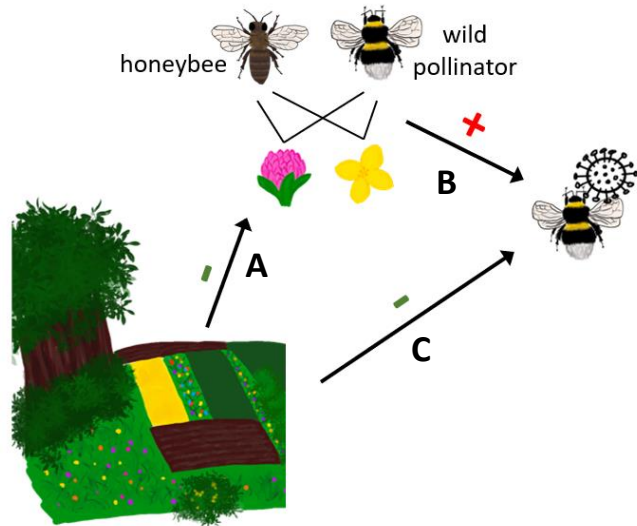


# Which species traits or landscape-level factors affect virus transmission among pollinators?

**INTRODUCTION:** Land-use change and habitat loss are major pressures on pollinators linked to declines in agricultural landscapes. These pressures also alter plant-pollinator interactions, which might affect the potential for transmission of viruses among pollinator species via shared flower use. This may lead to an increased risk of pathogen spill-over and emerging infectious diseases, posing an additional threat to pollinators. We investigated transmission of two viruses associated with the honey bee among 19 wild bee and hoverfly species across 12 landscapes varying in the amount of pollinator-friendly (i.e. flower-rich) habitat in Switzerland.

## KEY RESULTS:

- Honey bees had on average more than 10 times higher loads of Black queen cell virus (BQCV) and Deformed wing virus B (DWV-B) than wild pollinators, which suggests that they are the reservoir hosts.
- Viral loads of both viruses were increased in wild pollinators with a high floral resource overlap with honey bees and a high wild pollinator abundance in the landscape.
- A high amount of pollinator-friendly habitat decreased resource overlap with honey bees and also directly decreased BQCV prevalence.



**Figure 1** A high amount of pollinator-friendly habitat in a landscape reduced resource overlap between honeybees and wild pollinators (A), while a high resource overlap increased viral load in wild pollinators (B). A high amount of pollinator-friendly habitat in a landscape also directly reduced Black queen cell virus in wild pollinators (C). (Drawn by Corina Maurer with Procreate®)

## CONCLUSIONS AND IMPLICATIONS:

Conservation and restoration of pollinator-friendly habitat (i.e. flower-rich habitats such as grasslands, hedgerows, gardens) can mitigate transmission of viruses between pollinator species and therefore lower potential disease risks. It does so directly through provision of vital pollen and nectar sources, and indirectly by reducing the overlap in floral resources used by honey bees and wild pollinators and therefore the risk of contact (Figure 1). However, such habitats should be diverse in flowering plant species and not exclusively contain plant species that are highly visited by honey bees.

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