

Using Perennial Plant Headlands as Beneficial Insect Attractants in Cabbage

RESEARCH SUMMARY | ON-FARM DEMONSTRATION RESEARCH & MONITORING | 2024

RESEARCH LOCATION

- Delta, BC

FARMER COLLABORATORS

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AUTHORS

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HIGHLIGHTS

- This project evaluated the effect of a headland planted with perennial flowering plants on beneficial insect populations in a cabbage field.
- There was a trend towards higher beneficial insect levels in the field near the perennial plant headland, but this trend was also observed for aphid levels.
- Aphid levels were particularly high this year in Delta, and it may take several seasons for beneficial insect populations to build up.
- Multiple years of data collection would be useful to properly assess the efficacy of a perennial headland and strengthen confidence in results.

MOTIVATION

- Past research has shown that planting annual and perennial flowering plants around and within fields can increase diversity of beneficial insects.
- Planting flowering plants to attract beneficial insects could help manage pests that affect cabbage, such as aphids, thrips, and mites.

RESEARCH OBJECTIVE

The objective was to evaluate the effect of a headland planted with perennial flowering plants on beneficial insect populations in a cabbage field.

The research questions this trial addressed were:

- Will planting perennial flowering plants along a headland increase beneficial insect levels in the adjacent cabbage field?
- Will increased beneficial insect levels decrease the aphid populations in the adjacent cabbage field?
- Will increased beneficial insect levels decrease the number of insecticidal soap spray applications required against cabbage aphids?

METHODS

PLANTING

- A perennial headland 100 m long and 1.5 m wide was planted on June 3, 2023 along the north edge of a 32-acre cabbage field in Delta, BC.
- After soil was worked, organic fertilizer was added to the top 6 inches before planting. Three rows of plants were planted with about 0.5 m between each plant for a total of 500 plants.
- Plants of different species were planted next to each other with attention paid to their respective bloom times, so there would be diversity throughout the headland (Table 1).
- The headland was maintained throughout the season with weeding and irrigation.

WHAT IS ON-FARM DEMONSTRATION RESEARCH?

- Demonstration research is small-scale testing of an innovative practice on a working farm.
- Guided by producers' goals, demonstration research provides the farming community with experience and information about a new practice, product or technology.
- This research summary is intended to share information and is not official guidance.

Table 1. List of perennial plants planted in the headland along with their approximate start of blooming period.

Bloom	Plant Name
Early summer	Lavandula angustifolia Hidcote Salvia nem. Caradonna
Mid summer	Campanula Dickson's Gold Buddleia Black Knight Helianthus Salc. Autumn Gold Phlox Blue Paradise Phlox Red Riding Hood Salvia nem. Blue Marvel Salvia nem. May Knight
Late summer	Agastache Aur-hyb Tango Buddleia Black Knight Zauschneria
All Season	Achillea New Vintage White Echinacea purp Mellow Yellows Echinacea purp Pow Wow White Gaillardia Arizona Red Gaillardia Spintop Red Sunburst Rudbeckia Denver Daisy

DATA COLLECTION

- Both the headland and the field were inspected for cabbage aphids and beneficial insects for a total of four assessments (monthly- June to September).

- Density maps were created to study aphid and beneficial insect distributions moving into the field from the headland.
- Historical data on cabbage aphids and parasitized aphids were used as a baseline comparison.

RESULTS

WITHIN HEADLAND

- Overall, the headland established well (Fig. 1). Perennial plants that did especially well were Achillea New Vintage White, Gaillardia Arizona Red, Rudbeckia Denver Daisy, and Salvia Nemorosa Blue Marvel (Fig. 2). Plants that did not establish well included Campanula Dickson's Gold and Gaillardia Spintop Red Sunburst, likely due to dry conditions.
- Aphids and beneficial insects were noted at all three headland assessments. The beneficials that were recorded included syrphid flies, parasitoid wasps, lacewings, and orius (minute pirate bugs).
- Aphids and beneficial insect levels were overall low within the headland but were highest during the August assessment.
- Pollinators were especially active on flowering plants in August (Fig. 2b).
- It may take multiple seasons for the beneficial insect populations to build up in this habitat.

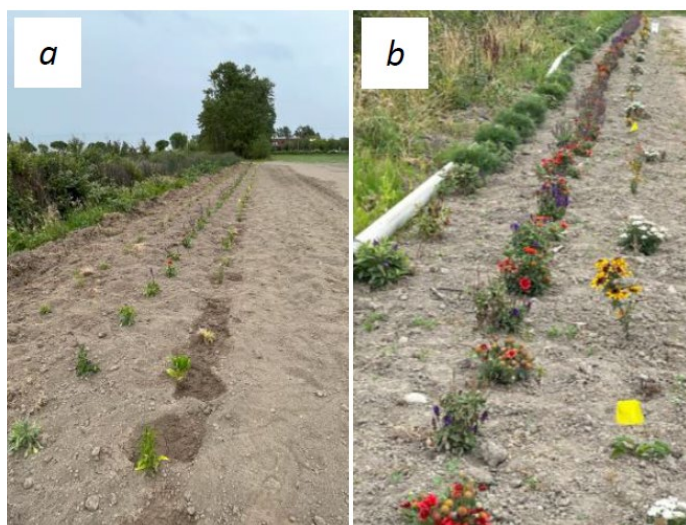


Figure 1. The headland after planting on June 9 (a) and on August 25 when there were the greatest number of plants in bloom (b).

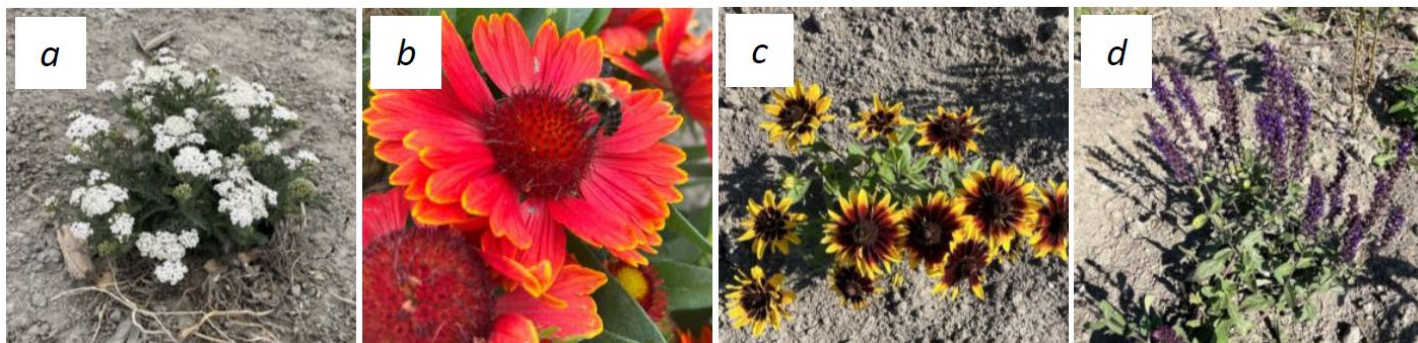


Figure 2. Achillea New Vintage White (a), Gaillardia Arizona Red (b), Rudbeckia Denver Daisy (c), and Salvia Nemorosa Blue Marvel (d) established especially well in the headland.

WITHIN FIELD (2023)

- Most beneficials recorded were parasitoid wasps and parasitized aphids, but aphid midge larvae and syrphid flies were also observed.
- Highest levels were recorded in August with more than 10 of both aphids and beneficials per sample (Table 2).
- Higher levels of aphids were seen at the two field edges compared with the middle of the field, with a trend towards higher levels closer to the headland. Beneficial insects also appeared higher along the edge closer to the headland, particularly in August.
- It should be noted that aphid and beneficial populations were very high across the Delta region in 2023.

WITHIN FIELD (HISTORICAL)

- Parasitized (mummy) aphid (Fig. 3) levels were used as they were by far the most numerous beneficial seen across all years.
- Aphid and parasitized aphid levels varied over the last five years. Aphid levels were the highest in 2023 and parasitized aphid levels were the higher in 2021, followed by 2023 (Table 3).
- Aphid levels start to increase with the warmer summer weather, usually peaking in August. Beneficial levels closely track aphid levels and tend to peak soon after.
- With just one season of data, it is too soon to conclude if the flowering plant headland is impacting beneficial insect or aphid levels.

Table 2. Levels of cabbage aphids and beneficial insects observed within the cabbage field, displayed by distance from the perennial plant headland at four assessments conducted at monthly intervals through the 2023 season. Rating system is as follows: VL=1-10, L=11-50, M=51-100, H=101-500, VH=>500. White squares indicate no beneficials or aphids were present in that sample.

Distance from headland (m)	Assessment date:															
	June 16				July 28				August 25				September 25			
	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2	Pass 1	Pass 2
	Beneficials		Aphids		Beneficials		Aphids		Beneficials		Aphids		Beneficials		Aphids	
0				VL	VL	L	M	VH	VH	VH	VH	VH	L	L		L
50							L	VL	H	H	VH	VH	VL		L	
100								VL	L	H	M	H		VL		L
150					VL	VL	VL	L	L	M	M	H	VL	VL		
200					L	VL	M	L	L	L	M	M	VL			
250						L		VH	VH	VH	VH	VH	VL	L		

Table 3. Historical levels (since 2019) of cabbage aphids and parasitized aphids in the same or the closest nearby cabbage field, at selected monthly dates.

Year	Date	Parasitized aphids	Aphids
2023	Jun 16		VL
	Jul 28	L	VH
	Aug 25	VH	VH
	Sep 25	L	L
2022	Jul 01		
	Aug 05	VL	H
	Sep 02	H	M
	Sep 23	VL	
2021	Jun 18		VL
	Jul 30	VL	H
	Aug 27	VH	M
	Sep 09	VH	H
2020	Jun 12		VL
	Jul 31	M	VH
	Aug 28	M	H
	Sep 25	L	L
2019	Jun 14		L
	Jul 26	L	H
	Aug 22	L	L
	Sep 27	H	VL

CONCLUSIONS & NEXT STEPS

- Most perennial flowering plants established well during this project.
- There was a trend towards higher beneficial insect levels in the field near the perennial plant headland, but this trend was also observed for aphid levels.
- Aphid levels were particularly high this year in Delta overall. To properly assess the efficacy of a perennial headland and strengthen confidence in the results, multiple years of data collection should be collected.
- The headland should be maintained to keep growing beneficial insect populations. Future steps include looking at multiple years of insecticidal soap spray data to determine the efficacy of the perennial headland at reducing the total number of sprays in a season.



Figure 3. A cabbage aphid colony on a cabbage leaf. Note the parasitized (mummy) aphids circled in yellow.

FIND MORE INFORMATION:

Read the research manual:

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/programs/regional-extension/using_perennial_plant_headlands_as_a_beneficial_insect_attractant_in_cabbage.pdf



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