

ASSESSING THE EFFECT OF ALLELOPATHIC COVER CROPS ON WEEDS

Allelopathy is the chemical impact an individual plant has on other plants. Allelopathy can affect growth and yield of other plant species or secrete chemicals that prevent propagation and development of seedlings of the same species. Allelopathy can be used as a strategic alternative to chemical weed management. Residues of allelopathic cover crops not only provide benefits to the soil but also help to reduce weed populations during their growth and likely for the cash crops seeded in the season thereafter.

This project was divided into four years. In 2021 and 2023, four crops were chosen based on their allelopathic properties, availability and popularity among growers. Rye (*Secale cereale* L.), annual ryegrass (*Lolium multiflorum* L.), hairy vetch (*Vicia villosa* L.), and sunflower (*Helianthus annuus* L) have been known to limit or reduce the growth of other plant species. In this experiment weeds were surveyed every two weeks after cover crop mix seeding to observe if allelopathic effects changed according to cover crop species or cover crop mixes. At the end of the season, plots were either roller-crimped or incorporated. The following growing seasons (2022 and 2024), canola, field pea, and wheat were sown perpendicular to the direction of these plots to observe if weed populations are still suppressed by the allelopathic effects of the cover crops and their mixes. A control plot is included where no crop is sown.

Task	Timeline	Details
Seeding	June 11	Canola 6 lb/ac, 0.75" depth Wheat 120 lb/ac, 1" depth Peas 140 lb/ac, 1.5" depth
Maintenance	May 20-23	Urea 100 lb/ac S15 80 lb/ac Glyphosate (pre-seed) 1 L/ac
Harvest	Sept. 20 - Oct. 3	Straight-cut

The most common weed species found at the NPARA Research Farm are wild buckwheat, stinkweed, lambsquarters, dandelion, shepherd's purse, horsetail, red clover, perennial sowthistle and Canada thistle.



ASSESSING THE EFFECT OF ALLELOPATHIC COVER CROPS ON WEEDS

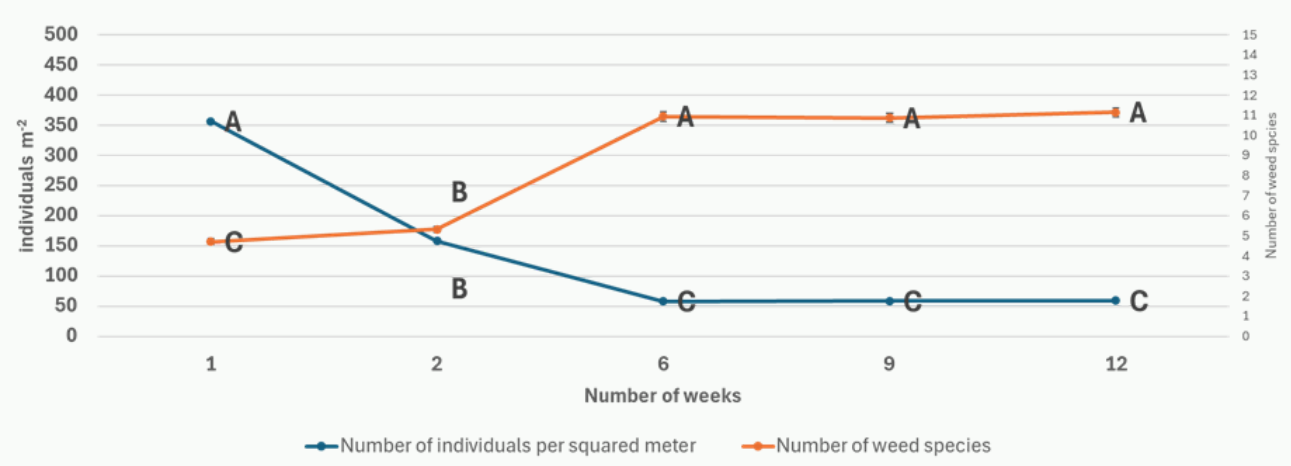


Figure 1. Number of weed species and number of weed individuals per squared metre found in cash crop treatments of wheat, canola, field pea and a bare control. Cash crops were seeded in 2022 and 2024, sown after seeding and termination (roller-crimping vs. incorporation) of annual ryegrass, hairy vetch, rye and sunflower allelopathic cover crops and their mixtures in 2021 and 2023.

More weed seedlings were observed underneath the cash crop and the cover crop canopy rather than fully developed weeds. This contributed to the increased number of species and a concurrent decrease of weed individuals (Figure 1).

The weed species found in 2024 were wild buckwheat (*Polygonum convolvulus* L.), lamb’s quarters (*Chenopodium album* L.), shepherd’s purse (*Capsella bursa-pastoris* L.) and stinkweed (*Thlaspi arvense* L.), and horsetail (*Equisetum arvense* L.). Cover crop termination method and cash crop species had no effect on the number of individuals found for each species. In addition, lamb’s quarters and shepherd’s purse seemed to have been outcompeted either by the other weed species or by the cash crop and volunteers cover crops present (Figure 2). Number of wild buckwheat stands did not increase through time. This can be owed to the fact that this weeds species prefers shady environments and expanded its vine network rather than produce more seeds for survival. Stinkweed on the other hand was one of the earliest emerging weeds that with time decreased by the end of the season, likely by smothering from cash crops and possibly allelopathic effects from wheat and canola.

ASSESSING THE EFFECT OF ALLELOPATHIC COVER CROPS ON WEEDS

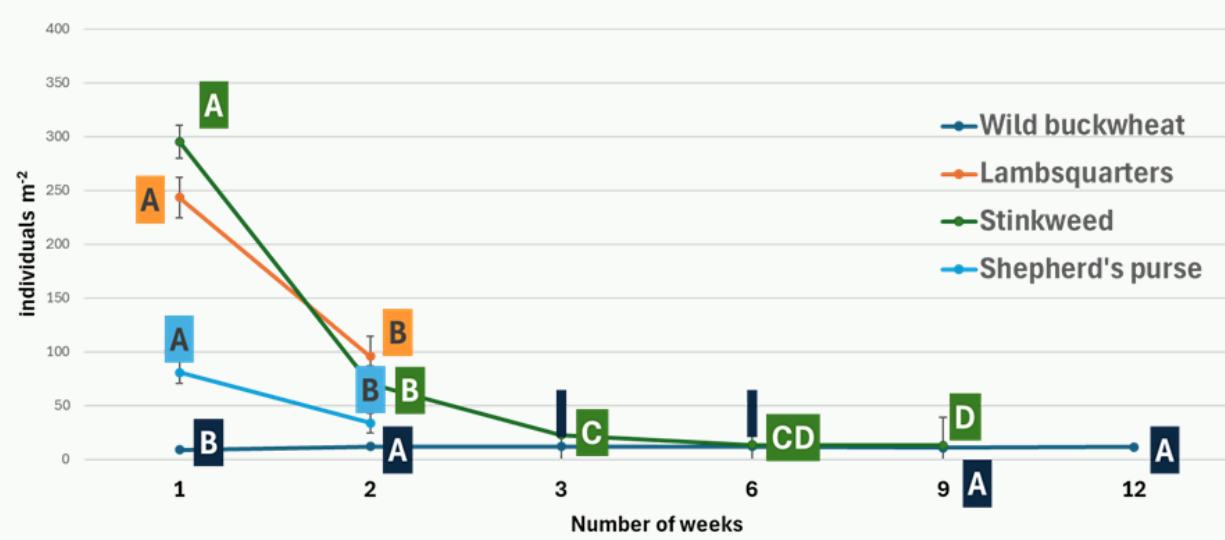


Figure 2. Number of wild buckwheat, lamb’s quarters, shepherds’ purse and stinkweed individuals per squared metre found cash crop treatments of wheat, canola, field pea and a bare control. Cash crops were seeded in 2022 and 2024, sown after seeding and termination (roller-crimping vs. incorporation) of annual ryegrass, hairy vetch, rye and sunflower allelopathic cover crops and their mixtures in 2021 and 2023.

It is possible that crops suffered from the heat wave that occurred in July and August. Thus, crops at this time were likely outcompeted by weed growth and propagation later in the season. As a takeaway from this experiment, a control plot, with no cover crop seeded should be included to observe the impact of sowing a cover crop vs no cover crop present in the weed community.



Key Points:

- No significant differences in weed pressure whether cover crops were roller-crimped or incorporated
- Most common weeds are Wild Buckwheat, Lamb’s Quarters, Shepherd’s Purse, Stinkweed, and Horsetail
- As the season went on, weed diversity increased due to competition in the field, but the number of individual weeds decreased because of heat