# Inventory of Quebec Weeds : Insights from the Centre-du-Québec region

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## Introduction

A comprehensive weed inventory was conducted from 2024 to 2025 in the Centre-du-Québec (CDQ) (**Figure 1**), the province's second-largest agricultural region, with 645 000 ha of croplands[1]. The region is particularly distinguished by its cranberry production, favored by extensive sandy soils.



The study aims to provide an overview of weed distribution, biology, and ecology under present agricultural and climatic conditions, identifying the most abundant or problematic species by crop type and comparing community composition between two regions (CDQ and Montérégie).

## Objectives

1. Compare weed richness and diversity across major crop type in CDQ.
2. Identify the weed species with the highest relative abundance index by crop type in CDQ.
3. Assess differences in weed community composition between CDQ and Montérégie region.

## Materials and Methods

- Field sampling was proportionally allocated by crop type, targeting 575 fields, with voluntary producer participation.
- Ten 1 × 1m quadrats were randomly placed in each field following an S-shaped transect.
- In quadrats, weed cover (%) and species density were recorded. Data were summarized using a relative abundance index (RA)[2] (**Figure 2**) and Shannon diversity index[3].
- Bray-Curtis dissimilarity between the CDQ and Montérégie regions was calculated from species RA and visualized with ordination to assess community differences.

**Relative abundance (RA) =** RF + RU + RD.
- **Relative frequency for a species ($RF_i$) =** Frequency ($F_i$) divided by the sum of F for all species, as %.
- **Relative uniformity for a species ($RU_i$) (all fields) =** Uniformity ($U_i$) divided by the sum of U for all species, as %.
- **Relative density for a species ($RD_i$) (all fields) =** Density ($D_i$) divided by the sum of D for all species, as %.

## Results and Discussion

For the first year of the inventory in the CDQ region, a total of 243 fields were surveyed across 26 different crops. The three crops with the greatest number of weed species were meadows (119), soybean (107), and maize (92).

**216** identified weeds → **149** weeds in field crops → **146** weeds in forage crops → **110** weeds in horticultural crops

The five species with the highest relative abundance (RA) index in CDQ, across all crop types, were (**Figure 3**): hairy crabgrass (*Digitaria sanguinalis,* DIGSA), smooth crabgrass (*Digitaria ischaemum,* DIGIS), common dandelion (*Taraxacum officinale*, TAROF), lamb's-quarters (*Chenopodium album*, CHEAL) and annual ragweed (*Ambrosia artemisiifolia,* AMBEL). **Table A** highlights the dominant species in each type of culture based on RA index.

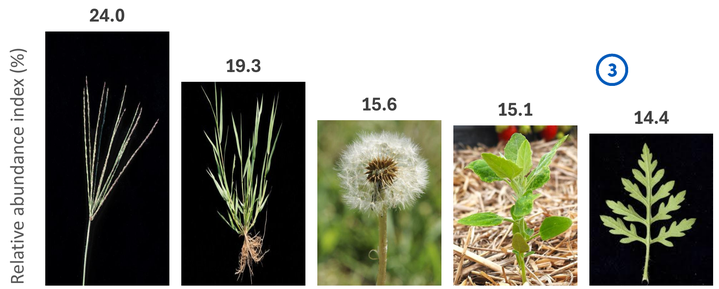


Figure 3. Top five species with the highest relative abundance (RA) index in CDQ, across all crop types.

Table A. Summary of the weeds with the highest relative abundance index for field crops, forage crops and horticultural crops in Centre-du-Québec.

| Crop types | Ranking | Scientific name | EPPO code | Number of fields | Relative frequency (RF) | Relative uniformity (RU) | Relative density (RD) | Relative abondance (RA) |
|---|---|---|---|---|---|---|---|---|
| Field crops (n = 151 fields) | 1 | *Digitaria ischaemum* | DIGIS | 35 | 2.1 | 2.5 | 21.8 | 26.5 |
| | 2 | *Digitaria sanguinalis* | DIGSA | 55 | 3.4 | 4.8 | 16.5 | 24.7 |
| | 3 | *Ambrosia artemisiifolia* | AMBEL | 77 | 4.7 | 6.8 | 6.7 | 18.2 |
| | 4 | *Chenopodium album* | CHEAL | 85 | 5.2 | 8.1 | 4.9 | 18.2 |
| | 5 | *Taraxacum officinale* | TAROF | 106 | 6.5 | 8.4 | 2.9 | 17.8 |
| Forage crops (n = 40 fields) | 1 | *Digitaria sanguinalis* | DIGSA | 6 | 1.0 | 1.5 | 24.7 | 27.2 |
| | 2 | *Elymus repens* | AGRRE | 11 | 1.8 | 2.6 | 14.1 | 18.5 |
| | 3 | *Poa annua* | POAAN | 11 | 1.8 | 2.5 | 10.3 | 14.6 |
| | 4 | *Taraxacum officinale* | TAROF | 29 | 4.8 | 6.9 | 1.5 | 13.2 |
| | 5 | *Trifolium repens* | TRFRE | 22 | 3.7 | 4.5 | 3.5 | 11.7 |
| Horticultural crops (n = 52 fields) | 1 | *Galinsoga quadriradiata* | GASCI | 14 | 2.9 | 5.9 | 17.5 | 26.3 |
| | 2 | *Digitaria ischaemum* | DIGIS | 11 | 2.3 | 3.6 | 18.9 | 24.9 |
| | 3 | *Chenopodium album* | CHEAL | 23 | 4.8 | 8.7 | 4.2 | 17.8 |
| | 4 | *Panicum capillare* | PANCA | 18 | 3.8 | 5.2 | 4.6 | 13.6 |
| | 5 | *Solanum emulans* | SOLPT | 5 | 1.0 | 2.3 | 9.1 | 12.5 |

Although field and forage crops exhibit greater species richness, horticultural crops show the highest Shannon diversity index (H') (**Figure 4**), which accounts for both species richness and evenness. This is likely due to a higher presence of weed species resulting from limited weed control options and longer production cycles in some horticultural corps (i.e. cranberry, blueberry, etc.).

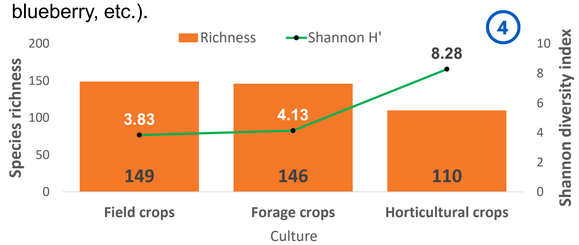


Figure 4. Richness and Shannon diversity index (H') in Centre-du-Québec by crop type.

Cranberry fields, characteristic of the CDQ region, exhibited a species richness of 44 and a Shannon diversity index of 6.76. The specific production conditions of cranberry (e.g., sandy and acidic soils, flooding during harvest, etc.) may contribute to a distinct weed flora compared to other cropping systems (**Figure 5**).




Figure 5. Word cloud of main weed species in cranberry fields (n = 18) in Centre-du-Québec. The colors indicate whether weeds are found exclusively in cranberry (red) or in cranberry and other horticultural crops (green). Word size reflects relative abundance.

According to the weed community dissimilarity (Bray-Curtis) (**Figure 6**), weed communities tend to be similar among crop type within a regions, but differ more between regions (CDQ vs Montérégie) : Horticultural crops and forage crops in CDQ have the greater dissimilarities with all three crop types in the Montérégie (0.41-0.45). In comparison, field crops were more similar across regions (0.30).

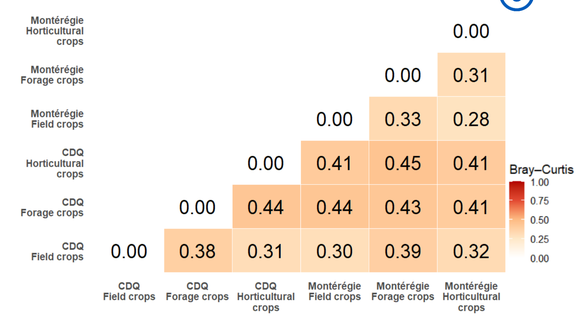


Figure 6. Bray-Curtis dissimilarity index, based on the relative abundance (RA) by crop type and région: Montérégie (2021-2023) vs. Centre-du-Québec (2024-2025).

## Conclusions

In Centre-du-Québec, hairy crabgrass (DIGSA), smooth crabgrass (DIGIS), and common dandelion (TAROF) were the species with the highest relative abundance across all crop types.

Horticultural crops of CDQ showed a higher diversity index. While the Bray-Curtis analysis showed field crops being most similar between regions (CDQ vs Montérégie).

These findings provide a snapshot of CDQ weed communities and highlight crop-specific patterns, offering insights for targeted management and future studies on cropping systems, soil, and climate effects.

## References

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