



CROP DIVERSIFICATION IN FORAGE PRODUCTION: BENEFITS TO POLLINATOR BIODIVERSITY

This factsheet is a part of the Pollinator factsheet Series for the project *Creating climate resilient pollinator communities in Bulkley-Nechako and Fraser-Fort George (BNFFG)*. This series summarizes key findings from two years of field work on agricultural properties in BNFFG that studied the distribution and emergence patterns of pollinators, along with factors that promote pollinator biodiversity and resilience. Full project information and reports are available on the [Climate Change Adaptation Program website](#).

KEY POINTS

Forage crops are an important resource for native pollinators in the Bulkley-Nechako and Fraser-Fort George Regional Districts, particularly in years with higher than expected temperatures.

Many plants can be used for pollinator enhancement, but forage producers may find non-bloat legumes particularly attractive, as they have high value as forage crops in addition to being attractive to pollinators.

Increasing flowering plant diversity encourages greater pollinator biodiversity: forage producers can accomplish this by diversifying seeding mixes, and/or by grazing instead of mowing fields.

ARE POLLINATORS FOUND IN AREAS USED FOR FORAGE CROP PRODUCTION?

In 2021 and 2022, we sampled pollinators in and around fields used for forage crop production (mostly alfalfa). We found many species of native pollinators (bees and hoverflies; over 120 species!) in these fields. Typically, 6 – 8 species of pollinators are present in forage fields at a given time, but the types of pollinators found varies over the course of the growing season. Bumblebees are generally common, but mining bees (Andrenidae) and leafcutter bees (Megachilidae) are more likely to be found early in the season (May and June).

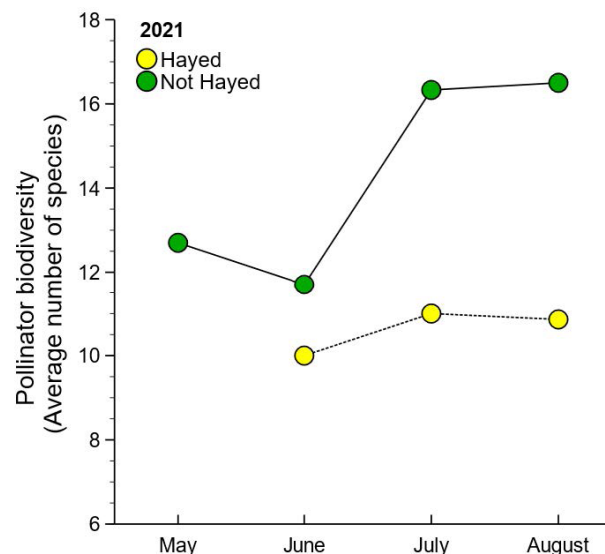
HOW DOES FORAGE CROP PRODUCTION AFFECT POLLINATOR BIODIVERSITY?

In years with difficult climate conditions, forage crops may be particularly important to supporting pollinator biodiversity. In June and July 2021, most of British Columbia experienced a long period of atypically high temperatures (referred to in the media as a 'heat dome'), and our samples from this period showed higher pollinator biodiversity in and around forage fields that were not hayed (shown in green on the figure at right; some were left fallow, and some were used for rotational grazing), in comparison to fields that were hayed (shown in yellow).

In 2022, which was cooler and wetter, this pattern was not observed: instead, pollinator biodiversity was relatively stable on most sites over the course of the season, and was not substantially lower on sites that were hayed.

FLORAL DIVERSITY IS CRITICAL FOR POLLINATOR BIODIVERSITY

In 2022, we identified the number of flowering plant species in bloom (potential food resources) on each site while collecting pollinator samples. Pollinator biodiversity was greater on sites with more floral diversity, and both native and domesticated plant species contributed to this finding. Collectively, this suggests that increasing the diversity of forage crops is likely to support more diverse pollinator communities.



WHAT KIND OF PLANTS ARE GOOD FORAGE CROPS IN ADDITION TO SUPPORTING POLLINATORS?

Many plants can be used for pollinator enhancement, but forage producers may find non-bloat legumes like Birdsfoot trefoil (*Lotus corniculatus*; in photo to right), Cicer milkvetch (*Astragalus cicer*), and/or Common Sainfoin (*Onobrychis viciifolia*) particularly attractive, as they have high value as forage crops in addition to being attractive to pollinators.

Other plants that should also be considered as appropriate additions to forage mixes in this region are: vetch (*Vicia americana* or *V. sativa*), goldenrod (*Solidago lepida*, *canadensis*, or *elongata*), and yarrow (*Achillea millefolium*). All of these plants have some value as forage for livestock and are adapted to growing conditions in BC's central interior.

HOW CAN YOU DETERMINE IF CROP DIVERSIFICATION IS BENEFICIAL FOR POLLINATORS?

Transect walks allow you to quantify pollinators without having to trap or kill them. These observations should be carried out multiple times (we recommend every two or three weeks) during the growing season in an area that has been planted with more diverse crops as well as an area that has been left as-is. Your method in each area should be exactly the same, to provide a fair comparison of pollinators between conditions. You will likely have the greatest success in observing pollinators on sunny days with little wind, when the air temperature is above 15 °C.

Identify a transect (route) of the same length through each field you wish to observe (typical pollinator transects should be 50 – 100 m long). At regular intervals during the growing season, walk these routes slowly, counting the total number of insects you see on flowers 1 metre to your right and left along the route (you may want to focus on bees more specifically – our identification guide is linked below; just make sure your method is the same for all transect observations). You may find it helpful to carry a reference object (like an aluminum tent pole) that is 2 metres wide to help you determine which flowers fall within 1 metre on either side of your transect.

Record the number of insects or bees on flowers for each transect you complete. After several observations, take the average number of pollinators seen on transects completed in fields with higher crop diversity with fields with lower crop diversity to determine whether there are differences in pollinators. The overall diversity of pollinators is usually positively correlated to the abundance of pollinators, so having a greater average number of pollinators observed on a given transect is likely to indicate greater pollinator biodiversity as well.



LOOKING FOR MORE INFORMATION?

- Agricultural Pollinators of Central Interior BC: <https://doi.org/10.5683/SP3/4LRJ3A>
- Visit <https://borealisdata.ca/dataverse/unbc> and search for 'agricultural pollinators' - all files will be archived under the project Agricultural Pollinators in the Bulkley-Nechako & Fraser-Fort George Regions, authored by Aija White & Dezene Huber.
- Dryland forage factsheets with details on non-bloat legumes: <https://bcclimatechangeadaptation.ca/resource-items/dryland-forage-selection-in-the-bulkley-nechako-and-fraser-fort-george-regions/>

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