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## Rehabilitation Approach for Quick and Sustainable Regain in Cocoa Production in Declining Full Sun Plantations

NORA KÄGI<sup>1</sup>, JOACHIM MILZ<sup>2</sup>, FRANCO WEIBEL<sup>3</sup>, NIELS VAN HOUDT<sup>4</sup>, CINZIA ANSELMINI<sup>5</sup>, JUAN GUILLERMO COBO<sup>6</sup>, MONIKA SCHNEIDER<sup>1</sup>

<sup>1</sup>*Research Institute of Organic Agriculture (FiBL), International Cooperation, Switzerland*

<sup>2</sup>*ECOTOP, Consulting on Successional Agroforestry, Bolivia*

<sup>3</sup>*Research Institute of Organic Agriculture (FiBL), Horticultural Science, Switzerland*

<sup>4</sup>*Barry Callebaut, Malaysia*

<sup>5</sup>*Barry Callebaut, Switzerland*

<sup>6</sup>*University of Hohenheim, Inst. of Plant Production and Agroecology in the Tropics and Subtropics, Germany*

### Abstract

In Malaysia an intensively managed high input full sun cocoa 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, mainly characterised by diversification levels (mono culture to high diversity agroforestry) and accordingly different external input levels (high to low), are compared under two tree age conditions: newly planted and old rehabilitated cocoa trees, after the removal of the original canopy back to the leader structure. The existing twenty-two-year-old plantation with the original canopy and a high input level serves as control treatment.

When cacao 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 practised 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 September 2012 and March 2013 (main harvest) an average of 462 kg dry beans per ha were harvested in the control treatment. The yields of the common practice treatment already amounted to 24.9% 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 fertiliser input is inherently slower.

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