

**Josef G. Knoll-Wissenschaftspreisträger 1990**

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**Hans-Joachim Fuchs “Ecological Impacts on Tea Production in Sri Lanka“, University of Mainz, 1988**

Summary

The study has characterized and analyzed the major ecological factors which play the most important role for the tea production in Sri Lanka. The impact between ecological factors and productivity is an essential question both from the scientific and practical side in order to contribute to a greater land use capability.

Tea represents the leading export crop of Sri Lanka on which the economy of the country decisively depends. 93% of the produced teas are exported, which make a third of the total export earnings (1985). The steady increase in Sri Lanka's total tea production in the 1950's reached its peak in 1965 (228 million kg), but production progressively declined thereafter to a minimum of 179 million kg in 1983.

In total, out of the 350 tea plantations in all, 107 state-owned tea plantations, in Sri Lanka traditionally called "estates", which are managed by the Janatha Estates Development Board (JEDB) and the Sri Lanka State Plantations Corporation (SLSPC), have been investigated, by personal research visits, including interviews, data collection, surveying of fields and thorough discussions. The author is deeply indebted to all officials and authorities of the 107 plantations during his 1-year research stay in Sri Lanka (1986), for their generous cooperation and substantial support towards a successful completion of this study.

The work provides a short description of the major geographical features of Sri Lanka is presented, with particular reference to the physical environment of land use, particularly tea cultivation. Based on this, a brief introduction into botany, cultivation, and marketing of tea is given.

With particular reference to the totally investigated 107 estates (with 350 divisions), the impact between the major ecological factors of tea cultivation and productivity was analyzed and critically evaluated. For this, estate- and division-wise data of the ecological factors were cross-tabulated in order to work out distinct relationships between certain ecological factors, affecting tea cultivation. It could be shown that interactions are mostly existing in a meso-respectively local-scale, depending on elevation, slope gradient, exposition, soil texture, and local topography. Evidence was also given to the importance of the planting material, whether seedling tea bushes and clonal tea bushes (which are vegetatively propagated).

Particular attention was paid to the effects by selected agro-climatic factors for tea cultivation. Among them, precipitation - in terms of annual variation and seasonal differences - plays the major role. Statistically proved, five different types of annual rainfall variation have been worked out, which clearly vary over space. The generally valid factor of drought was studied with regard to various criteria; measures were discussed in order to reduce the

unfavourable influence of drought, for example by shade trees which prevent the tea bushes from major moisture stress.

In addition other agro-climatic parameters, such as wind and frost, were studied, resulting in the prevalence of both criteria in district local-topographical sites only, for example the dry katabatic, foehn-like "Kachchan" on the eastern slopes of the Central Highlands, and frost in small-scale depressions in the top-country, mostly between 1.600 and 2.000 m a.s.l.

For the tea crop harvested, three factors of major economic importance were investigated: 1. pests and diseases; 2. manuring, chiefly nitrogen requirements and loss through surface run-off and erosion of the top-soil; 3. pruning, particularly its proper timing with regard to moisture conditions.

Based on the preceding findings, the effects of the ecological factors on the yield potential of tea were critically investigated. Among these correlations the following ones most clearly influence tea production:

1. the relationship between drought and productivity, in that way that the worsening effect of drought depends on the planting material; both seedling and estate clones are more drought-resistant than clones propagated by the Tea Research Institute (TRI).
2. the relationship between soil texture and productivity, whereby sandy/gravelly soils show a lower yield potential, compared with loamy soils.
3. the relationship between the annual rainfall total and productivity: it could be shown that tea potential decreases with both, excessive rainfall totals (>4.000 mm) and insufficient totals (<2.000 mm).
4. the relationship between five types of annual rainfall variation and annual yield variation, showing a 4-week delayed tea production against the moisture conditions.

Finally, preventive measures towards soil erosion were discussed and some innovative methods were given, for example uprooting, reconditioning, and replanting. Also, an education campaign in the tea sector is strongly suggested by the methods like mulching, cover crops, weeding, slope stabilization, contour drains and bunds.

The investigation has attempted towards a clarification of the multisided and complex relationship between tea productivity and the ecological environment, taking Sri Lanka as a case study. Based on a critical analysis of data packages, cross-tabulations between many variables have given clear evidence, that man-made measures of a proper management of the environment can lead to a higher productivity in tea in Sri Lanka.

Hans-Joachim Fuchs: Tea Environments and Yield in Sri Lanka, Tropical Agriculture, Margraf Scientific Publishers, 1988, ISBN: 3-8236-1173-9