

Towards the agroecological management of rubber plantations: insights from research works in Thailand and Ivory Coast

Gay Frederic¹, Chambon Bénédicte^{1,2}, Chotiphan Rawiwan^{2,3}, Kouakou Aymard⁴, Panklang Phantip⁵, Perron Thibaut¹, Sajjaphan Kannika^{2,3}, Simon Charlotte^{1,2}, Thoumazeau Alexis^{1,2}

¹ CIRAD, UMR ABSys, F-34398, Montpellier, France

² HRPP, Kasetsart University, Bangkok, Thailand

³ Department of Soil Science, Kasetsart University, Bangkok, Thailand

⁴ Nangui Abrogoua University, Ecology and Sustainable Development Laboratory, Abidjan, Côte d'Ivoire

⁵ Land Development Department, Bangkok, Thailand

Corresponding author: frederic.gay@cirad.fr

Abstract

The concept of agroecology has emerged over the last decade in response to concerns about the sustainability of agricultural production. Agroecology is developing as an alternative to the agricultural systems based on the intensive use of synthetic inputs and fossil fuel. In terms of crop management, agroecology is based on the mobilization of ecological processes (biogeochemical cycles, biological regulation of pests...) to improve the provision of various ecosystem services and to preserve natural and renewable resources. We identified two major challenges for the agroecological management of rubber plantations: the excessive use of synthetic fertilizers and herbicides, and the succession of rubber cycles on the same land (rubber monoculture). Those practices can cause various negative impacts on the environment, particularly to the soil health (erosion, acidification, loss of biodiversity and organic matter). They can also have deleterious effects on the agronomic performances of the plantations, and therefore on the profitability of production and the income of smallholders. In this communication, we present the results of several projects aiming at building up knowledge and assessing cultivation practices to develop an agroecological management of rubber plantation. Those works mainly focus on the sustainable management of soil fertility and health. They highlight the need to better understand the soil – plant interactions along the life cycle of a rubber plantations, in particular regarding the nutrient requirements of the rubber trees. They show how proper management of logging residues when renewing an old plantation can improve the soil biological activity and reduce the use of mineral fertilizers. They also intend to contribute to better design rubber agroforestry systems by assessing their agronomic, environmental and economic performances. To conclude, we stress the importance of having a systemic vision of the rubber plantation agroecology that integrates the sustainable management of soil but also the design of tapping systems that can contribute optimising the biological processes involved.

Keywords: Agroecology, Rubber plantation, mineral fertilizers, soil health, replanting, agroforestry.