



Herbicide-resistant kochia increases rapidly in Manitoba

CATEGORY [weeds](#) | Dec 7, 2021

A randomized-stratified survey of 315 sites in Manitoba found that, overall, 58% of the kochia populations tested were glyphosate-resistant, while 1% were dicamba-resistant. There was a rapid increase in glyphosate-resistant kochia over a five-year time frame, and the survey also confirms the first cases of kochia in Manitoba with dicamba resistance alone and in combination with glyphosate resistance.

Kochia resistant to glyphosate quickly spread in Alberta, and confirmation of dicamba-resistant kochia in Alberta and Saskatchewan is causing concern among Manitoba growers who grow soybean with stacked trait resistance with both of these herbicides

This study was conducted to determine whether the frequency of glyphosate resistance had increased among kochia populations five years after the initial confirmation in Manitoba, and also to determine whether dicamba-resistant kochia was present.

A randomized-stratified survey of 315 sites in Manitoba was conducted in the fall of 2018, five years after the preceding survey. Kochia populations from 300 of the 315 sites contained enough viable

seed for resistance testing. Sites were randomly predetermined and visited post-harvest during a 3 week period in early October.

Kochia populations were screened for resistance to glyphosate and dicamba in the greenhouse at the AAFC Lethbridge Research and Development Centre. The populations were categorized as susceptible (0% resistance incidence), or low (1-20%), moderate (21-60%), or high resistance (61-100%).

Rapid increase in glyphosate resistance

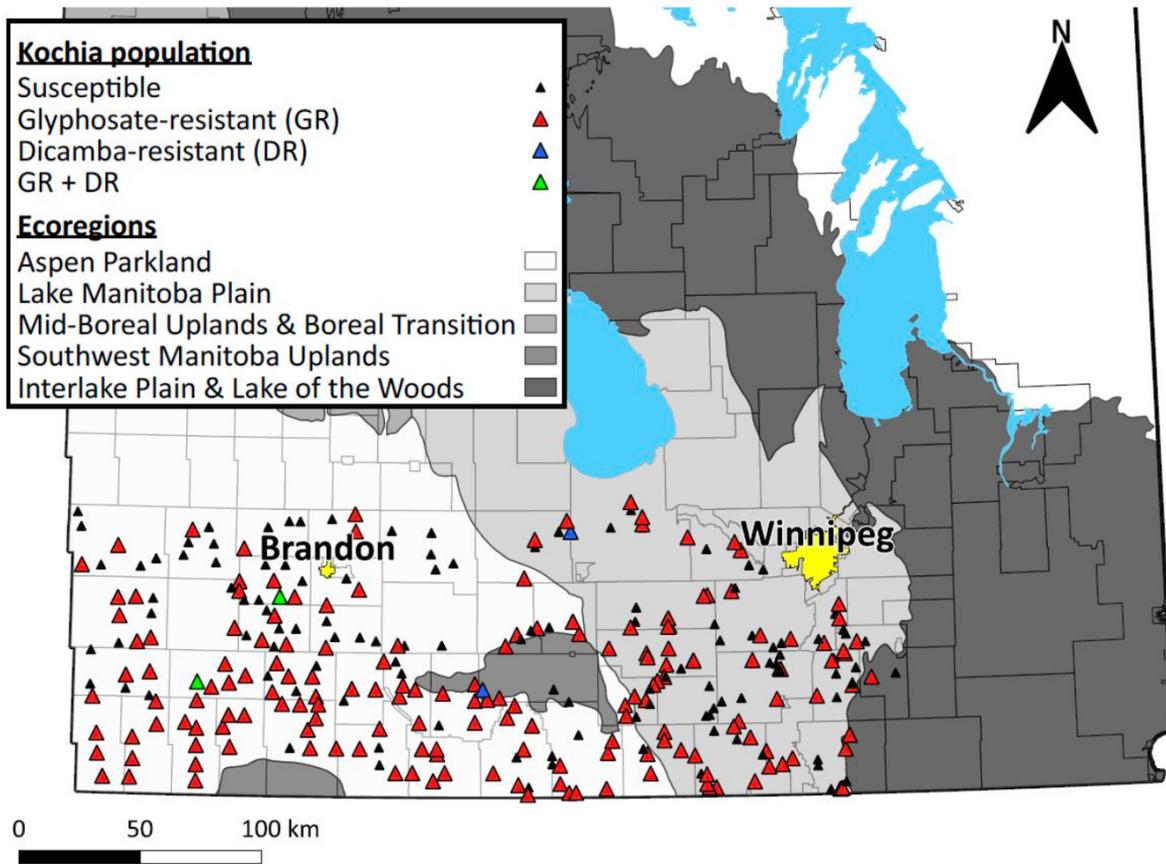
The 2018 survey documented the rapid increase of glyphosate resistance in Manitoba. In 2013, only 1% (2/283) of the kochia populations sampled were resistant to glyphosate. The 2018 survey found 58% of the kochia populations (175/300) containing a glyphosate-resistant biotype. Of the 175 glyphosate-resistant populations in 2018, 44% exhibited low resistance, while 38% exhibited moderate resistance, and 18% displayed high resistance.

Populations exhibiting moderate to high resistance are not likely controlled by glyphosate alone. Low resistance populations often go undetected, but these low resistance populations are being selected for resistance and predict future control problems.

The greatest frequency of glyphosate-resistant kochia was found in glyphosate-resistant soybean (78% of kochia populations were glyphosate-resistant) and corn (70%) crops, followed by other oilseeds (67%), canola (52%), cereals (49%), ruderal areas (29%), and pulse crops (20%). These results indicate that glyphosate-resistant soybean and corn contribute the greatest selection pressure for glyphosate-resistant kochia.

The rapid increase in frequency of glyphosate resistance in kochia between 2013 and 2018 strongly suggests that dispersal of herbicide-resistant biotypes through seed or pollen spread are the dominant factors in the spread of glyphosate resistant kochia. In-crop selection pressure from glyphosate use was also a contributing factor.

Glyphosate-resistant (GR), dicamba-resistant (DR), and multiple herbicide-resistant (GR+DR) kochia in Manitoba in 2018.



Source: Geddes et al. 2021.

Dicamba-resistant kochia was also confirmed

Dicamba (Group 4) resistance was found in 4 of 300 populations (1%) tested. Two of these dicamba-resistant kochia populations were also glyphosate-resistant. Even though Group 2 ALS inhibitor resistance was not tested, past surveys indicate that all kochia populations in western Canada are ALS inhibitor-resistant. This indicates that triple herbicide-resistant kochia has been present in Manitoba since 2018.

All dicamba-resistant populations exhibited low resistance (3-11% incidence), and were not likely showing loss of herbicidal control in the field. However, these populations were being selected for or developing higher levels of resistance that will become tolerant to dicamba.

The survey shows that agronomists and farmers should be aware of the potential risk for selection of glyphosate- and dicamba-resistant kochia biotypes in stacked trait glyphosate- and dicamba-resistant soybeans. In these production systems, a greater integration of non-chemical weed control tools will be necessary. This should focus on reducing kochia seed production and return to the soil seedbank to take advantage of the short-lived seedbank persistence of kochia. A community-based strategy will be required to mitigate reinfestation and movement of the tumbleweed between fields.

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Dr. Charles M. Geddes, Ms. Mattea M. Pittman, Dr. Robert H. Gulden, Mrs. Tammy Jones, Mrs. Julia Y. Leeson, Dr. Shaun M. Sharpe, Mr. Scott W. Shirriff, and Prof. Hugh Beckie. Rapid increase in glyphosate resistance and confirmation of dicamba-resistant kochia (*Bassia scoparia*) in Manitoba. *Canadian Journal of Plant Science*. **Just-IN** <https://doi.org/10.1139/CJPS-2021-0169>

Photo by Jeremy Boychyn

