Efficacy of Vegetative Filter Strips to Reduce Phosphorous (P) in Runoff From Dairy Waste Application Fields

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Content
- Background Information
- Objective
- Theory
- Materials and Method
- Result and Discussion
- Conclusion

Background Information
- Highly concentrated Dairy operation
- Runoff of pollutants such as P from the Waste application fields (WAFs) is a major environmental concern
- Impaired segments of North Bosque River

Environmental Concern
- Water quality degradation due to:
  - High Phosphorous content
  - Accelerated Eutrophication
  - Depletion of DO level

Objectives
- To select the most effective treatment among Sunflower, Coastal Bermuda (CB), Cool Season Grass (CSG) and Warm Season Grass (WSG) in reducing runoff P
- To recommend a combination of both warm and cool season treatments for year round better uptake of P from soil

P Extraction by the Warm Season Grasses

Ideal Soil P extraction
Average soil P extraction

Month
January
July
December
P Extraction by Cool Season Grasses

Ideal Soil P extraction

Average soil P Extraction

Cool Mass Extraction

Month

January
June
December

Combined Effect of P Extraction by Warm and Cool Season Grasses

Ideal Soil P Extraction

P Extraction by Cool Or Warm Season Grasses

Month

January
June
December

Materials and Methods

VFS Plots

Creek

Warm season forb (WSF) - Sunflower

Coastal Bermuda (CB)

VFS Treatments

- Cool Season Grass (CSG) - Wild Rye
- Warm Season Grass (WSG) - Indian Grass, Switch Grass, and Gama Grass
- Warm season forb (WSF) - Sunflower
- Coastal Bermuda (CB)

Schematic of VFS Plots

Field Plots Set-Up

24inch
30 gallon
Sampling Protocol

- Barrel water and sediments were weighed to determine runoff mass and volume.
- A thoroughly mixed 1-L composite sample collected and stored on ice.
- Samples analyzed for TP, SOP and TSS.

Results and Discussion

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Comparison of Runoff among Treatments

Comparison of TSS among Treatments

Soil TP and SOP

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<th>Plots</th>
<th>TP (mg/kg)</th>
<th>SOP (mg/kg)</th>
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<th>TP STDV</th>
<th>SOP STDV</th>
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Comparison of TP among Treatments
Comparison of SOP among Treatments

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<th>Mass (mg)</th>
<th>Parameter CSG</th>
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SOP in Soil & Runoff and TSS Load in Runoff

Summary

- Sunflower was the most effective in reducing TP in runoff followed by CB, WSG and CSG
- Lessening of P load in runoff was due to removal of sediment
- Cleaner water was collected in Sunflower and WSG treatment plots

Future Work

- Collection of more runoff data samples from treatment plots
- Tissue analysis of treatment plants

Acknowledgement

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Thank You!