How agricultural practices impact host-parasite interactions in farmland birds?

Audrey Bailly*[1], Karine Monceau[2], and Jérôme Moreau[3]

[1]Centre d'Études Biologiques de Chizé - UMR 7372 – La Rochelle Université, Centre National de la Recherche Scientifique - CNRS, Institut national de la recherche agronomique (INRA) – France
[2]Centre d'Études Biologiques de Chizé - UMR 7372 – La Rochelle Université, Centre National de la Recherche Scientifique - CNRS, Institut national de la recherche agronomique (INRA) – France
[3]Biogéosciences, UMR 6282 CNRS, Université Bourgogne, 6 Boulevard Gabriel, 21000 Dijon, France – UMR 6282 Biogéosciences – France

Résumé

The intensification of agriculture has led to the homogenisation of agricultural landscapes, the loss and fragmentation of habitats and the heavy contamination of the environment by a wide range of pesticides. In parallel, a significant decline in biodiversity has been observed for all the taxa monitored, and in particular for farmland birds. This loss may ultimately affect community structure by altering interspecific relationships. One of the most common interactions in the animal kingdom is that between hosts and their parasites. In fact, more than half of species on Earth are parasites, and no species is free of parasites. While the contribution of pesticides to bird declines is now widely recognised, little is known about their impact on host-parasite interactions. Pesticides could influence presence and density of parasites and/or alter the immune system of hosts and their ability to protect themselves against pathogen infection. Our aim was to investigate (for the first time to our knowledge), how pesticides may modify the parasite burden of different species of wild passerines in agrosystems by comparing birds and their parasites captured in conventional (CF) vs. organic (OF) farming areas since those two landscapes would differ by the use of synthetic chemicals. Eight different species of passerine birds were captured in 10 hedgerows surrounded by OF crops (n = 434 birds) and 10 hedgerows surrounded by CF crops (n = 462 birds) over two breeding seasons. For each individual, the number of ectoparasites (Ticks and Mallophaga), blood parasites (Plasmodium sp.) and intestinal parasites (Coccidia) were counted. Our results show contrasting effects of farming practices on the parasitic load of birds, depending on the parasites considered. For ectoparasites (Ticks and Mallophaga), birds caught in CF had a lower parasitic load than those reared in OF. On the other hand, birds in CF had more coccidia and blood parasites. Ectoparasites may be directly exposed to pesticides, resulting in high mortality of these organisms, and thus reducing their negative impact on their hosts. Conversely, the increase in endoparasite in CF birds suggests that conventional farming and its pesticide levels may alter the effectiveness of the host immune system, resulting in reduced parasite control. Such findings in birds may suggest a similar effect of conventional farming on parasite burden in other species, including humans, with potentially significant implications for their health (under the "One Health" concept).

Mots-Clés: agriculture intensification, organic farming, parasitic load, farmland birds

*Intervenant