Getting to the *Root* of Salinized Bayside Farmland Management

Jennifer L. Halchak, Denise Seliskar, and Jack L. Gallagher

University of Delaware

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Land Use Bordering the Delaware Estuary

In 2001, agriculture accounted for 26% of land use along the Delaware Estuary*

Occurrence of two recent major flooding events

Salt water intrusion will increase as sea levels rise

* Delaware River State of the Basin Report 2008

Transitions

Economic impacts of abandoning agricultural land due to salt intrusion

Need to allow for transition from upland to wetland along the Delaware Estuary

Salt water product :

Seashore Mallow

(*Kosteletzkya virginica*)

Seashore Mallow (*Kosteletzkya virginica*)

Salt tolerant to 30 ppt

Perennial

Several products produced:

- Biodiesel from oilseeds
- Cellulosic ethanol from stems
- Animal feed from seed remaining after oil extraction

Applications

K. virginica will stabilize shore-side farmlands as they transition into wetlands

K. virginica will act as nurse crop to alter farm soils in preparation for wetland plants

Provides an economic and ecologically sound transition

Objectives

What is the extent of root growth in one year?

What quantity of carbohydrates are stored in the roots overwinter?

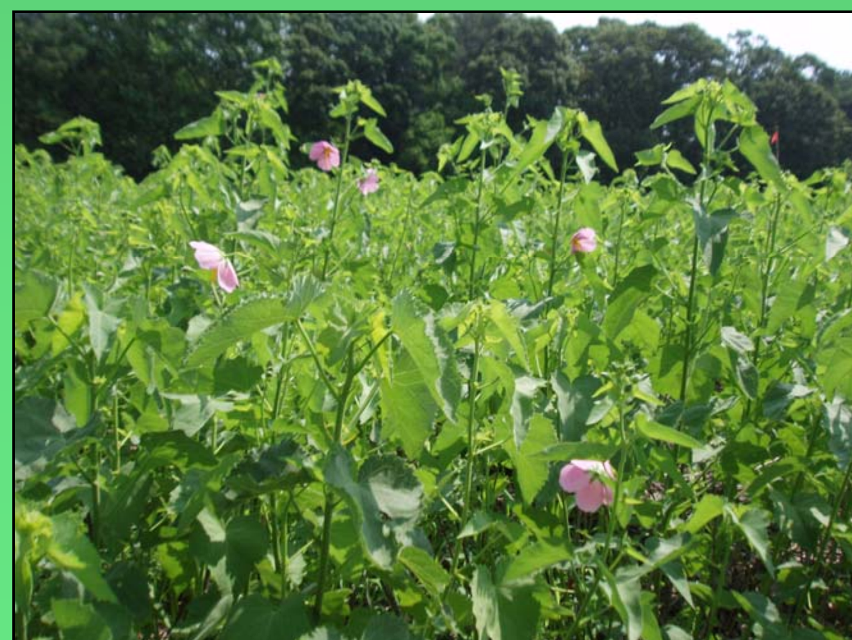
Do various soils or nutrient quantities influence root growth?

Root Depth

Three cores from research field after two years growth

Root growth past the depth of cores (76 cm)

Majority of roots within top 20 cm of soil



Storage Roots

Recoverable Underground Reserves:

	Dry Weight
Aerial Biomass	6.6 g
Root Biomass *remaining after growth	6.5 g

Plants reached 1 meter in height

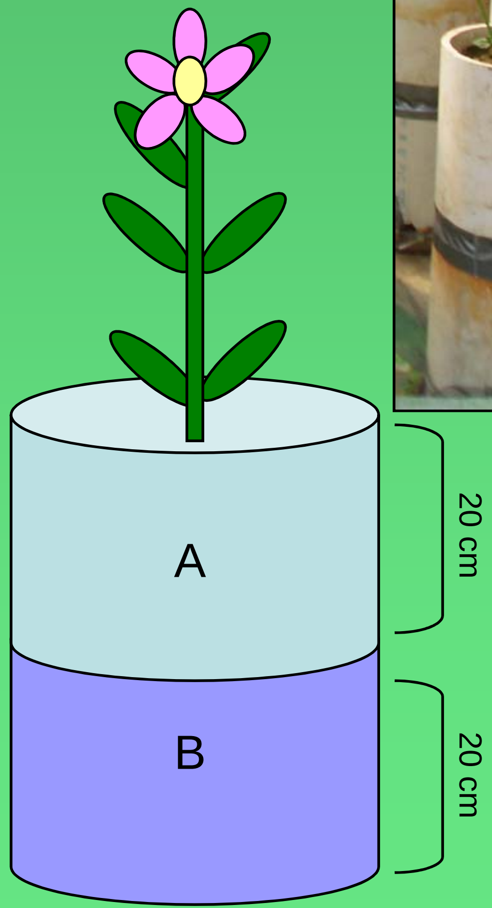
Nutrient and Soil Experiment

Two-chamber growth set-up

Chamber A – plant taken from field

Chamber B – varied by treatment

- Sieved Field Soil (Control)
- High Nutrient Addition – 20 grams
- Low Nutrient Addition – 5 grams
- Dredge Material



Extent of Growth

Lower chamber contained sieved soil

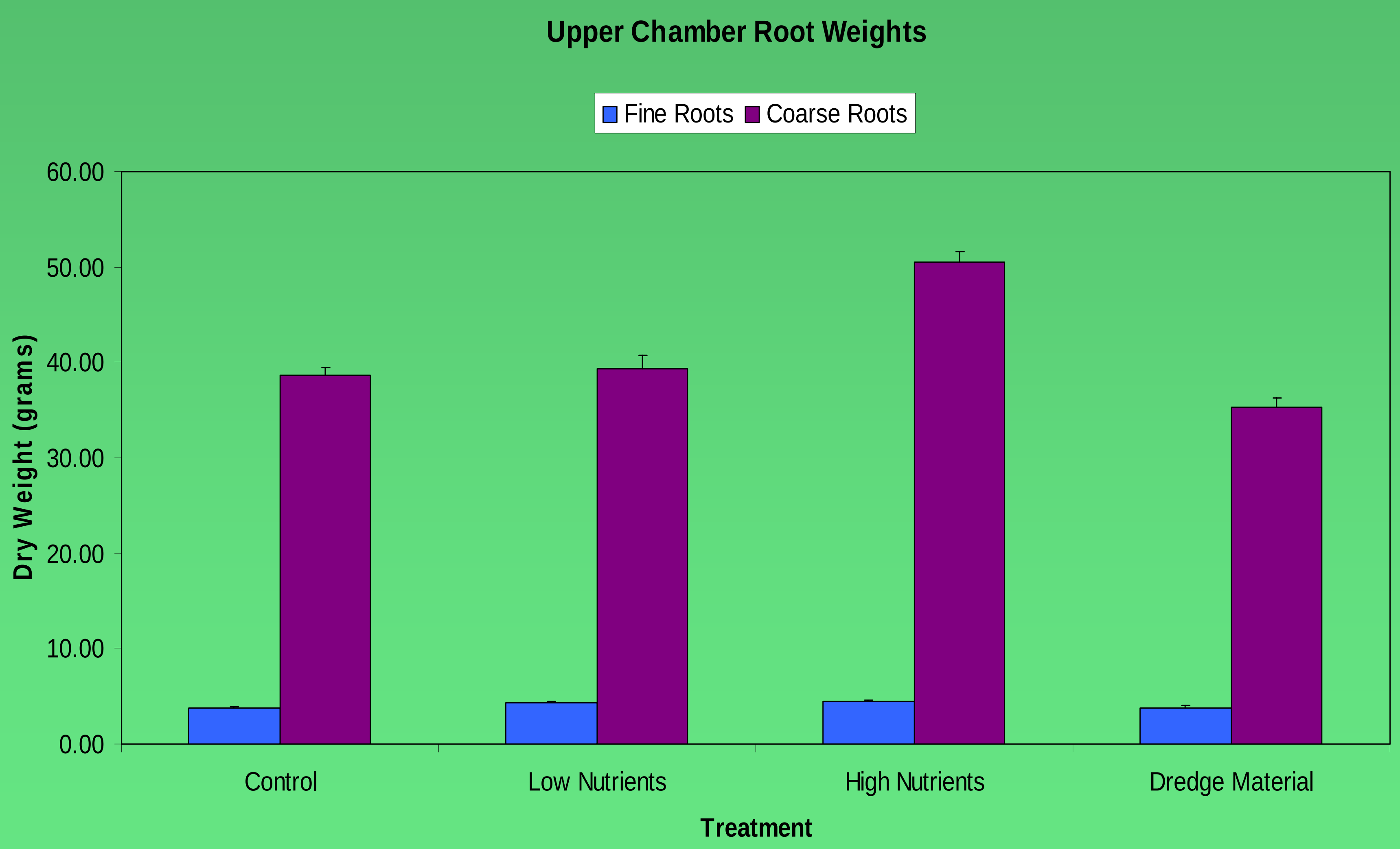
Fine and coarse roots quantified

- Fine roots <2 mm diameter
- Coarse roots ≥ 2 mm diameter

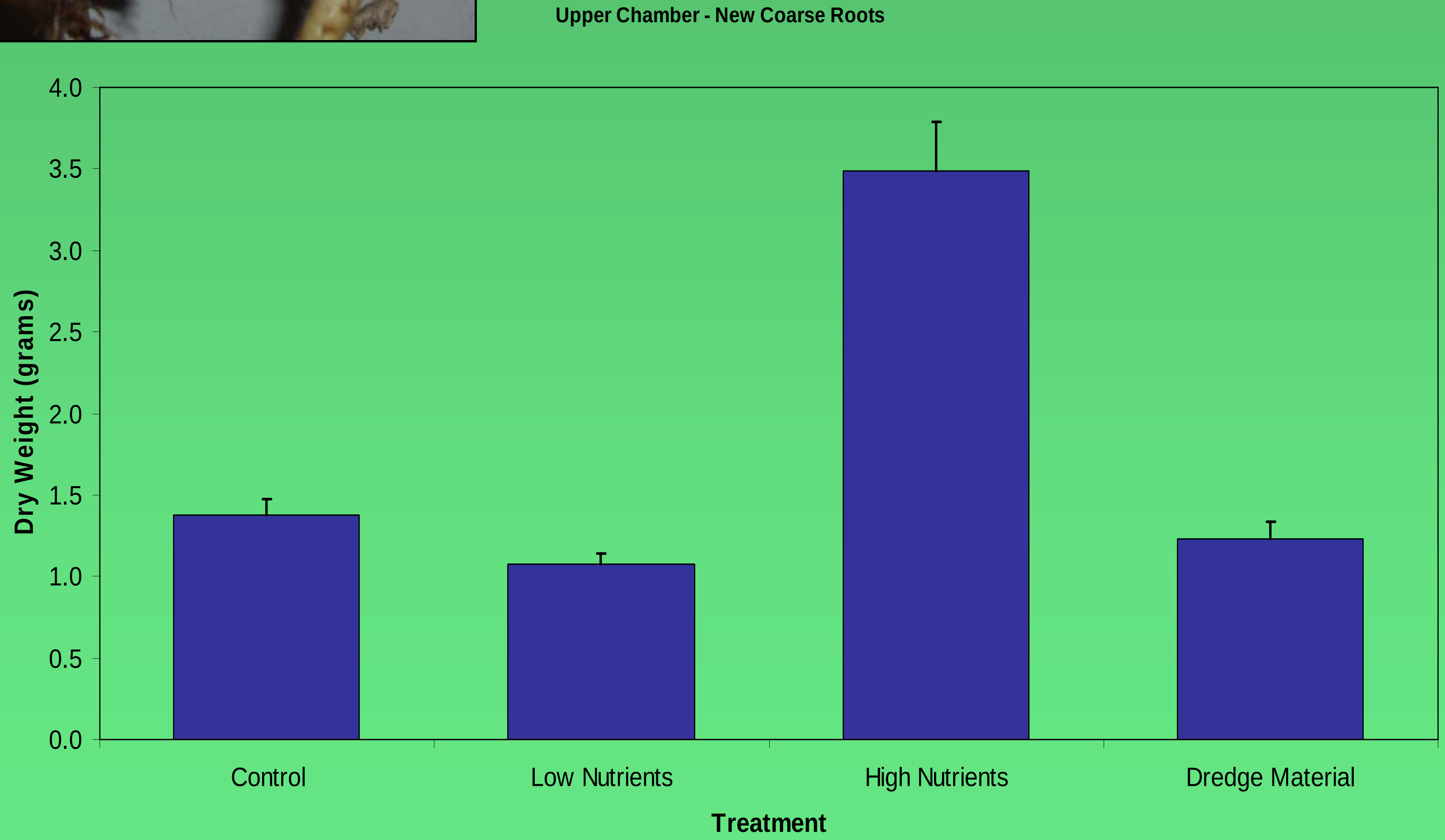
Lower Chamber after one season of growth

Lower Chamber

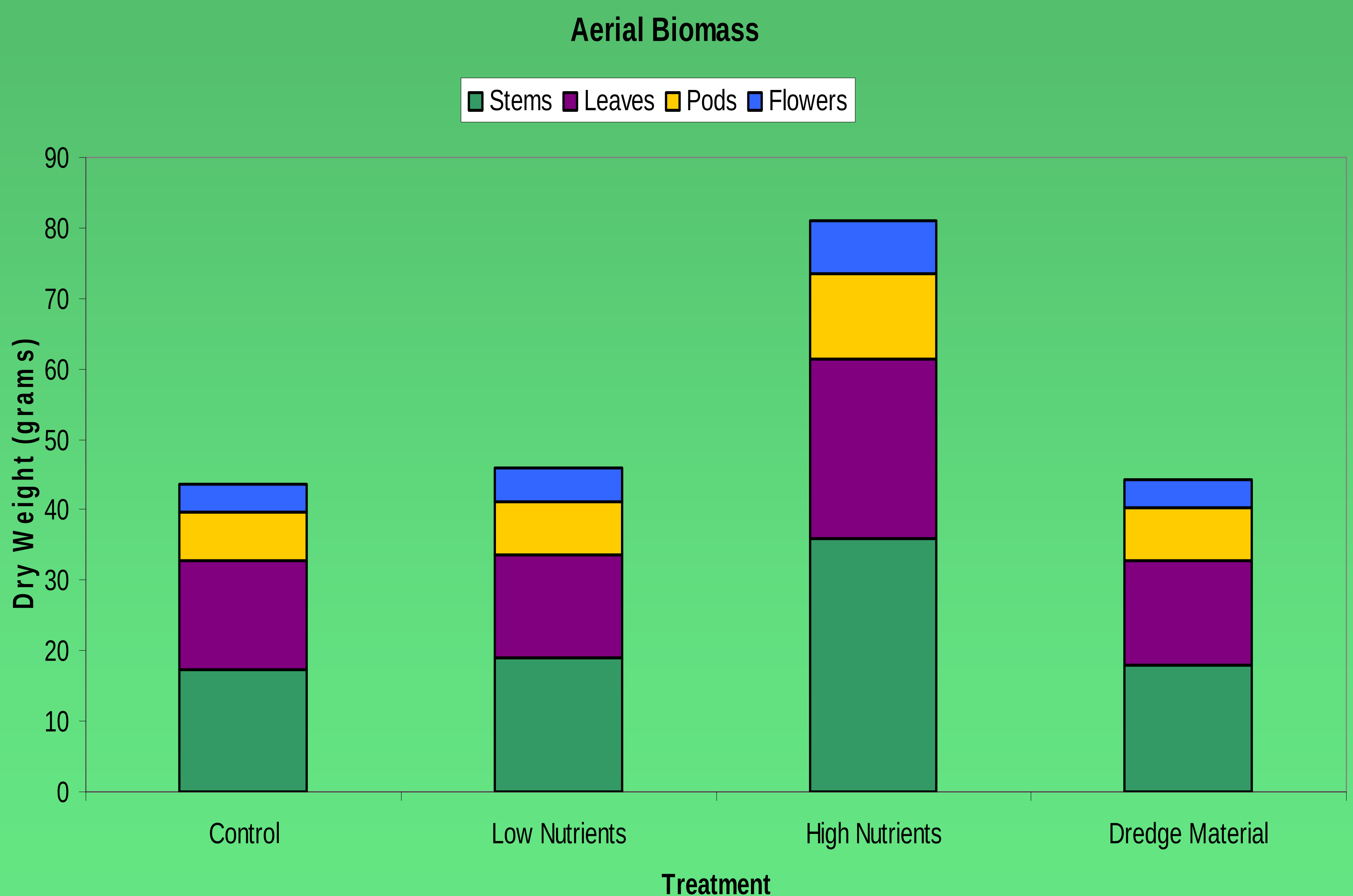
Upper Chamber



New Growth Upper Chamber



Aerial Biomass Treatment Influences

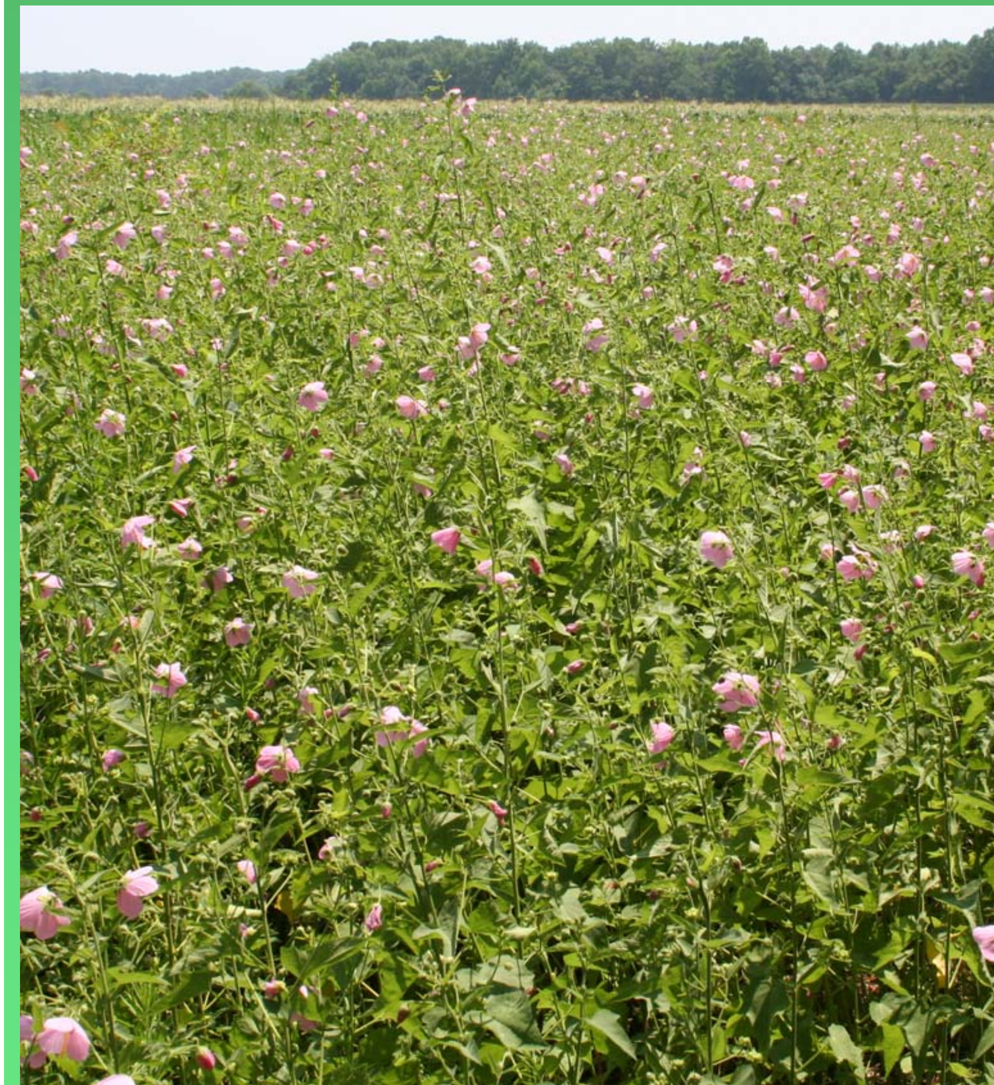


Algae Fertilizer

Macro algae harvested from DE inland bays

Material	Nitrogen (mg/g)	Carbon (mg/g)
K. virginica control	11.29	412.25
K. virginica with algae	24.33	406.49
Macro algae	26.72	230.92

Conclusions



K. virginica root >76 cm deep after two years growth

6.6 grams of recoverable underground reserves

5.9% of coarse root biomass was new growth

High nutrient treatment increased root biomass by 24.9%

Thanks to:

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