



Project EcoServPlantain: Quantification of Ecosystem Services in Agroecosystems, case of Plantain banana in Martinique

The objective of the EcoServPlantain project is to measure ecosystem services of plantain field systems in Martinique, especially in terms of conservation of arthropods and plant diversity, of regulation of pests, and of production. In order to maximize the provision of ecosystem services and to propose new management of agroecosystems, we study which are the mechanisms involved in producing these services and which are the potential trade-offs between services. Insular agroecosystems are tightly integrated in landscapes and thus play multiple roles (production of food for local market, limiting urbanisation, landscape conservation...). Since plantain agroecosystems are in close proximity to natural ecosystems, they may represent a threat for the environment: pollution, silting-up of coastal areas due to erosion. The quantification of ecosystem services of insular agroecosystems is of major importance for the sustainability of the production in this region, for the protection of the fragile natural environment, and for the preservation of their intrinsic biodiversity. Plantain systems in Martinique are representative of tropical agroecosystems, with important conservation and production

values at stake. The maximisation, maintenance and restoration of diverse ecosystem services in these systems and the development of policies that address all these aspects are necessary to the emergence of an ecologically intensive agriculture adapted to the diverse conditions of the Caribbean.



Description of the project

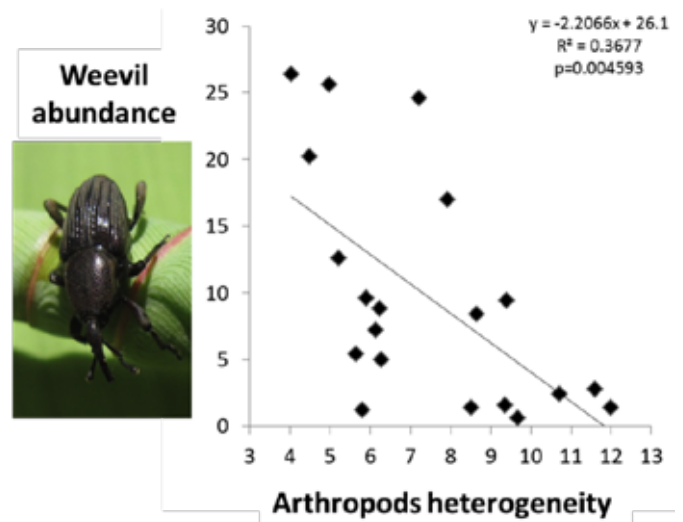
Over a network of farmers' fields that cover a wide part of the diversity of production types, the EcoServPlantain project has contributed to an inventory of more than 120,000 arthropods belonging to 260 different taxa and 2,800 plants belonging to 82 different species; it is the first reference work on the biodiversity of these systems. We showed that plant diversity in the fields has a positive effect on the abundance of some ant species that help keep the banana weevil (*Cosmopolites sordidus*) under control. Surprisingly, our results suggest that there are only very few trade-offs between regulation, production and conservation ecosystem services. This project also provides key knowledge to address the general hypothesis that biodiversity of plantain agroecosystems is needed for the provision of ecosystem services.



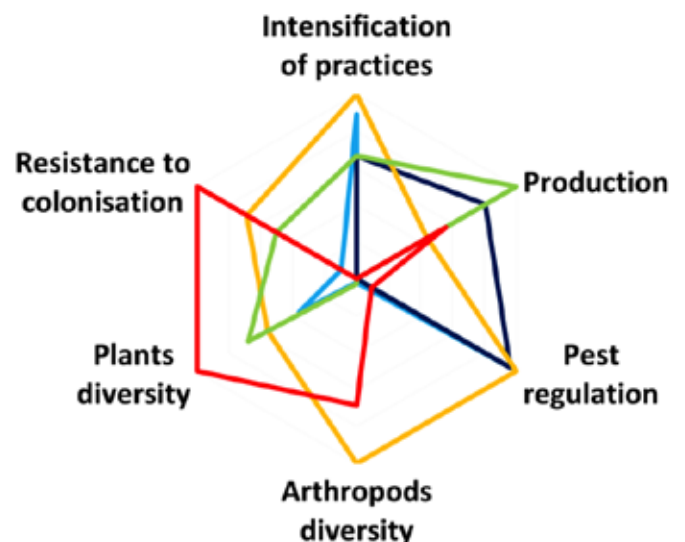
The practical objective of this project is to draft recommendations to policy makers allowing them to adapt their policies of management of biodiversity in agroecosystems. For instance, it includes the identification of agricultural practices that manage plant diversity in order to maximize ecosystem services and that could receive financial incentives. Our results defined 5 distinct groups of systems with different profiles of ecosystem services provided that may receive different incentives.

Key Results

- Plant and arthropods diversity was high in plantain agroecosystems; we identified a mean number of 20 taxa of plants (among the more than 80 inventoried in total) and 60 taxa of arthropods (among the more than 250 in total).



- High plant-parasitic nematodes populations in plantain systems show the lack of prophylaxis practices. The use of clean planting material and of crop rotations could greatly improve the control of these pests.
- The regulation of banana weevil was strongly correlated to the heterogeneity of other arthropods communities. This important result suggests that the implementation of small areas of high diversity in the fields (e.g. high plant diversity) could lead to a better expression of this major regulation service.
- Modelling of different scenarii of plant diversity management showed that simple rules of management can help preserve intra-field areas with high plant diversity without reducing the production.
- There was no trade-off between regulation, production, and conservation services, suggesting that an optimized management of all ecosystem services is possible.



Fields groups according to their profile of ecosystem services

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