
An indicator of the pollination service at a local scale based on crop pollinator dependence

Gabrielle Martin^{*1}, Colin Fontaine[†], and Emmanuelle Porcher^{‡1}

¹Centre d'écologie et de sciences de la conservation (CESCO) – CNRS : UMR7204, Université Pierre et Marie Curie (UPMC) - Paris VI, Muséum National d'Histoire Naturelle (MNHN) – 55 rue Buffon 75005 PARIS, France

Abstract

The developments of new farming methods since the 60s have increased agricultural productivity (Tilman et al. 2002). However, one major downside of agricultural intensification is a loss of biodiversity in agroecosystems, among which pollinators (Biesmeijer et al. 2006; Potts et al. 2010; Garibaldi et al. 2011). Nowadays, 35 % of global crop production for human food derive from crops that depend to some extent on pollination services (Klein et al. 2007) and 3-8 % of world crop production could be lost in the absence of pollinators (Aizen et al. 2009). Deguines et al. (2014) found that benefits of agricultural intensification decrease with increasing pollinator dependence, to the extent that intensification failed to increase yield of pollinator-dependant crops and decreased stability of yield over time. As a consequence, benefits from agricultural intensification may be offset by reductions in pollination services. At present, there is no consensus about an indicator of pollination service to measure this phenomenon. In this study, we focus on the changes in mean yield of the major crops in France according to their dependence on insect pollinators and try to undertake a country-wide assessment of the effectiveness of crop pollination. We analyse a dataset composed of more than 50 major crops produced between 2000 and 2010, at a departmental scale. Using the relationship between standardized crop yield and crop pollinator dependence, we calculate an indicator of the effectiveness of crop pollination in each department. This indicator is used to map pollination efficiency for the first time in France.

Keywords: agriculture, crop pollinator dependence, changes in mean yield over time, departmental scale

*Speaker

†Corresponding author: cfontaine@mnhn.fr

‡Corresponding author: porcher@mnhn.fr