

## RESEARCH SUMMARY

# Buzzing with benefits: Short-term on-farm grassland set-asides support beneficial insects

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## KEY TAKEAWAYS

- Non-crop areas on farms, such as grassland set-asides, provide important habitats for beneficial insects.
- There were **more ground beetles** (a beneficial insect), and a **greater variety** of them, in on-farm grassland set-asides compared to cropped fields.
- There were **more predatory insects and plant-eating insects**, and a **greater variety** of them, in flower-enhanced, on-farm grassland set-asides compared to cropped fields.
- Having more types and a larger population of predatory and plant-eating insects can **benefit farms** because they have potential to reduce pest insect populations by eating them (predatory insects) or competing with them for food (plant-eating insects).

## HOW CAN THIS RESEARCH BE USED?

- **Non-crop habitat supports native biodiversity and may help reduce pest damage.**
- Farmers can enrol their land in the grassland set-aside program through Delta Farmland and Wildlife Trust (DF&WT) to support beneficial insect populations.



## WHY WAS THIS RESEARCH DONE?

We studied how on-farm grassland set-asides affect the number and variety of both beneficial predatory insects and plant-eating insects compared to conventionally managed cropped fields. Insects are vital to agriculture as they provide pollination, pest control, and nutrient cycling. However, terrestrial insect populations are declining by up to 10% each year as a result of factors such as habitat loss, pesticide use, and climate change. Farmers can help reverse this trend by creating non-crop habitats, such as short-term grassland restorations, which support beneficial insects that, in turn, can provide benefits to crop production.

### Production Type

- Cattle, vegetables, berries

### Practice Benefit(s)

-  Improved pest management
-  Increased on-farm biodiversity

### Research Location

- Delta, B.C.



**Figure 1.** A granulated ground beetle (predatory insect) in the field. Photo by Matt Tsuruda.

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Farms in this study participate in the Delta Farmland and Wildlife Trust's grassland set-aside program, which helps offset the costs of planting and managing short-term grassland set-asides. In the program, grassland set-asides are farm fields that are planted with grasses and broad-leaved plants and are left to grow for up to four years before returning to crop production. These fields mimic the historic grasslands in the area and help restore degraded land, transition fields from conventional to organic production, and/or diversify crop rotation for soil health.

We evaluated two types of grassland set-asides:

- **'Traditional grassland set-aside'**: includes plant species that mimic historic tall grass habitats.
- **'Flower-enhanced grassland set-aside'**: the same plants species as the traditional grassland set-aside but also includes flowering plants which can support beneficial insect populations (such as pollinators and predatory insects).



**Figure 2.** Barley field (**left**), traditional grassland set-aside (**centre**), and flower-enhanced grassland set-aside (**right**). Photos by Matt Tsuruda.

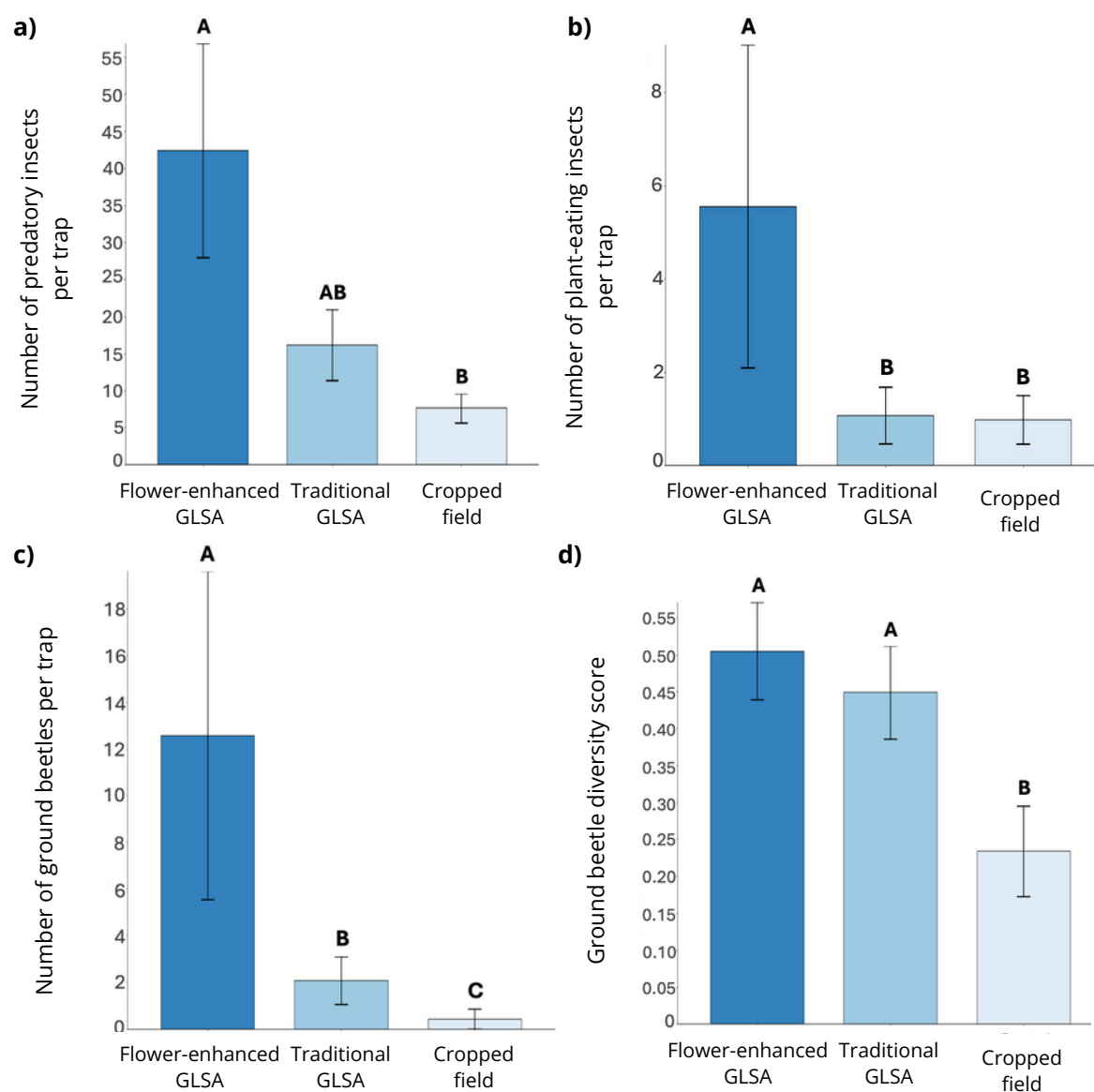
## WHAT WAS THE OUTCOME?

During this two-year study, we captured and identified a total of 79,111 arthropods (insects and other types of bugs such as spiders and centipedes) from our field sites.

**We found more ground-dwelling predatory insects and plant-eating insects in 'Flower-enhanced grassland set-asides' compared to cropped fields (Figure 3a and 3b).** Predatory insects can help with pest control as they directly feed on insect pests.

There was also a greater diversity (more species) of plant-eating insects in the 'Flower-enhanced grassland set-asides' compared to cropped fields. It is important to note that having more plant-eating insects is likely to reduce insect pest damage to crops, not make it worse. This is because the plant-eating insects that usually damage crops will be outcompeted by other plant-eating insects that don't harm crops.

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**Figure 3.** Average number of (a) predatory insects, (b) plant-eating insects, and (c) ground beetles captured per pitfall trap in the different field types. Each trap collected insects for one week. (d) Average diversity score of ground beetles captured in pitfall traps in the different field types over each sampling year; higher scores indicate more insect diversity. GLSA = grassland set-aside. Field types marked with different letters (A, B, or C) are statistically different.

**'Flower-enhanced grassland set-asides' had about 6 times the number of ground beetles found in 'Traditional grassland set-asides', and about 12 times the number found in cropped fields (Figure 3c).** We also found that both types of grassland set-asides (traditional and flower-enhanced) had a higher diversity of ground beetle species than cropped fields (Figure 3d). All types of ground beetles (both predatory and non-predatory) are beneficial to have on farms. Predatory ground beetles are highly effective at controlling insect pests, and all of the non-predatory ground beetles we caught were weed-seed specialists (only eat weed seeds), which means that they can help reduce weed growth.

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### WHAT'S NEXT?

An increase in the presence of beneficial arthropods is not guaranteed to lead to better pest management outcomes, so following up with measurable impacts on pest control will be an important next step to this research.

### HOW WAS THE RESEARCH DONE?

This study took place on farms across Delta, BC during the growing seasons of 2020 and 2021. We collected insect samples from **seven 'Traditional grassland set-asides', five 'Flower-enhanced grassland set-asides', and nine annual cropped fields**. The annual cropped fields consisted of six fields of barley, one corn, one pea, and one mixed vegetable field.

The seed mix used for the **'Traditional grassland set-asides'** contained (by seed weight): **25% orchard grass, 28% tall fescue, 15% timothy grass, 15% chewing fescue, 15% creeping red fescue and 2% double-cut red clover**, planted at 30 lbs/acre with a nurse crop of oats or barley. Of these species, only creeping red fescue is considered native to the region. **'Flower-enhanced grassland set-asides'** contained a variety of native and non-native flowering species (such as sunflower, vetch, red and white clover, and phacelia) and grasses based on site-specific considerations by farmers and seed availability.

We sampled each field site **three times per year** using both pitfall traps and insect vacuums. Pitfall traps passively collect ground-dwelling insects that fall in, while insect vacuums actively capture small flying insects from vegetation.



**Figure 4.** A diversity of insects are found in agricultural grasslands. Photo by Matt Tsuruda.

**RESEARCH SUMMARY****ABOUT THIS BRIEF****This brief is based on the following scientific journal article:**

Tsuruda, M., Clausen, M., Bondar, D., Kremen, C., & Carrillo, J. (2024). Short-term grasslands in agriculture support both natural enemy and phytophagous arthropod populations. *Journal of Applied Entomology*, 149(1), 100-110. <https://doi.org/10.1111/jen.13364>

**Want to learn more?**

- For any questions regarding this research, contact Matt Tsuruda at [tsuruda@mail.ubc.ca](mailto:tsuruda@mail.ubc.ca)
- If you are a landowner in Abbotsford, Delta, or Metro Vancouver and are interested in enrolling in the Grassland Set-Aside Program, please contact Delta Farmland and Wildlife Trust at <https://deltafarmland.ca/our-programs/grassland-set-aside-stewardship-program/>

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