

The Impact of Cocoa Cultivation on Soil Characteristics in Southwestern Nigeria.

Ekandade, Olusegun

Ph.D. Geography

Department of Geography

Obafemi Awolowo University, Ile Ife, Nigeria

1985.

Abstract:

This study investigates the impact of cocoa cultivation on soil properties in a part of the Nigerian Cocoa Belt with a view to providing a framework for land use planning and management. For comparative purposes, the conditions under forest and fallow were also investigated.

The plant-soil model was adopted in order to investigate the functional and reciprocal effects between soil and vegetation properties over time using the inferential analytical approach. This was based on the side-by-side comparison of soil and vegetation properties in cocoa and fallow plots of different ages, and in forest plots in geographically separate locations within a homogeneous zone in respect of the physical environment and landuse practices. Standard field and laboratory techniques were used to collect and analyse 15 soil and 11 vegetation parameters.

The changes in, and interrelationships between soil and vegetation properties under cocoa over time viz--a-viz the situation under fallow and forest were analysed using ANOVA, 'student's t-test, Pearson' s correlation, cumulative deviations from the mean, canonical correlation and stepwise regression. The results obtained from these analyses show that:

- (i) the values of most soil properties are significantly lower under either cocoa or fallow than under forest while a few exhibit significant differences between cocoa and fallow;
- (ii) complex soil-vegetation relationships exist under cocoa as opposed to the simple situations under fallow and forest thereby indicating the disturbance of the soil-vegetation system under cocoa over time;
- (iii) as opposed to what obtains under forest and fallow, tree density and biomass indices under cocoa indicate deleterious effects on cocoa soils. However, foliage cover and accumulated litter indicate beneficial effects on cocoa soils over time;
- (iv) at about the fortieth year of cocoa cultivation the cocoa soil-vegetation system breaks down. Thus, to maintain the fertility of cocoa soils over time in the Nigerian Cocoa Belt there is the need to apply organic soil improvement techniques. For optimum land use efficiency it is recommended that moribund cocoa plots, unyielding to rehabilitating efforts, should be converted to food-crop plots to enhance food production in Nigerian.

Keywords: Agriculture/cocoa/ soil-vegetation/ plant-soil model/ cultivation/ organic content

Supervisor: J.O. Adejuwon and L.K. Jeje

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