High Clearance Robotic Irrigator for In-Season Nutrient Management

Ohio State University

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Seasonal N Uptake

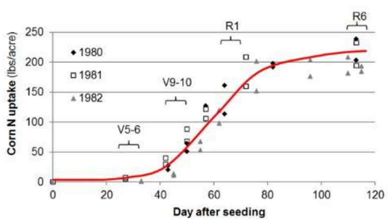

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Figure 1: 360 RAIN demonstration at Farm Science Review using blue dye to demonstrate nutrient injection into the water stream and then placement within the field.

Figure 2: 360 RAIN demonstration at Farm Science Review with frac tanks and tanker trailer to communicate how animal nutrient sources can be managed using the same injection approach.

3

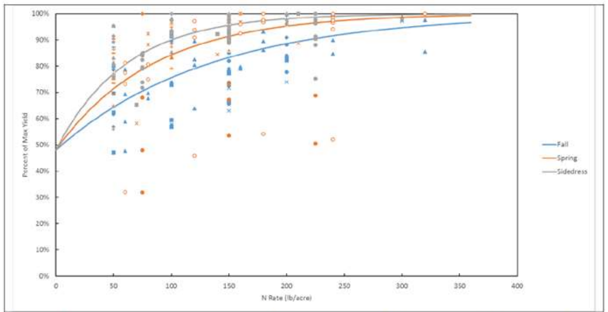

Figure 4: Yield as a function applied N rates for of Fall, Spring and Sidedress N management strategies.

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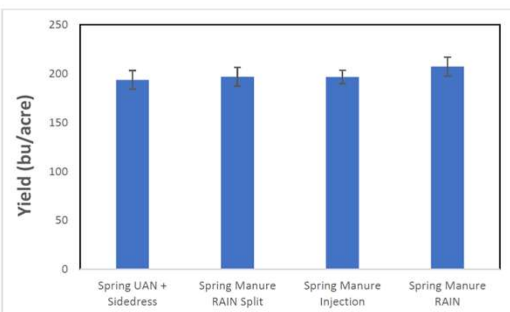

Figure 1. Average yields of the four treatments. Error bars represent standard error of the mean.

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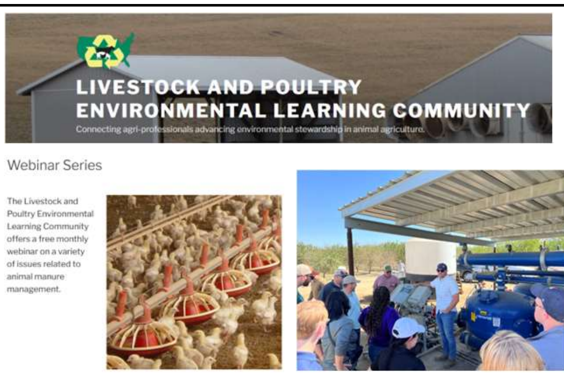

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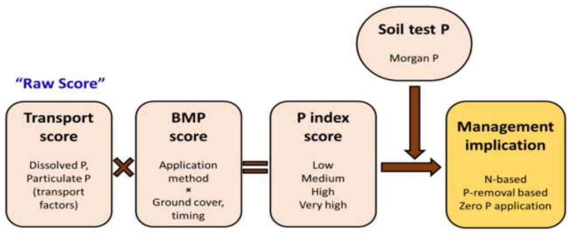
Revising and implementing phosphorus indices to protect water quality in the northeastern US.

Cornell University - Quirine Ketterings



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PI categories	PI score	Cornell Morgan-extractable soil test P (lbs P/acre) < 40	40-100	101-160	> 160
Low	< 50	N-based	N-based	P-based	Zero P
Medium	50 to 74	N-based	P-based	Zero P	Zero P
High	75 to 99	P-based	P-based	Zero P	Zero P
Very High	≥100	Zero P	Zero P	Zero P	Zero P

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Determination of a Field PI Score

Transport score

Dissolved P, Particulate P (transport factors)

Dissolved P (DP score)= $10*[FD+VFD_{DP}+FF+HSG_{DP}+CF]$

Particulate P (PP score)= $10*[FD+VFD_{PP}+FF+HSG_{PP}+E+CF]$

Factor	Option	Coefficient	
Flow distance (FD) to stream in ft	> 500	0	
	301-500	4	
	101-300	6	
	≤ 100	8	
Vegetated flow distance (VFD)[1]	<35 ft	0	
	≥35 ft	DP: -2	PP: -4
Flooding frequency (FF)	Never	0	
	Occasionally	2	
	Frequent	5	
Hydrologic soil group (HSG)	A	DP: 0	PP: 0
	B	DP: 4	PP: 1
	C	DP: 6	PP: 3
	D	DP: 8	PP: 5
Erosion (E) in ton/acre[2]	≤ 1.0	0	
	1.1-3.0	1	
	3.1-5.0	3	
	> 5.0	5	
Concentrated flow (CF)	None/treated	0	
	Present	4	

[1]Only for fields with FD ≤ 500 ft. [2]RUSLE2 A-value (yearly).

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BMPs – Select One from Each List and Multiply

BMP score

Application method
×
Ground cover, timing

Method of application	
Surface spread without setback	1.0
Surface spread with ≥100-ft setback from the field boundary (start of the predominant flow path)[1]	0.8
Surface spread with ≥35-ft managed vegetated (sod/harvested) setback from the field boundary (start of the predominant flow path)[1]	0.7
Incorporation within 24 h with ≥15-ft setback from down-gradient surface waters	0.7
Injection with≥15-ft setback from down-gradient surface waters	0.5
Ground cover and timing	
Bare ground and more than 2 weeks before planting	1.0
Bare ground and within 2 weeks of planting (in spring)	0.8
Winter-hardy cover crop (fall/winter)	0.8
Whole-plant crop residue (~80% or more ground cover, e.g. corn grain)	0.7
Sod after last cutting (fall/winter)	0.6
Growing sod or row crop/planting green	0.5

[1]Only for fields with FD ≤ 500 ft.

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Portable Separation Project

FINAL TECHNICAL REPORT
Awardee: Native, a Public Benefit Corporation (formerly NativeEnergy, Inc.)
Agreement #: 69-3A75-17-34
Start Date: December 2, 2016
End Date: September 29, 2023

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Map of Lake Champlain watershed

Project objectives:

- Greenhouse Gas ("GHG") Emission Reductions
- Reduction in Phosphorus Loading in Watershed
- Financial Benefit to Farms for "Waste" Product

Take home points:

- Biochar has many potential uses, but the agricultural market will drive demand in the near term as more research and development is needed to solidify demand in other sectors.
- Demand is limited by the lack of consumer education and product standardization.
- Policy incentives derived from carbon benefits could incentivize the agriculture sector demand.
- The biochar market is very volatile, making market evaluations and forecasts difficult to quantify.

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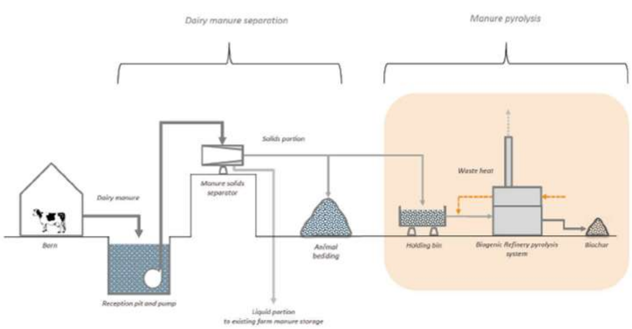

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Webinar Series

The Livestock and Poultry Environmental Learning Community offers a free monthly webinar on a variety of issues related to animal manure management.

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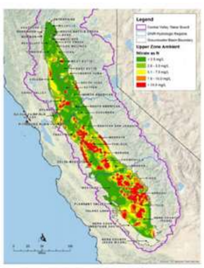
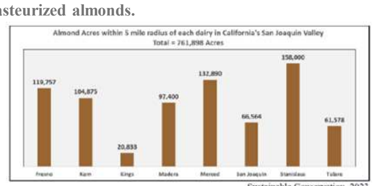
Sustainable Conservation - Improving Water Quality by Reducing Nitrate Loss from Dairies

Demonstrating How Surplus Manure Can Be Applied Safely to Almonds Using Subsurface Drip Irrigation



Nitrate hot spots in the Central Valley are highlighted in orange and red (Source: National Park Service , CV-SALTS coalition)

The goal of the project is to demonstrate how an existing dairy manure subsurface drip irrigation system (hereafter MSDI) can be modified to further improve groundwater quality by safely applying the system on pasteurized almonds.



Sustainable Conservation, 2023

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Project objectives:

Objective 1: Assess MSDI as a viable irrigation and nutrient management strategy for almond cropping systems

Objective 2: Calculate N use efficiencies among treatments to assess potential water quality benefits of MSDI

Objective 3: Evaluate food safety risks associated with management with MSDI in almond orchards

Objective 4: Assess MSDI economics with a cost-benefit analysis

Objective 5: Conduct education and outreach to encourage technology adoption

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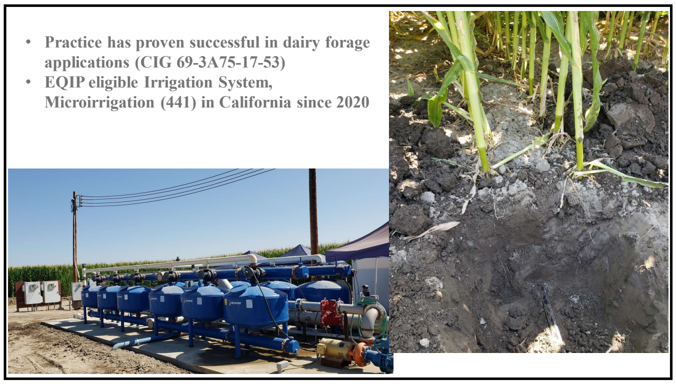
- Practice has proven successful in dairy forage applications (CIG 69-3A75-17-53)
- EQIP eligible Irrigation System, Microirrigation (441) in California since 2020



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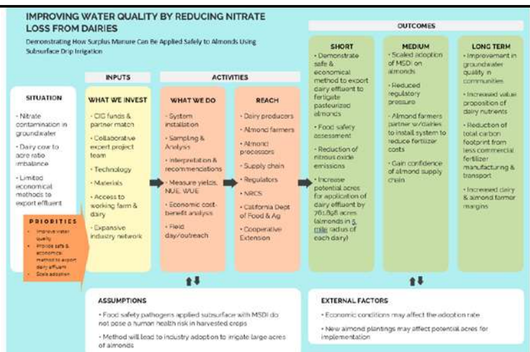

Sustainable Conservation, 2023

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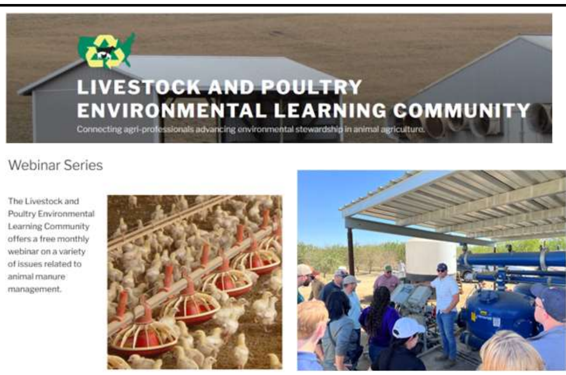

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NEWTRIENT

Compost Aeration – Positive and Negative Forced Air to Speed Up the Composting Process

APPLICATION FOR COMPONENT ADDITION TO NRCS

NRCS Practice Standard 317

NEWTRIENT Technology Advancement Team

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Compost Aeration and Heat Recovery Diagram

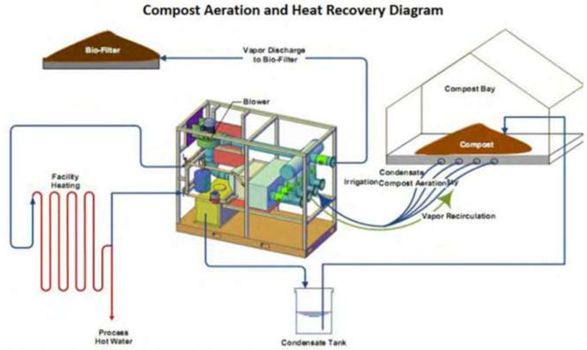

Figure 1. Compost aeration and heat recovery diagram.

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By delivering air through perforated pipes at the bottom of the pile, the pile stays oxygenated creating the best possible conditions for heat-loving microorganisms including bacteria, actinomycetes, and fungi to multiply and break down large quantities of organic matter over a relatively short period of time. Not only does the air flow maintain the population and diversity of the microbes within the pile but it also reduces foul odors that could occur if parts of the pile become anaerobic.

Advantages:

Compost aeration systems tend to have higher consistent temperatures and therefore, increased potential for pathogen kill. Composting decreases pathogens by up to 66% compared to recycled manure solids that are not composted.

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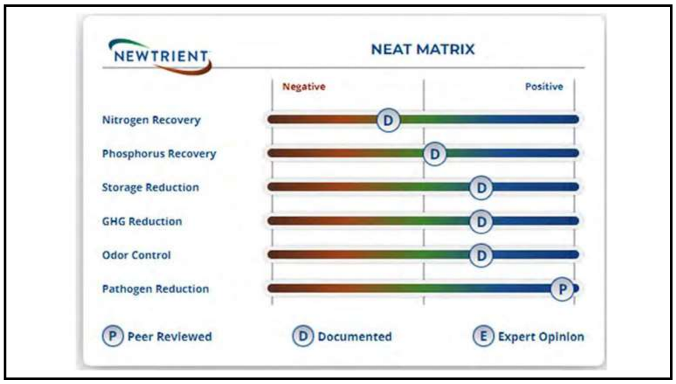
NEWTRIENT
NEAT MATRIX
Negative
Positive
Nitrogen Recovery
Phosphorus Recovery
Storage Reduction
GHG Reduction
Odor Control
Pathogen Reduction
D
D
D
D
D
P
P Peer Reviewed
D Documented
E Expert Opinion

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