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"Solidarity in a competing world — fair use of resources"

Productivity of Different Cacao Cultivars Depends on the Production Systems

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Abstract

Cacao production systems vary from full-sun monocultures to highly diversified agroforestry systems, which can be both organically or conventionally managed. Agroforestry systems have the potential to improve biodiversity in tropical regions but also farmer's food security by diversifying the crops. However, higher cacao yields are usually reported in monocultures. A proper choise of cacao cultivars might help to improve cacao yields in agroforestry systems. The aim of this study is to identify the most suitable cultivars for organically managed agroforestry systems.

The study was performed in 2015 in a long-term trial established in Bolivia in 2008 within the framework of the SysCom-programme (www.systems-comparison.fibl.org). It comprises monoculture and agroforestry systems under organic and conventional management and one successional agroforestry system with organic management. Twelve cultivars including locally selected trees by the plant breeding programme of EL CEIBO Coopertive, foreign clones (from the Imperial College Selections and Trinidad Selections) and hybrids were planted in each production system. Each system is replicated four times in a randomised block design, i.e. a total of 20 plots, and four trees of each cultivar were evaluated in each plot. Harvest data, i.e. number of pods and fresh weight were collected at tree level. Moreover, the number of cherelle wilt, the physiological abortion of the small pods, was registered for each tree throughout the harvesting season.

The results showed higher yields and number of pods in the monocultures, mainly the ones under conventional farming. No differences between organic and conventionally managed agroforestry systems were detected. Overall, the percentage of pod losses due to cherelle wilt was higher in the agroforestry systems. Interestingly, we found an interaction between the production system and the cultivars for both the cherelle wilt and yield and number of pods. It reveals that some cultivars performed better in some systems than in others, and *vice versa*. Therefore, our results suggest that there is the potential for improving cacao yield in organically managed agroforestry systems by accurately choosing the best performing cultivars in these production systems. The best performing cultivars could be then the base for the selection of improved cultivars for organic agroforestry

Keywords: Agroforestry systems, cacao yields, cherelle wilt, cultivars, full-sun monocultures, organic farming

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