

## BIOAG PROJECT FINAL REPORT

**TITLE:** Planning for a Phase II SCRI grant proposal on 'Utilization and Versatility of Biodegradable Agricultural Materials in Specialty Crop Production'

**PRINCIPAL INVESTIGATOR(S) AND COOPERATOR(S):** Rich Koenig, [richk@wsu.edu](mailto:richk@wsu.edu); Carol Miles, Debbie Inglis, Tom Marsh, Jessica Goldberger, Craig Frear (all WSU); and, Doug Hayes (UTK)

**KEY WORDS:** Biodegradable plastic mulch, vegetable production systems

### ABSTRACT

The planning grant was used to identify and convene a group of transdisciplinary scientists who will be the principal investigators for a new SCRI grant proposal to investigate the use and fate of biodegradable plastic mulch in agriculture. Scientists were convened at WSU Pullman October 23-25, 2012, and funds from the BIOAg Planning Grant were used to support travel to the meeting, and to provide staff time for follow-up proposal writing. As a result of this planning grant, a new interdisciplinary team has been formed to investigate biodegradable plastics in agriculture, working group leaders have been identified, a new SCRI-CAPs proposal has been drafted, and a second planning grant was received from the University of Tennessee-Knoxville to convene the team to complete writing the new SCRI proposal. Submission of the proposal is pending appropriations to the SCRI program.

### PROJECT DESCRIPTION

The primary objective of this planning grant was to identify and convene potential key PIs for a new SCRI-CAP project, and to draft this project proposal as Phase II for the team's current SCRI-SREP project (Inglis and Miles, co-PDs). The new SCRI project will assess agricultural, ecological, economic and sociological consequences of using both currently available and new formulations of prospective biodegradable plastics in specialty crop production systems. Plasticulture is used extensively throughout the U.S. and world-wide, and biodegradable plastics could offer significant improvements and benefits over conventional plastics, including reduced waste stream and perhaps other benefits. The original project led to development of PLA and PLA-PHA agricultural fabrics using nonwoven technologies as well as their testing using uniform field and laboratory research protocols and rating systems designed to measure material degradation. An outcome has been the finding that PLA-based mulch did not biodegrade under field soil conditions; however, opportunities to formulate, use, or dispose of biodegradable materials in creative ways, not previously realized, have now been recognized and will be explored in the new proposal.

### OUTPUTS

Work Completed:

1. PIs on the current SCRI-SREP project were polled, a new PD stepped forward, and a core group of current PIs was invited to participate in the new proposal. Gaps in research expertise were identified and new potential PIs were invited to attend the planning meeting.
2. The planning meeting was held in Pullman, WA in October, 2012. See appendix for the meeting agenda and a list of participants.
3. The PIs developed a plan of work for the new SCRI-CAPs project which builds on our current SCRI-SREP project (funded 2010). Working groups and working group leaders self-identified. Each working group developed a research and outreach outline for the new proposal.
4. Four conference calls occurred from August, 2012 through May, 2013 to further draft the proposal. Originally, the anticipated submission date for the new proposal was January, 2013; however, as no federal funding was appropriated for SCRI grants for 2013, the new target proposal completion date is December 2013.

Publications, Handouts, Other Text & Web Products:

None.

Outreach & Education Activities:

None.

**IMPACTS**

- Short-Term: A team has been convened for a new SCRI-CAPs proposal. The team will meet in Knoxville to complete writing the grant proposal.
- Intermediate-Term: A new SCRI-CAPs proposal will be submitted in the next funding cycle. The new project will assess agricultural, ecological, economic and sociological consequences of using both currently available and new formulations of biodegradable plastics in specialty crop production systems. Agricultural producers and manufacturers throughout the U.S. will benefit from new information generated from this grant project.
- Long-Term: The agricultural plastics waste stream will be reduced due to new biodegradable plastics and evaluation methodologies developed from this project. New opportunities to use and safely dispose of biodegradable materials will be established.

**ADDITIONAL FUNDING APPLIED FOR / SECURED**

A planning grant has been secured from the University of Tennessee-Knoxville to convene the full project team in September 2013. This meeting will be used to finalize the SCRI-CAPs proposal, and this proposal will be submitted in the next call for funding.

**GRADUATE STUDENTS FUNDED**

None

**RECOMMENDATIONS FOR FUTURE RESEARCH**

The proposal contains recommendations for future research in this area.

## Biodegradable Materials Planning Meeting

October 23-25, Pullman Washington  
Hulbert Hall Room 409; 509-335-2944

**Organizers:** Carol Miles, Dept. of Horticulture, WSU  
Doug Hayes, Dept. Biosystems Engineering and Soil Science, UTK  
Rich Koenig, Associate Dean and Director of Extension, WSU  
Debra Inglis, Dept. of Plant Pathology, WSU

Since 2009, a transdisciplinary team of scientists has been working on the NIFA SCRI grant-funded project “Biodegradable Mulches for Specialty Crops Produced Under Protective Covers” (Reference No: 2009-02484; <http://mtvernon.wsu.edu/hightunnels/ProjectDescription.html>). This 3-year study has reached the end of its funding cycle and some team members are beginning to plan for the leadership of a **new SCRI grant project** potentially titled, “**Biodegradable Plastics for Agriculture.**” Dr. Doug Hayes, Biosystems Engineer at UTK, will be the new project director.

At our meeting in Pullman we will both discuss and draft the objectives and research activities for a new project and proposal. Each participant will be asked to take a leadership role in writing activities for the new proposal during this working meeting - so bring your laptop! For your convenience, you will receive a copy of last year’s SCRI RFP, the funded 2010-2012 proposal, and other documents.

Our new SCRI grant project could readily build upon the accomplishments of the former project, which included the following objectives:

- Compare experimental and commercially-available biodegradable mulches to black plastic for specialty crop production
- Better understand mulch biodegradation in soil, potential residues, and impacts on soil ecology and plant health
- Calculate economic feasibility of biodegradable mulches
- Identify barriers to biodegradable mulch adoption
- Contribute to scientific literature on these issues

### Meeting Participants

\*Jennifer DeBruyn, Environmental Microbiologist, Dept. Biosystems Engineering and Soil Science, UTK, 865-974-7277 (o), 865-385-1646 (c), [jdebruyn@utk.edu](mailto:jdebruyn@utk.edu)

\*Chris Benedict, Extension Educator, Whatcom County, WSU, 360-676-6736, [chrisbenedict@wsu.edu](mailto:chrisbenedict@wsu.edu)

Doug Hayes, Materials Engineer, Dept. Biosystems Engineering and Soil Science, UTK, 865-974-7991 (o), 865-607-1441 (c), [dhayes1@utk.edu](mailto:dhayes1@utk.edu)

Suzette Galinato, Research Associate, IMPACT Center, WSU, 509-335-6653, [sgalinato@wsu.edu](mailto:sgalinato@wsu.edu)

Manuel Garcia-Perez, Bio-systems Engineer, Dept. Biological Systems Engineering, WSU, 509-335-7758, [mgarcia-perez@wsu.edu](mailto:mgarcia-perez@wsu.edu)

Jessica Goldberger, Rural Sociologist, Dept. Crop and Soils Sciences, WSU, 509-335-8540, [jgoldberger@wsu.edu](mailto:jgoldberger@wsu.edu)

Debra Inglis, Pathologist, Dept. of Plant Pathology, WSU, 360-848-6134 (o), 360-333-1784 (c), [dainglis@wsu.edu](mailto:dainglis@wsu.edu)

Rich Koenig, Soil Scientist, Associate Dean and Director of Extension, WSU, 509-225-2933, [richk@wsu.edu](mailto:richk@wsu.edu)

Hongzhi Liu, Post Doc with Jinwen Zhang, School of Mechanical and Materials Engineering, WSU, [hongzhil@wsu.edu](mailto:hongzhil@wsu.edu)

\*Tom Marsh, Economist, School of Economic Science, WSU, 509-335-8597, [tl\\_marsh@wsu.edu](mailto:tl_marsh@wsu.edu)

Carol Miles, Horticulturist, Dept. of Horticulture, WSU, 360-848-6150 (o), 360-610-09420 (c), [milesc@wsu.edu](mailto:milesc@wsu.edu)

\*\*Larry Wadsworth, Materials Engineer, Dept. Materials Science and Engineering, UTK, 865-974-3572, [lwadsworth@utk.edu](mailto:lwadsworth@utk.edu)

\*Annette Wszelaki, Horticulturist, Dept. of Plant Sciences, UTK, 865-974-8332, [annettew@utk.edu](mailto:annettew@utk.edu)

\*\*Jinwen Zhang, Materials Engineer, School of Mechanical and Materials Engineering, WSU, 509-335-8654, [jwzhang@wsu.edu](mailto:jwzhang@wsu.edu)

\* Participating by phone or Adobe Connect

\*\* Out of the country

**Email list:** [jdebruyn@utk.edu](mailto:jdebruyn@utk.edu); [chrisbenedict@wsu.edu](mailto:chrisbenedict@wsu.edu); [dhayes1@utk.edu](mailto:dhayes1@utk.edu); [sgalinato@wsu.edu](mailto:sgalinato@wsu.edu); [mgarcia-perez@wsu.edu](mailto:mgarcia-perez@wsu.edu); [jgoldberger@wsu.edu](mailto:jgoldberger@wsu.edu); [dainglis@wsu.edu](mailto:dainglis@wsu.edu); [richk@wsu.edu](mailto:richk@wsu.edu); [hongzhil@wsu.edu](mailto:hongzhil@wsu.edu); [tl\\_marsh@wsu.edu](mailto:tl_marsh@wsu.edu); [milesc@wsu.edu](mailto:milesc@wsu.edu); [lwadsworth@utk.edu](mailto:lwadsworth@utk.edu); [annettew@utk.edu](mailto:annettew@utk.edu); [jwzhang@wsu.edu](mailto:jwzhang@wsu.edu)

## Planning Meeting Agenda

### Tuesday Oct 23 - Carol Miles facilitating

- 8:00 – Introduction, Carol Miles
- 8:30 – Update on current status of SCRI funding, Mike Kahn, Assoc. Dir. WSU ARC
- 8:45 – Overview of former SCRI project accomplishments, Debra Inglis
- 10:00 – Break
- 10:15 – Discussion new project research objectives; working group leaders, Doug Hayes
- 11:00 – Group Analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT), Debra Inglis
- 12:00 – Lunch
- 1:00 – Biobased agricultural plastics: current status and future directions, Doug Hayes and Larry Wadsworth
- 2:00 – Physio-chemical and transport characterization of biodegradable plastics and evaluation of soil degradation rate, Manuel Garcia-Perez
- 2:30 – Diversifying renewable feedstocks for new biobased polymers and applications, Jinwen Zhang
- 3:00 – Break
- 3:15 – Economics and biodegradables: findings and future opportunities, Tom Marsh and Suzette Galinato
- 4:00 – Discussion, identify additional PIs, industry collaborators, stakeholders, Advisory Committee members
- 5:00 – Conclude for the day
- 6:00 – Dinner at local restaurant

### Wednesday Oct 24 - Doug Hayes facilitating

- 8:00 – Field research objectives for new project, Carol Miles and Debra Inglis
- 8:45 – Barriers and bridges to adoption of biodegradable plastics, Jessica Goldberger
- 9:00 – Crop production opportunities with biodegradable mulch, Annette Wszelaki
- 9:30 – Biodegradation of agricultural plastics – A microbial perspective, Jennifer De Bruyn
- 10:00 – Break
- 10:15 – Opportunities for soil science in biodegradable materials research, Rich Koenig
- 10:45 – Sociological perspectives on biodegradable agricultural plastics, Jessica Goldberger
- 11:15 – Discussion, identify additional PIs, industry collaborators, stakeholders, Advisory Committee members
- 12:00 – Lunch
- 1:00 – Extension and outreach ideas for new project, Chris Benedict
- 2:00 – Develop outline of project work goals, plans and assignments; utilize USDA logic model as required by RFP
- 3:00 – Break
- 3:15 – Discussion, identify working group leaders
- 4:00 – Outline strategies for obtaining matching funds
- 5:00 – Conclude for the day
- 6:00 – Dinner

Thursday Oct 25 – Doug Hayes facilitating

8:00 – Review project work plans; develop specific proposal writing assignments

10:00 – Break

10:15 – Outline budgets with matching funds; identify non-SCRI funding opportunities

12:00 – Lunch

1:00 – Develop list of overall project research activities, tasks, participants, outputs, outcomes, and impacts; create first draft of timeline for the research and extension activities utilizing Gantt chart format; provide communication plan

3:00 – Break

3:15 – Summarize proposal and next steps

4:00 – Closing remarks by Doug Hayes, Project Director

4:30 – Depart