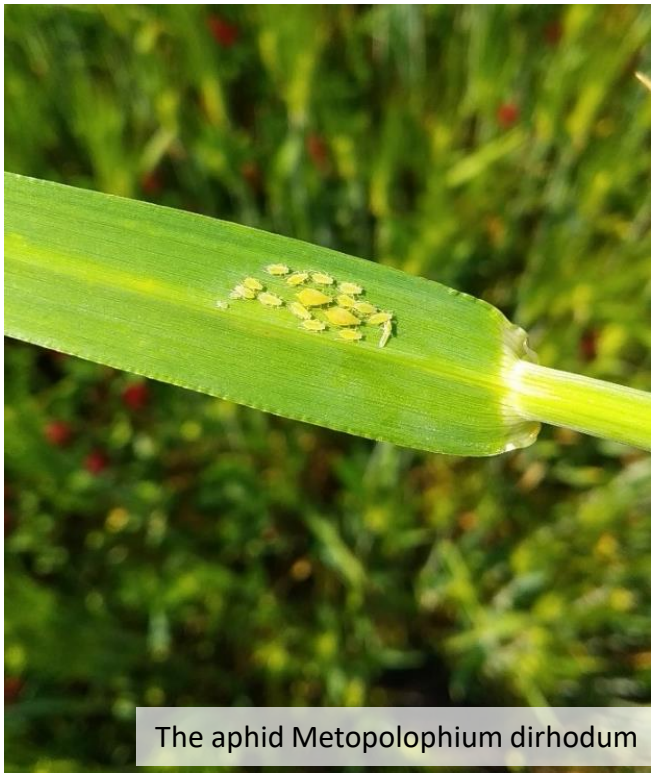
Biodiversity in Farmers' Fields: 1 - Natural enemies of aphids in French field experiments on cereal crops

The overall objective of EcoStack is to develop and support ecologically, economically and socially sustainable crop production via enhancement of ecosystem services provision and protection of functional biodiversity.

Aphids can be a serious pest in cereal crops, e.g. they can transmit the barley yellow dwarf virus (BYDV), which is the most important viral disease of cereals. In France variety mixtures of barley intercropped with clover are tested to see if increased diversity within and between crops can stimulate biological control of aphids by their natural enemies. But what are the natural enemies of aphids? Do they dwell in farmers' fields?

Let's have a look at some of the beneficial insects that can be observed in the field..



The aphid Metopolophium dirhodum

In the soil you can find:

Carabus monilis

Carabus coriaceus

Carabus auratus

Carabids, better known as ground beetles. There are more than 2700 species only in Europe, being one of the most abundant animal families on Earth. Some can feed on weed seeds but the majority are voracious predators of a variety of insect pests. They can also eat slugs. While some species tolerate soil disturbance, the highest diversity of carabids can be found where the soil is not frequently tilled. It is important to provide the right habitat for them having permanent grass strips on field margins for example.

Limax maximus

Spiders, as carabids, are generalist predators who feed on a varieties of preys. This means that they do not depend on a specific prey to survive, so they can be found in the field all-year round. They need a shelter for overwintering, that is why it is important to have undisturbed semi-natural habitats (field margins, hedgerows) where they can find refuge, for example after soil tillage, and from where they can re-colonise the field to catch their preys at the right time. They can be particularly active in spring on those aphids that are to be found close to the soil surface.

Agelena's net

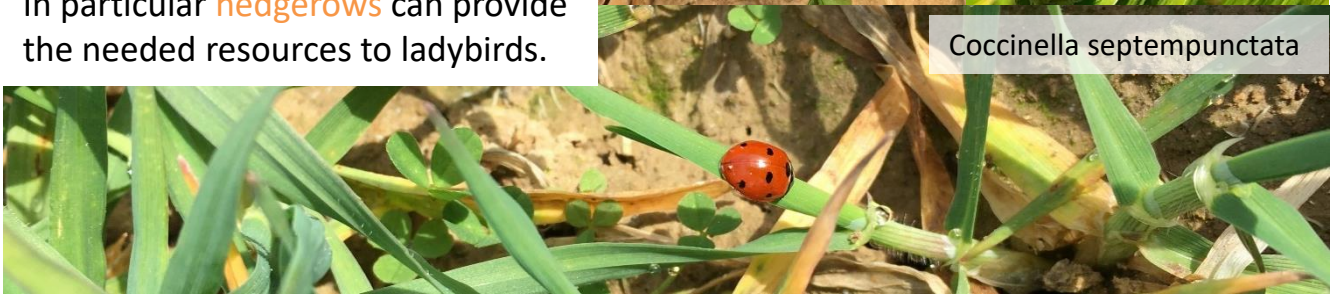
Agelena labyrinthica

Lyniphides' nets

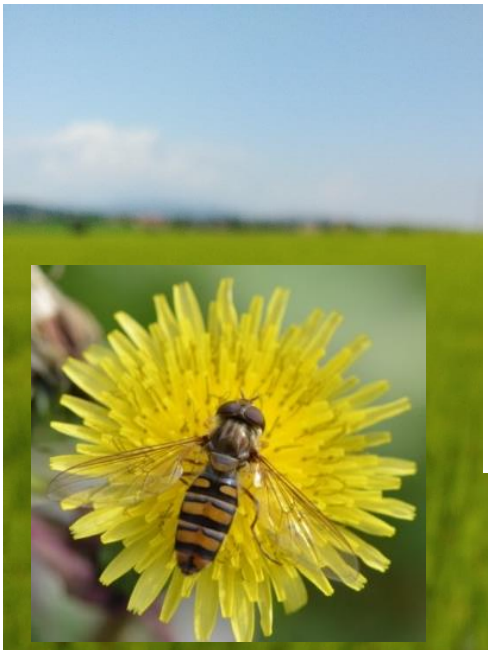
On the plants you can find several **flying insects**:

Ladybirds are voracious aphids predators. They feed on aphids both at larval and adult stage. One adult can eat more than 120 aphids per day! To allow them to be present throughout the season it is important to provide semi-natural habitats, where they can find food when there is no aphid infestation in the field and shelter during winter. In particular hedgerows can provide the needed resources to ladybirds.

Propylea quatuordecimpunctata



Coccinella septempunctata



Hoverflies (syrphids) are effective predators at their larval stage. The adults feed on nectar. They are yellow striped but they should not be confounded with bees! However, adults are good pollinators as well. They also need semi-natural habitats where they can find shelter in winter and flowers for feed. Hoverflies benefit from flower strips rich of nectar flowering species.
Adult hoverflies lay their eggs close to aphids colonies to provide fast-food to the hatching larvae.

Episyrphus balteatus larva and adult

Hoverfly larva and pupa

Recommendations

- To favour carabids and spiders the soil must be left undisturbed: leave uncut grass strips at the edges of the field and practice reduced tillage or no-till.
- Ladybirds need alternative preys and shelter in winter: have hedgerows composed of bushes, trees and herbaceous vegetation.
- To favour hoverflies, plant nectar-rich flower strips.

To make sure beneficial insects populate farmers' fields it is necessary to have multiple types of field margins and hedgerows across the farm land

Acknowledgements: Pictures were taken by Isara researchers in spring 2020. Special thanks to Anthony Roume, Sarah Grauby, and Garreth Kratz.

There are a variety of other beneficial insects and organisms that can be found in farmers' fields.
Stay tuned and check out our next newsletters! Meanwhile…

And you? What did you find on your field?

Share your pictures of field biodiversity @EcoStackH2020 !

Any questions? Please contact us at : info@ecostack-h2020.eu

Visit our Website to be informed and get involved through our Stakeholder Learning Platform: www.ecostack-h2020.eu

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