Infiltration Rates at Different Stages of Prairie Restoration
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Introduction
Infiltration rate (IR) is defined as the volume of fluid that passes through or into another substance per unit of time. Infiltration rates in soils depend on many factors such as clast size, porosity, permeability, vegetation cover, microtopography, precipitation intensity, and hill-slope gradient and length. Plants increase soil volume for infiltration via their roots. Roots also help develop soil structure and increase aeration for microorganisms which "serve as pathways for preferential flow". This project examines how native, restored prairie plants impact infiltration rates.

Methods:
1. Mini Disk Infiltrometer set to 2 cm suction rate, recorded every 30 seconds for 5 minutes
2. 14-15 infiltration measurements and soil samples collected per prairie
3. Oven dried soil at 105°C for 24 hours then ground up via mortar and pestle and sieved for
4. Ashton 6-acre impaired prairie has been sprayed with a pesticide, with no reseeding yet
5. Used ArcMap 10.7 to visualize prairie location slopes and generate random sample sites
6. Infiltration rates calculated via Decagon Devices Microsoft Excel spreadsheet provided

Data:
1. Morton Handcart Park remnant prairie is a native landscape to Johnson County, Iowa
2. Ashton 1-acre restored prairie is on its 2nd year of restoration with reseeded native prairie species
3. Ashton 6-acre impaired prairie has been sprayed with a pesticide, with no reseeding yet
4. 14-15 infiltration measurements and soil samples collected per prairie
5. 43 total infiltration measurements and soil samples were unable to be collected and analyzed due to field complications. A double-ring infiltrometer was originally planned for infiltration measurements, however, the Mini Disk Infiltrometer was more efficient due to time constraints
6. Due to time constraints, we were unable to conduct soil carbon analysis and would highly recommend doing so in future projects

Research Question and Hypothesis
H0: There is no difference in infiltration rates between the restored prairies and the impaired prairie.
H1: There is a difference in infiltration rates between the restored prairies and the impaired prairie.
- Independent variable: Prairie restoration age (years)
- Dependent variable: Infiltration rate (cm/s)

Results
ANOVA of Infiltration (cm/s)

<table>
<thead>
<tr>
<th></th>
<th>Remnant</th>
<th>Restored</th>
<th>Impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean IR (cm/s)</td>
<td>1.01E-04</td>
<td>1.14E-05</td>
<td>4.09E-05</td>
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</tbody>
</table>

ANOVA of Sediment Clast Sizes

<table>
<thead>
<tr>
<th></th>
<th>Remnant</th>
<th>Restored</th>
<th>Impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean % silt or finer clasts</td>
<td>23.572961</td>
<td>51.44785</td>
<td>35.93541</td>
</tr>
</tbody>
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Discussion
While we fail to reject the null hypothesis that there is no difference in IRs between stages of prairie restoration, it is interesting to find a significant difference in sediment clast sizes between prairie locations.
Some potential impacts on IRs in this study are differences in sediment clast sizes, weather conditions, slight variations in slope per sample site, and soil carbon content.
Due to time constraints, we were unable to conduct soil carbon analysis and would highly recommend doing so in future projects.

Data and Methodology

References

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