

Developing Seashore Mallow as an Alternative Crop for Salinized Soils Along Delaware Bayshore

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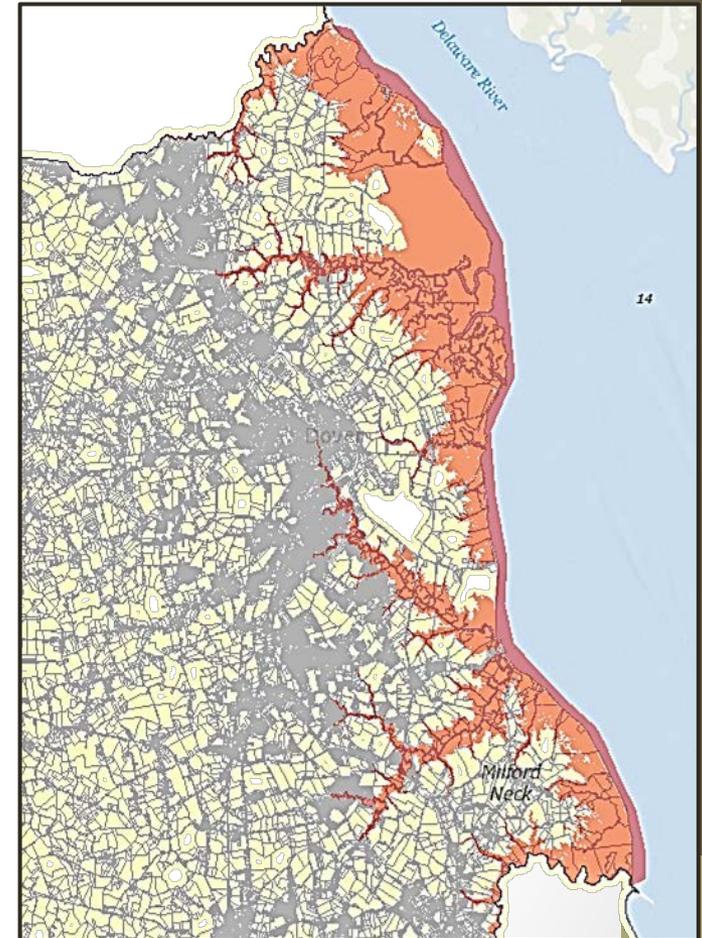
SLR Impacts on DWL's Milford Neck Lands

- **3,500 acres coastal saltmarsh, dune, upland forest and ag lands**
- **Increasing salinity in soils from storm over-wash and extreme tides**
- **DWL and other properties, including coastal farmland**
 - Decreasing productivity and profit
 - Die-off of trees
 - Conversion of freshwater wetlands
 - Erosion of marsh
- **Changes in wildlife, waterfowl, species utilizing site**



Investigating Options

- Options: berm, dikes, ditches, pump, abandon fields/forests, alternative crop
- UD research team (UD Cooperative Extension, DE Sea Grant Program, DENIN) working on seashore mallow as alternative crop
 - Work in Middle East
- Ecosystem services identified
 - Roots absorb nutrients, control spread of phrag, air and water filtration, food source for pollinators, carbon sequestration
- Economic benefits?
- Extent of issue in DE
 - DNREC 0.5 meter SLR scenario and 2007 LU/LC data (w/ ag lands) used to approximate impacted areas



Areas in Kent County affected by 0.5 meter rise in sea level.

Seashore Mallow

- Dr. Jack Gallagher's halophyte research lab
- Extension, nonprofit collaboration
- Native to the US East and Gulf Coasts
- Non-invasive
- Perennial (10 years)
- Drought-tolerant and water log-tolerant
- No known diseases
- Ecosystem services identified
 - Roots absorb nutrients, suppresses spread of *phrag*, air and water filtration, food source for pollinators, carbon sequestration



Potential SSM Products

- Seed is 18-20% oil (similar to soybean, corn, and cottonseed)
 - Potential biodiesel
- Meal is protein rich (30%), potential for feed stock?
- Milled stem material is highly absorbent
 - Kitty litter
 - Bioabsorbent for organic liquids
 - Hydromulch for erosion control
 - Small animal bedding...



Potential Use: Poultry Bedding?

- Pine shavings used throughout the Delmarva Peninsula
- 3-4" bedding material absorbs moisture from broiler feces and provides scratch material
- Cost is increasing (~\$3,500 for an average house), availability is decreasing
- SSM research shown to have excellent absorbent capacity and resists compaction
- If viable as bedding material, SSM could be a locally sourced ag crop grown on salt-impacted lands in DE and region

KEY QUESTION: Impact of new bedding material on bird development and growth?

SSM/Pen Study

Paw quality assessed by severity and extent of *Foot Pad Dermatitis*.



*Left - Birds participating in the poultry bedding pen study at the UD Lasher Laboratory in Georgetown, DE.
Right - Researchers scoring paws for Foot Pad Dermatitis.
Photos by Gary Emeigh (The News Journal).*



*Left - healthy paws. Right - paws afflicted with Foot Pad Dermatitis.
Photo by M. Czarick and B.D. Fairchild (University of GA).*

SSM Pen Studies (2014)

- **Lasher Laboratory in Georgetown, DE**
- **5 X 8' pens situated in 3 rooms to perform 3 replicates**
 - SSM evaluated with pine, Switch Grass, and Miscanthus
 - SSM harvested in Fall 2013, cut into roughly equal pieces 1.25" or less
 - Each bedding material weighed, placed in pens at 4" depth, checked for moisture, evaluated for density and moisture holding capacity prior to placement.
- **~38 day-old straight run chicks (donated by Amick Farms) in each pen**
 - Birds fed commercial broiler ration of starter, grower, finisher, and withdrawal diet
 - Water flow rates measured and adjusted accordingly
 - Mechanical ventilation monitored (<25 ppm ammonia, 50-70% relative humidity)
 - Following first flock, all bedding tilled, windrowed, and turned. Windrowing temps were measured
 - All bedding treatments were treated with PLT prior to placement of the second flock



Special recognition to Bill Brown, Dan Bautista, and the Lasher Lab staff for leading these efforts!

SSM as Potential Poultry House Bedding

- Chipped stem material tested in a small pen study
- Assessed impacts on bird health, growth, paw quality
- Results very promising!



*Jack Gallagher with bale of SSM stems.
Photo by Evan Krape/Bob Bowden*



*Rotochopper unit shredding Switch **Grass** for a full house study.*



*Bill Brown showing shredded SSM stems.
Photo: GARY EMEIGH/The News Journal*

Pen Study Results

Flock 1:

- Mild lesions observed in all treatments.
- Lesions may heal and/or peel off when hard scalded and peeled during processing. Not considered a production concern.

Flock 2:

- SSM had best (lowest) FPD ratings.
- Lesions were better on Flock 2, due to higher ventilation rates, necessary for combating the warmer June temperatures.

SSM as Potential Poultry Bedding

Flock 1 Foot Pad Dermatitis (FPD) Results

Bedding Treatment	FPD Rating (mean score)	% Downgrade Paws
Pine Shavings	0.30	5.3
Seashore Mallow	0.44	6.0
Switch Grass Bedding	0.66	11.8
Colony Pine (2 Reps)	0.23	3.0
Miscanthus (1 Rep)	0.12	0.0

Flock 2 Foot Pad Dermatitis (FPD) Results

Bedding Treatment	FPD Rating (mean score)	% Downgrade Paws
Pine Shavings	0.50	8.4
Seashore Mallow	0.18	0.0
Switch Grass Bedding	0.38	7.8
Colony Pine (2 reps)	0.30	3.8
Miscanthus (1 Rep)	0.53	7.9

Further Research & Study

- **Need more \$\$\$ and more SSM**
- **One commercial house** with multiple grow-outs between cleanouts.
 - Divide house, SSM on one side and pine shavings on other
 - Minimum of two flock grow-outs will be completed.
- **Large scale project**, more fully assess viability of SSM as new, local, source of poultry bedding.
- If green light, **compare cost effectiveness of SSM and pine shavings** from a poultry growers' perspective and **cost benefit analysis** for crop farmer growing SSM for a local poultry house bedding market.
- **Determine % of local/region bedding demand that can be met** by salinized ag lands in state and region.
- **Assess amount of land and SSM production needed** to support a poultry bedding market (keeping in mind other potential uses of seeds, flowers, roots, etc.)

Next Steps

- Challenges
 - Equipment
 - Plant improvements (determinant blooming, maturation)
- Needs
 - More acreage planted, more \$
 - Cooperator with interest and enthusiasm
 - Farmer to plant (year 1), tend, harvest, bale, provide fertilizer/herbicide

Summary

- Potential alternative crop for salt impacted lands
 - Extends productivity of coastal ag lands
 - Improves resilience of coastal farmers to SLR
- Beneficial services: water/air quality, carbon sequestration
- Potential to locally supply bedding material to major ag industry in DE and region
- Provide opportunities for adaption to SLR as lands become too wet to farm and wetland communities migrate inland
- Need more SSM planted soon!!

Questions?

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