

EXTRACT FROM A REPORT ON A VISIT TO THE TERRITORY OF PAPUA AND NEW GUINEA TO STUDY AND ADVISE ON TEA GROWING IN THE TERRITORY.

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Areas Suitable for Growing Tea.

Tea will grow under a wide range of soil and climatic conditions. Its best development, however, is limited by the interaction of several factors which go to make up these conditions.

Tea will grow on most soils, but will do best on those which are well supplied with the essential plant nutrients. More important, perhaps, than the nutrition status, is the physical condition of the soil. It should be porous, well-drained, but not one which dries out readily. Nevertheless, good tea gardens are known which are situated on fairly heavy clay soils as well as on old lateritic soils.

The optimum pH. value for tea soils lies at about 5.5—otherwise soils with a lower value (more acid) should be chosen.

Tea will grow from sea-level upwards in the tropics provided that soil and climatic conditions do not act as limiting factors.

The disadvantages of growing tea at low levels are associated usually with the poor physical (and sometimes chemical) condition of the soils which are often non-porous heavy soils, subject to white ant invasion and with difficulties associated with shade. Moreover, the quality of the prepared tea is usually poor. (It is true that fair quality teas are manufactured from gardens in Assam which are situated at heights of 300 ft. or less above sea level, but the latitude of these areas should be kept in mind). It is generally conceded that the greater the altitude the better the quality of the prepared tea. The two chief factors which set the upper limits where tea can be grown are temperature and sunshine.

In countries with a latitude similar to that of Papua and New Guinea heavy losses may occur because of frost, especially in recently pruned gardens. (Here again it should be noted that any damage to tea bushes due to frost in Assam cannot be compared with that which may occur on similar material grown in Java at certain altitudes. At latitudes of 7 degrees-8 degrees, where the cambium of the tea bush stems is more or less always active the plant is not in a physiological condition to withstand frosts).

At higher altitudes, with the lower soil and atmospheric temperatures the growth and development of the tea bush is slower and smaller crops are obtained. This is associated not only with temperature but with the lack of sunshine, especially during the wet season. In parts of Java in certain periods of the year there are only 2 or 3 hours of sunshine during the day.

In general, it may be said that it is not an economic proposition to grow tea below 750 ft. a better proposition at 1,500 ft., and the optimum commences at about 2,500 ft.

The question of altitude is probably one of temperature and there is much to be learned in this field. It is known that the optimum surface-soil temperature lies between 25 degrees—35 degrees C.

Air temperatures, per se, have little significance; the temperature—moisture relationship is of importance. Excessive evaporation or transpiration should be avoided. In this connection, winds, especially hot winds, are unfavourable for the best development of the tea bush.

The rainfall requirements for tea are variable but, in general, lie between 100 inches and 200 inches per annum. The quantity of "effective" precipitation is determined by the distribution of the rainfall, soil moisture-holding capacity, evaporation, etc. Lower rainfalls evenly distributed throughout the year may be as effective as higher total annual precipitations in areas with a distinct dry season.

In areas where the rainfall is low at any time during the year, soil moisture plays an important role. (Hence the need for ground cover and shade). In areas with high precipitation, evaporation is not so important.

One author has given the following classification according to the amount of rainfall:

- (a) Dry months—where less than 2.5 inches of rainfall per month.
- (b) Medium-dry months—where 2.5 inches to 4 inches of rainfall per month.
- (c) Wet months—where rainfall is greater than 4 inches per month.

A good general rule to follow in selecting an area for growing economic crops of tea, as regards rainfall, is that it should not normally be subject to more than 3 to 4 "dry" months.

There are considerable areas in the various districts which were visited which measured up well to the requirements set out above. There is little doubt that many of the areas referred to will produce 600lbs. of prepared tea per acre per annum, some areas probably very much higher yields.

In the following notes, which concern areas in the Territory best suited for tea, it should be remembered that the inspection of the several districts was somewhat superficial. It is suggested that a more detailed survey be made by officers of the departments concerned to determine the actual areas which measure up to the requirements set out above. In doing so, it is suggested that the start should be made in the most likely areas which are mentioned below.

It should be emphasised here that in considering suitable areas for tea, regard was paid only to whether the tea bushes would produce sufficient crop, which, under conditions prevailing elsewhere, would be considered economic. No account has been taken of accessibility to market, labour supply, etc.

The soils in the areas which were visited can be classified roughly into two large groups with a number of variations within each group.

- A. Soils derived from old metamorphic rocks, chiefly schists and gneisses. These soils are to be found around Garaina and the area extended westward from Aiyura as far as the Baiyer River Valley.

These soils are medium to good in fertility depending on the conditions under which they have developed. Most profiles show a top horizon about 12 inches to 18 inches in thickness of black soil apparently rich in organic matter. There is a sharp line of demarcation between this and the underlying clay.

This clay is often mixed with parental rock material sometimes in the form of impervious gravel layers in the old high river terraces. Laterisation seems to be proceeding in these soils. Such terraces are to be found in the Goroka Valley and part of the Waghi Valley. With proper treatment, these soils should be suitable for growing tea.

A similar type of soil is found on the foothills in most of the valleys but these are less fertile due chiefly to native cultivation. The clay is very much stiffer than that on the high terraces and when super-saturated with moisture causes serious hillside slipping. This is not considered suitable soil for growing tea.

The low-lying soils on the valley bottoms with heavy blue clays developed under anaerobic conditions are also considered unsuitable for

tea, in their present condition.

All of these soils respond to good cultural methods. If drained and conditions made possible for the development of the microbiologic population in the soil, tea should grow well on them. There is one such valley-bottom lying between foothills to the south of Aiyura (in the direction of the Kuminakara fields) which shows promise. It is suggested that 200 acres of this area be drained and planted with tea for observation. The area, after draining, should be planted with a legume, possibly *Crotalaria*, which should be ploughed in. It is anticipated that the development of the tea bush may be comparatively slow in the first two years but more rapid later on in this area.

In addition to the above mentioned soils, there are others in which the metamorphic material has been mixed with granodioritic material from volcanic intrusions. Such soils are to be found around Aiyura, Garaina and possibly Karanka. Any other similar areas should be regarded as good prospects for tea growing.

- B. Soils derived from volcanic material, such as those of the Sangara lands which have probably developed from trachytic-andesitic material. Similar soils are to be found in the Mt. Victory region, and probably at the Western end of the Waghi Valley around Mt. Hagen. These should prove first-class propositions for the cultivation of tea.

To summarise; if reconnaissance surveys are to be made the best prospects seem to lie in the following areas, which are expressed in order of preference.

1. Areas where the soils are derived from trachytic-andesitic material in the Sangara, Mt. Victory and Mt. Hagen areas.
 2. The lateral valleys leading into the Baiyer River Valley.
 3. Areas where the grano-dioritic material from volcanic intrusions has been mixed with the schists and gneisses such as are found at Aiyura and Garaina.
 4. High river terraces, especially where leading up to the mountains as found in the Goroka and upper Waghi Valleys.
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