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**Successful Rehabilitation Approach for Sustainable Regain in Cocoa Production
Systems in South-East Asia**

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ABSTRACT

In Malaysia an intensively managed high input full sun cacao (*Theobroma cacao L.*) plantation can reach high yields of 1.5 to 2 t dry beans per ha. Following a high production period of 10 years the yields often decrease markedly. Focusing on leading depleted cacao plantations sustainably back to full production a research project was initiated in June 2011 using a diversification approach with agroforestry systems. The experimental site is located on a large commercial farm in the humid tropical lowlands of peninsular Malaysia, in the region of Kuala Lipis. In a field trial with a strip-split-plot design, three different production systems are compared under two tree age conditions: newly planted and old rehabilitated cacao trees, after the removal of the original canopy back to the leader structure. The examined production systems are: i) high external inputs in a mono crop full sun system representing the common practice of large cacao plantations in South-East Asia (COM); ii) medium level of external inputs in an agroforestry system of low diversity focusing on leguminous and timber trees (AF LD); iii) low external inputs in an agroforestry system of high diversity and high density shade trees including annual crops and fruit trees (AF HD). The existing twenty-two-year-old plantation with the original canopy and a high input level serves as control treatment (REF).

When cocoa yields decline after the initial high production period trees are often replanted. This results in a non-productive phase lasting several years before the young trees start to develop pods and even longer before yields reach a remunerative level. Rehabilitating old low producing trees on the other hand, as practiced in the present experiment, is expected to re-establish higher yields more quickly than re-planting.

The first full harvest in the trial started in September 2012, 15 months after the rehabilitation pruning. Between October 2012 and June 2013 (main harvest) an average of 471.2 kg dry beans per ha were harvested in the control treatment. The yields of the common practice treatments already amounted to 41.6 % of the control. This is a very promising result, especially in view of the development of young trees which will take at least another year before the first pod development. Yields in the agroforestry systems increased less quickly as tree development under shade and with lower fertilizer input is inherently slower.

Keywords: Agroforestry, cocoa, rehabilitation, south-east asia, sustainable yield increase

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