SCREENING STUDY OF SELECT COTTON-BASED HYDROMULCH BLENDS PRODUCED USING THE CROSS-LINKED BIOFIBER PROCESS

Bryan N. Scholl – Colorado State University
Greg A. Holt – USDA-ARS
Chris I. Thornton – Colorado State University

International Symposium on Erosion and Landscape Evolution
Hilton Anchorage Hotel, Anchorage, Alaska. September 18-21, 2011
Background

- Utilization of the 2.5 to 3 million Mg of byproducts produced from cotton ginning needed.
- Processes developed to add value to cotton byproducts (COBY [6,383,548] & Cross-Link Biofiber Process [CLBP – 7,788,847]).
- COBY products evaluated.
- Need to evaluate CLBP in using low value as substrate for hydraulic mulch.
Cotton Gin Byproducts
Lint
Sticks
Cotton Carpel (Burs)
Objective

Evaluate blends of agricultural by-products with cotton gin by-products (CGB) using the CLBP in comparison to a popular commercially available hydro-mulch (control) used on slopes of 3:1 or greater.
Procedures

- 11 blends of agricultural residue evaluated under simulated rain using sandy loam soil.
- Trays filled w/ 186 kg of soil packed to density of 1.43 g/cm³.
- Moisture added to approximate 8-12% mc
- Trays moved to hydromulcher & mulch applied at 2242 kg/ha using gantry system
- Trays dried for 48h before testing
Procedures (continued)

- After drying, 3 trays placed in rain simulator, elevated to 2:1 slope
- Rain intensity = 14.5 cm/h for 45 min
- All runoff caught in 10 micron filter bags
- After testing, filter bags dried for 48 hours at 60°C, weighed, and organic matter determined using muffle furnace (500°C)
- ANOVA performed with alpha = 0.05
Gantry Application System

- Gantry Motor
- Switch
- Tray
- Spray Nozzle
- Hose
- Hydroseeder motor
- Gear Pump
- VFD
Treatments Evaluated

- AG1 & 2: Ag. Res., CGB, CF, Poly, <20 mesh
- AG3 – 7: Ag. Res., CGB, CF, Poly
- HG1 & 2: Haygrazer, CGB, CF, Poly
- CS 1: Cotton Stalks, CGB, CF, Poly
- WG1: Wheat Straw, CGB, CF, Poly
Total Runoff (kg/ha)

- Control
- AG1
- AG2
- AG3
- AG4
- AG5
- AG6
- AG7
- HG1
- HG2
- CS1
- WG1

The chart shows the total runoff in kilograms per hectare for different treatments and controls.
Soil Runoff (kg/ha)
Organic Matter Runoff (kg/ha)
Summary & Conclusion

- Agricultural residues can be effectively used as erosion protection.
- Runoff associated with soil & organic matter (mulch) was equivalent to the control for 5 treatments.
- Organic matter losses can be improved with changes in chemistry.
- CS1 was eliminated due to variability
- Treatments AG1 & AG2 were selected for further study
ACKNOWLEDGEMENTS

Support for study provided by Landmark Earth Solutions, Incorporated.