



Impact of Rye Cover Crop on Pigweed Seed Viability

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Introduction

- Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus tuberculatus*) are two of the most problematic pigweed species in the north central region (Schwartz *et al.*, 2016).

- Cereal rye (*Secale cereale*) is an important cover crop in the Great Plains due to its nitrogen uptake ability and ability to prevent erosion.

Objective:

To identify the viability of palmer amaranth and waterhemp seeds grown in rye cover cropping systems

Materials and Methods

- Wire mesh packets were filled with 50 seeds each and buried in seven different sites across Indiana, Kansas, Missouri, North Dakota, and Wisconsin in or without the presence of a cover crop.

- Seeds were cleaned, separated into petri dishes, and germinated in a controlled growth chamber (Figure 1).

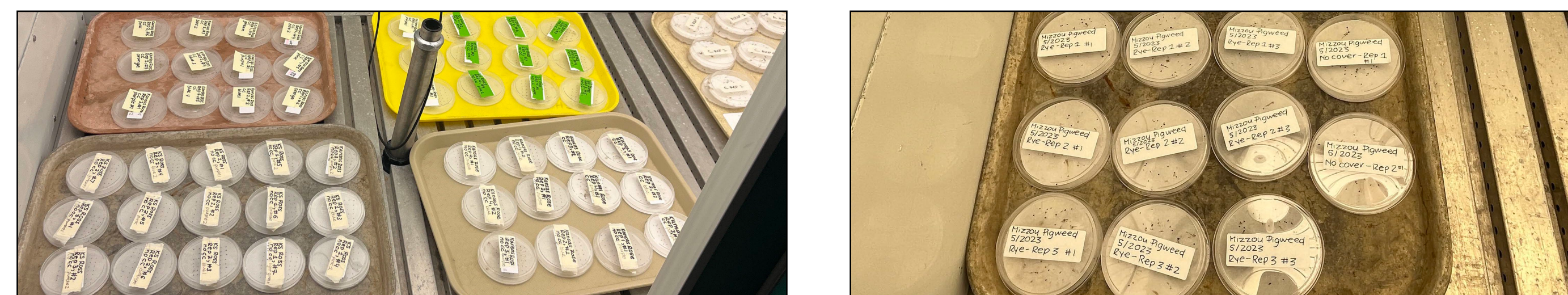


Figure 1. The growth chamber was set to 30°C/20°C and 14/10-hour day/night conditions (Guo *et al.*, 2003)

- Dishes with no germination for more than 3 days were submitted to a squish test under a microscope. Full, white seed coatings are *viable* and empty or brown seed coatings are *nonviable* (Figure 2).

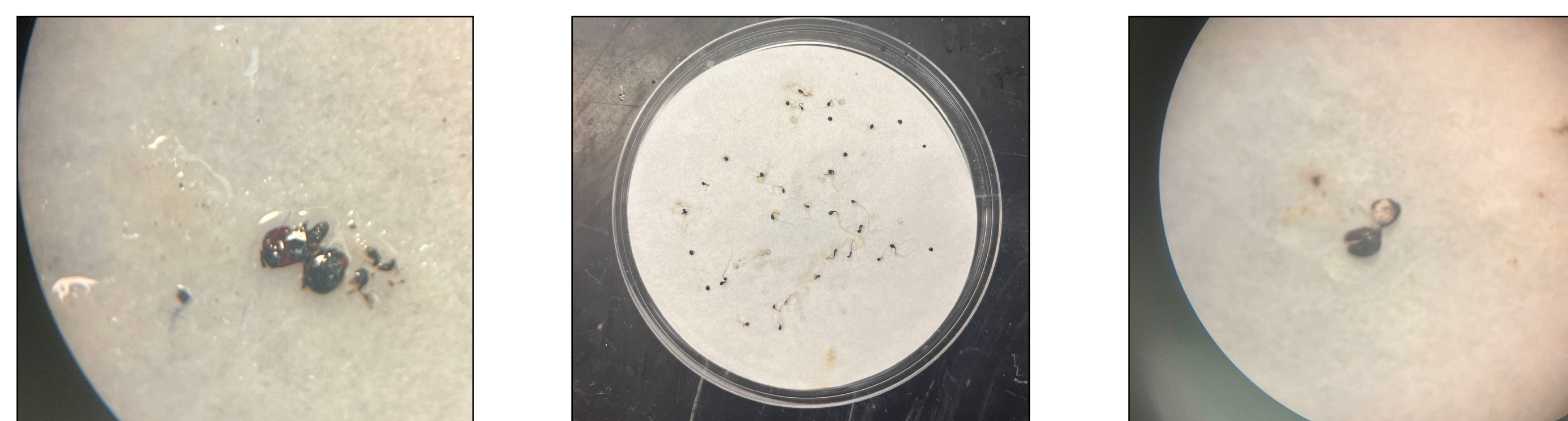


Figure 2. Photos show evidence of nonviable, germinated, and viable seeds (from left to right)

Results

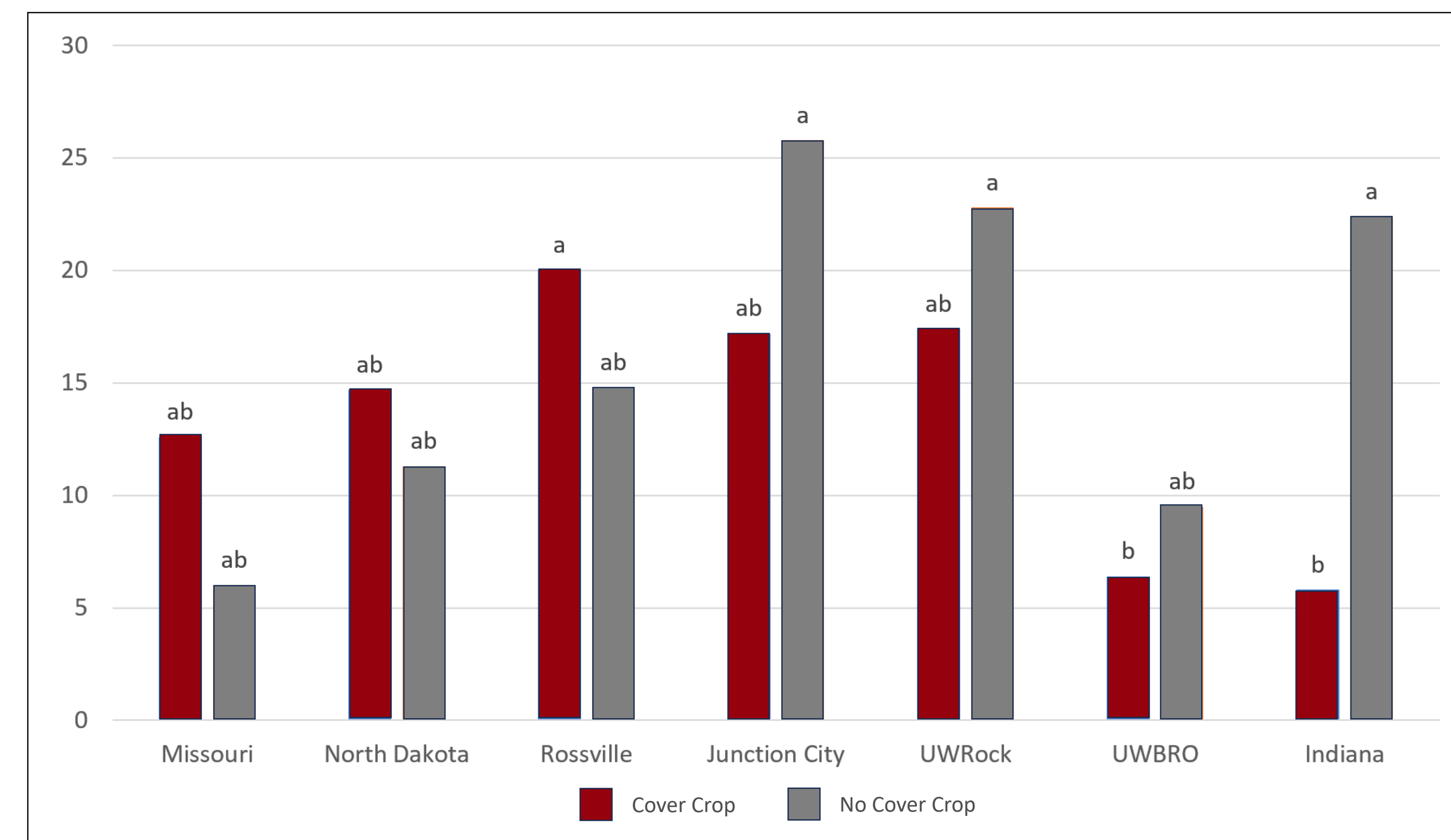


Figure 3. Pigweed seed viability for each treatment per location

- There were more **viable pigweed seeds** in **cover crop systems** from Missouri, North Dakota, and Rossville locations.
- There were more **viable pigweed seeds** in **no cover crop systems** from Junction City, UWRock, UWBRO, and Indiana locations.

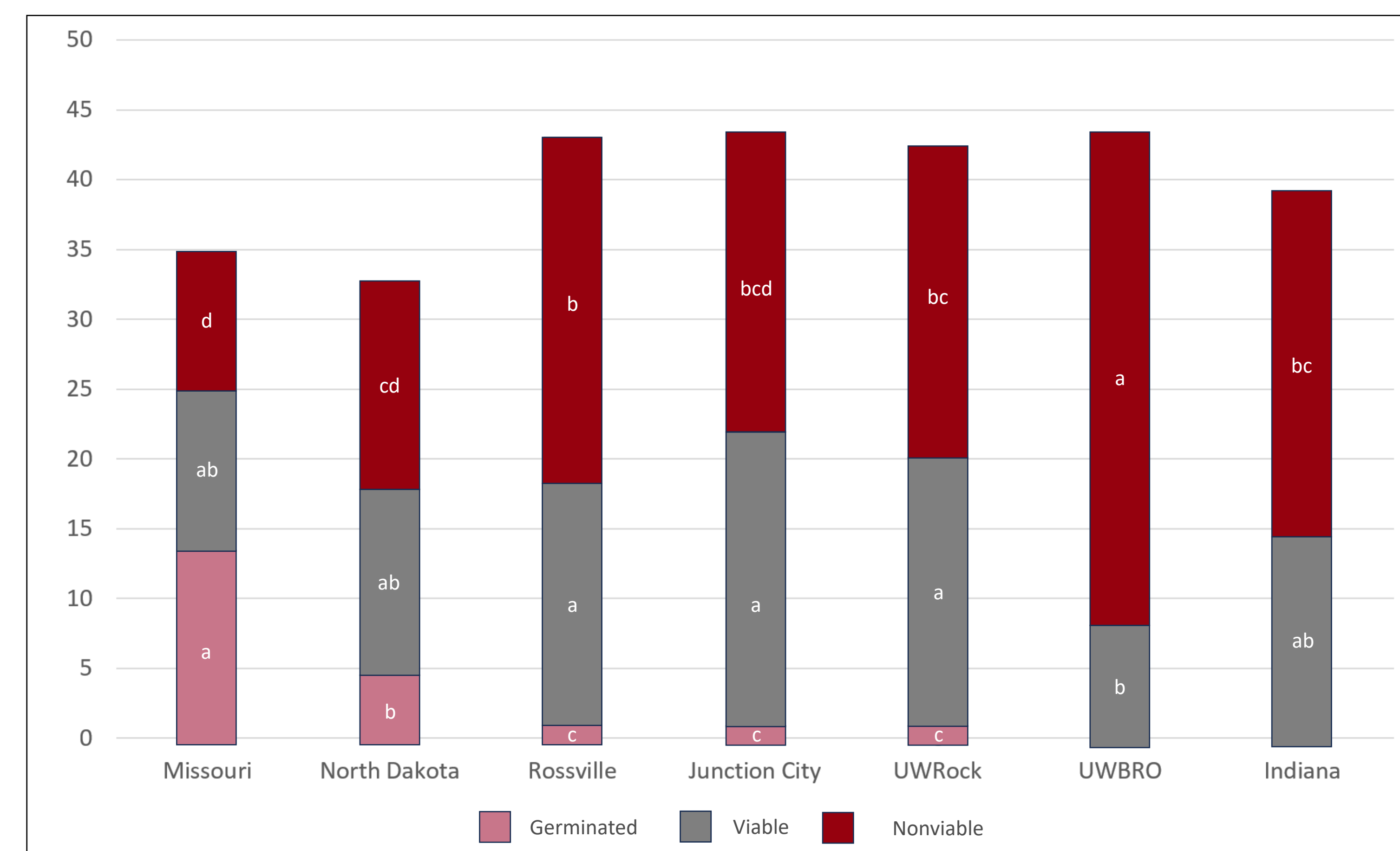


Figure 4. Pigweed seed germination and viability for cover cropping systems

- There were more **dormant** seeds (viable and nonviable) than **germinated** seeds across all locations.
- There were significantly more **nonviable** than viable or germinated seeds at the UWBRO location.

Discussion and Conclusion

Result 1 (Figure 3)

- Missouri, North Dakota, and Rossville locations showed a **less favorable result** in the use of cover crop systems to prevent pigweed germination.
- Junction City, UWRock, UWBRO, and Indiana showed a **more favorable result** in the use of cover crop systems to prevent pigweed germination.

Result 2 (Figure 4)

- Seeds showed more **dormancy** than germination which suggests a slower growth of weeds in the presence of a cover crop
- The use of cover crops had **no significant difference** on the viability of pigweed seeds.

Conclusion:

Palmer amaranth and waterhemp seeds grown in rye cover cropping systems show no significant change in viability

References

- Schwartz, *et al.*, *Journal of Weed Technology* 30.1 (2016).
- Guo, *et al.*, *Journal of Weed Science* 51.6 (2003).

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