Assessing ground predation by invertebrates in crops: different communities provide the same level of pest regulation in oilseed rape

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Résumé

Psylliodes chrysocephala is among the main pests of oilseed rape. Increasing insecticide resistance, health troubles and environmental concerns have highlighted the need for alternatives to chemical control. Among them, conservation biological can contribute to pest predation. At the end of their development in oilseed rape, pest larvae fall to the soil surface before pupating underground, where they are highly vulnerable to ground-dwelling predators. Our objectives were to identify the predators of *P. chrysocephala* larvae, to compare whether different cropping systems result in different levels of predation, and to identify which taxonomic and functional characteristics of epigeic communities influence predation. First, we used sentinel prey morphologically and taxonomically similar to oilseed rape pest larvae (larvae of *Callosobruchus maculatus*), coupled with cameras, to identify their consumers in agricultural fields. We observed that larvae were mainly consumed by carabids and secondarily by rove beetles, ants and chilopods. Then, we assessed the effects of contrasting cropping systems (conventional, organic, conservation agriculture) on sentinel prey disappearance. Half of the prey was consumed within 24 h, with a large variability across the 34 studied fields.

Predation increased with the number of carnivorous carabids and ground-hunting spiders, with a positive interaction between them and the quantity of springtails. Predation increased with the proportion of nocturnal ground beetles. However, no effect was observed for the hunting strategies of the carabid beetles and spiders, the size of the organisms, or the nycthemeral rhythm of the spiders. Finally, the functional diversity of these traits had no effect on predation. Epigeic communities were affected by the different cropping systems, with more spiders in conservation agriculture and more carabid beetles in conventional agriculture. However, predation levels did not differ between cropping systems, suggesting functional redundancy among different predators.

*Intervenant

In conclusion, our results demonstrate the usefulness of direct observations for verifying potential predators of crop pests. Taxonomically distinct communities can be functionally equivalent, with a predominant role for the dominance of certain functional groups, but no effect of predator functional diversity on predation potential.

Mots-Clés: conservation biological control, camera trap, Psylliodes chrysocephala