

Management Intensive Grazing of Cover Crops for Soil Health and Profitability

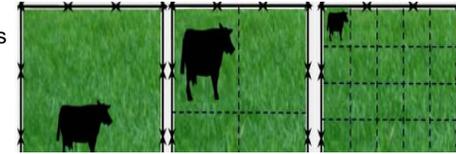


Divya Pant¹, Sjoerd Duiker²

¹Master's student in agronomy, ²Soil management Specialist, Department of Plant Science



MIGCC presents an opportunity to enhance economic return, maximize land use efficiency, diversify agricultural production systems and year-round utilization of resources on livestock farms that currently plant cover crops for nutrient management or soil health only. But grazing cover crops is not widely practiced in Northeastern US because of concerns with compaction, that could negatively impact following crop yields and increase sediment and nutrient runoff. The study evaluates the effects of grazing cover crops planted after small grain or corn silage harvest on soil physical and biological properties, forage production, and economic returns on four farms located in Adams and Franklin counties.



Continuous Vs Management intensive grazing

Hypothesis

- ❖ Soil biological and physical properties will not be negatively impacted by MIG of cover crops after corn silage and small grain harvest in no-tillage systems.
- ❖ Soil biological, physical properties and economics under grazed cover crop fields will improve respective to double cropped soybeans after small grain harvest

Studied two scenario

- ❖ Grazed Cover after Small Grain vs Double-Cropped Soybeans
- ❖ Grazed cover crop vs non-grazed cover crop after corn silage

Treatment:

1. Ungrazed cover crop
2. Recently grazed cover crop
3. 2 weeks ago grazed cover crop
4. Double Crop Soybean



Research Method

- ❖ Soil sampling depth: 0-10 cm
- ❖ Experimental conditions: Treated as completely randomized design
- ❖ Consideration: The spatial variability within the sampling area was autocorrelated.
- ❖ Ungrazed, recently grazed and 2 weeks ago grazed cover crop fields: Adjacent to each other.
- ❖ Variability: Sampled within each treatment to get a measure of variability that was replicated four times called Pseudo replicates
- ❖ Similar soil type and slope under each treatment: Pseudo replication as a viable approach to conduct the study on the farm.
- ❖ One way ANOVA analysis: Considered significant at $p \leq 0.05$

Results

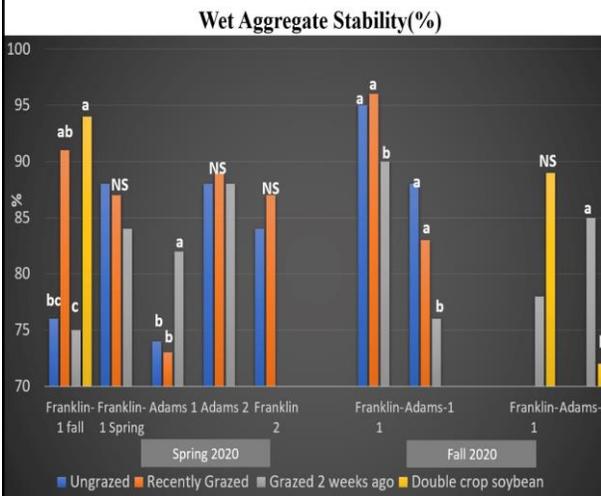


Table 1. Wet aggregate stability (0-10 cm depth) as influenced by grazing cover crops on 4 southern Pennsylvania farms in 2019/20.

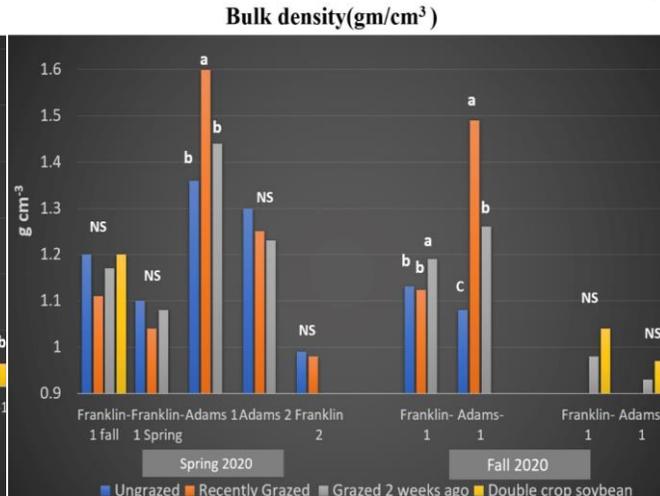


Table 2. Bulk density (g cm^{-3}) as influenced by grazing cover crops on 4 southern Pennsylvania farms in 2019/20.

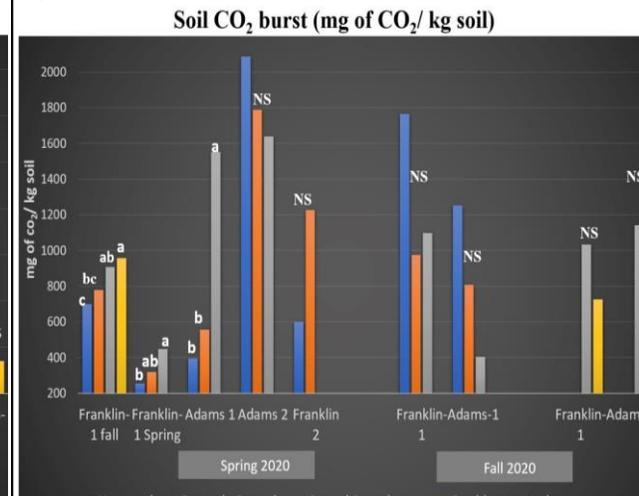


Table 3. Soil respiration measured as CO_2 burst ($\text{mg of CO}_2/\text{kg soil}$) as influenced by grazing cover crops on 4 southern Pennsylvania farms in 2019/20.

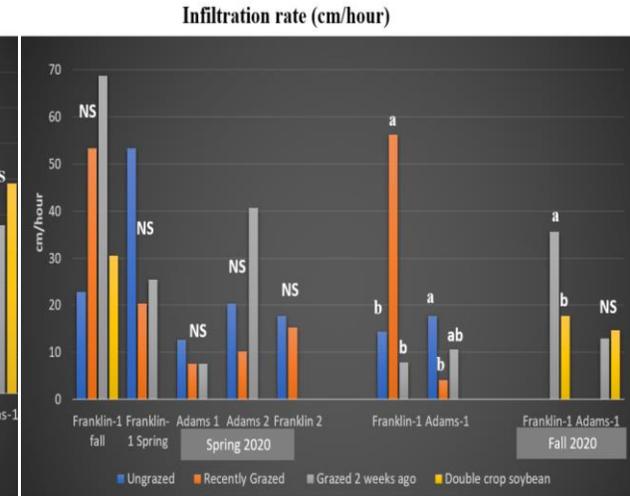


Table 4. Infiltration rate (cm/hour) as influenced by grazing cover crops on 4 southern Pennsylvania farms in 2019/20.

- ❖ Cover crops provided 1416-2091 kg/ha grazed DM & 1522-6664 kg/ha(>50%) cover crop residue for soil function.
- ❖ Grazing increased bulk density on one farm observed right after grazing only
- ❖ Grazing did never reduce aggregate stability and sometimes improved it a few weeks after grazing
- ❖ Grazing sometimes increased CO_2 burst – may indicate soil health benefit of grazing
- ❖ Grazing didn't significantly affect Infiltration rate but it seemed to be reduced numerically sometimes especially day after grazing

Conclusion

Under MIGCC, where is grazing is managed with take half, leave half principal, most soil properties were not negatively impacted except for bulk density which increased immediately after grazing. Infact in some cases soil respiration and aggregate stability were found to improve two weeks after grazing. Therefore, we can conclude grazing if managed properly can provide additional feed, income and protection to soil health.