les dossiers
d'**AGROPOLIS**
INTERNATIONAL
Expertise of the scientific community
Special Partnership Issue

Agroecological transformation for sustainable food systems

Insight on France-CGIAR research

Number 26
September 2021

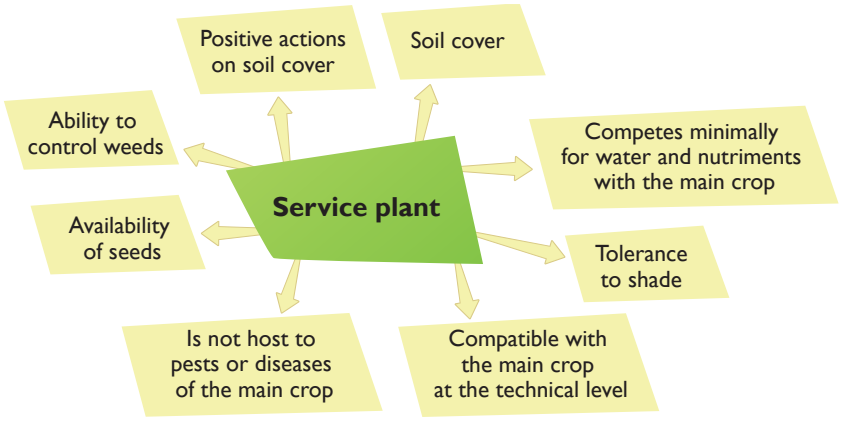
From natural process regulation to agroecosystem design

Agroecological solutions for the Global South – an example of service plants

Intensive agrosystems systematically eliminate some natural ecosystem characteristics, especially by drastically reducing biodiversity and species interactions through deep and frequent tillage, woody species removal, use of a narrow range of crops at the field and landscape scale, etc. The agroecological approach therefore consists mainly of (re)introducing and managing functional, cultivated and associated biodiversity within agrosystems in order to enhance ecosystem services.

The diversity of communities that prevail in agrosystems likely helps ensure provision of a number of ecosystem services[1,2]. For instance, the introduction of a service plant will modify the composition of the plant community, thereby promoting weed control. Service plants must satisfy a set of sometimes contradictory characteristics[3] (Figure). They are increasingly used in various monospecific cropping systems, such as banana plantations and fruit orchards, to control weeds (Photo), thereby curbing herbicide use. Furthermore, the inclusion of a cover crop modifies the system's overall functioning in terms of water and nutrient cycles, as well as interactions between insect and microorganism communities. Introducing a new resource in the system is an effective food web modification lever. Service plants are also used with annual crop species via numerous techniques to fulfill various objectives, i.e. plant protection through attractive and repulsive processes, or soil protection. For instance, service plants in mulch-based systems can help maintain permanent plant cover while limiting tillage. This practice reduces erosion and enhances the soil biological activity, hence contributing to sustainable soil organic matter management. Agroecological principles are based on natural ecosystem functioning analyses. For larger than plot scales, insight into several organizational levels is needed to implement these principles in agrosystems. Yet the agroecological approach must also be mainstreamed into more or less territorialized social systems, including value chains and, more generally, food systems.

▲ *Cover plants in a* Citrus *plantation, Réunion (France).* © *E. Malézieux*



Contact

Éric Malézieux (HORTSYS, CIRAD, France), eric.malezieux@cirad.fr

For further information

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Antimicrobials in livestock farming in the Global South

Minimizing their use while curbing health and socioeconomic risks

Major changes in livestock farming methods that have taken place over the last 50 years have led to the widespread use of antimicrobials in livestock and aquaculture. In some countries of the Global South—due to the growing demand for animal protein and the absence of appropriate regulations—the volume of antimicrobials used continues to rise, which has led to the emergence of bacterial resistance. These bacteria spread through natural food webs and commercial food chains (Figure), from local to global scales via human mobility and trade flows. Resistant bacteria pose a threat to human and animal health and ecosystems. International organizations and governments are calling for interventions to reduce antimicrobial use in livestock. The effectiveness of such actions depends on the implementation of One Health approaches combined with agroecological principles.

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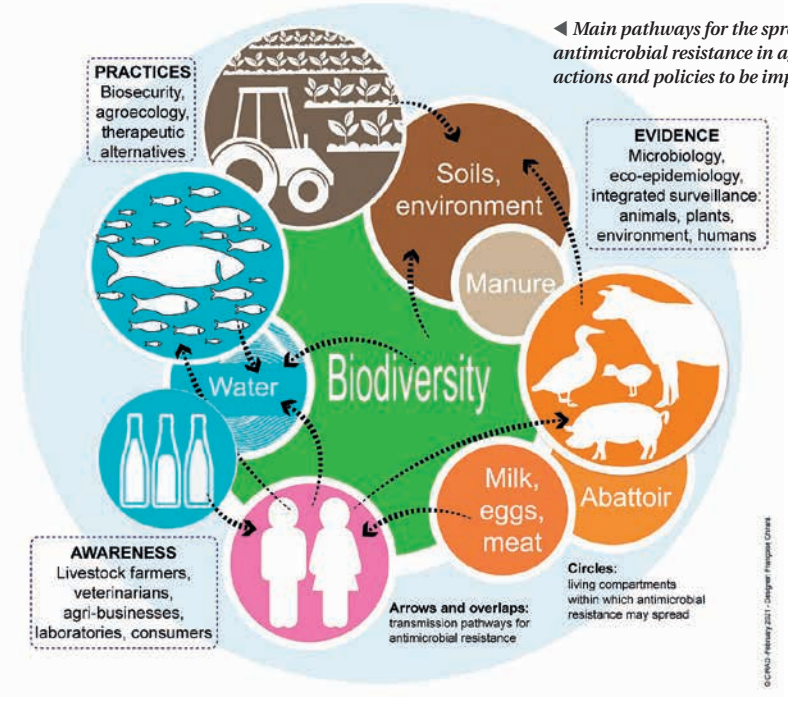

◀ *Main pathways for the spread of antimicrobial resistance in agriculture: research, actions and policies to be implemented.*