Stacked Edge of the Field Conservation Practices
Woodchip Bioreactor & Saturated Riparian Buffer

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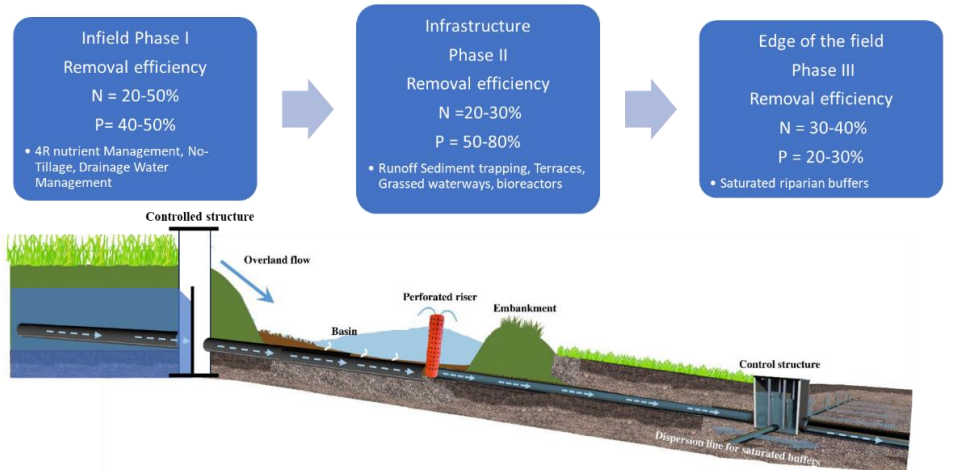
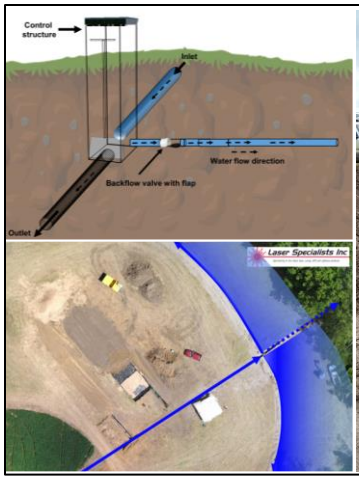
A 5-year research on stacked edge-of-the-field (EOF) conservation practices including a woodchip bioreactor (WBR) and saturated riparian buffer (SRB) was conducted at the Grace Greenley Farm, University of Missouri (Singh et al., 2024). The additive effect of stacked conservation practices is unknown; therefore, this research evaluated three conservation practices including drainage water management (DWM), WRB, and SRB; and monitored the performance of these practices in the claypan-dominated region of Missouri.



Previous research has reported over a 70% reduction in nitrate-N loss using DWM (Nash et al., 2015). Nutrient export reductions of WBR and SRB were determined for precipitation events that were categorized as low (<0.5 in), intermediate (0.5-1.0 in), high (1.0-2.0 in), and very high (>2 in). Over the five seasons, nitrate-N export was reduced 88% at the WBR outlet and 78% at SRB outlet when used in a stacked series configuration. The efficacy of EOF was affected by the intensity of precipitation events. The low and intermediate-intensity precipitation events generated 67% of the total discharge from the subsurface drainage system which accounted for 74% of the influent nitrate-N. During low and intermediate-intensity precipitation events, discharge was reduced by 58 to 65%, nitrate-N loss was reduced by 49 to 88%, and total-P loss was reduced by 65 to 73% by using the stacked practice of WBR and SRB. During high and very high-intensity precipitation events only nitrate-N export was reduced 61 to 66%. The cumulative effect of stacked edge-of-the-field practices and their performance during different precipitation events should be considered when managing conservation practice-based cropping systems.



Further Reading and References

Christianson, L.E. et al. 2021. Effectiveness of denitrifying bioreactors on water pollutant reduction from agricultural areas. Trans. ASABE. 64(2), 641-658.

Janes, D. et al. 2018. Questions and Answers about Saturated Buffers for the Midwest. Available online: https://www.extension.purdue.edu/extmedia/ABE/ABE-160.pdf.

Nash, P. R., Nelson, K. A., Motavalli, P. P., Nathan, M., & Dudenhoeffer, C. (2015). Reducing phosphorus loss in tile water with managed drainage in a claypan soil. Journal of environmental quality, 44(2), 585-593.

Singh, G. et al. 2024. Drainage Water Management, Woodchip Bioreactor, and Saturated Riparian Buffer as Stacked Conservation Practices for Improving Crop Yields and Water Quality. Environmental Technology & Innovation, 103779.