CROP ROTATION – CROP ASSOCIATION
A healthy soil, a diversified and resilient agricultural production

INTRODUCTION

Contrary to conventional systems, one of the principles put forward by agroecology is the diversification of agricultural production. In this framework, the agricultural practices recommended by agroecology, among other practices, are crop rotation and crop association. Crop rotation is the cyclic replication of many crops on the same farming area. While crop association is the simultaneous production of a number of crops at the same time on the same farming area so as to maximize the synergies and biological interactions among them. As such, crop rotation differs from crop association in the sense that the different crops are not cultivated at the same time, but in a rotating and successive way.

ADVANTAGES OF CROP ROTATIONS AND ASSOCIATIONS

Contratry to monocultural systems that are reducing soil fertility, crop associations and rotations offer a number of advantages as they contribute to most of the agroecology principes, particularly to those linked to soil fertility, pest and disease management, and generally to all the biological interactions that are taking place among different crops and other components of the agroecosystem.

ADVANTAGES AND LIMITATIONS OF CROP ROTATIONS AND ASSOCIATIONS

▪ Permanent soil cover (one of the principles of conservation agriculture) ▪ Strengthening soil fertility and soil structure ▪ Better soil water retention capacity, thus reduced evaporation ▪ Enrichment of soil organic matter ▪ Contribution to agrobiodiversity ▪ Diversification of agricultural production and income sources ▪ Improved household and consumers access to a diversified diet and better nutrition ▪ Reduced pest and disease pressure ▪ Strengthening the resilience of agroecosystems to shocks and crop loss due to pest and disease attacks ▪ Optimized use and management of natural resources (soil, water, nutrients, light, biodiversity)	▪ Restricted adoption by farmers who prefer cultivating continuously and in majority staple crop s that constitute the basis of their diet ▪ Require some technical knowledge on which crops to associate or rotate and how to conduct the association ▪ Might increase farming workload linked with the conduct and management of different types of crops ▪ Lack of farmers awareness on the advantages of crop association and rotation

PRINCIPES FOR CROP ROTATIONS AND ASSOCIATIONS

Cultivating several crop species on the same land creates competitive or complementary interactions among them concerning access to natural resources (land, water, nutrients, light, etc.). For the practices of crop rotation and crop associations to provide the expected benefices and advantages, a certain number of principles and rules are to be considered. As such, the planning of crop associations and rotations must be conducted according to the following rules (AGRISUD, 2010)[1]:

- **Avoid cultivating twice consecutively plants of the same family** in order to reduce the spread of plant pest and diseases, often specific to the same crop family;
- **Avoid cultivating twice consecutively a plant for the same harvested part or organ** (fruit, leaf, root) to avoid that the same nutrients are exported from the soil. Soil fertility is therefore enhanced and soil structure is improved and preserved
- **At the beginning or "head of the succession", consider planting nutrient-demanding crops to take advantage** of the supplied organic matter or of recycled manure
- **Wait long enough** before cultivating the same plant on the same farming area. Generally, a relatively long period of time (3-4 years) is required to achieve real impacts.

All is about promoting associations and rotations ensuring better crop protection or enabling synergies among the different crops in the systems. A proven crop association is the one that includes cereals and leguminous crops. The latter fix nitrogen in the soil for the cereals to take advantage of it.

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CONCLUSIONS

Due of the complementarity of crop rotations and associations, it is recommended that these two practices are combined to take better advantages of the expected biological synergies and interactions among the different crops present on the farm (GRET, 2015)[2]. Moreover, for crop rotations and associations to have long lasting impacts, they need to be integrated with other agroecological practices; considering the fact, that agroecology is a set of agricultural practices aiming at better and optimized management of natural resources.

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[1] AGRISUD, 2010. Agroecology, best practices

[2] Guide pratique : Pratiques agroécologiques et agroforestières en zone tropicale humide, GRET 2015