To which extent can service plants be used to promote multipest regulation, while limiting disservices in agroecosystems?

Delphine Moreau*[1], Elsa Ballini[2], Marie Chave[3], Stéphane Cordeau[4], Caroline Djian-Caporalino[5], Anne-Violette Lavoir[5], Frédéric Suffert[6], and Anne-Marie Cortesero*[7]

[1]École des Hautes Études en Santé Publique [EHESP] – École des Hautes Études en Santé Publique [EHESP], École des Hautes Études en Santé Publique (EHESP) – France

[2]Plant Health Institute of Montpellier – INRAE, CIRAD, Institut de recherche pour le développement [IRD], Université Montpellier UPVM – France

[3]Agrosystèmes tropicaux (ASTRO) – Institut national de la recherche agronomique (INRA) : UR1321 – INRA Domaine Duclos Prise d'Eau 97170 PETIT-BOURG F-97170 Guadeloupe, France

[4]Agroécologie [Dijon] – Université de Bourgogne, Université Bourgogne Franche-Comté [COMUE], Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement, INSTITUT AGRO DIJON – France

[5]Université Côte d'Azur, INRAE, UMR ISA, 06600, Nice, France – Université Côte d'Azur (UCA) – France

[6]UMR BIOGER (biologie et gestion des risques en agriculture) – Institut National de la Recherche Agronomique, AgroParisTech, Université Paris-Saclay,Sorbonne Universités – Campus AgroParisTech BP01 F-78850 Thiverval-Grignon, France

[7]Institut de Génétique, Environnement et Protection des Plantes (IGEPP) – Université de Rennes – France

Résumé

Service plants (primarily used in agroecosystems to provide ecosystem services that are not directly marketable) are a promising option to promote biological pest regulation. Past studies demonstrated their usefulness for regulating one pest category (either pathogens/parasites, herbivores or weeds). However, meeting the challenge of agroecology requires a multi-pest view of the role of service plants. We developed a trait-based approach in order to analyse to which extent service plants can be used to promote the regulation of multiple pest categories. Concretely, we synthesized the main service plants traits involved in the regulation of each pest category. Then, by crossing the information, we analysed the compatibility across the pest categories. Despite knowledge gaps, we identified a good potential of service plants for multi-pest regulation. However, service plants efficient for 'multi-pest' regulation may also cause disservices, i.e. negative impacts on crop productivity (in terms of quantity or quality) or on production costs (Zhang et al. 2007). For example, service plants can directly repress crop growth, persist in subsequent crops and therefore become weeds, and/or promote non-targeted pests. Therefore, to provide a more concrete overview of the potentialities of service plants for multi-pest regulation, it is necessary to analyse to which

*Intervenant

extent service plants can reconcile multi-pest regulation and disservice mitigation. Towards this aim, the present work analysed (1) the mechanisms and service plant traits involved in disservice mitigation, and (2) on this basis, the compatibility between promoting multi-pest regulation and limiting disservices.

Mots-Clés: multipest regulation