

# Commodity Crop Production on a De-Nitrifying Bioreactor System

*Ca Dept of Food and Agriculture SCB Grant, implemented by CSLRCD*

## What is a De-Nitrifying Bioreactor?

*Biological tool for water quality improvement*

- A subsurface trench filled with a carbon source that hosts bacteria working to break down nitrates through denitrification.
- Water enters the bioreactor and is impounded until nitrates are reduced then discharged from the system.
- Nitrates are respired as nitrogen gas, harmless in this concentration

## What are the advantages?

*Improved water quality*

- Tool to reduce nitrates on-farm
- Scalable technology
- Small footprint and minimal infrastructure required
- Effective method of removing Nitrates from creeks, lakes and groundwater
- When planted with a crop, the system provides a source of irrigation water and nitrogen otherwise lost as runoff.



## Planting on a Bioreactor

A bioreactor system provides a unique opportunity for commodity crop production. Water entering the bioreactor is essentially reused to irrigate the crop, and nutrients that would otherwise be lost to runoff is utilized by the crop before being treated by the bioreactor.

100 blackberry plants were planted in the bioreactor on the shore of Little Oso Flaco Lake in October 2016. Those plants are thriving and producing berries that are nutritionally comparable to locally grown organic blackberries. No inputs are required. Water high in nitrates is pumped into the bioreactor, where the plants utilize the water and residual nutrients.

## Outcomes

Criteria	Outcome
Water Quality, Soil Moisture	As expected: consistent trends following seasonal fluctuations.
Plant Vigor	Strong growth in the initial growing season, 100% survival rate.
Fruit Quality	Weight and yield lower than anticipated, result of predation, sun and wind damage.
Nitrate Removal	Highly effective. 75 lbs. removed, 750,000 gallons of water treated, levels consistently below drinking water standard levels of 10 ppm.

Contact the Coastal San Luis Resource Conservation District for more information  
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