Lecture 19
Tropical Beverage Crops—Tea

***Camellia sinensis*, formerly *Thea sinensis*; Theaceae**

Tea History

- Originated in SE Asia (western and southern China, Cambodia, Laos, Burma (Myramar), & NE India).
- Long grown in China, earliest use was probably medicinal, but used as a beverage for 2000–3000 years.
- First brought to Europe in the 16th century but did not reach eastern Europe until after 1650, when coffee drinking was well established.
- Use became general in Europe in the 18th century and replaced coffee in Britain who spread the tea-drinking habit throughout their sphere of influence.
- Tea ceremony in Japan is an important cultural heritage.
- Boston Tea Party (1773)
- Opium Wars (1839–1844)

Current Uses

- Tea remains the most inexpensive beverage.
- In the United States ice tea is very common in the South and is increasing in popularity. It is now canned as a noncarbonated soft drink.
- Herbal teas made from other plants have increased in sales.
- In Arab countries, especially in Morocco, infusions of tea plus mint are very common.

2001 World Production

Continent	1000 tonnes	Chief countries
World	3,059	
Africa	421	Kenya (240), Malawi (45), Uganda (33)
South America	70	Argentina (50), Brazil (9), Peru (7)
Asia	2,554	India (855), China (711), Sri Lanka (295)
Europe	5	Russian Federation (5)
Oceania	10	Papua New Guinea (10)

Botany

- An evergreen or semi-evergreen tree, 15 m tall but in commercial production tree is pruned to a shrub.
- It is closely related to camellia.
- There are two major groups of tea plus hybrids:
  - Chinese teas (var. *sinensis*; syn = bohea, viridis, thea). These are the most adaptable teas, about 10 m tall. More tolerant to cold than assam teas.
  - Assam teas (var. *assamica*) are fast growing tall trees, requiring high temperature.
    - There are dark and light foliage types.
    - The lighter the leaf, the darker the infusion but dark leaves have greater flavor and astringency.
  - Djarling teas are hybrids between Chinese & Assam teas, so named because grown in Djarling, India)

There are a limitless number of cultivars

Important characteristics are:

- Continuous high yields
- Frost resistance
- Recovery from insect or disease depredation

Ecology

- A subtropical plant adapted to temperatures between 13° to 30°C.
- All of the subtropics and mountainous regions of the tropics are suitable.
- When dormant it will withstand temperatures below freezing but N and S limits are set by 0°C winter isotherm.

- Highest quality tea is produced in cool climates.
- Most suitable areas have 100" of rain, evenly distributed.
- Will not do well with less than 80" because shrub suffers under drought, but also declines with prolonged wet season because of reduced sunlight.
- Requires deep friable soil.
- At low elevations yield increases but quality declines.

Tea estate, Ceylon, 1968

Culture

- Propagated cheapest by seed (the best are from selected clones), but also vegetatively propagated from cuttings and by budding.
- One thousand cuttings can be obtained from a shrub each year.
- High moisture in shade is necessary for rooting.
- Rooted cutting is transplanted after 3 years.

Propagation of tea, Ceylon

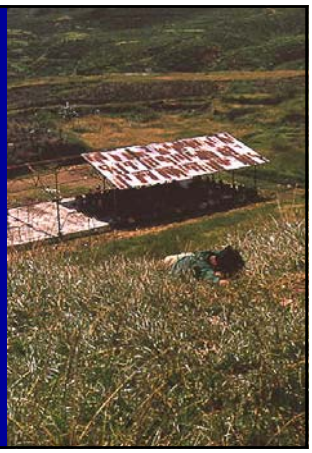
Propagation of tea, Ceylon

- Typical planting density is 100,000 shrubs per ha (4000/acre).
- Nursery is usually shaded.
- Tea plantation is typically shaded when young with leguminous trees which are reduced as planting matures.
- Pruning is carried out for framing, shaping to maintain a plucking surface, maintenance, and rehabilitation.
- Harvesting of leaves has a pruning function.
- Tea responds well to fertilizer.

Tea on the road to Bandung, Java, Indonesia

Tea estate, road to Bandung

Tea worker at break, Java



Asian tea propagated from seed

Harvest

- A balance between quality (very young shoots) and yield is required.
- Usually a terminal bud and two to three leaves are harvested by "plucking."
- Finer plucking give greater number of new shoots.
- Coarse plucking gives higher yields at first and then adversely affect yields.
- Quality increases with the frequency of harvest.
- A typical cycle is harvest after 7 to 10 days.
- Care must be taken not to bruise the leaves.
- Mechanical harvesting carried out in Japan and Russia.

Tea plucker, Ceylon, 1968

Tea plucker, Ceylon, 1968

Tupi tea company, Registro, Sao Paolo, Brazil, 1965

Tea fields

Shirley at tea farm

Harvesting tea

Processing

Three main types:

- Black tea—fermented tea
- Green tea—low volume, high quality, not fermented but heated first
- Oolong—partially fermented.

Four steps:

1. Withering and drying.
   Fresh shoots are 75–80% water, spread on trays, may be heated.
2. Rolling and sorting.
   Leaves are separated from the tips and crushed to distribute sap using a corrugated table and cylindrical rollers.
   First rolling without pressure for 1 hr; later rollings with increasing pressure and higher speed 45 to 60 min. (longer rollings stronger teas; less rolling lighter and more flavorful teas) followed by sifting and grading.

3. Fermentation. 21°–25°C, 90% humidity.
   Complex biochemical changes; requires oxygen.
4. Drying. 20–25 minutes at 90° to 100°C, moisture reduces to 3–6%; sorting on screens.
5. Grading. Teas are graded on appearance, uniformity, and aroma.
   There are 3 grades:
   Leaf teas (orange pekoe—regular pieces with orange tip; pekoe; pekoe souchon; souchon)
   Broken teas
   Lower grades

Tea factory in Registro, wilting room

Rolling tea leaves before fermentation, Ceylon

Black tea after fermentation

Loading tea