



## Kochia persists in aerial seedbanks

CATEGORY [weeds](#) | June 22, 2023

Overwintering kochia plants, 7 to 8 months after plant senescence the previous fall, retained an estimated  $2091 \pm 297$  seeds per plant in May. This represented an average estimated at  $18.5 \pm 1.9\%$  of total seed production.

[Research](#) has shown that kochia has a relatively short longevity of 1 to 2 years in the soil seedbank. However, even though management strategies have tried to reduce the seedbank, kochia populations continue to increase in relative abundance on the Prairies.

A source of kochia seed that contributes to the seedbank is the plant canopy, or aerial seedbank. This adaptation, called serotiny, means that the aerial seedbank helps the population persist because these seeds avoid decay, predation and lethal germination in the soil.

To investigate serotiny in kochia, a study was conducted with the objectives to determine whether kochia plants retain seed in aerial seedbanks, and to quantify the number of viable seeds retained on kochia plants, 7 to 8 months after maturity and during planting of crops the subsequent spring.

A survey was conducted in 4 counties in southern Alberta in May 2022 to evaluate over-winter seed retention on kochia plants. A single kochia plant was collected at 109 sites in the counties of Lethbridge (27 sites), Taber (18 sites), Warner (30 sites), and Forty Mile (34 sites).

The sampled plants were characterized as either still rooted in the soil, or detached as a tumbleweed. They were also characterized as either full plants, or partial plants that were missing branches or had been cut off during harvest operations.

Each plant was hand-threshed for seeds that had overwintered on the kochia plant. The seed sample was weighed and then planted in greenhouse flats. The number of emerging kochia seedlings were counted and removed weekly for 4 weeks. These seedlings were considered to represent viable seeds, and a back-calculation was conducted to estimate the percentage of viable seeds that were retained on each plant based on a harvest index.

### **Aerial seedbank contributes to population survival**

Kochia seed survival on the over-wintered kochia plants was considerable. There was a wide range among samples from 15 to 24,041 seeds per plant, estimated at 0.1% to 86.5% of total seed production. Overall, kochia plants retained  $2091 \pm 297$  seeds/plant or an estimated  $18.5 \pm 1.9\%$  of total seed production on average, 7 to 8 months after plant senescence.

Tumbleweed samples had about one-half the seeds, an average of 1150 seeds/plant, compared to plants that were still rooted into the soil. This is likely because of seed shed while the plant tumbled across the landscape. Other [research](#) has found that kochia tumbleweeds lose about 90% of their seed within 1 km of travel from their origin, but about 10% of seed were still retained beyond this distance.

With a short soil seedbank longevity of 1 to 2 years, kochia seed serotiny in the aerial seedbank provides the weed species with another mechanism for population persistence. It also suggests that disturbance from seeding could dislodge seeds from the aerial seedbank thereby seeding kochia with the crop. This could help the species avoid control during the pre-plant burndown herbicide window.

Further research and understanding of the contribution of aerial and soil seedbanks to kochia persistence will help to develop management strategies to control the overall seedbank. Strategies such as mowing weed escapes in the summer prior to seed set could help reduce the seedbank populations.

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Charles M. Geddes and Mattea M. Pittman. 2022. Serotiny facilitates kochia (*Bassia scoparia*) persistence via aerial seedbanks. *Canadian Journal of Plant Science*. **103**(3): 324-328.

<https://doi.org/10.1139/cjps-2022-0178>

Related articles:

Beckie, H.J., Blackshaw, R.E., Leeson, J.Y., Stahlman, P.W., Gaines, T.A., and Johnson, R.N. 2018. Seedbank persistence, germination and early growth of glyphosate-resistant *Kochia scoparia*. *Weed Res.* **58**: 177-187. <http://dx.doi.org/10.1111/wre.12294>

Beckie, H.J., Blackshaw, R.E., Hall, L.M., and Johnson, E.N. 2016. Pollen- and seed-mediated gene flow in kochia (*Kochia scoparia*). *Weed Sci.* **64**: 624-633. <http://dx.doi.org/10.1614/WS-D-16-00038.1>

Photo by Charles Geddes