

Investigating Erosion Reduction Rate under the Perennial Groundcover(PGC) System using Rainfall Simulation

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What have we learned?

- PGC and grass generated statistically significantly lower runoff volume and sediment load compared to corn on residue, continuous corn, and bare land.
- We expected bare land to have the most runoff, but it did not - we attribute this to the runoff collection trough becoming clogged with sediment during rainfall simulation, impeding free flow of runoff.
- We found no consistent patterns in the infiltration rate among different cover; further work on long-term PGC plots will be required in order to capture effects of soil structure differences over time.

Rationale

- Generation and collection of data that will enhance modeling of ecosystem services in the PGC system.
- Rainfall simulation on different treatments will facilitate comparison of PGC system to other land cover / cropping systems.

Introduction

- Perennial Groundcover (PGC) ensures a longer period of soil underneath vegetation which may increase infiltration and lower runoff and erosion.
- Observed data on the potential reduction in runoff and soil loss under PGC is lacking.
- Rainfall simulation is an established method of monitoring soil erosion and runoff on plots.
- Simulating rainfall on the plot with PGC will help us know how the system responds to rainfall event.

Methodology

- On the Sorenson Research Farm near Ames, we set up five treatments (shown) with 3 replicates each.
- We measured soil moisture content using a neutron probe
- Using the rainfall simulator, we watered each of the plots until it reached field capacity(FC).
- After FC, we continue to rain the plot while we collected runoff for 30 minutes.
- Runoff samples were taken to the lab to measure the sediment load.
- We used Cornell infiltrometer to measure the rate of infiltration for each plot.

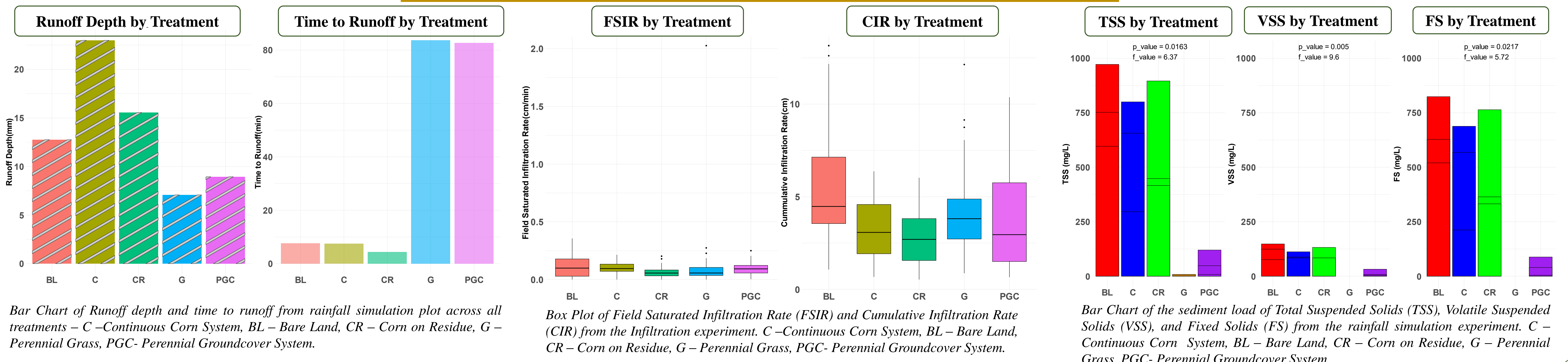
Study Area

- Study Area:** Sorenson Research Farm near Ames, IA
- Soil Series:** Webster Clay loam (64%) Clarion Loam (36%)
- Slope:** 1% - 2%
- Average Volumetric Moisture Content before start of simulation:** 26.5%

Treatments



Results



Future Work

- Use field data to evaluate the performance of two models we are adopting in effort to simulate PGC system: the Environmental Policy Integrated Climate (EPIC), and Agricultural Production System Simulator (APSIM).
- Using rainfall simulation, compare runoff and erosion rates in different PGC cover, specifically Kentucky Bluegrass and Radix Poa Bulbosa.



OBJECTIVE 4: ECOSYSTEM SERVICES AND MODELING

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