



Developing methods to test the effects of road dust on plant reproduction

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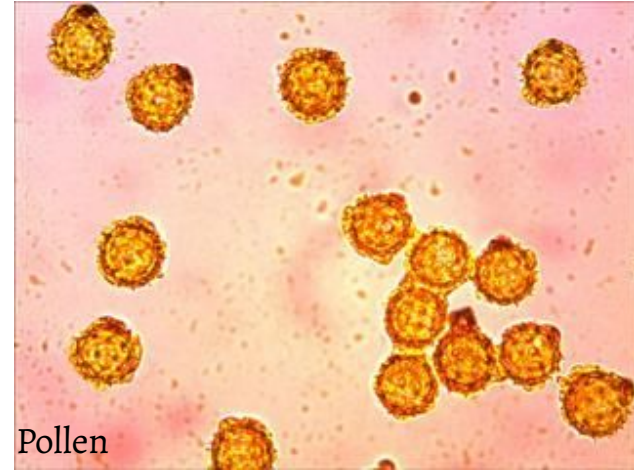
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Dust and pollen have a lot in common.

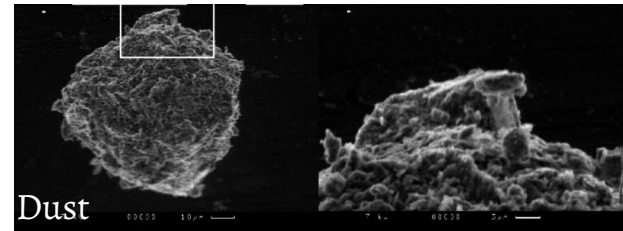
They are a similar size and shape, and both are seasonally abundant in prairie remnants that persist along gravel roadsides.

Dust that lands on plant stigmas can interfere with plant reproduction.

Agricultural practices, development, and climate change are all expected to **increase dust** in tallgrass prairies.



Amanda Gallinat



McCall et al. 2008

Tallgrass prairies are likely to become dustier.

However, **the effects of dust on reproduction on tallgrass prairie plants are unknown.** Previous studies on dust interference with plant reproduction have occurred in arid landscapes, where plants may be better adapted to dust than in the tallgrass prairie.



We developed methods to assess the prevalence of dust in roadside prairie remnants and an experiment to test the effects of dust on reproduction of the narrow-leaved purple coneflower, *Echinacea angustifolia*.

Assessing dust prevalence in roadside prairies

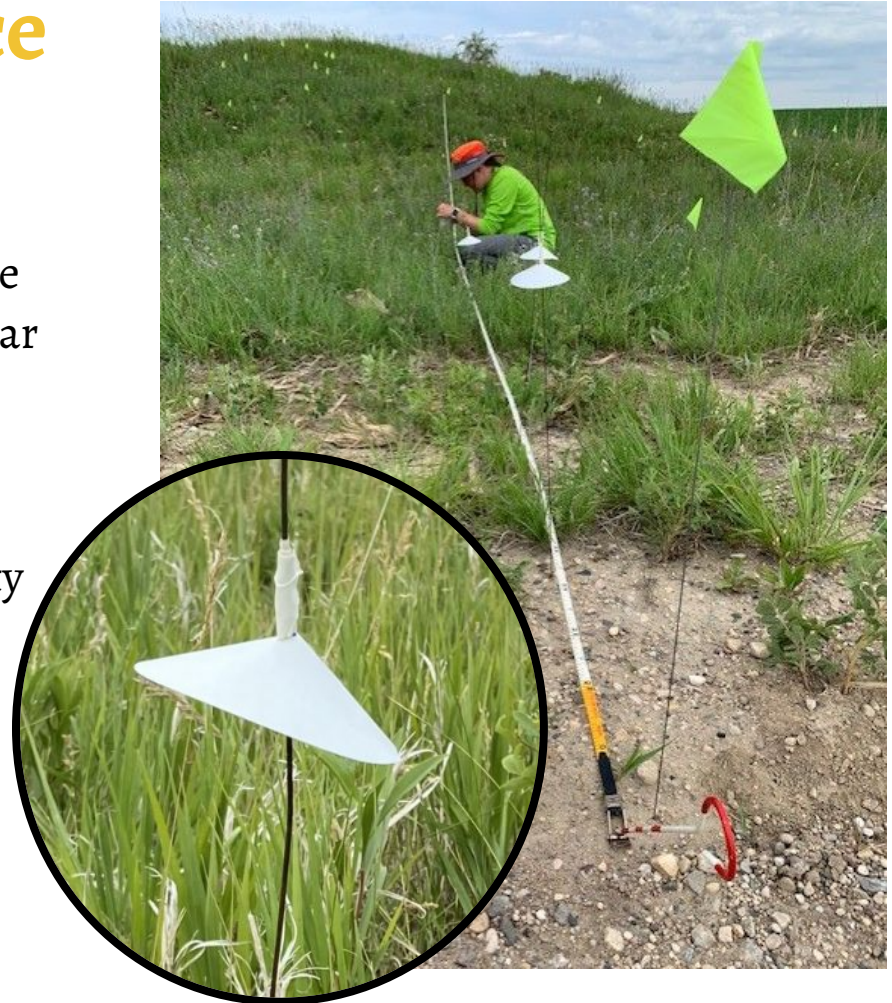
We designed filter paper “dust traps”, which we mounted on flag pins in transects perpendicular to gravel roadsides.

Pros and cons:

Easy to set up and collect, but some uncertainty about how well the filter paper captured dust

Alternative designs:

- Sticky paper (notecards with petroleum jelly)
- Other ideas? Let us know!



Experimentally testing the effects of dust

In a common garden, we selected 40 heads and randomly assigned them to **dust addition** (n=20) or a **control** group (n=20).

We sifted **0.5mL of dust onto each dust addition head using a mesh sieve**. We repeated this 4-5 times per plant, depending on duration of flowering.

Preliminary results based on style shriveling (a proxy for seed set) showed **no difference** in reproductive success between the treatment groups.

We plan to refine our methods next summer by using a **finer mesh** sieve, that will better replicate the particles generated on gravel roadsides.



Next Steps

Forthcoming results: we are processing the seedheads from our experimental study now and will evaluate seed set soon. However, we note that 2021 was an exceptionally dry year, which may have affected our results. Repeating this study will help clarify the effects of dust.

We plan to implement these methods on a larger scale during summer 2022.

Questions and ideas for future study:

Does the amount of dust matter? Test a gradient of dust addition treatments.

When and how does dust interfere? Add dust treatments before and after a hand-pollinating styles.

How does dust affect photosynthesis? Measure dust on leaves and photosynthetic capacity.

What effect does the weather have? Simulate rain/drought with water and rain-out shelters.

Acknowledgements



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Please reach out if you have any suggestions or questions. We would be glad to hear from you!

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