

A GEOGRAPHICAL APPRAISAL OF THE TAIWAN TEA INDUSTRY*

臺灣茶業的地理評價

By

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The Study: Purpose and Procedure

The tea industry of Taiwan provides an intriguing and valuable topic for analysis by the agricultural geographer. cursory examination of statistical sources and maps readily accessible to this profession reveals the following facts. Tea ranks as a chief cash crop in Taiwan. Its production is more highly geared to foreign markets than any other except sugar cane. It is a major earner of foreign revenue. Its area of production is more localized than any other notable crop. The tea gardens occupy lands largely unsuited for cultivation of other crops. There is a large number of tea planters with small acreages. The tea industry is a major employer of labor.

These facts were major stimuli of the writer's interest in carrying out a complete geographical appraisal. This interest began shortly after coming to Taiwan in 1949, first when he was a student at Taiwan Normal University, and continued on during his service on the faculty of the same institution. In 1958 when the writer formalized plans to come to Oregon State University to pursue graduate study he selected this thesis topic and initiated detailed

*Sincere appreciation is expressed to Professor Richard M. Highsmith, Jr., Department of Natural Resources, Oregon State University, for his helpful criticism of the first draft of this paper, and to Professor Hsueh-chuen Sha, Department of Geography, Taiwan Normal University, for his valuable suggestion for the field work. The material for the paper was collected while the author was a teaching assistant at Taiwan Normal University, 1957-61, and the content is therefore limited to the period before 1961.

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study. This continued through mid-1961. This phase included perusal of published materials, books, journal articles, experiment station bulletins, and governmental statistics. It also included much field work; interviewing tea planters, processors, administrators, and scientists; and mapping distributions and case study farms. The basic data had been assembled and much of the analysis completed before the writer arrived in the United States. At Oregon State University the limited sources in English have been reviewed and this brief synthesized presentation of all the findings prepared.

The main objectives are: (1) to examine the physical and societal basis for the industry in Taiwan; (2) to trace its evolution; (3) to examine its structure, significance, practices, and trade pattern; and (4) to isolate its problems and offer an opinion relative to its prospects.

The Significance of Tea to the Economy of Taiwan

There are about thirty-two thousand tea farms on forty-seven thousand hectares of land in tea in Taiwan. Both figures are about five percent of the total number of all farms and cultivated land area in Taiwan respectively. In northwestern Taiwan, twenty per cent of the total farms are tea farms and twenty-two percent of the total cultivated land area is devoted to tea gardens (See Table 1). Northwestern Taiwan has the overwhelmingly dominant portion of the tea growing area of Taiwan.

Table 1. The Importance of Tea Farming in Northwest Taiwan, 1959

| Hsiens | Cultivated Land (A) | Tea Gardens (B) | Percent (B/A) | All farms (C) | Tea farms (D) | Percent (D/C) |
|---------|---------------------|-----------------|---------------|---------------|---------------|---------------|
| Taipei | 57,100ha. | 17,101ha. | 29.9 | 40,842 | 12,138 | 29.7 |
| Taoyuan | 58,326 | 9,820 | 16.8 | 39,800 | 4,872 | 12.2 |
| Hsinchu | 44,244 | 12,852 | 29.0 | 32,063 | 8,113 | 25.3 |
| Miaoli | 41,923 | 5,154 | 12.3 | 37,374 | 4,956 | 13.3 |
| Total | 201,593 | 44,927 | 22.3 | 150,079 | 30,079 | 20.0 |

Sources: Taipei, Taoyuan, Hsinchu, and Miaoli Hsien Governments.

Annually, Taiwan produces seventeen million kilograms of crude tea which are worth five million and five hundred thousand U.S. dollars. In terms of the value of agricultural production, tea is less than those of rice, sugar

cane, sweet potato, and vegetables, and ranks the fifth.

Among the exported commodities, tea ranks third and earns seven million U.S. dollars of foreign exchange for Taiwan annually.¹

There are about thirty-two thousand tea farm households. Consequently, tea production supports an industry of 366 tea factories with about six thousand workers. In addition there are many others engaged in buying and selling, packing, exporting, and flower gardening. The plucking of tea leaves needs much hand labor. Tea pluckers generally are women and girls from over-populated local villages and they are not capable of helping in the production of other crops. Therefore, the total population supported wholly or partly by the tea industry is about four hundred thousand.

In terms of land use, the land in tea is not suited to food crops. To plant tea, on one hand can extend land up the slopes, and on the other hand it brings additional income to the land owner.

In summary, the tea industry is one of the chief economic bases of Taiwan. Tea is the third largest exported commodity, a major source of foreign exchange. Tea makes possible intensive use of about 40,000 hectares of land not suited for growing food crops. The tea industry is also a major employer. In Taiwan with its rapidly growing population and limited land, the tea industry is truly significant.

The Physical and Societal Basis of the Industry

Introduction

Tea is well suited to both physical and societal conditions in Taiwan. In the northwestern part of the island, hill slopes and tableland surfaces with rather deep well-drained soils, relatively even-distributed annual rainfall of 2,000 mm. and a growing season of more than eleven months favors the growth of the tea trees. Plentiful and cheap labor supply, the encouragement and help of the government, good local transportation facilities, and a wide overseas market also are favorable.

¹Tea is less than sugar cane and rice. Textiles and canned pineapple are very close competitors.

The Ecological Requirements of Tea

The limitation of land relief to tea trees is not critical. Tea trees can grow from level lands to hill slopes. Some of the best teas, however, are commonly produced on the rather high hills (41)² where growth is slow and yields are low (35). In Taiwan, no tea garden is found above 1,000 meters (28) because the low temperature during a winter night is a discouraging factor.

Except in very general terms it is difficult to specify the ideal or the average climate that tea requires, especially in respect to rainfall (35). As an evergreen plant, the tea tree can grow in many humid parts of the world, except where temperatures are too cold or too hot (8). Commercial production, however, flourishes only in the rainy regions of the tropics and subtropics, where moderate to high rainfall in excess of evaporation and equable temperatures with high humidity throughout the greater part of the season exist. For optimum production temperatures should not fall below 13°C nor exceed 30°C; however, noncommercial plantings are found beyond these ranges (36). In general, mean minimum temperatures below 13°C are likely to bring about damage to the foliage and a cessation of growth; mean maximum temperatures above 30°C are likely to be accompanied by humidities so low that a similar cessation of active development is inevitable (35).

The tender shoot of the tea trees can not stand the frost. Frost damaged tender leaves are not worth plucking (8).

The tea tree needs not only plentiful, but also evenly distributed annual rainfall with frequent dews and fogs (36). In general there does not seem to be a decisive upper limit to the amount of rainfall under which tea will grow vigorously. On the other hand there is a consensus of opinion that at 1,750 mm. per annum, rainfall is marginal unless other climatic conditions provide mitigating circumstances. Without exception the rainfall in the dry weather period is critical (35). Crop production suffers severely if monthly averages fall below 50 mm. over a period of several months.

Relative humidity should be high, the individual showers light, and there should be absence of hot winds (36).

The range of soil types on which tea is grown is remarkably wide. The optimum soils for tea trees are gravelly clay and clay loam with deep surface

²Number in parenthesis refers the bibliography.

soils, rich in organic matter. Sandy loam and gravelly loam also are suitable soils for the tea trees. The soils should have good permeability and the pH value should fall between 6.5 to 4.0. Tea, however, can also be grown on soils and on steep slopes unsuited for ordinary tilled crops (31).

The Suitability of the Taiwan Environment to Tea Production

The Surface: In Taiwan, tea is grown almost entirely on the hill slopes and tablelands. About four-fifths of the total tea garden area is located on hill slopes with an angle of 20-40 degrees, whereas only one-fifth is on essentially level lands (23). The level land tea gardens are mainly concentrated in the Taoyuan Tableland (See Table 2). The surface of the tableland is about 50 to 200 meters above sea level (28). Hill slope tea gardens (See Tables 1 and 2) are scattered from Keelung Hills in the northern end of the island to Puli Basin in central Taiwan. In the total land use pattern, rice paddy fields occupy the valley bottoms which can be readily irrigated. Villages are scattered along the foot hills which are between paddy fields and upland fields. Tea gardens are located in the upper sloping part of the valleys. Orchards, vegetable gardens, and sweet potato fields are commonly between the villages and the tea gardens (11, 28, 60 and 85).

The acid soils of the hill slopes and tablelands of northwestern Taiwan are not adaptable for the growing of food crops (4). Moreover the erosion danger is commonly prohibitive for clear cultivation. In 1926,³ as Tables 2 and 3 show, the slope land-tea garden index⁴ was calculated to be more than 200 in Tachi, Chungli, Taoyuan, and Hsinchuang where most of the tea gardens are on level land rather than on the hill slopes. The S-T Indexes of Hsinchu, Haishan, Wenshan, Chutung, Tanshui and Keelung are all over 50. These sub-prefectures mostly lie in the hills region (See Tables 2 and 3).

Linkou Tableland may be considered as an example, illustrating the relationship between tea gardens and topography (28 and 85). This relationship is indicated in the following table (4).

Logically, the tea trees can be planted in any part of northern Taiwan, except where poor drainage exists. In reality, however, many patches where

³No new data of slope land in crops are available. 1926 data are the latest.

⁴The acreage of tea gardens is divided by the total acreage of slope fields, and then is multiplied by one hundred. $\text{Tea acreage} \div \text{total slope fields acreage} \times 100 = \text{S-T Index}$.

tea trees could be grown are devoted to food crops in order to feed the ever growing population (11).

Table 2. The S-T Indexes of Taipei, by Sub-prefectures, 1926

| Sub-prefectures | Tea Gardens (A) | Slope Lands (B) | $\frac{A}{B} \times 100$ |
|-----------------|-----------------|-----------------|--------------------------|
| Wenshan | Chias* 4,547 | Chias 5,194 | 88 |
| Haishan | 2,896 | 3,265 | 89 |
| Tanshui | 2,735 | 4,488 | 61 |
| Hsinchuang | 2,013 | 1,000 | 201 |
| Keelung | 1,762 | 3,486 | 51 |
| Chihsing | 1,747 | 2,327 | 71 |
| Ilan | 113 | 506 | 22 |
| Lotung | 8 | 112 | 7 |
| Suao | 4 | 57 | 7 |
| Total | 15,825 | 20,435 | 77 |

* One Chia is equal to 0.969932 hectares or 2.39680 acres.

Sources: (1) Taiwan Government, Bureau of Productive Industries, *Agricultural Basic Survey Report, No. 10, Land Use in Taiwan*, pp. 61-68, Taipei, 1926.

(2) Taipei Prefectural Government, *Statistical Yearbook of Taipei Prefecture, 1928 edition*.

Table 3. The S-T Indexes of Hsinchu, by Sub-prefectures, 1926

| Sub-prefectures | Tea Gardens (A) | Slope Lands (B) | $\frac{A}{B} \times 100$ |
|-----------------|-----------------|-----------------|--------------------------|
| Chutung | Chias 7,820 | Chias 12,411 | 63 |
| Hsinchu | 6,441 | 6,747 | 95 |
| Chungli | 5,518 | 1,280 | 431 |
| Tachi | 5,377 | 1,188 | 453 |
| Taoyuan | 3,130 | 1,122 | 279 |
| Chunan | 1,256 | 3,090 | 41 |
| Miaoli | 1,227 | 3,668 | 33 |
| Tahu | 241 | 2,358 | 10 |
| Total | 31,010 | 31,864 | 98 |

Sources: (1) Taiwan Government, Bureau of Productive Industries, *Agricultural Basic Survey Report, No. 10, Land Use in Taiwan*, pp. 61-68, Taipei, 1926.

(2) Hsinchu Prefectural Government, *Statistical Yearbook of Hsinchu Prefecture, 1928 Edition*.

The Climate: Throughout all the tea regions of the island, the mean monthly

temperatures rise to 20°C in April, and this rising condition continues until November. June to September is the hottest period of the year with mean monthly temperatures ranging from 26°C to 28°C. During these months mean maximum temperatures are higher than 30°C. November to March is the cool period with mean monthly temperatures still above 15°C and mean minimum temperatures not less than 10°C. Frost and snow are unknown (See Table 5).

Table 4. The Relationship Between Land Use and Topography,
Linkou Tableland (percent)

| Items | Tea | Paddy Field | Upland Field | Building | Forest | Grass | River and Ponds | Total |
|-------------------|------|----------------|-----------------|----------|--------|-------|-----------------------|-------|
| Tableland Surface | 72.1 | 8.5 | 1.9 | 4.3 | 7.4 | 3.2 | 2.6 | 100.0 |
| Valley | 0.4 | 60.0 | 4.3 | 3.1 | 5.3 | 15.9 | 11.0 | 100.0 |
| Slopes | 11.4 | 14.0 | 2.4 | 0.5 | 52.7 | 18.5 | 0.5 | 100.0 |

Source: Yoshiro Tomita, *The Cultural Geographic Landscape of Taiwan*, Taihoku Imperial University Memorial Essay, Vol. 5, p. 158., Taipei, 1936.

The average annual rainfall of the tea regions of Taiwan is about 2,000 mm. The rainfall is relatively evenly distributed throughout the year without long periods of drought. For example, there are 185 rainy days at Taipei, 141 at Hsinchu, and 148 at Jihyuehtan (97). The moisture balance at the above mentioned three stations also shows a favorable condition for the tea trees. There is no water deficiency except a short period in October at Hsinchu (9).

Table 5. Mean Monthly Temperature at selected Stations (°C)

| Station | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual Average |
|------------|------|------|------|------|------|------|------|------|-------|------|------|------|-------------------|
| Taipei | 15.2 | 14.8 | 17.0 | 20.7 | 24.1 | 26.6 | 28.2 | 27.9 | 26.3 | 23.1 | 20.0 | 16.8 | 21.7 |
| Tanshui | 15.2 | 14.4 | 17.3 | 20.9 | 24.1 | 26.5 | 28.3 | 28.0 | 27.4 | 23.3 | 21.8 | 16.5 | 22.0 |
| Ilan | 15.8 | 16.0 | 17.9 | 20.6 | 23.5 | 26.1 | 27.6 | 27.2 | 25.8 | 22.8 | 20.2 | 17.2 | 21.7 |
| Hsinchu | 15.0 | 14.6 | 17.0 | 20.5 | 24.1 | 26.7 | 27.9 | 27.7 | 26.5 | 23.7 | 21.5 | 16.8 | 21.8 |
| Pingchen | 13.9 | 14.1 | 16.1 | 20.2 | 24.0 | 26.7 | 28.1 | 27.8 | 26.3 | 22.8 | 19.8 | 16.5 | 21.4 |
| Taichung | 15.8 | 15.7 | 18.4 | 22.0 | 25.2 | 26.9 | 27.7 | 27.5 | 26.6 | 23.8 | 20.6 | 17.3 | 22.3 |
| Jihyuehtan | 14.3 | 14.8 | 16.8 | 19.0 | 20.5 | 21.7 | 22.4 | 21.9 | 22.0 | 20.8 | 18.9 | 15.4 | 19.0 |
| Tainan | 17.0 | 17.1 | 19.7 | 23.4 | 26.3 | 27.4 | 27.8 | 27.5 | 27.1 | 24.8 | 21.8 | 18.5 | 23.2 |

Sources: (1) Taiwan Weather Bureau, *Taiwan Meteorological Data*, Taipei, 1952.

(2) Pingchen Tea Experiment Station, *Memoirs of the Pingchen Tea Experiment Station*, Vol. 1, p. 11, Pingchen, 1954.

Table 6 shows rainfall at selected stations.

Table 6. Rainfall at Selected Stations (mm.)

| Station | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual Average |
|------------|------|------|------|------|-----|------|------|------|-------|------|------|------|----------------|
| Taipei | 90 | 136 | 174 | 168 | 219 | 316 | 234 | 285 | 221 | 122 | 64 | 74 | 2,101 |
| Tanshui | 102 | 169 | 120 | 160 | 211 | 325 | 154 | 124 | 141 | 179 | 180 | 125 | 1,988 |
| Ilan | 153 | 149 | 129 | 125 | 214 | 245 | 157 | 188 | 386 | 399 | 358 | 245 | 2,746 |
| Hsinchu | 71 | 134 | 158 | 205 | 246 | 397 | 146 | 180 | 104 | 34 | 36 | 54 | 1,763 |
| Pingchen | 111 | 154 | 222 | 225 | 237 | 313 | 213 | 229 | 171 | 94 | 71 | 95 | 2,133 |
| Taichung | 34 | 67 | 107 | 128 | 236 | 394 | 292 | 325 | 134 | 22 | 17 | 29 | 1,784 |
| Jihyuehtan | 35 | 51 | 85 | 168 | 421 | 597 | 430 | 359 | 155 | 39 | 28 | 59 | 2,428 |
| Tainan | 19 | 33 | 47 | 70 | 185 | 390 | 438 | 422 | 164 | 35 | 17 | 19 | 1,839 |

Sources: (1) Taiwan Weather Bureau, *Taiwan Meteorological Data*, Taipei, 1952.

(2) Pingchen Tea Experiment Station, *Memoirs of the Pingchen Tea Experiment Station*, Vol. 1, p. 11, Pingchen, 1954.

As far as the temperature concern in Taiwan, tea trees can be grown anywhere except the southernmost part where the summer temperature is too high and the high mountain district where the winter temperature is too low. The confinement of the tea cultivation to northwestern Taiwan is mainly due to the pattern of rainfall. The tea tree can not flourish in southern Taiwan because the dry season is too long in duration (17). It is impossible to do layerage in southern Taiwan because of low rainfall during the winter (31). Moreover, in southern Taiwan the rainy season, April through October, makes withering of the fresh leaves very difficult (59). In general, the tea flourishes in the mesothermal humid climatic region in terms of the Thornthwaite System (9.)

Soils: About seven-tenths of the tea cultivated area of Taiwan is in the diluvium and three-tenths is in the Tertiary sediments area (93). The former is the red soils tea region running north from the southern side of Kuanyinshan, via Linkou, Kueishan, Lungtan, Hsinchu, to Sani, roughly coinciding with the Hsinchu-Miaoli Tableland (43). The elevation varies from 100 to 400 meters above sea level. Soils are deep and underlain by a gravel deposit. The top soils have fine texture with a pH value of 4.0 to 4.8. The content of organic matter is very low. Generally, as a result, the tea trees are small and the yields are low (87 and 93).

The tertiary sediments area lies in the foot hills of the Central Mountains. Generally, it includes the Keelung-Chunan Hills at the north and the Fengyuan

Hills at the south (43). The elevation varies from 300 to 800 meters. Soils are yellowish. The top soils are deep, with a pH value of 4.5 to 5.4. The organic matter content is a little higher than the reddish soils. These are the best tea soils in Taiwan; yields are high, but soil erosion is a very serious problem (2, 37, 52 and 93).

Summary: In Taiwan, tea is grown almost entirely on the hill slopes and tablelands. The drainage of these hill slopes and tablelands is good. The mean monthly temperature throughout the tea region in Taiwan ranges from 15°C to 28°C. About 2,000 mm. of annual rainfall is relatively evenly distributed throughout the year. Both temperature and rainfall conditions are favorable. Soils are reddish and yellowish. The pH value is of 4.0—5.4. Topography, climatic conditions, and soils are thus favorable to the growth of tea. These lands, on the other hand, are not suitable for growing other food crops due to acidic soils and unfavorable topographic conditions. The agricultural use of land is, therefore extended when tea is grown.

The Social Factors

Labor Needs: The cultivation and processing of tea requires a great deal of labor (90). Attempts at tea production were made in the United States during the middle of the last century and later, but did not prove successful, primarily as a result of the inability to obtain satisfactory low-cost labor (88). It is obvious that almost all tea producing countries are abundantly populated. Cheap

Table 7. Direct Tea Production Costs Per Hectare, 1955

| Items | New Taiwan Dollars | Percent |
|--------------------|--------------------|---------|
| Plucking | 1,139.46 | 38.4 |
| Ploughing (man) | 1,118.51 | 37.6 |
| Fertilizer | 76.04 | 2.6 |
| Seedlings | 407.48 | 13.7 |
| Ploughing (animal) | 213.72 | 7.2 |
| Various materials | 15.94 | 0.6 |
| Total | 2,969.15 | 100.0 |

Source: PDAF, *Agricultural Basic Survey-Production Costs of Major Crops*, Vol. II, 138-141, Taipei, 1956.

labor encourages the tea culture. In Taiwan labor expenses are three-fourths of the total direct tea production costs (See Table 7). Densely populated north-western Taiwan (See Table 8) has available plentiful and cheap labor. This was one of the dominant factors in the development of the tea industry in Taiwan.

Technical Requirement: The tea industry, especially if it is geared to the export market, requires considerable technical ability. Proper application means better quality of tea and lower production costs, hence a favorable competitive position on the world market. Taiwan tea industry was modernized and mechanized by the Japanese (71) during their period of control (1896-1945). Since the restoration of Taiwan in 1945, the Chinese-American Joint Commission on Rural Reconstruction and the Provincial Department of Agricultural and Forestry technical assistance has been significant (13).

The Markets: Taiwan tea has long been refined chiefly for export. The amount of tea consumed on the island is very small. About ninety-five percent of the production is exported (15). Annually, Taiwan ships about three percent of the world's total export of tea (42). The Taiwan tea industry thus can not control the world tea price, but fluctuations of the tea price in the world tea markets seriously affect Taiwan (89). Major overseas buyers of Taiwan tea are the United States, Morocco, the United Kingdom, Hong Kong, Netherlands, and Thailand (15). Maintenance of these markets is essential.

Table 8. Population and Cultivated Land of Northwestern Taiwan, 1950

| Hsiens | Total Pop. (A) | Agro-Pop. (B) | B/A×100 | Cultivated Land (ha.) | Pop. Density Per Hectare of Cultivated Land | Agro-pop. Density Per Hectare of Cultivated Land |
|----------|-------------------|------------------|---------|--------------------------|--|--|
| Taipei | 761,280 | 267,081 | 35.1 | 56,698.48 | 13.43 | 4.71 |
| Taoyuan | 416,087 | 234,998 | 56.5 | 58,106.75 | 7.16 | 4.04 |
| Hsinchu | 408,675 | 201,248 | 49.2 | 44,666.06 | 9.15 | 4.51 |
| Miaoli | 395,622 | 258,455 | 65.3 | 43,534.07 | 9.09 | 5.94 |
| Taichung | 544,321 | 333,547 | 61.3 | 47,551.64 | 11.45 | 7.01 |
| Nantao | 361,010 | 246,604 | 68.3 | 44,564.30 | 8.10 | 5.53 |
| Ilan | 306,845 | 153,437 | 50.0 | 28,437.30 | 10.79 | 5.40 |
| Total | 3,193,840 | 1,695,370 | 53.1 | 323,560.60 | 9.87 | 5.24 |

Source: Taiwan Provincial Department of Agriculture and Forestry.

The Evolution of the Tea Industry

Although there is a lack of absolutely credible historical data regarding the origin of the cultivation in Taiwan, it is believed that tea cultivation began after numerous immigrants, from Fukien and Kwangtung, settled on the island. According to various fragmental records, it is believed that some tea was produced in mountains of central Taiwan during the later years of the seventeenth century (12).

Today, however, most of the tea gardens in Taiwan are in the hilly regions and tablelands of northwestern Taiwan (See Figure 4).

The Early Development

The tea cultivation of northwestern Taiwan originally started on the hill slopes of the southeastern border of the Taipei Basin, one hundred and fifty years ago. During the period 1796-1820 Mr. Ko Chao returned to Taiwan from Fukien and planted the Bohea tea trees at Chienhyukeng (13). Because of favorable climatic and topographical factors, these tea trees grew very well, yielding four harvests a year and the leaves possessed unique quality and flavor (50). Following this success tea gardens spread quickly over Taipei Hsien, Taoyuan Hsien, and Miaoli Hsien.⁵ Even today tea trees more than one hundred years old can be found in old tea gardens of Shihing Hsiang (11). There was no export before the years of Taokuang (1821-1850), when some crude tea was shipped to Foochow, Fukien (50). The first formal record concerning tea exported from Taiwan was kept by the Tamsui Maritime Customs and began in 1865 (16).

The English Influence

Since the middle of the nineteenth century the rapid development of the

⁵ In 1876, after the tea industry in northern Taiwan had become well developed, 100,000 tea seeds were planted in southern Taiwan. The physical conditions, however, were unfavorable and the gardens there were abandoned.

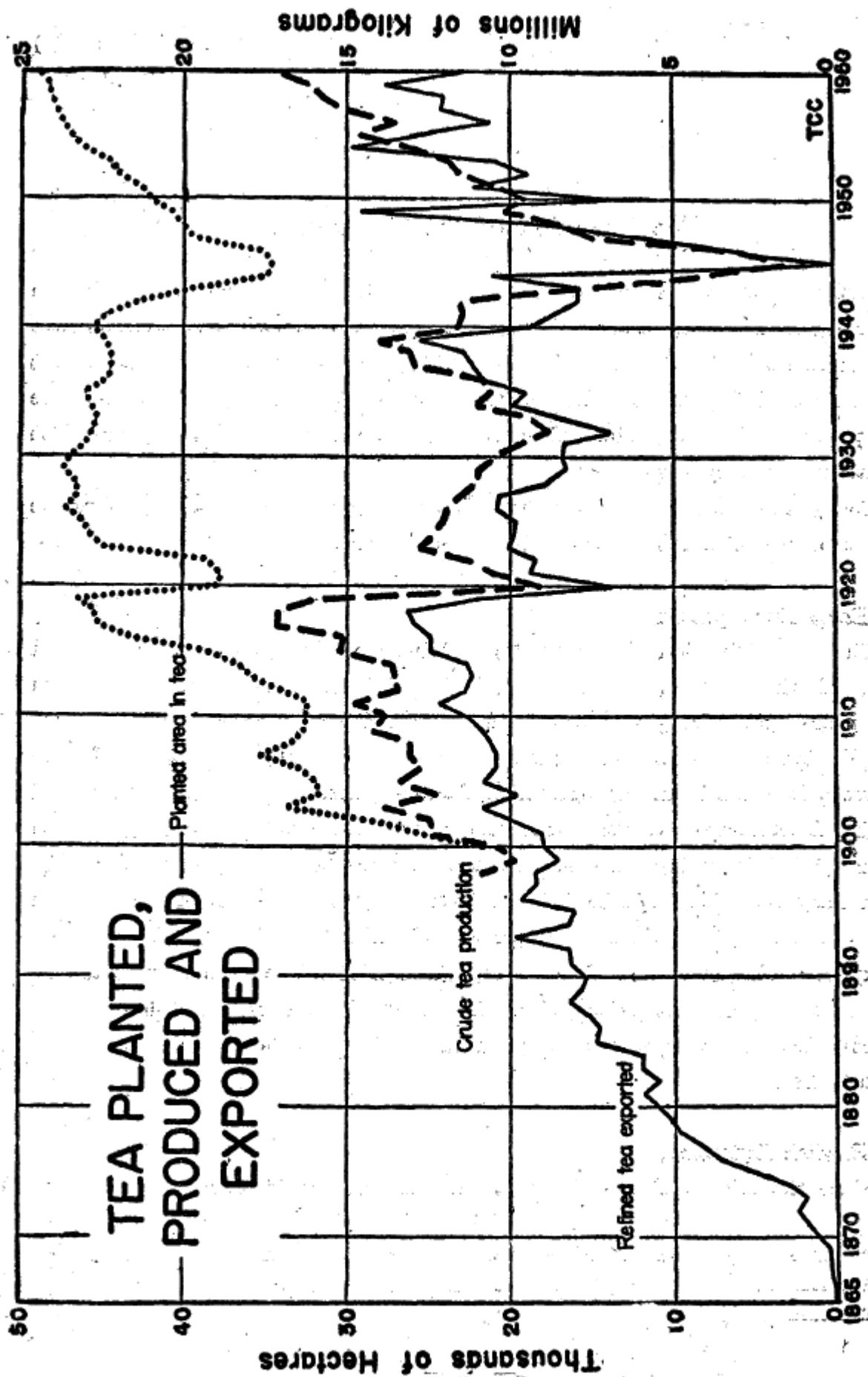


Figure 1. Tea planted, produced and exported

tea industry in Taiwan, especially the export phase, is due to the contribution of several Englishmen. In 1861, Mr. Robert Swinhoe, the first British consul in the island, is credited with the discovery of the tea industry in Taiwan, reporting its possibilities to his government. In 1865, Mr. John Dodd, an Englishman, who came to the island, visited the farmers in the Tamsui district and made a personal investigation of the suppliers of Formosa oolong tea available for export. As a result, John Dodd and Company, the first foreign tea firm, was established. The next year, Dodd began to buy crude tea and encourage new plantings. Tea seeds were imported from Anchi, Fukien. Dodd loaned money to Chinese farmers to foster plantings. In 1867, the company made a shipment to Macao, via Amoy with success. In the same year, Ko Sing, a Chinese tea buyer, came to Tamsui in the interest of Tait and Company of Amoy, and shipped a few baskets (34). The following year Mr. Dodd established the first tea refinery at Wanhua, the oldest part of Taipei City, and brought experienced operators from Amoy and Foochow, Fukien, to do the work (50). In 1869, John Dodd used two junks to carry 2,131 quintals of the oolong tea, using Formosa Tea as a trade mark, directly to New York. This was the first time that Taiwan tea appeared in the American tea market. The success of the tea was immediate, and it obtained a wide popularity in the eastern and New England states (86).

The high prices of tea encouraged farmers to greatly extend their plantings and more people began to engage in the industry. In 1872, there were five foreign tea trade firms in Taipei. Fields near Taipei formerly utilized to raise jute and indigo were converted into tea gardens (11). At that time the tea region of northern Taiwan spread eastward to Ilan, southward to Taoyuan, Hsinchu, and Miaoli, and northward to Tatanshan (13). The export quantity of Taiwan tea increased year by year (15).

Formation of the Tea Industry Association

In 1885, as the governor of Taiwan Province, Liu Ming-chuan greatly improved the tea industry (95). On the one hand he helped the planters to improve the method of cultivation. On the other hand, he united planters, refiners, and traders to establish Cha Chiao Yu Ho Hsing or Tea Industry Association at Tataochen. The export of tea was encouraged. The tea refineries were enlarged and the method of refining was improved. The quality of the tea was also improved.

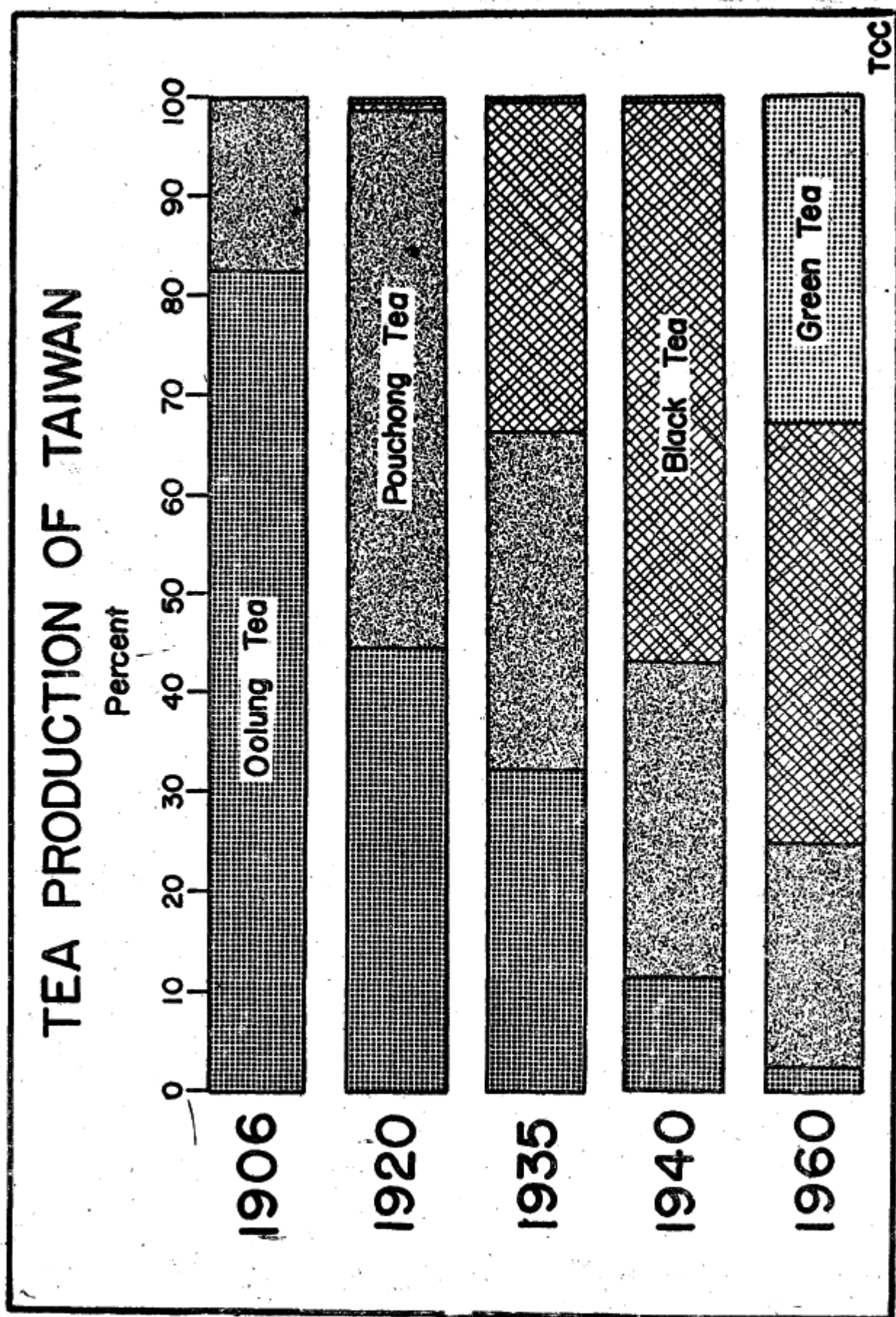


Figure 2. Tea production of Taiwan

The export of Taiwan tea increased very rapidly. Between 1865 and 1895, it increased nearly one hundred times (See Figure 1).

In early days, only oolong tea was refined (50). In 1881, Taiwan began to refine pouchong tea.

Japanese Colonial Control

After the occupation of Taiwan, the Japanese colonial government did much to help the tea growers and manufacturers (71). The methods of cultivation and refining were improved. Fertilizer and tea seedlings were given to the growers, and machines to the refineries. The colonial government also helped the exporters to extend the overseas markets. For tea experiment stations were established. In 1933, the Taiwan Tea Inspection Bureau was established. By this time there were 171 tea companies and co-operative tea farms which had received machines free from the government. This was the foundation of the modern tea industry in Taiwan. Generally speaking, the Japanese colonial government had complete control of the tea industry of Taiwan. Most of the profits were obtained by the Japanese traders rather than the tea farmers (11).

Following the outbreak of the Pacific War the export of Taiwan tea was checked (See Figure 1). By the end of World War II, more than 10,000 hectares of tea gardens had become more or less useless.

Post-war Recovery

Since 1945, when Taiwan was restored to China, the tea industry has recovered gradually. The rehabilitation after the restoration was due mainly to the technical direction and financial help of the Chinese American Joint Commission on Rural Reconstruction and the Provincial Department of Agriculture and Forestry (13).

Historic Changes in Production and Processing Pattern

The development of the tea industry progressed from north to south (See Figures 3 and 4). In 1900, there were 26,610 hectares of land in tea. Of this, 97 percent was in the three northwestern hsien—namely two-thirds in Taipei, one-fifth in Taoyuan, and one-tenth in Hsinchu. Plantings increased rapidly up to 47,069 hectares in 1930. The increase amounted to 76.6 percent. The area increased was 9,053 hectares in Hsinchu, 2,401 hectares in Miaoli, 1,165 hectares

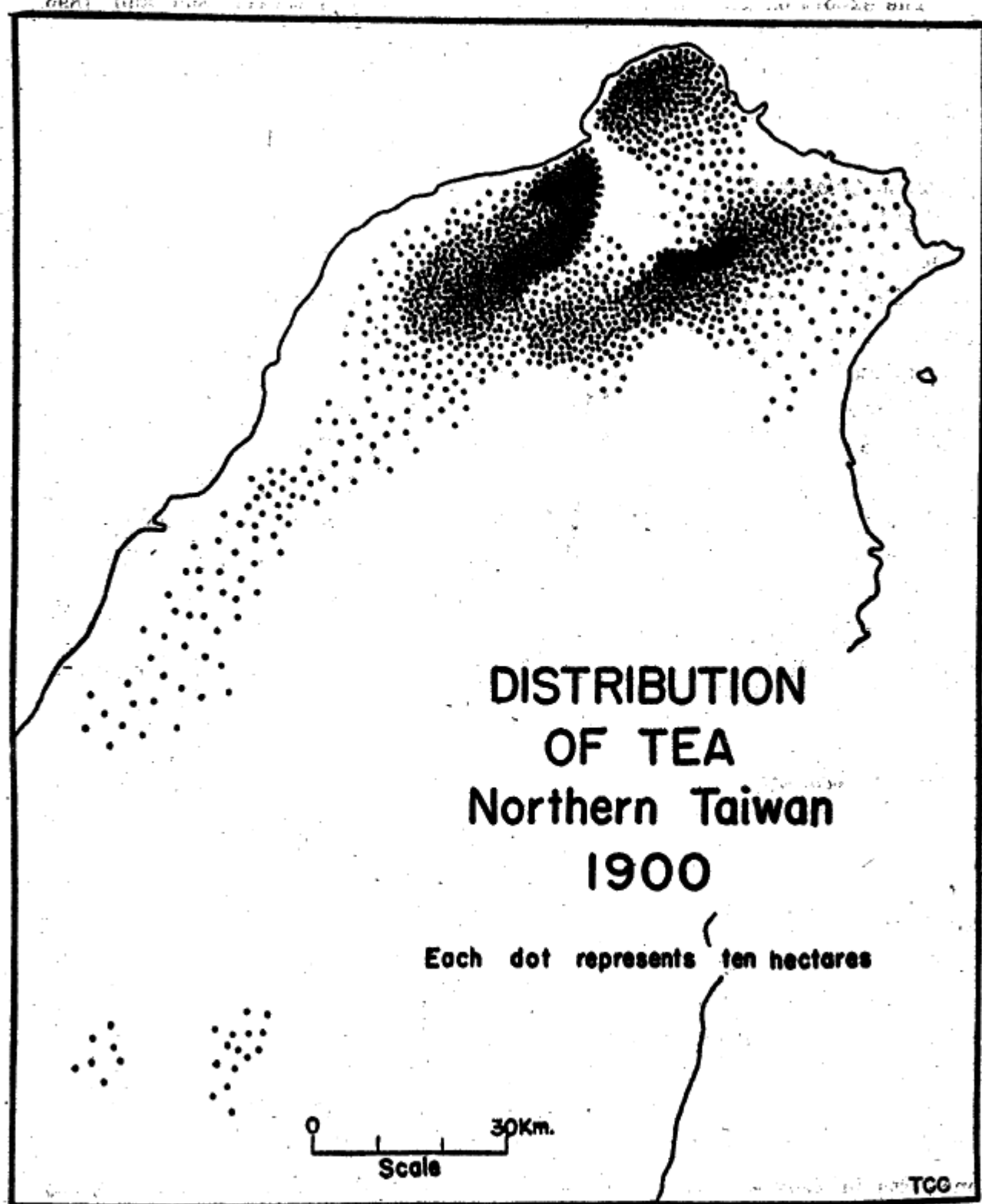


Figure 3. Distribution of tea, northern Taiwan, 1900

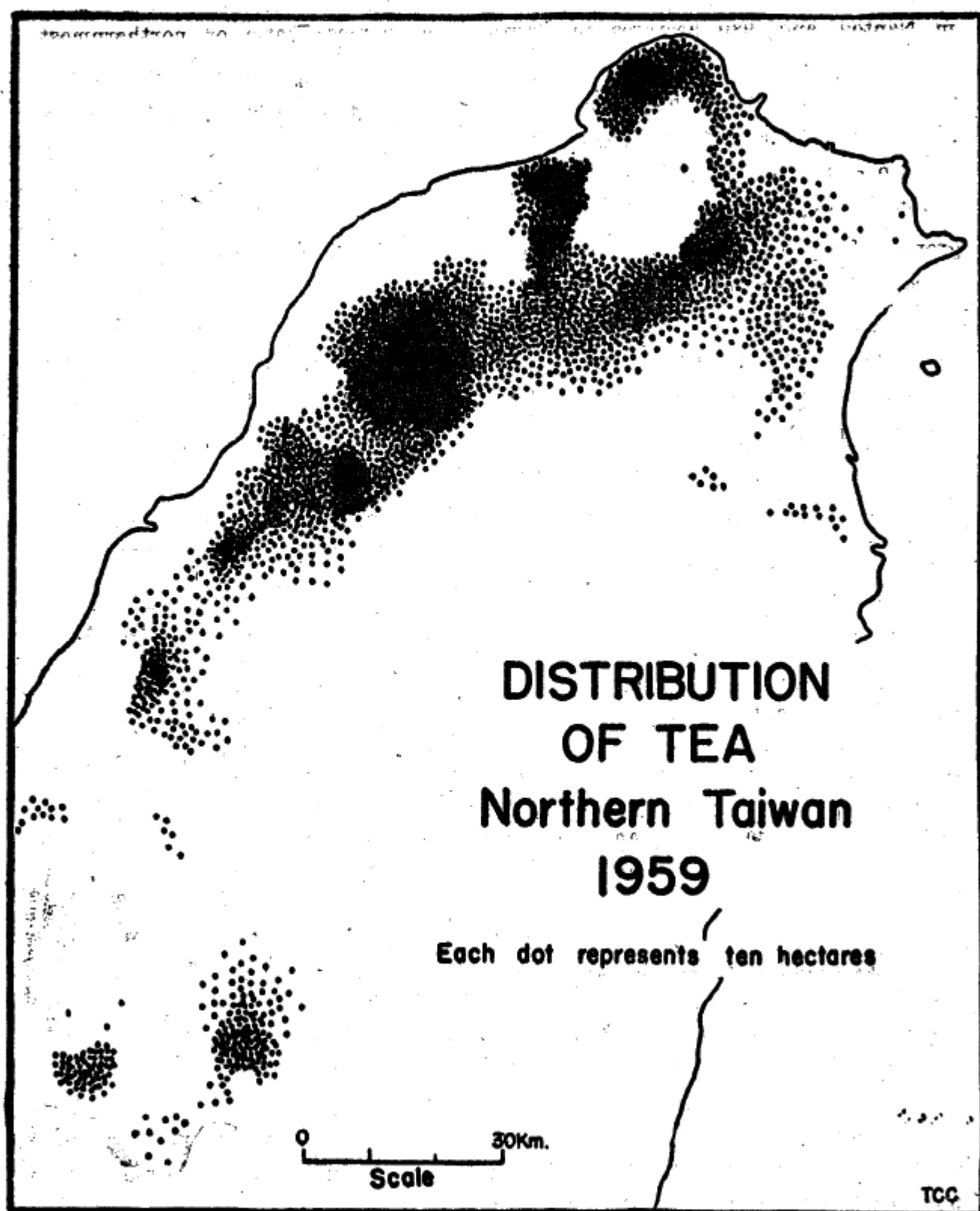


Figure 4. Distribution of tea, northern Taiwan, 1959

in Nantou, and 980 hectares in Taipei. The increase ratio of northernmost Taipei was the lowest or only 5.6 percent during the thirty years. The increase was higher in southern hsien, amounting to 117.4 percent in Taoyuan, 356.4 percent in Hsinchu, 518.6 percent in Miaoli, and 746.8 percent in Nantou (See Table 9 and 10).

The acreage of tea remained about the same in 1955. But as a result of the growth of rural population, the northernmost two hsien, Taipei and Taoyuan, decreased 22.7 percent and 6 percent in acreage of tea respectively. In these hsien, part of the land in tea had to be converted to growing food crops. On the contrary, the southern hsien showed an increase in acreage in tea, 67.1 percent in Miaoli, 8.7 percent in Hsinchu, and 47.2 percent in Nantou (See Tables 9 and 10).

Table 9. Land in Tea, 1900, 1930, and 1955

| Hsien | 1900 | | 1930 | | 1955 | |
|----------|--------|---------|--------|---------|--------|---------|
| | ha. | percent | ha. | percent | ha. | percent |
| Taipei* | 17,465 | 65.6 | 18,445 | 39.2 | 17,343 | 36.9 |
| Taoyuan | 5,748 | 21.6 | 12,495 | 26.5 | 12,606 | 26.8 |
| Hsinchu | 2,540 | 9.5 | 11,593 | 24.6 | 9,661 | 20.6 |
| Miaoli | 463 | 1.7 | 2,864 | 6.1 | 4,785 | 10.6 |
| Nantou | 156 | 0.6 | 1,321 | 2.8 | 1,944 | 4.1 |
| Ilan | 132 | 0.5 | 168 | 0.4 | 377 | 0.8 |
| Taichung | 10 | 0.0 | 156 | 0.3 | 261 | 0.6 |
| Others** | 96 | 0.4 | 27 | 0.1 | 22 | 0.0 |
| Total | 26,610 | 100.0 | 47,069 | 100.0 | 47,000 | 100.0 |

*Includes Taipei City, Keelung City and Yangminshan Administration.

**Includes Hualien Hsien, Taitung Hsien and Pingtung Hsien.

Sources: (1) Taiwan Government, *The Fourth Statistical Yearbook*, pp. 343-359, Taipei, 1902.

(2) PDAF, *The Statistics of Taiwan Tea Industry*, Taipei, 1950.

(3) PDAF (for the figure of 1955).

The second change in the industry is the mechanization of the tea processing industry. Years ago almost all tea growers also were crude tea processors. In 1928, for instance, 20,844 of the 21,250 tea farm households processed crude tea (77). After the establishment of modern tea factories most of the tea growers no longer processed crude tea.

The shift of the tea refineries from Taipei City to the tea producing area is the third significant change of the industry. In 1926, there were 99 tea refineries in Taipei (77). Today the number is only 50 (See Table 26).

Table 10. 1900-1955 Change in Acreage

| Hsiens | 1900-30 Increase | | 1930-55 Increase | | 1900-55 Increase | |
|----------|------------------|---------|------------------|---------|------------------|---------|
| | Ha. | Percent | Ha. | Percent | Ha. | Percent |
| Taipei | 980 | 5.6 | -1,102 | - 6.0 | -122 | -0.7 |
| Taoyuang | 6,747 | 117.4 | -2,894 | -22.7 | 3,913 | 68.1 |
| Hsinchu | 9,053 | 356.4 | 1,013 | 8.7 | 10,066 | 396.3 |
| Miaoli | 2,401 | 518.6 | 1,921 | 67.1 | 4,322 | 983.5 |
| Nantou | 1,165 | 746.8 | 623 | 47.2 | 1,788 | 1,146.2 |
| Ilan | 36 | 27.3 | 209 | 124.4 | 245 | 185.6 |
| Taichung | 146 | 1,460.0 | 105 | 67.3 | 251 | 2,510.0 |
| Others | -69 | -71.9 | -7 | -25.9 | 673 | -8.4 |
| Total | 20,459 | 76.6 | -69 | -0.1 | 20,390 | 76.6 |

Sources: (1) Taiwan Government, *The Fourth Statistical Yearbook*, pp. 343-359, Taipei, 1902.

(2) PDAF, *The Statistics of Taiwan Tea Industry*, Taipei, 1950.

(3) PDAF (for the figure of 1955).

Tea Culture

Tea Varieties

During the first sixty years of the last century, immigrants from Fukien Province brought with them more than seventy varieties of small-leaf tea trees indigenous to China. These varied greatly both in yield and quality (83). Green-heart Oolung, Large-leaf Oolung, Green-heart Tapon and Hard-stem Red-heart have been considered (See Tables 11 and 12) the best varieties (47). A large scale extension of these four varieties, encouraged by free allocation of 126 million young tea seedlings to tea growers, was made during 1918-1935 (71).

In 1925, Assamica varieties from India were introduced. They grow well in Yuchih and Puli townships, where the wind velocity is much less than the tea regions in northern Taiwan (31).

The latest survey (1952) shows that sixty percent of the total acreage is

planted to the four best varieties. Green-heart Tapon accounts for 24 percent of the total; Green-heart Oolung, 20 percent; Large-leaf Oolung and Hard-stem Red-heart, 7 percent each; and Assamica, 2 percent (See Table 11).

Table 11. The Distribution of Tea Varieties, 1952.

| Hsiens a Cities | Green-heart Tapon | | Green-heart Oolung | | Large-leaf Oolung | |
|-----------------------|----------------------|---------|-----------------------|---------|----------------------|---------|
| | Ha. | Percent | Ha. | Percent | Ha. | Percent |
| Taipei Hsien | 2,751 | 17 | 4,644 | 29 | 1,628 | 10 |
| Taoyuan Hsien | 1,514 | 18 | 1,232 | 14 | 356 | 4 |
| Hsinchu Hsien | 4,862 | 40 | 1,067 | 9 | 313 | 3 |
| Miaoli Hsien | 1,185 | 35 | 684 | 20 | 141 | 4 |
| Taichung Hsien | 28 | 21 | 60 | 46 | — | — |
| Nantou Hsien | 6 | 1 | 706 | 48 | — | — |
| Ilan Hsien | 91 | 29 | 108 | 34 | 8 | 3 |
| Taipei City | — | — | 2 | 10 | 16 | 76 |
| Keelung City | — | — | — | — | 324 | 100 |
| Total | 10,487 | 24 | 8,503 | 20 | 2,786 | 7 |

| Hsiens and Cities | Hard-stem Red-heart | | Assamica | | Other | | Total | |
|-------------------------|------------------------|---------|----------|---------|--------|---------|--------|-----|
| | Ha. | Percent | Ha. | Percent | Ha. | Percent | | |
| Taipei Hsien | 2,127 | 13 | 122 | 1 | 4,987 | 30 | 16,209 | 100 |
| Taoyuan Hsien | 95 | 1 | 70 | 1 | 5,229 | 62 | 8,496 | 100 |
| Hsinchu Hsien | 544 | 5 | — | — | 5,225 | 43 | 12,011 | 100 |
| Miaoli Hsien | 112 | 3 | 109 | 3 | 1,204 | 35 | 3,435 | 100 |
| Taichung Hsien | — | — | — | — | 44 | 33 | 132 | 100 |
| Nantou Hsien | — | — | 609 | 41 | 142 | 10 | 1,463 | 100 |
| Ilan Hsien | 2 | 1 | — | — | 105 | 33 | 314 | 100 |
| Taipei City | 3 | 14 | — | — | — | — | 21 | 100 |
| Keelung City | — | — | — | — | — | — | 324 | 100 |
| Total | 2,883 | 7 | 910 | 2 | 16,886 | 40 | 42,405 | 100 |

Source: PDAF, *Report on a Survey of Tea Production Capacity of Taiwan*, Taipei, 1952. pp. 19-37.

By 1953, 22 varietal strains had been selected from advanced trials and promoted to regional in Wenshan, Linkou, Sani Yuchih, and Pingchen. Several of the 22 newly developed varieties have grown very well (47).

Planting

Asexual propagation, chiefly layerage, is used in all Taiwan tea garden, except the Yuchih district where sexual propagation, chiefly bedding method, is used for the Assamica varieties.

Table 12. The Characteristics of Leading Tea Varieties

| Varieties | Growing up | Size of Tree | Seasonal Patterns of Plucking | Unit yield (kg./ha.) Average | Quality of Teas Made of | | | |
|---------------------|------------|--------------|-------------------------------|------------------------------|-------------------------|-----------|----------------|----------------|
| | | | | | Green Tea | Black Tea | Pouchong Tea | Oolung Tea |
| Green-heart Tapon | Quick | Big | Summer | 4,375 | Excellent | Excellent | Excellent | Very Excellent |
| Green-heart Oolang | Slow | Small | Common | 4,115 | Excellent | Fair | Very Excellent | Excellent |
| Large-leaf Oolung | Quick | Big | Spring-Summer | 4,171 | Excellent | Fair | Good | Excellent |
| Hard-stem Red-heart | Quick | Big | Summer | 2,275 | Bad | Excellent | Bad | Excellent |
| Red-heart Tapon | Quick | Average | Spring-Summer | 2,989 | Good | Good | Fair | Good |
| Red-heart Oolung | Average | Average | Spring-Summer | 3,525 | Fair | Fair | Good | Fair |
| Yellow-heart Oolung | Quick | Big | Common | 3,088 | Good | Fair | Good | Good |
| Assamica | Quick | Biggest | Spring-Summer | 4,000 | Bad | Excellent | Bad | Bad |

Source: Taiwan Provincial Tea Institute.

The layerage method is quite simple to apply. Moreover, all of the mother tree's characteristics can be transmitted to the young trees. The young plants grow faster than sexual propagation seedlings. The weather condition of northern Taiwan during March and April is most favorable to lay the branches. Most tea growers, however, lay their tea branches in May and June rather than in March and April when Spring tea leaves are being plucked. One man can lay branches of 50-70 clumps of tea trees in a day. Each clump has 8-15 branches which are laid (31). The young plants are cut off from their mother trees during December through March. The most preferable time to transplant the young tea trees to the gardens is from December through February in Taipei Hsien and Ilan Hsien; January through February in Taoyuan Hsien; late January through early February in Hsinehu Hsien; and February through March in Taichung Hsien (58). In general, the young trees are planted 60-80 centimeters apart in rows of 100-150 centimeters apart. Plantings of 7,000-10,000 trees per hectare are usual. A worker can transplant 150-200 young trees in a day (31).

In Nantou Hsien, the bedding method is chiefly used for the Assamica

varieties. Seeds are harvested from October to December and sown in well controlled nursery beds during the following February and March. One year later, seedlings of 30 centimeters in height are transplanted to the garden during February through April. The seedlings are planted 90 centimeters apart in rows of 150 centimeters apart. In this system 7,000-7,500 seedlings are planted per hectare (31).

Three years after transplanting, the trees grow to maturity and are ready for limited plucking. Then the production tea leaves increases year by year, reaching a peak in the seventh to ninth year after transplanting. Pruning is necessary when the production decreases two years after the peak. The preferable time for pruning is in December after the winter plucking. The pruning circle of tea trees in Taiwan is shown in Table 13 (64).

Table 13. Pruning Circle of Tea Trees in Taiwan

| Varieties | 1st CP* | 2nd CP | 3rd CP | 4th CP | 5th CP |
|---------------------|---------|---------|--------|--------|--------|
| Green-heart Oolung | 11-12** | 9-10*** | 8-9*** | 7-8*** | 7-8*** |
| Green-heart Tapon | 11-12 | 9-10 | 8-9 | 7-8 | 7-8 |
| Large-leaf Oolung | 10-12 | 9-10 | 8-9 | 7-8 | 7-8 |
| Hard-stem Red-heart | 9-10 | 8-9 | 7-8 | 6-7 | 6-7 |
| Shih-cha | 7-9 | 6-7 | 5-6 | 3-4 | 3-4 |
| Huang-kan | 8-10 | 7-8 | 6-7 | 5-6 | 5-6 |
| Pu-hsin | 10-11 | 8-9 | 7-8 | 6-7 | 6-7 |
| | 1st DP* | 2nd DP | 1st CP | 3rd DP | 4th DP |
| Assamica | 10-15 | 8-10 | 8-10 | 10-15 | 8-10 |

* CP for collar pruning, DP for down pruning.

** Age of tea trees.

*** Number of year after previous pruning.

Source: Hsuan-chung Chiu, *Tea Farming*, Yuchih Tea Experiment Station, Taiwan, 1959. (Mimeographed) p. 148.

Fertilizing

Taiwan tea growers did not use fertilizer fifty years ago. Until then they believed that fertilizer would spoil the quality of the tea leaves. At the beginning of the twentieth century, the Japanese colonial government encouraged

the farmers to use fertilizer (11). Later on, the use of fertilizer became more and more common.

Ammonium sulfate, calcium cyanamide, bean cake, compost, and excrement are the fertilizing materials most commonly used (44). When and how many times to fertilize in a year varies in different areas (31). In general, the tea growers apply fertilizers four times during the year, in January through February, in middle May, in middle August, and in middle September through middle October (41).

Taiwan tea soils are low in organic material. The use of various green manures is therefore highly regarded. There are more than fifty different green manure plants, but only a few are commonly cultivated. Lupinus is the most important. Lupinus plantings amounted to 9,000 hectares in 1957. One half of the total acreage was in Taoyuan Hsien. Tephrosia Candida comes next. All green manure plants are planted between the rows of the tea trees (64 and 92).

Plucking

Plucking (72) is an important work (88) in the production of tea and a major user of labor. The quality of tea is greatly influenced by the quality of

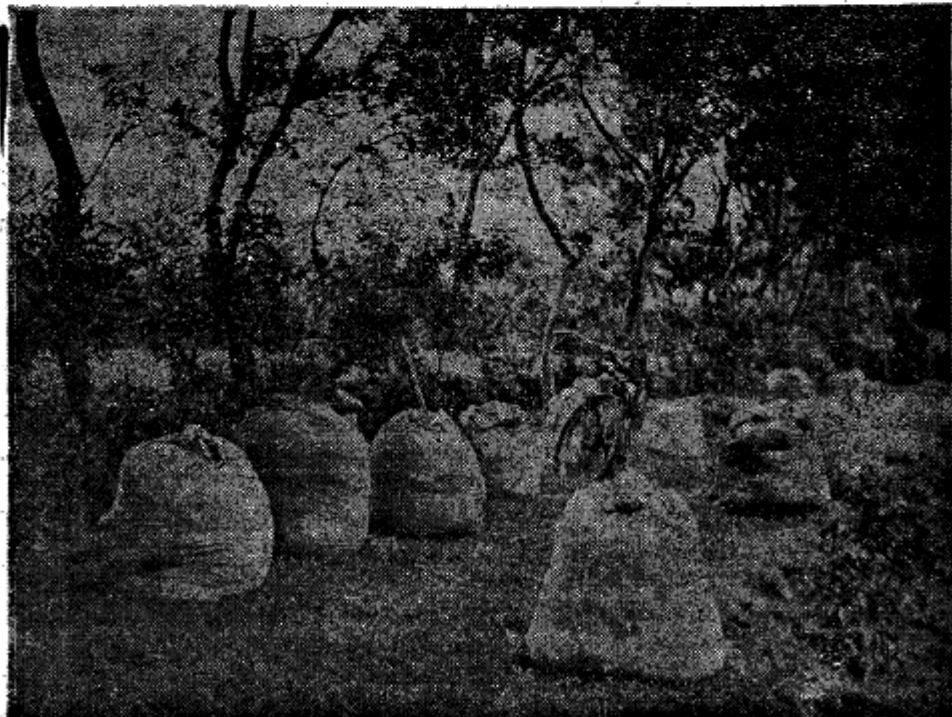


Figure 5. Sacks of fresh tea leaves of the Taiwan Tea Institute Plantation. The bicycle in the middle belongs to the supervisor of the tea pluckers. (Author's photo)

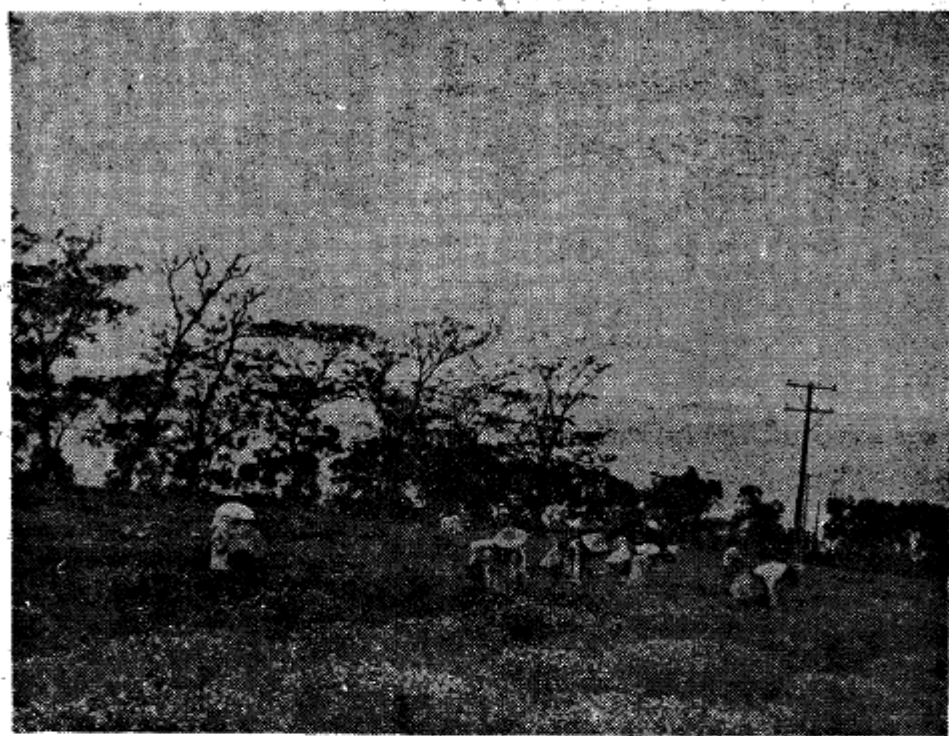


Figure 6. Tea garden of Linkou, Taipei. Note the shadow and windbreak trees. Girls are picking the seeds of *Lupinus*. (Author's photo)

the fresh tea leaves. The more tender the fresh tea leaves, the better the quality of tea; the only principle of plucking is thus to pluck the tender leaves. One bud with two young leaves is, however, considered the standard plucking type in Taiwan (31 and 45). Over-plucking is a serious problem of Taiwan tea culture (94). One bud with three or even four leaves plucked is not uncommon (47). The plucking season (See Table 14) lasts eight months from late March to November. There are eleven to twenty pluckings annually. Tea growers harvest two to three pluckings in the warm spring while during the hot summer there are four to eight pluckings. Four to seven pluckings are harvested during the cool autumn, whereas there are only one to two pluckings in the cold winter. Nearly half of the total value of fresh tea leaves is plucked during the spring; one-third during the summer; one-fifth during the autumn; and less than one-twentieth of the total is harvested during the winter (11). The fresh tea leaves plucked in the summer and autumn are preferable for refining oolong tea and black tea, whereas those preferable for refining pouchong tea are harvested during spring and autumn (41).



Figure 7. A tea plucker of Linkou, Taipei. Note a child on her back. (Author's photo)



Figure 8. Taiwan tea pluckers. Tea plucking is an all-girl trade. The containers fastened to their waists are made of bamboo. Note that the girls are well protected from sun. (JCRM)

In general, the best fresh tea leaves are plucked from high noon through three o'clock in the afternoon. Leaves plucked in the early morning are insipid (31).

Plucking is solely women and girl's work. They pluck by hand without the aid of shearers or knife. A girl can pluck 20-30 kilograms of fresh tea leaves in a single day. Eighty to ninety women and girls are needed for the plucking of each hectare of tea garden (31). Abundant cheap labor is therefore a most important factor of the tea industry in Taiwan (57 and 64).

Table 14. Tea Plucking in Taiwan

| Seasons | Plucking Period | Number of Pluckings | Production of Fresh Tea Leaves Per 10,000 Tea Clumps | |
|----------|------------------|---------------------|---|---------|
| | | | Kg. | Percent |
| Spring | Apr-mid May | 2-3 | 1,020 | 46 |
| Summer | Late May-mid Aug | 4-8 | 618 | 28 |
| Autumn | Late Aug-Oct | 4-7 | 483 | 22 |
| Winter | Late Oct-mid Nov | 1-2 | 99 | 4 |
| All Year | Apr-mid Nov | 11-20 | 2,220 | 100 |

Source: C. S. Chen, *Land Utilization in Taiwan*, Taipei, 1950, P. 213

Other Cultural Practices

There are several varieties of windbreak and shade trees used. *Acacia confusa* and *Leucaena Glauca* Benth are the most important two. The former is planted over the entire tea region, while the latter is mainly confined to the tea districts of central Taiwan (92).

Contour farming is utilized to prevent soil erosion in well managed tea gardens. But soil erosion is still a serious conservational problem in Taiwan. In many old tea gardens, tea trees have been planted at random. Contour farming is unknown to these tea planters. Soil erosion takes place on hill slope tea gardens during the summer high intensity rainfall period. Many small eroded gullies were seen here and there by the author during his field trips. In many gardens soils have been so eroded that the remainder is very thin (30).

There are four periods of ploughing and weeding a year. Twelve cattle-working-days and 20-30 man-working-days are needed per hectare of tea garden on the level land whereas 60-80 man-working-days are needed per hectare on the slopes where the entire work must be done by man (31 and 64).



Figure 9. Weeding is done solely by man-power on the hill slope tea gardens. The man with map in hands is the author. (Mr. Yang Ling-sheng)

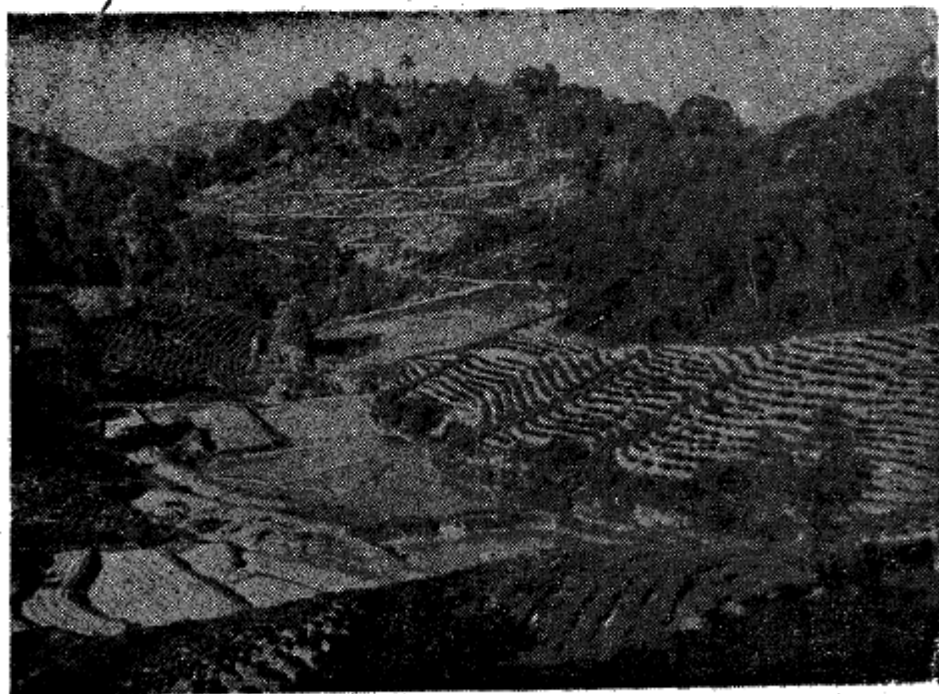


Figure 10. Tea plantation in Yueh Hsiang, Nantou. Note the location of rice paddy fields and forests. (Author's photo)

Figure 11. Taiwan Tea Grower's Calendar

| Month | J | F | M | A | M | J | J | A | S | O | N | D |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Layage | | | | | | | | | | | | |
| Seed sowing | | | | | | | | | | | | |
| Transplanting | | | | | | | | | | | | |
| Ploughing and weeding | | | | | | | | | | | | |
| Deep ploughing | | | | | | | | | | | | |
| Fertilizing | | | | | | | | | | | | |
| Down pruning | | | | | | | | | | | | |
| Collar pruning | | | | | | | | | | | | |
| Plucking | | | | | | | | | | | | |

The Structure of the Tea Industry

Land in Tea

In 1955, there were 47,000 hectares of land in tea (13). Plantings had reached this areal extent by the second decade of the century. In view of increasing population and mounting pressure on better tea lands for food crops, it would appear that growers will be pressed to maintain this amount of tea in production.

More than nine-tenths of the tea gardens are concentrated in the central and northern seven hsien and cities where environmental details and labor supply are most favorable. More than one third of the total are in Taipei Hsien. Hsinchu Hsien has one-fourth of the total. Taoyuan Hsien has about one-fifth of the total, and about one-tenth of the total is in Miaoli Hsien. Nantou Hsien of central Taiwan has only four percent of the total, whereas other hsien

and cities have less than one percent of the total or none each.

Of the 47,000 hectares of land in tea in 1955, 91.1 percent were under plucking. Distribution of total plantings and portions plucked are shown by hsiens in Table 15.

Table 15. Land in Tea, 1955

| Hsiens | Under Cultivation | | Under Plucking | |
|----------|-------------------|---------|----------------|---------|
| | Ha. | Percent | Ha. | Percent |
| Taipei | 17,342.98 | 36.90 | 15,483.90 | 36.16 |
| Hsinchu | 12,605.70 | 26.82 | 11,818.20 | 27.61 |
| Taoyuan | 9,661.00 | 20.56 | 9,134.00 | 21.34 |
| Miaoli | 4,785.12 | 10.18 | 4,274.00 | 9.98 |
| Nantou | 1,944.31 | 4.14 | 1,569.00 | 3.67 |
| Ilan | 377.37 | 0.80 | 347.00 | 0.81 |
| Taichung | 261.05 | 0.56 | 166.81 | 0.39 |
| Others | 22.50 | 0.04 | 15.20 | 0.03 |
| Total | 47,000.03 | 100.00 | 42,808.11 | 100.00 |

Source: *Taiwan Agricultural Yearbook*, 1955. P. 71.

Tea gardens situated mainly on hill slopes generally are not competitive with major food crops for land. About four-fifths of the total acreage in tea are slope tea gardens and one-fifth is on the level land (23).

In rice areas, the ratio of land in tea to the total cultivated land is very

Table 16. Land in Tea and Cultivated Land, 1955

| Hsiens | Cultivated Land(A) | Upland Fields (B) | Land in Tea(C) | $\frac{C}{A} \times 100$ | $\frac{C}{B} \times 100$ |
|----------|--------------------|-------------------|----------------|--------------------------|--------------------------|
| | Ha. | Ha. | Ha. | | |
| Taipei | 60,610 | 28,208 | 17,343 | 29 | 61 |
| Hsinchu | 44,869 | 25,540 | 12,606 | 28 | 50 |
| Taoyuan | 57,964 | 14,043 | 9,661 | 17 | 69 |
| Miaoli | 43,632 | 21,537 | 4,785 | 11 | 22 |
| Nantou | 44,768 | 26,415 | 1,944 | 4 | 7 |
| Ilan | 28,425 | 7,644 | 377 | 1 | 5 |
| Taichung | 48,205 | 14,576 | 261 | 1 | 2 |
| Others | 131,238 | 72,530 | 22 | 0 | 0 |
| Total | 873,002 | 340,314 | 47,000 | 5 | 14 |

Source: Taiwan Provincial Department of Agriculture and Forestry.

low or even zero. But in hilly or tableland areas, the ratio is as high as two-thirds. In Taipei, Taoyuan, and Hsinchu Hsiens, tea is the second crop, next to rice, in terms of crop area (10). (See Tables 16 and 17).

Table 17. Acreage of Major Crops in Northwest Taiwan, 1955

| Crops | Taipei | | Taoyuan | | Hsinchu | | Miaoli | |
|--------------|--------|------|---------|------|---------|------|--------|------|
| | Ha. | Rank | Ha. | Rank | Ha. | Rank | Ha. | Rank |
| Rice | 45,042 | 1 | 62,373 | 1 | 25,609 | 1 | 29,102 | 1 |
| Tea | 16,917 | 2 | 9,661 | 2 | 12,606 | 2 | 4,785 | 6 |
| Sweet potato | 10,024 | 3 | 9,426 | 3 | 10,666 | 3 | 14,260 | 2 |
| Vegetables | 9,353 | 4 | 5,491 | 4 | 5,037 | 5 | 5,316 | 5 |
| Green manure | 2,118 | 5 | 4,537 | 5 | 7,424 | 4 | 9,298 | 4 |
| Peanut | 1,329 | 6 | 1,500 | 6 | 2,227 | 6 | 4,027 | 7 |
| Citrus | 985 | 7 | 400 | 7 | 1,611 | 7 | 362 | 8 |
| Banana | 57 | 8 | 17 | 10 | 63 | 10 | 54 | 10 |
| Citronella | 19 | 9 | 97 | 8 | 113 | 9 | 10,041 | 3 |
| Sugar cane | — | — | 22 | 9 | 211 | 8 | 295 | 9 |

Source: Taiwan Provincial Department of Agriculture and Forestry.

Table 18. The Yield of Tea, 1955

| Country | Yield per Acre |
|-----------------------------|----------------|
| Japan | 1,695 pounds |
| Northern India and Pakistan | 861 |
| Kenya | 760 |
| Uganda | 700 |
| Southern India | 699 |
| Nyasaland | 693 |
| Ceylon | 671 |
| Malaya | 625 |
| Mozambique | 600 |
| South Rhodesia | 500 |
| Indonesia | 429 |
| Tanganyika | 417 |
| Congo | 375 |
| Mauritius | 333 |
| Taiwan | 259 |
| Tuekey | 167 |
| Brazil | 154 |
| Argentina | 37 |

Source: T. Eden, *Tea*. London, Longmans, Green and Co., 1958. P. 189.

Technically, the cultivation methods of Taiwan tea gardens range from very progressive (38) to traditional (4). The loss of plantings during wartime have not been entirely regained, especially within established gardens. About forty percent of the total acreage of tea gardens is planted to poor tea varieties. Therefore, in Taiwan as a whole, the yield per acre of tea is rather low (91) (See Table 18).

Size of Tea Farms

The small size of tea farms is an impressive feature of the tea industry in Taiwan(60). At one time, because the profits from tea plantations in Ceylon, India, and Java became greater than those of the small tea farms in Taiwan, a number of Taiwan tea farmers united together to establish cooperative tea farms with an acreage of 50-100 hectares each (13). The total area remaining in these cooperative tea farms, however, is very small. More than two thirds of the tea farms have less than two hectares (60). It is understandable, therefore, that almost all of the tea farmers are also rice growers.

In 1955, the 47,000 hectares of land in tea were cultivated by 32,687 tea farm households. On the average, each household had only 1.44 hectares in tea garden. Taoyuan Hsien had the largest average tea farm size, but it was only 2.2 hectares (See Table 19).

Table 19. Average Tea Farm Size, 1955

| Hsiens | Tea Area | Number of Tea Farm Households | Average Size of Tea Farm |
|----------|----------|-------------------------------|--------------------------|
| | Ha. | | Ha. |
| Taipei | 17,345 | 12,477 | 1.4 |
| Taoyuan | 9,661 | 4,429 | 2.2 |
| Hsinchu | 12,606 | 8,536 | 1.5 |
| Ilan | 375 | 390 | 1.0 |
| Misoli | 4,786 | 4,521 | 1.1 |
| Taichung | 263 | 209 | 1.3 |
| Nantou | 1,944 | 2,102 | 0.9 |
| Others | 24 | 23 | 1.0 |
| Total | 47,000 | 32,687 | 1.44 |

Source: Taiwan Provincial Department of Agriculture and Forestry.

Taiwan Tea Corporation is the only large plantation. (See Table 20) The corporation owns seven separate tea plantations, ten crude tea factories, and two refineries. The corporation controls 2,500 hectares or 5 percent of the total tea acreage of the island. Only 890 hectares, or 36 percent of corporation total, are cultivated by the seven plantations. The remainder is rented to tenant farmers on a basis of selling the fresh leaves to the corporation's factories (38).

Table 20. Taiwan Tea Corporation, 1952

| Tea Plantation | Acreage | Number of Crude Factories | Number of Refineries |
|-------------------------|----------|---------------------------------|----------------------------|
| | Ha. | | |
| Haishan Tea Plantation | 474.00 | 1 | |
| Taiiao Tea Plantation | 111.00 | 1 | |
| Wenshan Tea Plantation | 76.00 | 2 | |
| Tachi Tea Plantation | 618.00 | 1 | |
| Kuanshi Tea Plantation | 122.80 | 1 | |
| Sani Tea Plantation | 376.00 | 1 | |
| Yuehshih Tea Plantation | 727.47 | 3 | |
| Total | 2,500.27 | 1 | 2* |

*Two refineries are operated by the headquarters and located in Taipei City.

Source: PDAF, *Report on a Survey of Tea Production Capacity of Taiwan, 1952*, Taipei, 1952, pp. 54-101.

Tea Growers

The 32,687 tea farm households are about 4.5 percent of the total farm households in Taiwan. The distribution of the tea growers follows the same pattern as the tea gardens (See Table 21).

As noted earlier, almost all Taiwan tea growers raise tea on a part-time basis. About half of the land of a tea farm is used for growing tea (See Tables 22 and 23). The remainder is devoted to rice paddy fields, potato fields, orchards, vegetable gardens, forest, and other uses. Part-time operation is a form of agricultural insurance. Tea growers can live on other crops when the tea price is low. In general, the larger farms have a higher percentage of land in tea (See Table 24).

Table 21. The Distribution of Tea Farm Households, 1955

| Hsiens | Number of Total Farm Households (A) | Tea Farm Households | | $\frac{B}{A} \times 100$ |
|----------|--|---------------------|---------|--------------------------|
| | | Number (B) | Percent | |
| Taipei | 48,671 | 12,477 | 25.2 | 25.2 |
| Hsinchu | 30,234 | 8,586 | 28.1 | 28.2 |
| Miaoli | 35,256 | 4,521 | 12.8 | 12.8 |
| Taoyuan | 36,376 | 4,429 | 12.2 | 12.2 |
| Nantou | 45,598 | 2,102 | 4.6 | 4.6 |
| Ilan | 26,400 | 390 | 1.5 | 1.5 |
| Taichung | 53,069 | 209 | 0.4 | 0.4 |
| Others | 98,636 | 23 | 0.0 | 0.0 |
| Total | 732,255* | 32,687 | 100.0 | 4.5 |

*Total of the whole island.

Source: Provincial Department of Agriculture and Forestry.

Table 22. Land Use of Taiwan Tea Farms*

| Hsiens | Tea | Rice Paddy Fields | Forest | Upland Fields | Orchard | Grass | River and Ponds | Total |
|---------|---------|-------------------------|--------|------------------|---------|--------|-----------------------|--------|
| Taipei | ha. | 2.0734 | 0.7923 | 0.7586 | 0.2692 | 0.0951 | 0.0234 | 4.0127 |
| | percent | 51.7 | 19.7 | 18.9 | 6.7 | 2.4 | 0.6 | 100.0 |
| Taoyuan | ha. | 2.6568 | 1.0887 | 0.3612 | 0.0504 | 0.0848 | 0.0472 | 4.2390 |
| | percent | 61.9 | 25.4 | 8.4 | 1.2 | 2.0 | 1.1 | 100.0 |
| Hsinchu | ha. | 2.3071 | 0.6350 | 1.2310 | 0.5107 | — | 0.0234 | 4.7842 |
| | percent | 48.7 | 13.4 | 26.0 | 10.8 | — | 0.5 | 100.0 |
| Miaoli | ha. | 1.4728 | 0.7267 | 0.8509 | 0.2977 | — | 0.0406 | 3.3887 |
| | percent | 43.5 | 21.5 | 25.1 | 8.8 | — | 1.2 | 100.0 |
| Nantou | ha. | 1.0934 | 0.7578 | 0.7605 | 0.0057 | — | — | 2.6174 |
| | percent | 41.8 | 29.0 | 29.1 | 0.2 | — | — | 100.0 |
| Average | ha. | 2.1459** | 0.8184 | 0.7877 | 0.2556 | 0.0516 | 0.0185 | 4.0953 |
| | percent | 52.4 | 20.0 | 19.2 | 6.2 | 1.3 | 0.5 | 100.0 |

*A sampling survey of 500 tea farm households in September of 1956.

**This is larger than the average tea farm household.

Source: Teh-tsui Chang and Wei-fang Chuang, *A Study of the Production and Marketing of Taiwan Tea Industry*, Taipei, Chinese-American Joint Commission on Rural Reconstruction, 1956, p. 13.

Table 23. Crop Area of Major Crops of Tea Farm

| Hsiens | Tea | Rice | Sweet Potato | Fruits | Vegetables | Others | Total |
|---------------|--------|--------|-----------------|--------|------------|--------|--------|
| Taipei { ha. | 1.8912 | 1.1520 | 0.1586 | 0.1344 | 0.0384 | — | 3.3697 |
| percent | 56.1 | 34.2 | 4.6 | 4.0 | 1.1 | — | 100.0 |
| Taoyuan { ha. | 2.5057 | 1.8816 | 0.0480 | 0.0288 | 0.0096 | 0.0019 | 4.4756 |
| percent | 56.0 | 42.0 | 1.1 | 0.6 | 0.2 | 0.0 | 100.0 |
| Hsinehu { ha. | 2.2272 | 1.1904 | 0.2112 | 0.2208 | 0.0288 | 0.0088 | 3.8828 |
| percent | 57.4 | 30.7 | 5.4 | 5.7 | 0.7 | 0.1 | 100.0 |
| Miaoli { ha. | 1.3586 | 1.4016 | 0.1824 | — | — | 0.2784 | 3.2161 |
| percent | 42.1 | 43.6 | 5.7 | — | — | 8.7 | 100.0 |
| Nantou { ha. | 1.0934 | 1.0944 | 0.0960 | — | — | 0.0864 | 2.3702 |
| percent | 46.2 | 46.2 | 4.1 | — | — | 3.7 | 100.0 |
| Average { ha. | 2.0256 | 1.3632 | 0.1440 | 0.1056 | 0.0192 | 0.0318 | 3.6894 |
| percent | 54.9 | 37.0 | 3.9 | 2.7 | 0.5 | 0.9 | 100.0 |

Source: Teh-tsui Chang and Wei-fang Chuang, *A Study of the Production and Marketing of Taiwan Tea Industry*, Taipei, Chinese-American Joint Commission on Rural Reconstruction, 1958, p. 14.

Table 24. Tea Garden and Size of Tea Farms

| Size of Tea Farms | Tea Garden Percent of Total Land Area | Tea Percent of Total Crop Area |
|-------------------|---|--------------------------------------|
| 0-1 ha. | 28.9 | 26.7 |
| 1-2 | 42.9 | 45.3 |
| 2-3 | 50.0 | 52.2 |
| 3-4 | 57.1 | 54.9 |
| more than 4 | 69.8 | 74.5 |

Source: PDAF, *Report on a Survey of Tea Production Capacity of Taiwan, 1952*, Taipei, 1952, pp. 13-14.

Tea Processing

The processing of tea is divided into two stages. The first is performed in the crude tea factories and the second takes place in the tea refineries. The first stage comprises the preliminary processes of withering,⁶ rolling, fermenting,

⁶ A new method of green tea processing without withering has been experimented by the Yuehli Tea Plantation. By this new method, much time and money can be saved.

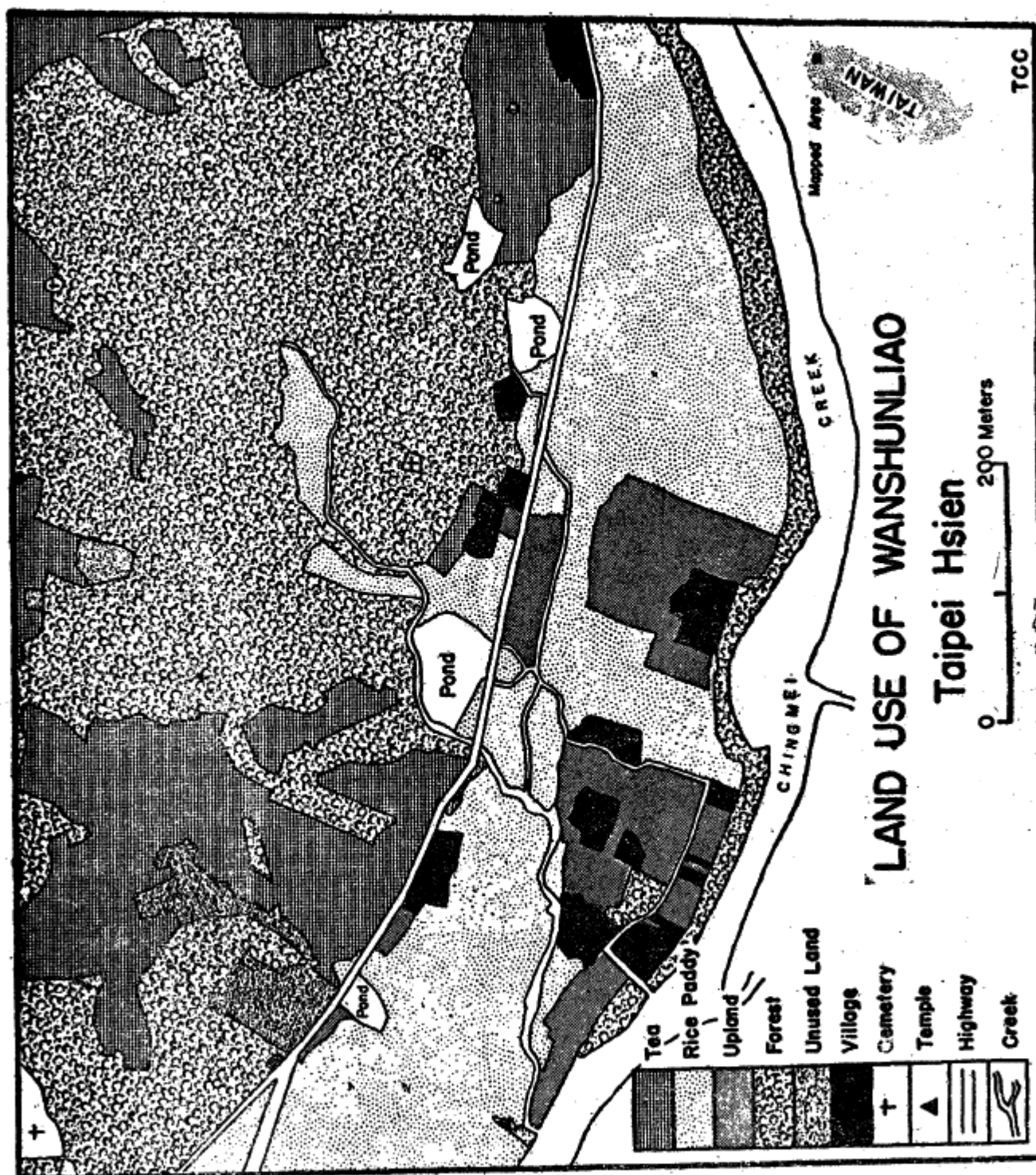


Figure 12, Land use of Wanshunliao, Taipei Hsien

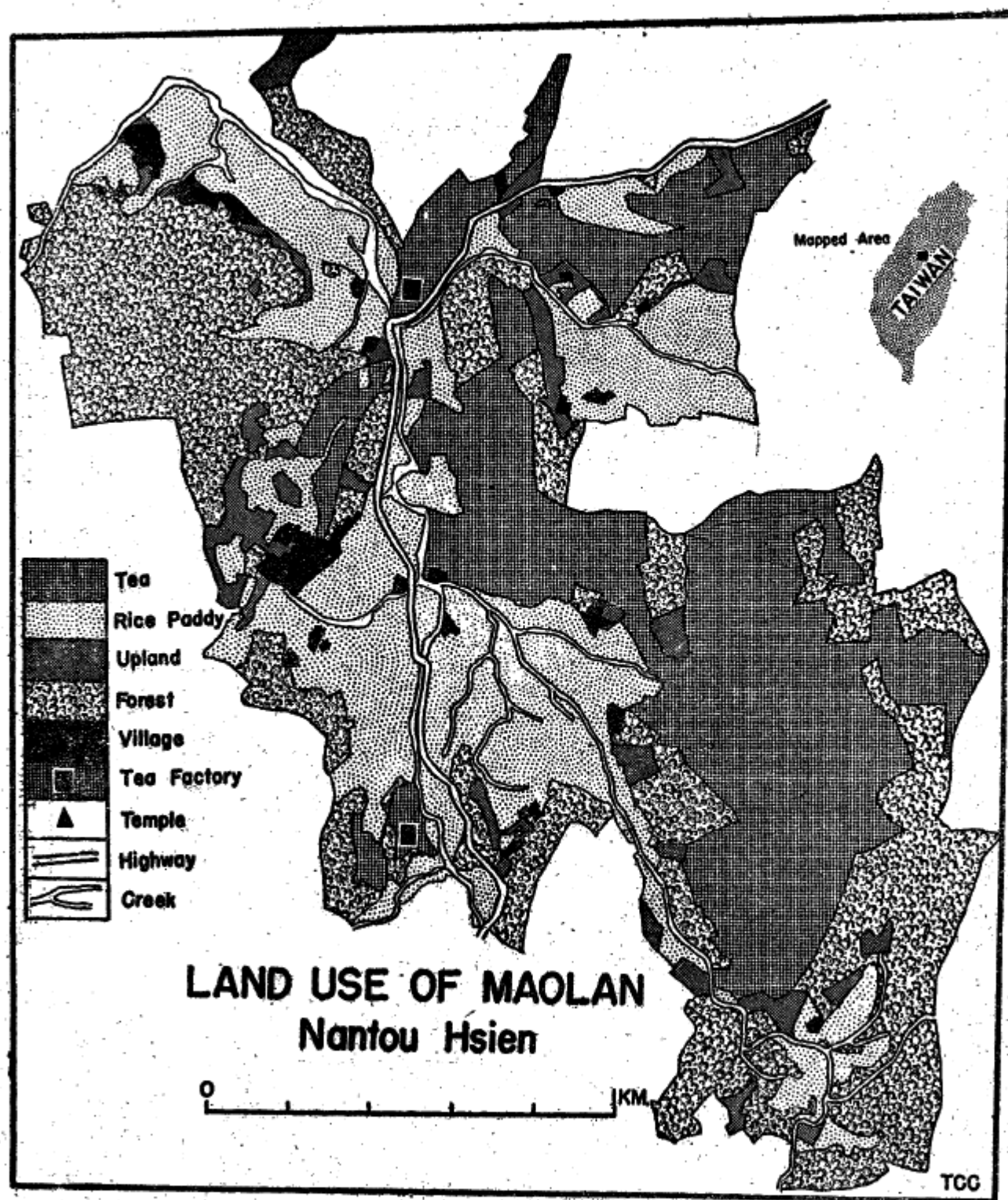


Figure 13. Land use of Maolan, Nantou Hsien

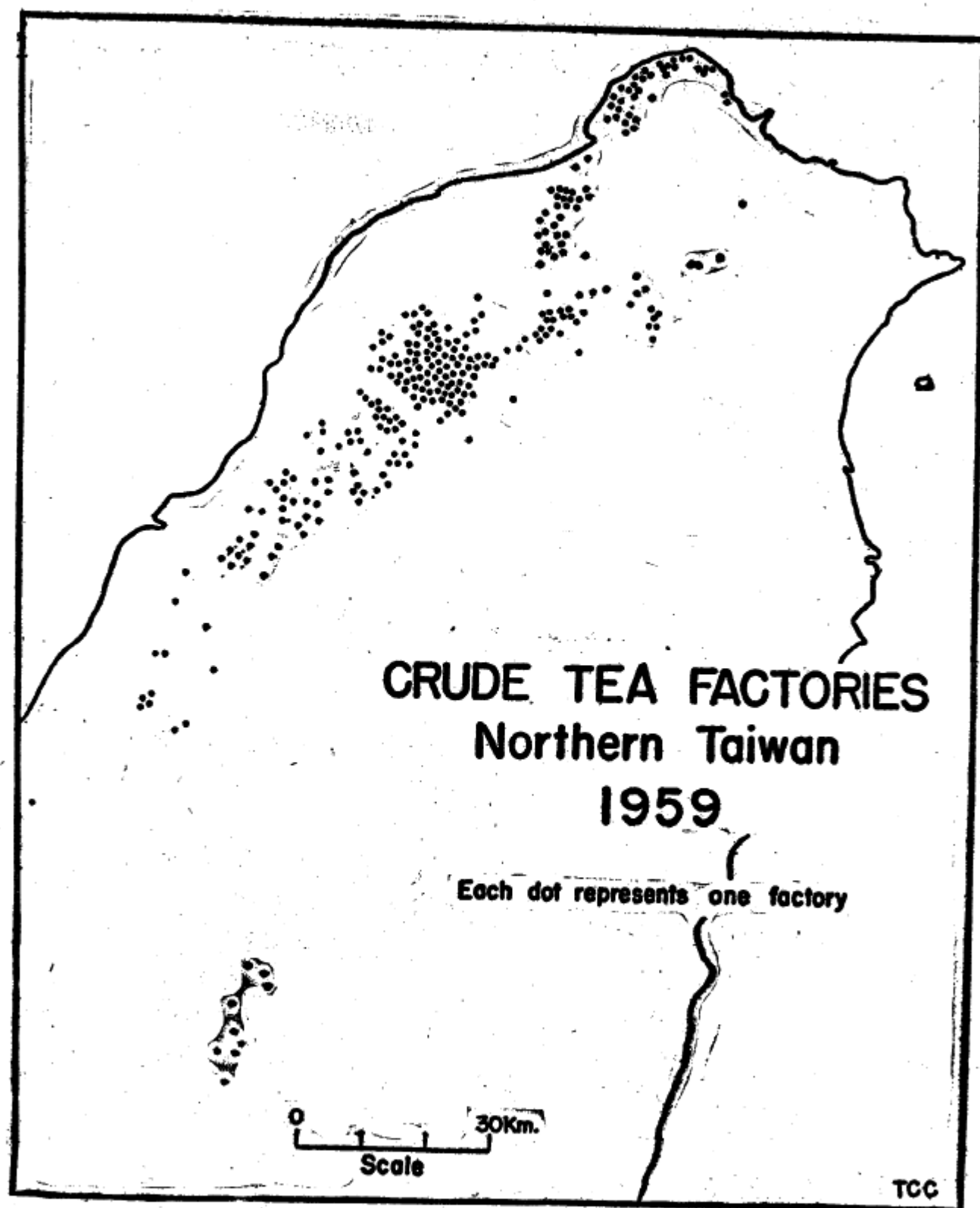


Figure 14. Crude tea factories, northern Taiwan, 1959



Figure 15. A small tea processor at Shengkeng, Taipei Hsien. Note that the tea leaves are laid out evenly on the bamboo trays for withering. (Author's photo)

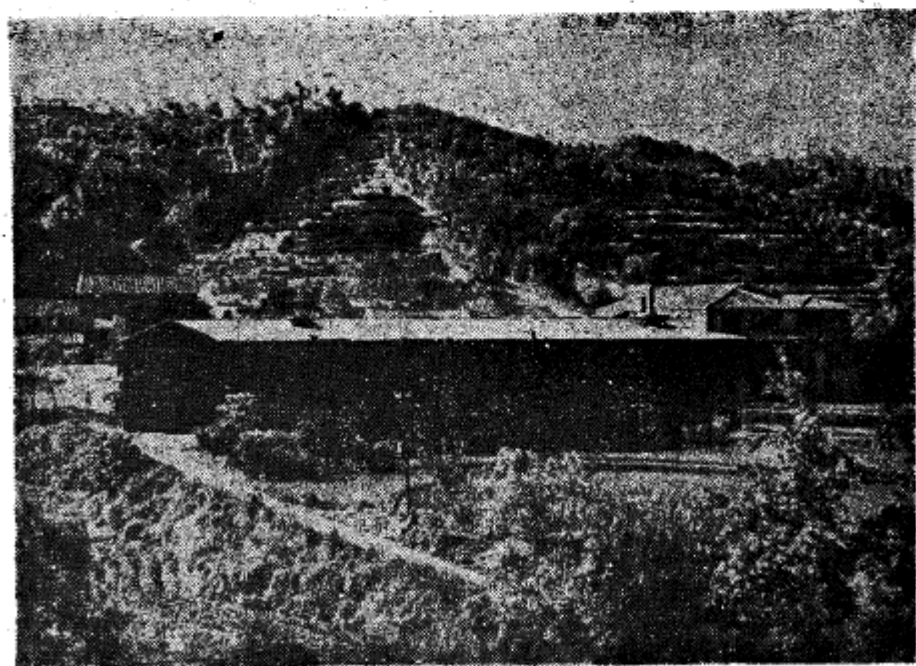


Figure 16. A crude tea factory of Hsinpu, Hsinchu Hsien. (JCRR)

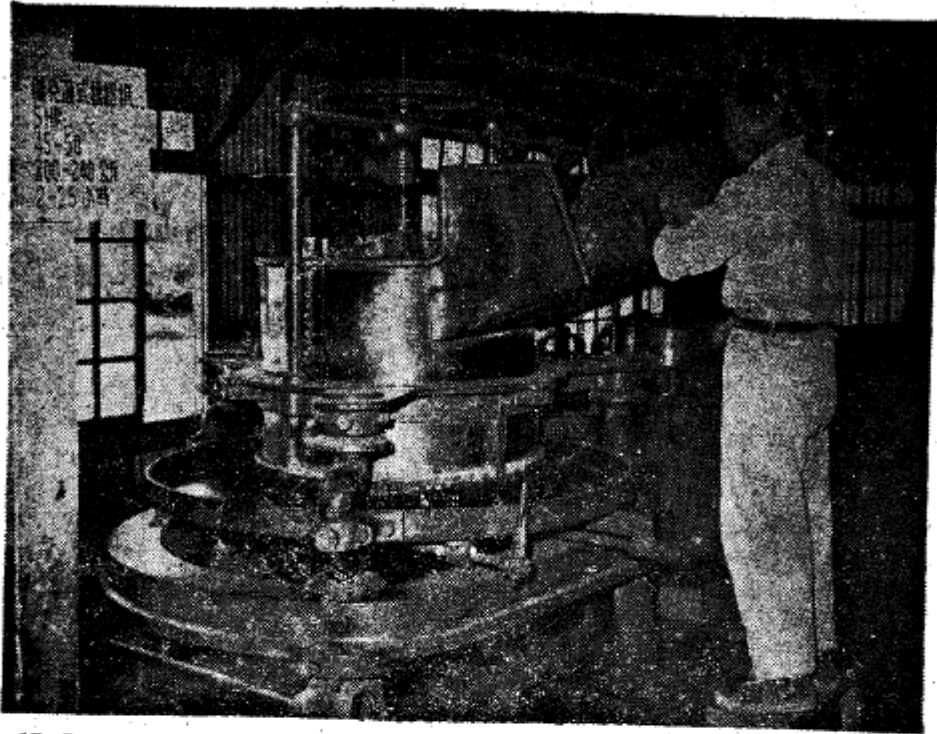


Figure 17. Rolling of tea leaves. After withering, the tea leaves are fed to a roller, where they are pressed while being rolled. The rolling and pressing partially break the tissue structure of the leaves, let out the juice, set in fermentation, and give the tea leaves the shape of rolls. (JCRR)

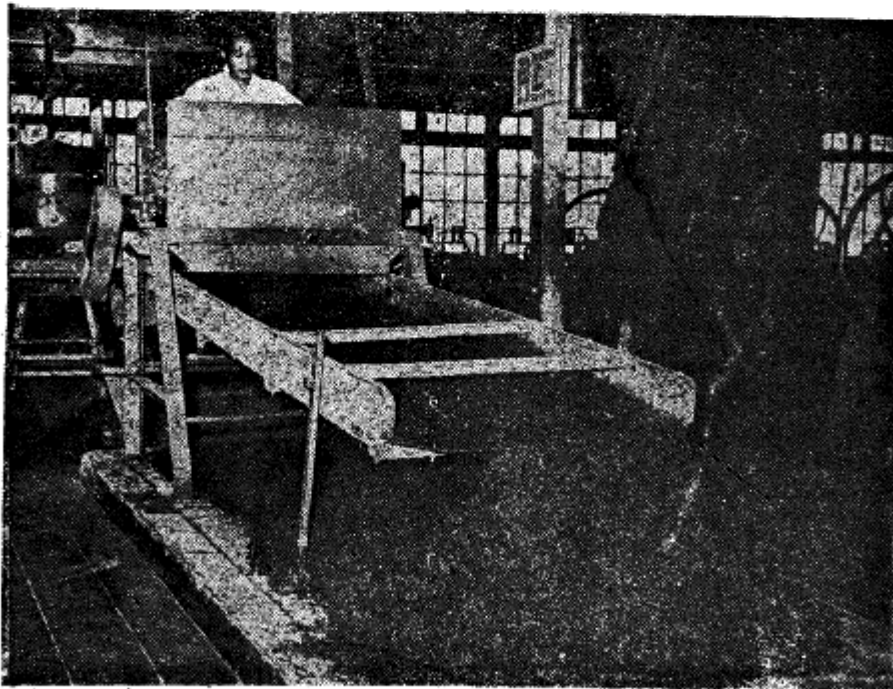


Figure 18. Roll-breaking of tea leaves. A roll-breaker breaks the lumps of the pressed and rolled tea leaves. (JCRR)

and drying, by which the product known as crude tea is produced. Different methods are employed to process different kinds of teas. Black tea is full-fermented, oolong tea is semi-fermented, pouchong tea is slightly-fermented, and green tea is non-fermented. Since the ultimate quality of the finished product depends entirely upon the excellence of the crude tea, this process is exceedingly important. The second stage is to produce refined tea by the final process of firing, grading, and sorting. In general, sorting is performed by girls. This work is in progress any day throughout the tea-season on the verandas of the tea refineries at Tataochen which is the main center of tea refineries. Other work is done by machine, except for the crude tea that is processed at home where the work is all done by hand or with the help of simple machines.

The pouchong tea or scented tea is known as jasmine tea in the United States. To make pouchong tea, the crude tea is mixed with jasmine and gardenia flowers, previous to the final firing. In general, 30 to 40 kilograms of scented flowers are required to penetrate one hundred kilograms of crude tea. More gardenia than jasmine sambac is required to scent the same quantity of crude tea (49, 56 and 68).

In 1959, there were 306 crude tea factories (See Table 25) in Taiwan. These were scattered throughout the entire tea producing region. In addition, there were about 1,500 tea farm households who processed crude tea at home in the old-fashioned way. These small home-processors, in general, process high grade

Table 25. Crude Tea Factories, 1959

| Hsiens | Number of Factories | Annual Production Capacity of Crude Tea | | Average Annual Production of Crude Tea, 1956-58 | |
|----------|------------------------|---|---------|---|---------|
| | | Kg. | Percent | Kg. | Percent |
| Taipei | 87 | 3,931,290 | 24.6 | 2,868,760 | 21.8 |
| Taoyuan | 73 | 3,834,350 | 24.0 | 3,634,176 | 27.7 |
| Hsinchu | 93 | 5,361,500 | 33.2 | 4,815,484 | 36.7 |
| Miaoli | 40 | 1,778,400 | 11.2 | 1,163,322 | 8.9 |
| Taichung | 2 | 40,200 | 0.3 | 49,067 | 0.4 |
| Nantou | 10 | 1,010,706 | 6.3 | 593,221 | 4.5 |
| Ilan | 1 | 41,000 | 0.3 | 7,545 | 0.1 |
| Total | 306 | 15,997,446 | 100.0 | 13,131,575 | 100.0 |

Source: PDAF, *Report on Taiwan Tea Production, 1959*, Taiwan, 1960.

tea when the tea price is high. Most of these home-tea-processors are located in the eastern border of the Taipei Basin, not far from Tataochen; thus they may handily sell the crude tea to the refineries.

Today there are 78 tea refineries (See Table 26) in Taiwan, 48 of which are at Tataochen, the northwestern part of Taipei City. There are several reasons for the domination of this center. Taipei is the transportation hub of northern Taiwan. It is easily reached from all tea regions by railroad or highway. During the past, river transportation was significant. Tataochen was a river port which could serve the tea regions of Taipei Basin borderlands by way of the Tamsui River and its tributaries (16). Taipei is close to both Keelung and Tamsui, tea exporting ports of today and the past. Logically, Keelung should be the tea refining industry center. Keelung, however, is handicapped by limited lowland and long rainy season.

Table 26. Tea Refineries, 1959

| Hsiens | Number of Refineries | Annual Production Capacity of Refined Tea | | Average Annual Production of Refined Tea, 1956-58 | |
|---------------|----------------------|---|---------|---|---------|
| | | Kg. | Percent | Kg. | Percent |
| Taipei City | 50 | 28,560,000 | 71.4 | 10,324,301 | 79.9 |
| Taipei Hsien | 12 | 4,360,000 | 10.9 | 886,296 | 6.9 |
| Taoyuan Hsien | 9 | 3,360,000 | 8.4 | 1,535,300 | 11.9 |
| Hsinchu Hsien | 5 | 3,040,000 | 7.6 | 125,819 | 1.0 |
| Miaoli Hsien | 1 | 240,000 | 0.6 | 55,346 | 0.3 |
| Nantou Hsien | 1 | 480,000 | 1.2 | — | — |
| Total | 78* | 40,040,000 | 100.0 | 12,927,062 | 100.0 |

*18 of them are also crude tea factories.

Source: PDAF, *Report on a Survey of Tea Production Capacity of Taiwan, 1952*, Taipei, 1952, pp. 13-14.

Since more than nine-tenths of the tea is refined for export, the industry is greatly influenced by any change in the world tea markets (13). The kind of tea produced is therefore dependent chiefly upon the demand of foreign customers. This is illustrated by the trends during the last 90 years. Only oolong tea had been processed until 1873 when pouchong tea was introduced. In 1934, Taiwan began to process a large quantity of black tea, and the three shared the total equally during the following few years. Green tea had no importance in quantity. In 1940, more than one-half of the total refined tea was black tea, one-third was pouchong tea, and oolong tea was only one-tenth

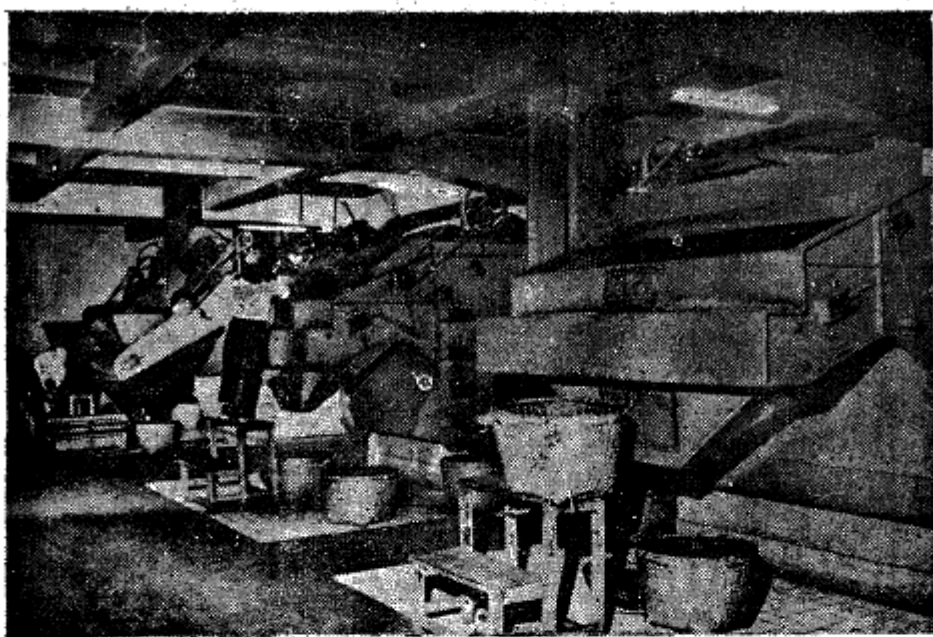


Figure 19. Tea drier. Tea drying house of the Yuchih Tea Plantation crude tea factory. (JORB)



Figure 20. Various kinds of tea packed in tins. From left to right are black tea, oolong tea, jasmine tea, and green tea. (JORB)

of the total. Following the end of World War II, green tea gradually rose to a leading place. In 1960, four-tenths of the total was black tea, one-third was green tea, one-fifth was pouchong tea, and only 2.6 percent was oolong tea (See Figure 2).

Tea Marketing

About five percent of the tea is consumed in Taiwan. Retail tea stores buy the refined tea from the refineries and sell to the tea drinkers directly.

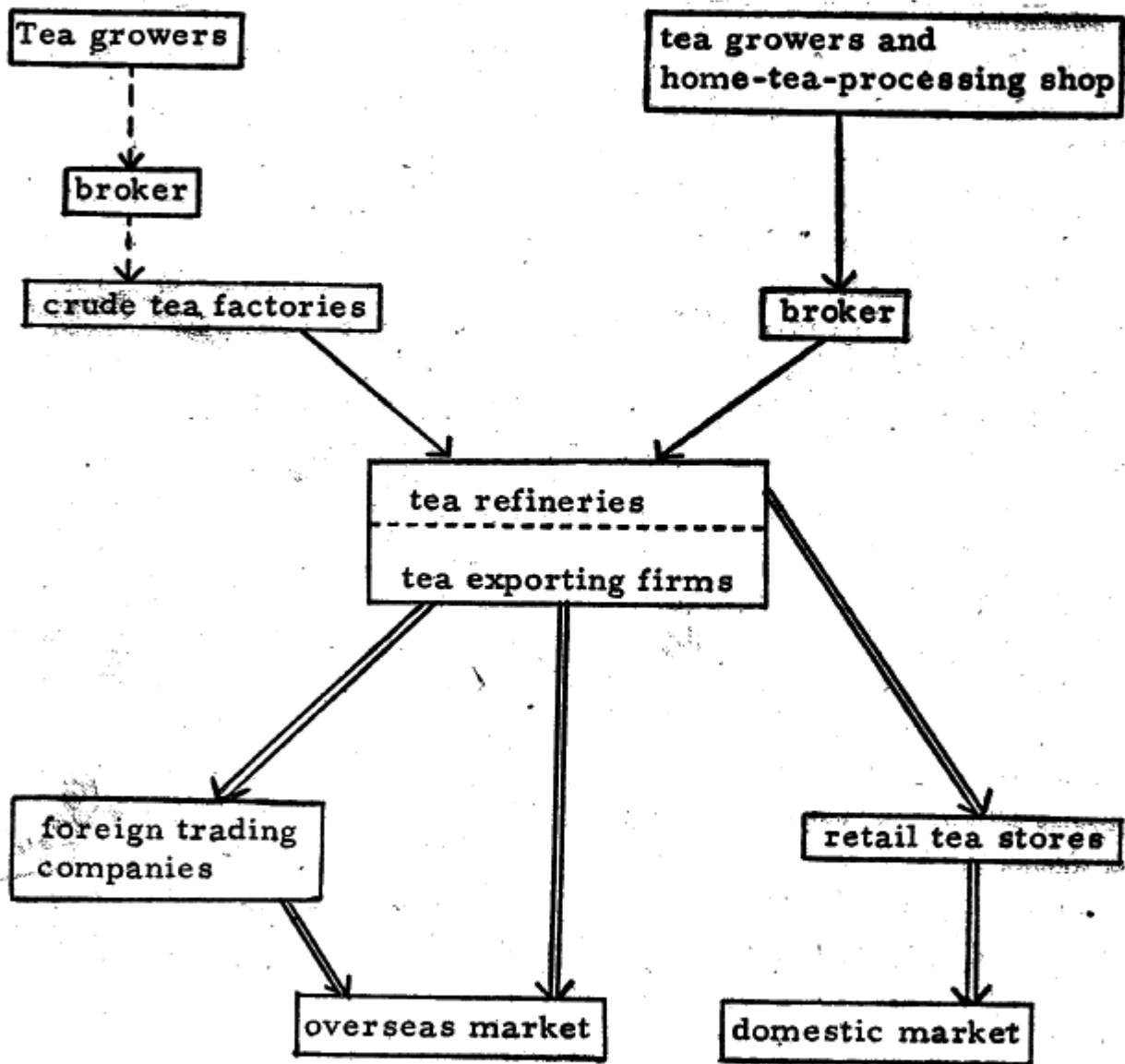
Refined tea is exported in two ways. One is direct export by the tea refineries or tea trading companies to the tea trading companies of market countries. In general, tea refineries are also tea trading companies. The other way is for tea refineries to sell the tea to the foreign companies in Taipei. Tea is then exported by these foreign companies. Today, there are four British trading companies and two American trading companies which buy and sell tea. These six foreign companies handle more than a half of the total tea exported.

Tea has to be inspected before export (29). Taiwan Tea Inspection Bureau is in charge of this inspection. During the last decade, one-tenth of tea inspected failed to pass the inspection. Inferior quality and low grade tea is one of the problems of the industry. After inspection, the tea is transported to the Port of Keelung by trucks. Tea is checked again by the Bureau at the port before it is loaded.

The export container is a cubic plywood box which contains about forty kilograms of tea. An inner lining of foil and waterproof paper protects the tea from dampness.

Keelung is the most important tea port in Taiwan. Keelung is the largest seaport in northern Taiwan and only 30 kilometers north of Taipei.

Figure 21. Tea from Farm to Market



— — — — — → fresh tea leaves

————— → crude tea

===== → refined tea

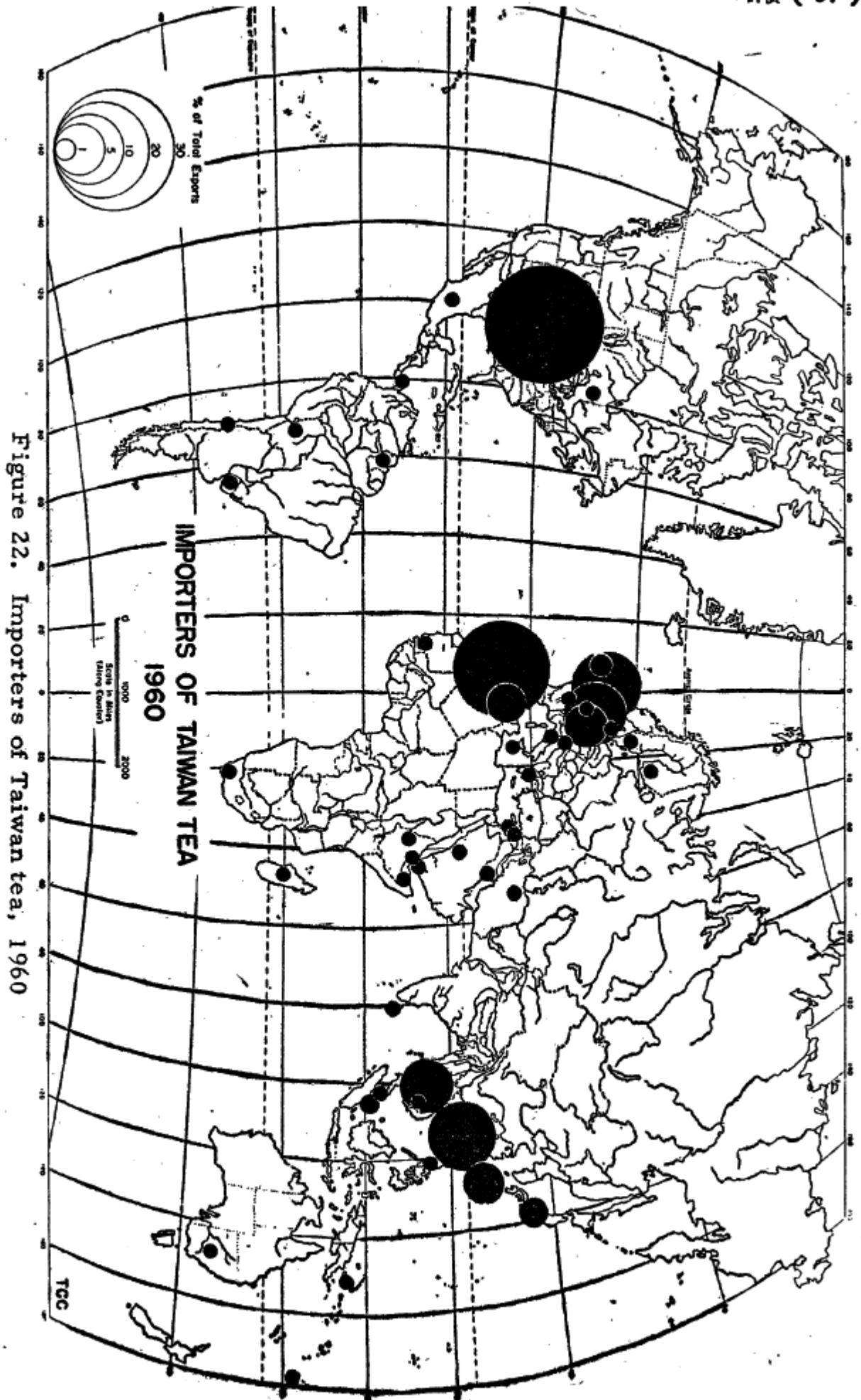


Figure 22. Importers of Taiwan tea, 1960

Taiwan Tea Export Market

Sugar, rice, and tea are the three major agricultural commodity exports of Taiwan. Of these only tea has a notable problem with respect to maintaining markets. Japan has long been the leading consumer of Taiwan sugar, and very likely the Chinese mainland also eventually will be a reliable market for this commodity. Since the population of the island has increased rapidly during the last decades, there remains only a small amount of rice for export.⁷ The market for rice will never be questionable because of nearby deficiency producers. This, however, is not so with tea. Tea consumption on the island is very small; most of the tea must be exported. The China mainland and Japan also are leading tea exporters, competing with Taiwan. Taiwan exports about eleven million kilograms of tea annually. Today, the major buyers of Taiwan tea are the United States, Morocco, the United Kingdom, Hongkong,⁸ Netherlands, Thailand, West Germany, Ryukyu, Algeria, Japan, and Ireland (See Figure 22).

As noted, Taiwan exports four different kinds of tea. In 1960, Taiwan exported 11,437,273 kilograms of tea, of which 28.8 percent was black tea, 21.9 percent was green tea, 15.2 percent was pouchong tea, 1.8 percent was oolong tea, and 32.3 percent was miscellaneous teas which include stem, dust and so on (See Table 27).

Taiwan black tea has a rather wide market. Before World War II, the major customers were the United States, the China Mainland, Japan, the United Kingdom, Netherlands, Germany, Iran, Sudan, Australia, Iraq and Canada (15). Today, the United States, the United Kingdom, West Germany, Netherlands, Japan, Hong Kong, Ireland, and Chile are the important buyers (See Table 28).

⁷ In 1959, Taiwan exported only 81,350 metric tons of rice, and a value of US\$11,802,500. See *China Yearbook 1960-1961*, Taipei, China Publishing Co., p. 383.

⁸ The tea is very possibly re-exported from Hong Kong to Southeast Asian countries.

Table 27. The Export of Taiwan Tea, 1960

| Tea | Kilograms | Percent |
|--------------------|------------|---------|
| Black tea | 3,296,363 | 28.8 |
| Green tea | 2,510,153 | 21.9 |
| Pouchong tea | 1,738,974 | 15.2 |
| Oolong tea | 201,162 | 1.8 |
| Miscellaneous teas | 3,689,621 | 32.3 |
| Total | 11,437,273 | 100.0 |

Source: Taiwan Tea Association, *News Letter*, No. 92, 1961, P.12.

Table 28. The Export of Black Tea, 1960

| Destination | Kilograms | Percent |
|----------------|-----------|---------|
| United States | 1,154,288 | 35.0 |
| United Kingdom | 515,409 | 15.7 |
| West Germany | 405,071 | 12.3 |
| Netherlands | 321,861 | 9.8 |
| Japan | 227,596 | 6.9 |
| Hong Kong | 132,522 | 4.0 |
| Ireland | 109,607 | 3.3 |
| Chile | 80,631 | 2.4 |
| Greece | 50,027 | 1.5 |
| Arabia | 49,896 | 1.5 |
| Italy | 43,695 | 1.3 |
| Algeria | 40,960 | 1.2 |
| All Others | 164,800 | 5.1 |
| Total | 3,296,363 | 100.0 |

Source: Taiwan Tea Association, *News Letter*, No. 92, 1961, P.12.

Morocco is the most important customer of Taiwan green tea. More than eight-tenths of the total export goes to that nation. Other significant customers are Algeria, Senegal, and Hong Kong (See Table 29).

During the early days, Taiwan exported pouchong tea to Southeast Asian countries via Amoy, Fukien. In 1905, she began to export pouchong tea to Java directly and later to Malaya, Singapore, Borneo, Indo-china, the Philippines, and Thailand. The overseas Chinese and the native people of Southeast Asia are

Table 29. The Export of Green Tea, 1960,

| Destination | Kilograms | Percent |
|-------------|-----------|---------|
| Morocco | 2,090,898 | 83.3 |
| Algeria | 302,124 | 12.0 |
| Senegal | 64,124 | 2.6 |
| Hong Kong | 27,938 | 1.1 |
| Thailand | 9,043 | 0.4 |
| France | 5,623 | 0.2 |
| Singapore | 4,500 | 0.2 |
| All Others | 5,119 | 0.2 |
| Total | 2,510,153 | 100.0 |

Source: Taiwan Tea Association, *News Letter*, No. 92, 1961, P.12.

fond of Taiwan pouchong tea (15). Today, the important pouchong tea buyers are Hong Kong⁹, Thailand, Ryukyu, the United States, Singapore, Malaya, and the United Kingdom (See Table 30).

Table 30. The Export of Pouchong Tea. 1960

| Destination | Kilograms | Percent |
|----------------|-----------|---------|
| Hong Kong | 597,650 | 34.4 |
| Thailand | 552,935 | 31.8 |
| Ryukyu | 391,547 | 22.5 |
| United States | 96,241 | 5.5 |
| Singapore | 44,558 | 2.6 |
| United Kingdom | 17,610 | 1.0 |
| Malaya | 17,960 | 1.0 |
| Phillipines | 10,463 | 0.6 |
| All Others | 10,010 | 0.6 |
| Total | 1,738,974 | 100.0 |

Source: Taiwan Tea Association, *News Letter*, No. 92, 1961, P. 12.

During the last century, the China mainland was the chief customer of Taiwan oolong tea. After the turn of this century, the United States

⁹ The tea is very possible re-exported from Hong Kong to Southeast Asian countries.

became the most important buyer of Taiwan oolong tea, except during the war time (15). Other customers are the United Kingdom, Netherlands, Australia, and West Germany (See Table 31).

Table 31. The Export of Oolong Tea, 1960

| Destination | Kilograms | Percent |
|----------------|-----------|---------|
| United States | 132,017 | 65.3 |
| United Kingdom | 48,401 | 23.9 |
| Netherlands | 11,726 | 5.8 |
| Australia | 4,681 | 2.3 |
| West Germany | 2,736 | 1.4 |
| Canada | 796 | 0.4 |
| Hong Kong | 726 | 0.4 |
| All Others | 1,079 | 0.5 |
| Total | 202,162 | 100.0 |

Source: Taiwan Tea Association, *News Letter*, No. 92, 1961, P.12.

Summary and Prospects

Major Findings

The major findings of this study can be summarized as follows:

1. The tea industry is one of the leading industries; is a major employer of labor; is the third ranking export commodity, bringing seven million U.S. dollars of foreign exchange annually to Taiwan. Tea extends agriculture use to about forty thousand hectares of land unsuited for growing food crops.

2. Tea gardens are mainly confined to the tablelands and hillslopes of north-western Taiwan where relatively evenly distributed precipitation and rather deep, well-drained, acid soils favor the growth of the tea trees. Plentiful and cheap labor supply, and the government help are also favorable.

3. Taiwan tea planters are also rice growers. Almost all of the planters grow tea in small patches. Most tea planters have less than two hectares in tea gardens. The influence of the growing population pressure and limited arable

land on the industry is very impressive.

4. There are many grades of tea varieties. More than one-third of the tea garden area is occupied with poor varieties. In general, the methods of cultivation are extensive and inefficient. Over-plucking is not uncommon. Soil erosion is a serious conservational problem.

5. The yield of fresh leaves is low and the production costs are high, due to the loss of plants during wartime and inefficient methods of cultivation.

6. Crude tea factories are scattered in the tea producing region. Tataochen is the most important tea refining center. Home-tea-processors are numerous

7. Relationship between the planters and factories is not reasonable. There is a serious lack of vertical integration among the majority of tea operators. Such a situation does not favor the industry.

8. More than nine-tenths of tea produced is exported to overseas markets. Black tea is chiefly exported the United States, the United Kingdom, West Germany, Netherlands, and Japan. Morocco and Algeria are the most important customers of Taiwan's green tea. Pouchong tea is chiefly exported to Hong Kong, Thailand, Ryukyu, and the United States. The leading buyers of Taiwan's oolong tea are the United States, the United Kingdom, and Netherlands. The industry, therefore, has long been greatly influenced by the world tea market.

Author's Suggestions

The author suggests the following improvements for the good of the industry:

1. Increase the tempo of planting the improved tea varieties in existing gardens.

2. Train tea planters with a basic agricultural knowledge. The methods of cultivation, yields, and soil maintenance, therefore, could be improved.

3. The planters, the refiners, and the traders should unite into various plantations or organizations, sharing the profit on a reasonably proportional basis. A sensible integrated tea industry therefore would develop.

4. Establish a system of divided regions to supply fresh tea leaves for certain crude tea factories.

5. High grade tea should be encouraged for export, but low grade tea should be restricted for export. A very strict inspection of tea would also be helpful to secure fame for Taiwan tea in overseas markets.

Prospects

It is believed that the following features will characterize the tea industry in the future.

1. The relative importance of the industry in the economy of Taiwan will continue to decline as other industries develop.

2. It will be difficult to increase the acreage of tea gardens in the near future. In fact, if irrigation water becomes available, level-land tea gardens may be converted to growing other food crops, especially on the Taoyuan tableland where the Shihmen Reservoir is being constructed.

3. Taiwan will continue to export more high grade tea than before, because only high grade tea can secure the overseas markets.

4. The holdings will continue to be small, but a reasonable relationship between growers and factories, no doubt, will be established.

5. With the technical and financial help of the government, the cultural practices and processing methods will continue to be improved.

6. Taiwan will continue to export more black tea and green tea than any other teas. Pouchong tea's market will be materialized only when the political situation changes.

7. In the near future, the United States, Morocco, the United Kingdom, Hong Kong, Netherlands, and Thailand will continue to be the major buyers of Taiwan tea.

8. Production surplus is a problem throughout the world as a whole. Competition in the world tea market is becoming increasingly serious. Thus the future is closely related to maintaining satisfactory markets.

BIBLIOGRAPHY

1. Association of Taiwan Tea Exporters. *News Letter* (biweekly). Taipei, 1956-61.
2. Chang, Chung-min. *Tea soils of Kuanshi, Taiwan*. Agriculture and Forestry Bulletin 5:58-73. 1953.
3. Chang, Chung-min. *Tea soils of Kuanshi, Tasiwan*. Agriculture and Forestry Bulletin 6:47-56. 1954.
4. Chang, Hsien-tsiu. *Problems of tea production in Taiwan*. Taipei, Chinese-American Joint Commission on Rural Reconstruction, 1953. 26 p. (Plant Industry Series No. 2)
5. Chang, Pei-ying. *Tea in Taiwan*. The Bank of Taiwan Quarterly 2:98-118. 1949.
6. Chang, Teh-tsui and Wei-fang Chang. *A study of the production and marketing of Taiwan tea industry*. Taipei, Chinese-American Joint Commission on Rural Reconstruction, 1958. 45 p. (Special Publication No. 25)
7. Chang, Wo-chung. *Tea in Taiwan*. The Bank of Taiwan Quarterly 2:75-88. 1949.
8. Chen, Cheng-siang. *Climate optimums for beverage crops*. Taiwan Agriculture and Forestry Monthly 3:36-41. 1949.
9. Chen, Cheng-siang. *Climatic classification and climatic regions*. Taipei, National Taiwan University, 1957. 174 p. (Forestry Series No. 7)
10. Chen, Cheng-siang. *Crop combination and crop regions in Taiwan*. Memoirs of the College of Agriculture, National Taiwan University 4:52-75, 1956.
11. Chen, Cheng-siang. *Land utilization in Taiwan*. Taipei, National Taiwan University, 1950. 346 p.
12. Chen, Pei-kuei. *Tamsui ting chih*. Taipei, 1956. 198 p. (Reprinted from 1871 ed.)
13. Chiang, Tao-chang. *A brief history of the Taiwan tea industry*. The Continent Magazine 18:14-19. 1959.
14. Chiang, Tao-chang. *The production of tea in Taiwan*. The Continent Magazine 22:18-21. 25-30. 1961.

15. Chiang, Tao-chang. *Taiwan tea exports*. The Continent Magazine 21:13-25. 1960.
16. Chiang, Tao-chang. *Tamsui: Its past and present*. Taiwan Wen Shian 12:111-141. 1961.
17. Chiang, Tao-chang. *The tea geography of Taiwan*. The Bulletin of Taiwan Normal University 6:325-405. 1961.
18. Chiang, Tao-chang. *Tea industry in Taiwan*. China Today 3:58-62. 1960. (In English)
19. Chiang, Tao-chang. *The tea industry in Taiwan*. The Bank of Taiwan Quarterly 12:119-153. 1961.
20. China. Government Information Office. *Tea in China*. Nanking, 1947. 42 p.
21. China. Provincial Government of Taiwan. *Taiwan statistical abstract, 1894-1945*. Taipei, 1946.
22. China. Provincial Government of Taiwan. *The trade of Taiwan, 1896-1948*. Taipei, 1949. (In Chinese and English)
23. China. Provincial Government of Taiwan. Department of Agriculture and Forestry. *Report on a survey of tea production capacity of Taiwan, 1952*. Taipei, 1952. 110 p. (In Chinese and English)
24. China. Provincial Government of Taiwan. Department of Agriculture and Forestry. *Report on the production capacity of the Taiwan tea industry, 1959*. Nantou, 1959, 69 p.
25. China. Provincial Government of Taiwan. Department of Agriculture and Forestry. *The statistics of the Taiwan tea industry*. Taipei, 1950.
26. Chinese Maritime Customs. *Statistical Series No. 1. The trade of China (Taiwan), 1950 ed.* Taipei, 1950. 100 p. (In Chinese and English)
27. Chinese Maritime Customs. *Statistical Series No. 1. The trade of China (Taiwan), 1955 ed.* 100 p. (In Chinese and English)
28. China Map Service Survey Department, C.C.S.F. *Taiwan. 1:25,000*. Taipei, 1955. 251 sheets. (In Chinese and English)
29. Chiu, Chi-tzu. *The inspection of Taiwan tea*. Taiwan Tea Quarterly 1:33-36. 1948.
30. Chiu, Hsuan-chung. *Soil conservation in Taiwan tea gardens*. Agriculture and Forestry Bulletin 8:66-70. 1955.
31. Chiu, Hsuan-chung. *Tea farming*. Yuchih, Yuchih Tea Experiment Station, 1959. 278 p.

32. Cho, Frank F. *Formosa: Emphasis on quality*. Coffee and Tea Industries 81(9):49-50. 1958. (In English)
33. Cho, Frank F. *The geography of Formosa tea*. Coffee and Tea Industries 82(10):46, 94. 1959. (In English)
34. Davidson, James W. *The island of Formosa: Past and present*. London, Macmillan, 1903. 646 p. (In English)
35. Eden, T. *Tea*. London, Longmans, Green, 1958. 201 p. (In English)
36. Highsmith, Jr., Richard M. and J. Granville Jensen. *Geography of commodity production*. Chicago, J.B. Lippincott, 1958. 426 p. (In English)
37. Hsi, Lein-chih. *Soils of Taiwan: A soil survey report*. Taipei, Taiwan Fertilizer Company, 1951. 82 p.
38. Hsieh, Ho-shou. *Post-war rehabilitation of the tea industry in Yuchih*. Agriculture and Forestry Bulletin 2:53-57. 1951.
39. Hsieh, Sam-chung. *Production costs of major crops in Taiwan: A survey*. The Bank of Taiwan Quarterly 8:210-242. 1956.
40. Hsinchu Prefectural Government. *Statistical Yearbook of Hsinchu Prefecture, 1928*. Hsinchu, 1928. (In Japanese)
41. Huang, Chuan-yuan. *The cultivation of tea trees*. Linkou, Taiwan Tea Institute, 1954. 294 p
42. International Tea Committee. *Annual bulletin of statistics, 1959*. London, 1959. 20 p. (In English)
43. Juan, Vei-chow. *Physiography and geology of Taiwan*. Taipei, China Culture Publishing Foundation, 1954. (In English)
44. Kang, Hsuan. *The consumption of chemical fertilizers in Taiwan*. The Bank of Taiwan Quarterly 11:149-151. 1960.
45. Kao, Hsiung. *Tea-plucking*. Agriculture and Forestry Bulletin 1:25. 1950.
46. Li, Hsing-chuan. *Green tea Processing*. Linkou, Taiwan Tea Institute, 1954. 254 p.
47. Li, Hsing-chuan. (ed.) *Better cultivation of your tea gardens*. Linkou, Taiwan Tea Institute, 1958. 77 p.
48. Li, Pe-nien and Hung-yuan Chin. *The tea processing industry in Taiwan*. The Bank of Taiwan Quarterly 9:61-95. 1957.
49. Li, Pe-nien. *The Taiwan scented flowers culture*. Taipei, Bank of Taiwan, 1955. 74 p.

50. Lien, Heng. *A general history of Taiwan*. Taipei, 1955. 792 p. (Reprinted from 1920 ed.)
51. Lin, Chin-chang. *Taiwan tea industry*. Bachelor's thesis. Taichung, Taiwan Provincial College of Agriculture, 1951. 93 numb. leaves.
52. Lin, Ching-teh and Chun-chuan Chen. *A preliminary study of the soils of Yuchih tea gardens*. Agriculture and Forestry Bulletin 1:10-14. 1950.
53. Lin, Fu-chuan. *Current problems of the Taiwan tea industry*. Taiwan Tea Quarterly 1:13-17. 1948.
54. Lin, Fu-chuan. *Current problems of the Taiwan tea industry*. Taiwan Tea Quarterly 2:7-11. 1948.
55. Lin, Fu-chuan. *Current problems of the Taiwan tea industry*. Taiwan tea Quarterly 4:7-11. 1949.
56. Lin, Fu-chuan. *The processing of oolong tea and pouchong tea*. Linkou, Taiwan Tea Institute, 1956. 223 p.
57. Lin, Fu-chuan. *Production costs of Taiwan tea*. Annual Report of the Taiwan Tea Institute 2:103-109. Linkou, 1958.
58. Lin, Yinh-shih. *The cultural practices of the major tea districts in Taiwan*. Agriculture and Forestry Bulletin 1:32-34. 1950.
59. Lin, Ying-shih. *Propagation of Taiwan tea trees*. Agriculture and Forestry Bulletin 4:32, 1953.
60. Maeda, Nataro. *The tea industry in Taiwan: An economic and geographic survey*. The Formosan Agricultural Review 320:12-32. 1933. (In Japanese)
61. Maeda, Nataro. *The tea industry in Taiwan: An economic and geographic survey*. The Formosan Agricultural Review 321:21-40. 1933. (In Japanese)
62. Maeda, Nataro. *The tea industry in Taiwan: An economic and geographic survey*. The Formosan Agricultural Review 322:44-53. 1933. (In Japanese)
63. Maeda, Nataro. *The tea industry in Taiwan: An economic and geographic survey*. The Formosan Agricultural Review 323:37-63. 1933. (In Japanese)
64. Maman, Seino. *Cultural methods of major crops in Taiwan*. Taipei, Taiwan Government, 1942. 241 p. (In Japanese)
65. Miyosi, Seiki. *Cash crops in Taiwan*. Taipei, 1939. 360 p. (In Japanese)

66. Montgomery, P.H.S. *Report of Tainan Maritime Customs for 1882-1891*.
(Chinese translation) The Bank of Taiwan Quarterly 9:172-196, 1957.
67. Morse, H.B. *Report of Tamsui Maritime Customs for 1882-1891*. (Chinese translation) The Bank of Taiwan Quarterly 9:149-171. 1957.
68. Muraua, M. *The perfume flowers in Taipei basin*. Journal of Taiwan Agricultural Association 3:55-68. 1941. (In Japanese)
69. Peng, Hsia-ling. *Black tea processing*. Linkou, Taiwan Tea Institute, 1952. 123 p.
70. Pingchen Tea Experiment Station. *Memoirs of the Pingchen Tea Experiment Station*. Vol. 1. Pingchen, 1954. 150 p.
71. Shen, Chih-kang. *The improvement of the tea industry during the last fifty years*. Agriculture and Forestry Bulletin 1:15-17. 1950.
72. Shen, Chuen. *The plucking of tea*, Taiwan Tea Quarterly 2:29-31. 1948.
73. Taipei Prefectural Government. *Statistical yearbook of Taipei Prefecture, 1928*. Taipei, 1928. (In Japanese)
74. Taipei Prefectural Government. *Tea industry in Taipei Prefecture*. Taipei, 1939. 53 p. (In Japanese)
75. Taiwan Government. *The fourth statistical yearbook*. Taipei, 1902. (In Japanese)
76. Taiwan Government. *The statistical summary of Taiwan*. Tokyo, 1913. 457 p. (In English)
77. Taiwan Government. Bureau of Productive Industries. *The statistics of the Taiwan tea industry*. Taipei, 1929. 60 p. (Publication No. 523) (In Japanese)
78. Taiwan Government. Bureau of Productive Industries. *The statistics of the Taiwan tea industry*. Taipei, 1935. 46 p. (Publication No. 684) (In Japanese)
79. Taiwan Government. Bureau of Productive Industries. *The statistics of the Taiwan tea industry*. Taipei, 1937. 53 p. (Publication No. 768) (In Japanese)
80. Taiwan Government. Bureau of Productive Industries. *The statistics of the Taiwan tea industry*. Taipei, 1940. 60 p. (Publication No. 882) (In Japanese)
81. Taiwan Government. Bureau of Productive Industries. *The statistics of the Taiwan tea industry*. Taipei, 1942. 61 p. (Publication No. 939)

(In Japanese)

82. Taiwan Government. Bureau of Productive Industries. *Land use in Taiwan*. Taipei, 1926. p. 61-68. (Agriculture Basic Survey Report, No. 10) (In Japanese)
83. Tan, Kai-yun. *Taiwan tea varieties*. Agriculture and Forestry Bulletin 1:17-18. 1950.
84. Ting, Kuei-san. *The cultivation of Assam tea trees and its prospect in Taiwan*. Agriculture and Forestry Bulletin 2:37-38, 60. 1951.
85. Tomita, Yoshiro. *The cultural geographic landscape of Taiwan*. Taipei /Imperial University Memorial Essay 5:153-180. 1936. (In Japanese)
86. Ukers. William H. *All about tea*. Vol. 1. New York, Tea and Coffee Trade Journal Co., 1935. p. 327-340. (In English)
87. Ukers. William H. *All about tea*. Vol. 2. New York, Tea and Coffee Trade Journal Co., 1935. p. 230-243. (In English)
88. Van Royen, William. *The atlas of the world's resources: The agricultural atlas of the world*. New York, Prentice-Hall, 1954. p. 114-117. (In English)
89. Wang, Chiang. *Taiwan struggles in the world tea market*. China Newsweek 107:10-13. 1952.
90. Wickizer, V.D. *Coffee, tea and cocoa: An economic and political analysis*. Stanford, Stanford University, 1951. 497 p. (In English)
91. Wu, Chen-to. *Factors responsible for the low yields in Taiwan tea gardens*. Scientific Agriculture 3:85-93. 1956.
92. Wu, Chen-to. *Green manure in Taiwan tea gardens*. Pingchen, 1957. 12 p. (Pingchen Tea Experiment Station Research Report No. 7)
93. Wu, Chen-to. *Soil of Taiwan tea gardens and its need of fertilizer*. Pingchen, 1957. 10p. (Pingchen Tea Experiment Station Research Report No. 5)
94. Wu, Chen-to. *On the tea-plucking*. Agriculture and Forestry Bulletin 4:17-24. 1953.
95. Yang, I-nung. *Liu Ming-chuan and the Taiwan tea industry*. Kung Lun Pao (Taipei, Taiwan) p. 4, December 5, 1950.
96. Yu, Yung-tsung. *The export and production of Taiwan tea*. Bachelor's thesis. Taichung, Taiwan Provincial College of Agriculture, 1951. 78 numb. leaves.

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97. Taiwan Weather Bureau. *Taiwan Meteorological Data*. Taipei, 1952. (In Chinese and English)

(All entries without indication are in Chinese)