placed in the palm of the hand, warmed and moistened with the breath and then inhaled. Then the infused leaf — the infusion as it is called — is examined. Ideally it should be as bright as a new penny and of that colour throughout. Often the taster makes a pile of the wet leaves and puts his nose into them to test the aroma. Eyes, nose and touch have already told him a lot about the tea. He is ready for the final evidence of actual tasting.

"There is a certain dignity about wine-tasting. Serious men slowly chew the wine, forcing it into the recesses of the mouth, their eyes seemingly focussed far away on the sunny vineyard where this wonder grew. Certainly the spit can be a shock but, done well, it is no more ugly than an exclamation mark accentuating the final judgement."

"The tea-taster generally goes round with a spoon — quite a humble-looking spoon with none of the dignity of a silver taste-vin. He fills it with the liquor, as he calls liquid tea, and sucks this into his mouth with a noise very similar to that made by an emptying soda-water siphon. A second later — no more — the liquor is spat out again into the big spittoon. Apart from the action being inelegant the tea does not seem to have been given a fair trial."

"But it has, for the proof of the tasting is in the final blend. The violent inhalation of the liquor — it is more than imbibing — has thrown it against the pertinent parts of the mouth up to the back of the nose for a final vote from the olfactory nerve. Tea tasting is quick yet thorough, and there is neither bluff nor snobbery in it anywhere." (J.M. Scott, The Tea Story, Heinemann, London, 1964, pp. 181-182.)
Quality appears when the growth of the bush is comparatively slow; it tends to disappear during the heavy flushing season when the leaves grow fast. In the same estate quality may differ from one bush to another. Perhaps, by seed selection and vegetative propagation, quality differences may be lessened. If quality is not present in the quality season, in an estate situated in a quality district, there is obviously something wrong. Also, nothing much can be done to produce liquor quality in a district which produces predominantly non-quality teas.

The quality periods in India may be tabulated as follows:

Darjeeling:
- First flush quality - April to May
- Second " " - May to June
- Autumnal quality - October to November

Assam:
- First flush quality - May & June (first half)
- Second " " - Second half of June
- Autumnal quality - November

Cachar:
- Cachar does not produce teas with liquor quality.

South India:
- The quality season is generally from January to March. There is some slight improvement in quality in August and September.
Apart from liquor quality, consumers look for leaf appearance also. Egypt and Iraq prefer teas that are black. Tippy teas are popular in Eire and Iran. Fannings are in demand in the United Kingdom. They are also popular in Canada and the U.S.A. where fannings are used in 'tea bags'. European countries prefer clean broken grades, though during the pre-War years they absorbed leaf grades which had to be well-twisted and stalk-free.32

The factors which determine the quality of tea may be analysed as follows:

(i) Climatic and Seasonal Factors

These two factors, which are intimately related to each other, have a profound effect on the quality of tea. The slow growth of the tea bushes is mainly due to low temperature which, in turn, results in the production of quality teas. Conversely, high temperature and humidity are conducive to heavy flushes which bring down the quality of tea.

(ii) Soil

There does not seem to be any strong correlation

between the nature of the soil and the quality of tea. However, the teas of Dooars grown on what is known as "Red Bank" possess quality which is missing in the neighbouring areas. The same is the case with the red lateritic soils of Assam.

(iii) Production Methods

Plucking of the leaves and processing affect the quality of tea much more than any other factor. It is now a matter of common knowledge that finer plucking results in better quality tea; coarse plucking can produce only poor liquoring stalky teas. The present plucking standards are not good enough to produce a good leaf appearance in the final product. Labour as well as planters fall a prey to coarse plucking.

Planters of North-East India take to annual pruning along with the cleaning of the unproductive growth because they consider it necessary for the production of finer quality. In South India, because of the difference in conditions, annual pruning is seldom undertaken.

Processing method should be good if the quality of tea is to be good. Good leaves can be spoilt by bad manufacture. Good tea requires a good wither. The finer
varieties of tea are those which have been well withered. High firing, stewing, bacterial infection, etc., cause deterioration in quality.

(iv) Seeds

As in the case of most plants and their products, tea seeds have an important bearing on the quality of tea. Flavoury tea is produced by China and China hybrids which are grown in Darjeeling. Selected Assam types produce strong quality teas in the plains.

(v) Transport

Speedy transport of processed teas from the factory to the consuming centres is of utmost importance. Prolonged storage of a hygroscopic commodity like tea leads to deterioration in quality. In North India, difficulty is often experienced in the movement of tea from the estates to Calcutta. Teas thus delayed lose their fine quality.

(vi) Quality of Packing Material

Though tea is generally packed in plywood chests, the panels (or battens) used are sometimes of unseasoned and unsuitable timber. When that is so, the quality of the contents deteriorates. Tea is particularly vulnerable to odour. Therefore, it is important that
the packing material should be completely odourless. Losses through taint, however, have been less numerous than actual physical losses through bad packing material which either through poor manufacture, poor casing, unsuitable timber or borer infection, is not strong enough to carry the tea safely from the factory to the consumers.

(vii) Manufacturing Capacity

Inadequacy of manufacturing capacity is yet another factor which affects quality adversely. There are many factories which deal in crops much in excess of their capacity. Consequently, quality suffers. In many cases, the withering space is inadequate. During the heavy flush season the position becomes still worse with the result that great pressure is thrown on the firing process for which many factories have insufficient machines. It is, therefore, natural that the product should lose its appearance. Badly sorted stalky teas generally come out of factories which are striving hard to cope up with enormous quantities of green leaves which they (the factories) are not in a position to process.

(viii) Adulteration

Unscrupulous dealers take to many different ways of
adulterating tea. When the price of tea rises owing to a temporary shortage of supply, the malpractice becomes widespread. It is difficult, if not impossible, to make an accurate estimate of the extent to which adulteration prevails. But there is no doubt that this anti-social activity is widespread in the case of common teas sold in the domestic market.

The problem of adulteration may be studied by taking note of the kind of adulteration that is indulged in, in the different regions of the country. For this purpose the country may be divided as follows:

(1) North-West India,
(2) South India,
(3) North-East India,
and (4) West India.

(1) North-West India

The Amritsar tea market handles cheaper varieties of black teas. It is reported that Amritsar sends a high percentage of adulterated tea to Uttar Pradesh and East Punjab.
(2) South India

Adulteration is rampant in South India. What is worse, dealers licensed by municipalities are selling adulterated tea in the open. The two South Indian towns which have become notorious for adulteration are Virudhunagar and Tuticorin. Whenever such malpractices are brought to the notice of the municipal authorities, the dealers are at best fined and their licenses withdrawn. But the business of dealing in adulterated tea is still carried on, underground. Kozhikode (Kerala) is another town where this malpractice is widespread. The materials used for adulteration are generally black gram husk, "avari leaves" and saw dust.

(3) North-East India

In this region adulteration of tea is practised on a large scale, particularly in Calcutta. During its tenure, the Indian Tea Market Expansion Board paid the salary of a Calcutta Municipal Inspector whose duty was to detect cases of adulteration of tea. The Board also paid an allowance to the Municipal Analyst to analyse the samples given by the Inspector. The results of the analyses are

indeed interesting. In one single year, out of 332 samples analysed, 65 were found to be adulterated. That amounts to about 20 per cent. In another later year, in the analyses for just two months, out of 50 samples submitted, 17 were found to be adulterated. This works out to about 34 per cent.

Much of the adulterated tea is usually sent out to far off villages where inspection is conspicuous by its absence.

(4) West India

Bombay is the centre of adulteration in Western India and the main adulterant used is black gram husk. Much of this adulterant is secured from Cochin. The adulterated tea is sent not only to other States in India, but also to countries around the Persian Gulf.

That adulteration of tea is reprehensible needs no emphasis. Only concerted and continuous action by the Government and municipal and other local authorities can minimise the evil of this anti-social activity. Intensive consumer education may also be of help in curbing adulteration.
Unscrupulous dealers also take to other fraudulent ways, some of which are as follows:

(i) **Packing**: Tea factories produce large quantities of what are known as the "residue" grades. Dealers who buy these teas ex-factory pack them in hessian bags because it is cheaper to do so. Then they are transported over long distances. Whatever little quality the "residue" grades possessed is lost when packed in hessian bags.

(ii) **Tea Sweepings**: Dealers in Calcutta receive considerable quantities of tea sweepings, particularly towards the end of the season. These approved dealers are expected to sell the sweepings to approved shippers for export or to approved buyers in Calcutta for extracting caffeine. But, in actual practice, the sweepings are sold to tea merchants who mix the sweepings with good tea.

(iii) **Regenerated Tea**: Considerable quantities of infused tea leaves are sun-dried and soaked in some chemical solution. When treated thus, the leaves begin to get a fresh appearance. Such teas are sold in considerable quantities in the industrial areas of Calcutta and Bombay.
(iv) **Other Adulterants:** It is not possible for the untrained eye to detect adulteration when tea is mixed with chemically-treated black gram husk. Chemical treatment also ensures some degree of colour in the infused liquor. "Manjanati" leaves and the bark of acacia are also mixed with tea. In Calcutta, acacia bark is treated with tannic acid and used as an adulterant. Generally, these adulterants are mixed with "fannings" and "dust".

**Anti-Adulteration Measures**

When teas are meant for exports, it is not practicable to institute an elaborate system of safeguards to prevent adulteration. It is well-nigh impossible to check all the packages before shipment. Business depends on faith and any dispute may be allowed to be settled by the buyer and the seller. Where the buyer and the seller are not able to settle the dispute, provision may be made for arbitration.

As regards the domestic market, the increasing traffic in processed "avari" leaves and black gram husk needs to be totally banned. Prosecution of offenders will have a wholesome effect. Besides, complaints may be
invited from bona fide dealers and the public about the anti-social activities of tea vendors. It would be desirable to pack tea wastes in plywood chests and not in hessian bags. Dealers should not be allowed to transport the tea they buy from factories unless they are packed in plywood chests.

IV Suggestions for Improvement of Quality

(1) It is important that tea plantations should be provided with reasonable facilities for expanding their manufacturing capacity. It would mean, firstly, the allotment of building materials like structural steel, cement, etc. It would also mean a liberal public policy in permitting imports of machines and other requirements which tea factories urgently need. It is true that many items of indigenous manufacture have reached high standards of performance, comparable with the imported items. But the judgement on performance standards of machinery and equipment used by the producers should be theirs and import policy in regard to such a valuable foreign exchange-earner should be a matter for detailed discussion, consultation and decision. The requirements of the industry in the matter of import allocations deserve urgent consideration.
(2) While transport facilities are not bad in South India, many North-East Indian estates have been experiencing transport difficulties. The provision of increased allotments of suitable watertight wagons for the movement of tea from the estates to Calcutta in North-East India and to Cochin in South India will go a long way in the improvement of the quality of Indian teas.

(3) Fine plucking and finer varieties of tea go together. The chief obstacle to fine plucking is the eagerness of labour to earn more. The question of a bonus for fine plucking has been examined by associations of producers and considered not feasible. The problem of fine plucking is thus eluding solution. However, given a certain amount of co-operation between labour and industry, surely a way can be found. Coarse plucking is suicidal in the long run not only to the industry but to labour as well. Besides, other things remaining the same, Indian teas will be able to compete effectively in world markets, if plucking is fine.

(4) Warehousing facilities need improvement. There must be space enough for hundred per cent inspection, for such inspection helps improve quality. Many of the
operations in the warehouses are performed with hand. If handling is mechanized, deterioration in quality can be checked to some extent.