

Abstract: NeSA202100poster-07: Greenhouse gas emission in cover crop-forage system

Time: 12:00-1:00 PM

Presenter:

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Integrating cover crops on a forage production system could provide soil health and environmental benefits by offsetting greenhouse gas (GHG) emissions and increasing soil organic carbon. A study was conducted during 2018–20 to determine the cover crop effects on CO₂ and N₂O emissions in forage corn-sorghum rotation. The study had a randomized complete block design with the split-plot arrangement of four cover crop treatments within each phase of a corn-sorghum rotation. The cover crop treatments were Fallow (no cover crops), Mix-1 (G, B, L), Mix-2 (G, B), and Mix-3 (G, L) where grasses (G) comprised annual ryegrass and winter triticale, legumes (L) comprised berseem clover and Austrian winter pea, and brassicas (B) comprised daikon radish and turnip. The GHG emissions were monitored weekly on both cover crops and forage crop phases of crop rotation. The CO₂ fluxes showed the consistent trend of elevated emissions during the crop (main crop and cover crops) growth period in both years, indicating the influence of root respiration. The N₂O fluxes were inconsistent in the trend and showed negative fluxes, mostly during cover crop phases. GHG fluxes (CO₂ and N₂O) averaged higher during the main crop phases than cover crop/fallow phases, irrespective of cover cropping treatments. The study suggests that the cover crop integration increases GHGs, specifically the CO₂ fluxes, through root respiration. Negative fluxes of N₂O during the cover crop phase could offset the net CO₂-C emissions overall effect neutral or negative global warming potential in cover cropped systems.

Keywords: cover crop mix, fallow, forage corn, forage sorghum, greenhouse gas