A VISIT TO INDONESIAN TEA PLANTATIONS AND RESEARCH INSTITUTES

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General

The republic of Indonesia consists of six large islands and numerous smaller islands numbering about 13661. The capital of Indonesia is Jakartha. The population of Indonesia is composed of many ethnic groups. The national language is Basha Indonesia.

Indonesia has a tropical climate with heavy rainfall, high humidity and a high temperature. The average rainfall which is well distributed is about 120 inches per year with the wet season from November - March and the dry season from June - November.

Indonesia is essentially an agricultural country and it is the mainstay of the economy. Nearly two-third of the employment is provided by the agricultural sector and out of the agricultural exports the main products are Rubber, Tobacco, Sugar, Palm Oil, Tea, Coffee, Cocoa and Cinchona. A major part of the export crops are produced in large plantations while a comparatively small amount is contributed by small holdings. The main food crops are paddy, maize, yams, fruits and vegetables. Oil is the major foreign exchange earner of the country.

THE INDONESIAN TEA INDUSTRY

History

The Indonesian tea industry was started in west Java in 1826 by planting seeds of the China variety imported from Japan by the government. Tea is grown in two islands of Indonesia viz. Java and Sumatra, with the major part of the tea (about 80%) being grown in west Java. Though the land was owned by the government, the industry made very little headway which compelled

the government to handover the plantations to private organisations. The government sold the tea lands to private companies in the mid 1860s. In 1878 these companies imported high jat tea seeds from India (Assam) and planted them on a large scale, adopting modern technology as a result of which the tea industry which was not making any profits became a viable and a profitable industry. The first plantations in Sumatra commenced in 1910. During the World War II, the tea industry suffered considerable setback due to the Japanese occupation, when large tea acreages were uprooted and converted to short term cash crops like vegetables etc. (Even at the present time, it was observed that some prefer to grow vegetables in tea lands, for some time before re-planting).

The remaining plantations were collar pruned and neglected. Further neglect of the tea industry occurred during the struggle for independance during the period of 1945 - 1950 and during the political unrest in 1950.

In 1958 the Indonesian government nationalised all the companies owned by the Dutch nationals. At the initial stages after nationalisation the industry faced tremendous problems due to the lack of experienced personnel to run the industry and for want of capital. Since 1965 the government took positive steps to rehabilitate the industry with aid from the World Bank resulting in significant improvements and is today on a sound footing. Before World War II the Indonesian tea area was estimated to be composed of 138,000 hectares of estates and about 75,000 hectares of small holders. The exported tea amounted to about 83,000 tons (18.5% of the world exports volume) and its value was 7.5% of the total Indonesian exports, being the second biggest foreign exchange earner after rubber in the agricultural sector.

Due to the difficulties faced during the earlier period, the present tea acreage consists of about 68,000 hectares (40,500 hectares owned by the government estates corporation called PTP "Perseroan Terbatas Perk-bunan" and 27,500 hectares owned by private estates and agencies) and a further 40,000 hectares owned by "Productive" small

holders. The national production is about 106,800 tons which comprises of 86,000 tons Black Tea, and 20,800 tons Green Tea. The green tea is mainly for local consumption while about 74,000 tons of Black Tea is exported. Presently tea takes the fifth place among the agricultural exports from Indonesia.

Present Tea Plantations

In Indonesia tea is grown mainly in the elevation range of about 300 - 1800 m above sea level and in most of the areas where tea is planted the rainfall is well distributed having an average rainfall of about 120 inches/ year. The tea areas are classified into three soil groups:

a. Andosol - about 52% of plantations are found on this soil type

b. Red-Yellow Podzolic - 18% of plantations are found on this soil

c. Latosol - 15% of plantations are found on this soil

The large plantations consist of 110 tea estates, 39 government corporation owned, and 71 privately owned. The size of estates range from 250 - 2700 hectares. The number of small holdings are around 30,000 and their size is in the range of 0.5 to 12 hectares. The small holdings cover about 60% of the total tea area. The plantations are mainly of seedling tea with a good jat and very little replanting is undertaken. Much attention is paid to infilling than for replanting. The clones recommended for infilling and replanting are according to the elevation and in all elevations TRI 2025 and TRI 2024 is used along with local clones.

Fertilizer

Normally the fertilizer recommendations are on a replacement basis of N - 12%, P_2O_5- 2% and K_2O- 4% mixed in a ratio of 6:1:2 and usually fertilizer is given in three to four applications per year. The source of Nitrogen is SA and Urea. During the first year only SA

based mixtures are used while urea based mixtures are used only from the second year after pruning. Half the quantity of N is given in the form of straight fertilizers.

Cultivation Practises

The present plantations consist mostly of the Assam jat of seedling tea and since this tea has a very good cover, replanting is not encouraged while infilling is done on a large scale. Under Indonesian conditions the need to replant does not arise so much in view of the high yields obtained, which presently is about 1500 to 2500 kg/ha in PTP estates. These high yields could be attributed to the following factors:

a. The long rest that the tea bushes are given and the rest that they have earned during the years of unrest in the country which contributed to the excellent frame formation.

b. The very deep soil with a rich organic top soil layer of about 60 - 120 cm. This is purely due to the volcanic origin of the soils.

c. The good weather conditions without any drought periods with a well distributed rainfall, the lowest rainfall experienced being about 100 mm in the dry periods.

d. The coarse plucking (compared to our standards) and inclusion of refuse tea in the production figures (the refuse tea is used for making batik dyes in the world famous Indonesian batik industry).

e. Very cordial relationship existing between the labour and management without any labour unrest. This is due to many incentives given to workers such as 5 days paid leave for every 25 continuous work period, incentive payments for over poundage, etc.

Infilling

While very little replanting is encouraged infilling is practised with clonal teas such as TRI 2025,

TRI 2024 and local clones.

Pruning

The usual pruning cycle is 4 to 5 years and a high prune of 50 to 60 cm above ground level is practised with no cleaning at all. Though the Research Institute has recommended rim-lung pruning this is hardly adopted. This type of pruning could be adopted as there are no incidents of pests such as Shot hole borer, Live wood termite or fungal diseases such as stem and branch Canker. Once in about 3 to 4 cycles the pruning height is brought down but very little cleaning is done. In view of the non-adoption of sanitary pruning, we observed considerable amount of wood rot on the tea bushes.

In all the plantations that we visited, every attempt is being made to retain the prunings in the field, by employing field watchers, though it is a difficult task.

Soil Conservation

Hardly any soil conservation is done. Non-adoption of such measures do not result in much soil erosion because the tea plantations are located in flat lands or those with very little slopes though situated in high elevations. Furthermore, there is not much of soil wash due to the very good cover of tea.

Shade

Until Blister Blight *(Exobasidium vexans)* was experienced in 1949, shade was grown in the plantations. The types of shade grown were *Albizia, Leucaena* and *Erythrina.* At present all plantations have removed the shade to control Blister. Nevertheless we saw some shade trials at the Pasir Sarongge Research Station and was told that there is some re-thinking about shade.

Rehabilitation and Green Manure Crops

Rehabilitation is done before block infilling which is mostly adopted, and Guatemala grass is grown as the rehabilitation crop. This grass is also grown to control *Poria* (red root disease), but this is not effective. *Crotalaria* and *Tephrosia* are grown as green manure crops.

Pests and Diseases

Blister blight is the most serious disease experienced. The first outbreak occurred in North Sumatra in 1949, and in West Java in 1951. Shade was completely removed due to the heavy loss in crop as a result of Blister Blight. Blister is now effectively controlled by spraying copper fungicides. The most important root diseases are Red Root *(Poria hypolateritia)* and Black Wood Rot *(Rosellinia arcuata)* which is still controlled by conventional methods such as digging deep isolation trenches and planting rehabilitation grass such as Guatemala and no chemical method of control is adopted. No serious pests affect the plantations except for seasonal mite attacks which is effectively controlled by chemical spraying.

Nursery Techniques

As in Sri Lanka, vegetative propagation is done with single-node cuttings planted in polythene bags, the difference being that the bags are 2/3rd filled with an earth soil mixed with a NPK fertilizer mixture and the balance 1/3rd is filled with jungle soil. The soil is watered before planting the cuttings and all the bags are sealed with polythene tents for three months. This method helps in faster growth of roots and shoots by maintaining a high temperature and humidity. Above the polythene tent high shade is provided with coir matting or ferns. The only other fertilizer given is in the form of foliar application. The plants are restacked and trained as done in Sri Lanka. Plants are kept in the nursery for at least 9 months prior to planting.

Processing

Two types of processing are done:

1. Black Tea
2. Green Tea

Black Tea: The Black tea processed in Indonesia is of the orthodox type as in Sri Lanka. The entire process adopted is similar to that of Sri Lanka. In all the factories that we visited the work force wear gloves, masks, as well as head caps and boots and the inside as well as the outside surroundings of the factories were kept very neat and clean and they adopt high standards of sanitation. Most of the newly constructed factories have given careful thought to the internal and external lay out in order to obtain a pleasing appearance with beautiful lawns and well planted trees and ornamental plants. The heat used for drying is generated using fuel which is cheap. This is understood because Indonesia produces its own fuel and almost all equipment and machinery are made in the country except for the fluid bed drier.

Green Tea: A number of private estates produce green tea, besides black tea, and leaf from small holders is mainly processed for green tea in a number of small factories numbering about 800. The process adopted (Pasir Sarongge) in making green tea is as follows:

The fresh leaf is withered in rotating drums or pans and the withered leaf is then rolled in rollers similar to black tea. The rolled tea is dried in a black tea drier and this is followed by drying again in rotary drums. This is done to obtain a curled made green tea to suit consumer preference.

The green tea so processed in West Java is then sold to Jasmin tea processors, who are found concentrated in central Java, where Jasmin is grown extensively. The process of Jasmin tea manufacture is to fire the green tea in baskets above charcoal fires. The green tea then becomes extremely dried and black and Jasmin flowers are mixed with this and then

moistened. Once the tea absorbs the fragrance of the flowers, the mixture is re-dried and the excess flowers are removed. The re-drying is done in black tea driers. Jasmin tea is sold in packs of different sizes. Since 1978 this tea is sold as bottled tea which is becoming popular as "Soft Drinks".

Marketing

Only black tea is exported from Indonesia and is sold through Jakartha auctions which is a government organization. These auctions are held every Wednesday of the week. From the total production of 106,800 tons tea, about 74,000 tons of black tea is exported and 12,000 tons of black tea and 20,800 tons of green tea is used for domestic consumption. The tea is exported mainly to U.S.A., Australia, Holland, U.K., New Zealand, Pakistan, Singapore and Egypt.

Research

Research on tea was started in 1893 at the Botanical Gardens in Bogar and in 1902 a Research Institute for tea was established as a division of the Botanical Garden. In 1912 the Research Institute came under the Administration of the Ministry of Agriculture. In 1932 the Institute was amalgamated with the Research Institute for Rubber and was responsible for research on Rubber, Tea, Coffee, Cocoa and Cinchona. From 1942 - 1966 very little work was done due to the unrest in the country.

In 1973 in accordance with the policy of the government to have separate research institutes for different crops the Research Institute for tea and cinchona (RITC) was established, and located in Gambung.

The construction of laboratories was completed in 1974 and the factory in 1976. The Institute was inaugurated in 1976 when Indonesia celebrated the 150th anniversary of the Indonesian tea industry. The Institute is situated in the main tea growing area i.e. in West Java at an altitude of 1280 m above sea level. The Institute

functioned on a cess fund and with the abolition of the cess, from 1980 the Institute is financed by the government estate corporations (PTP).

Functions and Service of the RITC

The function of the RITC is to carry out research into all aspects of Tea and Cinchona industries, and to disseminate the research findings to tea planters and small holders.

The services of the RITC consists of providing advisory services to plantations and small holders by visiting the plantations and small holdings, provide publications, hold workshops, symposia, demonstrations, etc. The Research Institute consists of the following deparments:

Head of the Institute - Director assisted by an Assistant Director (Research) and Assistant Director (Extension).

Departments:

1. Agronomy
2. Cinchona Agronomy
3. Plant Protection
   a. Plant Pathology
   b. Entomology
   c. Weed Science
4. Plant Breeding
5. Soil and Fertilizer
6. Processing
7. Analytical Chemistry
8. Socio-Economics
9. Advisory and Extension

Besides the RITC head quarters at Gambung it has four other stations in Pasir Sarongge, Simalungun, Bah Butong and North Sumatra. The latter three are small extension centres with the green tea factory being located in Pasir Sarongge.

The Gambung estate in which the RITC is located is 636 ha in extent out of which 250 ha is in tea. This provides land and co-ordinated field trials and provides facilities to do research studies in Socio-Economics as well.