

The
Tropical Agriculturist

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EDITORIAL

Agriculture and Population Density

IN Ceylon the distribution of the rural population is very uneven and the unevenness is intensified if the urban population is considered as well. The rural population tends to congregate in areas where climatic and soil factors are favourable to agriculture, whether of permanent plantation crops or of paddy. Thus we find that in the coastal districts and in the wet zone the percentage of the land cropped is relatively high and the population dense compared to the dry zone. Further, this concentration of population leads to a reduction in size of holdings (apart from large estates) to an extent more evident than in the dry zone.

It has been frequently observed that the greater the density of the population the greater the care bestowed on the cultivation of the land. This is noticeable in Ceylon where the cultivation is generally of a higher standard in the wet zone compared to the dry zone, though even so it leaves much to be desired. The utilization of the land in the denser-populated wet zone is much more intense. The bunding of every available piece of land for rice cultivation and the planting of the hilly parts with permanent crops such as rubber, cinnamon, citronella, tea and mixed gardens is a characteristic of this zone. Doubtless this is because the denser population demands a greater production of food and of saleable products. A second and most important difference is the almost complete absence of shifting cultivation (*chena*) in the densely populated areas whereas in the dry zone it is the prevailing system apart from rice in low-lying hollows or where irrigation is possible. The *chena* system cannot by its very nature sustain a high population. A minimum interval between successive fellings of the forest is essential and in consequence a greater area of land is required to sustain an individual than is the case under sedentary agriculture. Under shifting cultivation the fallow area is very large and may amount to ten or more times the cultivated area. Yields are also generally low. Repeated fellings and a contraction of the time interval allowed for regeneration causes deterioration in the forest,

less accumulation of humus and a poorer burn in each successive cycle. Ultimately the land becomes unprofitable for shifting cultivation and one of two things must happen. Either the population migrates to new areas, as has often happened in the hinterland of Asia, or the people are compelled to adopt sedentary agriculture and to change their methods entirely. A similar result can come from repeated invasion of the *chena* by fire, which destroys young trees while allowing coarse grasses to persist. In such ways *patna* lands and savannahs are formed. There is no doubt that the deterioration of the forests through a shortening of the *chena* cycle has led to the downfall of many races in the past and it is a probable cause of the abandonment of much of the dry zone lands of Ceylon. If there had been a system of sedentary agriculture a higher population could have maintained itself, but once the population density rose to a point where forest regeneration was hindered the break-down of the *chena* system became inevitable. The people then seem to have adopted the first alternative and to have migrated.

As a system suited to the needs of primitive peoples there is much to recommend *chena* cultivation, but it is limited in the population it can support and, as the people become settled in permanent centres of residence and as their demands for social services rise, the system breaks down. It is not, however, to be wholly condemned under certain conditions and it may be justified if a long enough cycle can be maintained. It is doubtful whether this can be done any longer in the drier parts of Ceylon and, perhaps for the second time in history, an alternative must be found. With no land to migrate to, the adoption of permanent rotational agriculture would seem to be the only way out. Van Beukering has estimated that so long as the population does not exceed 130 per square mile the forests of Java can regenerate under *chena* cropping, but it is certain that the Ceylon dry forests will not be replenished so rapidly. The density of population in Ceylon's dry zone, as given by Paul in his paper in this issue, is 81 per square mile, which we are inclined to think indicates that the limit of curtailment of the *chena* cycle has been reached, even allowing for the proportion of permanent rice lands. The adoption of methods of rapid regeneration of abandoned *chenas* by planting quick-growing trees and shrubs to permit a shorter rotation period may stave off for a time the change-over to another system but cannot be a permanent remedy in the face of a rising population. It is but a step in the direction of a permanent agriculture. The system of mixed farming advocated by Turbet in this number represents a gradual evolution from shifting methods to a static form of agriculture. With permanent villages and garden culture already established there has been a slow, gradual evolution towards a stable form of land usage.

We would like to direct attention to garden culture since this is a characteristic of most villages of Ceylon and the present policy of settlement on the land envisages its continuance on the highland part of each holding. A stroll round any village, particularly in the wetter areas, reveals a very large variety of fruit trees and crops, not required in large amount, but which supplement and add attraction to the rice meal. Some Dutch workers regard this varied garden culture as a remnant of a primitive hoe culture, the useful plants of the forests having been collected together near the dwellings. The area

occupied by such mixed gardens in Ceylon must be very large but there has been no detailed study of its production or improvement. It is not possible to say how many calories the villager derives from his garden land. The value of garden culture is undoubtedly great, particularly from the nutritional point of view, while saleable produce improves the villager's economy. The unbalance of the economy of peoples who depend solely on one crop, as occurs in large parts of Asia such as parts of Siam and Burma, is very evident, and this is intensified where the land tenure system leads to a class of roving tenants with no interest in a permanent garden.

The inter-relationships of the many species involved in garden culture must constitute a very complex community in which any disturbance of the balance would be risky. Any attempts at improvement should be cautious and the mixture of species planted in seeming disorder should not be viewed against the Western background of well-ordered orchards and plantations. The serious erosion of clean-weeded, line-planted crops is not so noticeable in the garden culture, which receives far less attention and disturbance, and where the mixture of plants seem to have settled almost into a climax community.