



Sun Grant / US Department of Energy
Regional Feedstock Partnership

Jim Doolittle, Director
North Central Sun Grant Center
South Dakota State University



Three Areas of Activity

- Host a Regional Feedstock Partnership Workshop in each of the SGI Regions
 - Billion Ton Study as basis
- Assemble teams of scientists to address specific questions/tasks
- Host a “Biomass Bioenergy Sustainability Conference” in 2008



Sun Grant Initiative Regions and Regional Centers



Regional Feedstock Workshops

- All five SGI Regional Centers have hosted workshops
 - Between May 2006 and November 2007
- Each Regional SGI Center has published a summary of the outcomes from their workshop
 - Accessible through Regional SGI web pages
- A National Executive Summary is being assembled from the individual regional reports
 - To be published on the National Sun Grant Web page

Executive Summary Biomass Feedstock Partnership Workshops

Working draft available

Presentation later if time

Final version to be posted in April 2008



Sustainability Conference

- Full-day symposium in conjunction with the joint annual meetings of the American Society of Agronomy and Geological Society of America
 - October 5-9, 2008
 - Houston, Texas
 - Invited speakers followed by volunteer posters
 - In the process of identifying appropriate speakers



Partnership Task Teams

1. GIS Resource Assessment
2. Sustainable Corn Residue Removal
3. Herbaceous Biomass Feedstock Development
4. Woody Biomass Feedstock Development
5. Sustainable Cereal Crop Residue Removal
6. Education and Outreach



Current Task Teams Status

- Task Team leads identified
- Team members recruitment
- Draft research plans
- Draft research budgets
- Proposed plot locations identified by GPS coordinates



GIS Resource Assessment Team

- Team Lead = Tris West
- Regional Coordinators
 - NE=Peter Woodberry, SE=Burt English, SC=Mark Gregory, NC=Matt Hansen, W=Chris Daly
- Research Associate = Rajesh Chintala
- SGA Advisor = Larry Walker
- DOE Advisor = Allison Goss Eng



GIS Team objectives/outcomes

- Resource assessments to determine regional feedstock supply curves (variable costs of feedstock across various sites)
- Economic studies that identify the best site conditions and general locations for biorefineries within a region



Corn Residue Team

- ARS Co-Leads = Doug Karlen & W Wilhelm
- Land Grant U. Co-Lead = tbd
- Univ./ARS field plot partners= in progress
- Residue Removal Tool Dev group
- SGA Advisor = Clarence Watson
- DOE Advisor = Richard Hess



Corn Residue Objectives/Outcomes

- Conduct replicated field trials across regions to determine the impact of residue removal on grain yield (in subsequent years).



Herbaceous Feedstock Team

- Team Lead = Vance Owens
- Crop Coordinators
 - Switchgrass=Vance Owens, miscanthus=Tom Voight, sorghum=Bill Rooney, energy cane=Brian Baldwin, & CRP=DK Lee
- SGA Advisor = Kevin Kephart
- DOE Advisor = Anthony Turhollow



Herbaceous Objectives/Outcomes

- Field trials (including genetic evaluations) to develop energy crops within a geographical region.



Woody Feedstock Team

- Team Lead = Tim Rials
- SAG Advisor = Tom Klindt
- DOE Advisor = Mark Downing



Woody Objectives/Outcomes

- Field trials (including genetic evaluations) to develop energy crops within a geographical region.



Cereal Crop Residue Team

- Team Co-Lead W = Russ Karow (?)
- Team Co-Lead C =
- SGA Advisor = Thayne Dutson
- DOE Advisor = Richard Hess



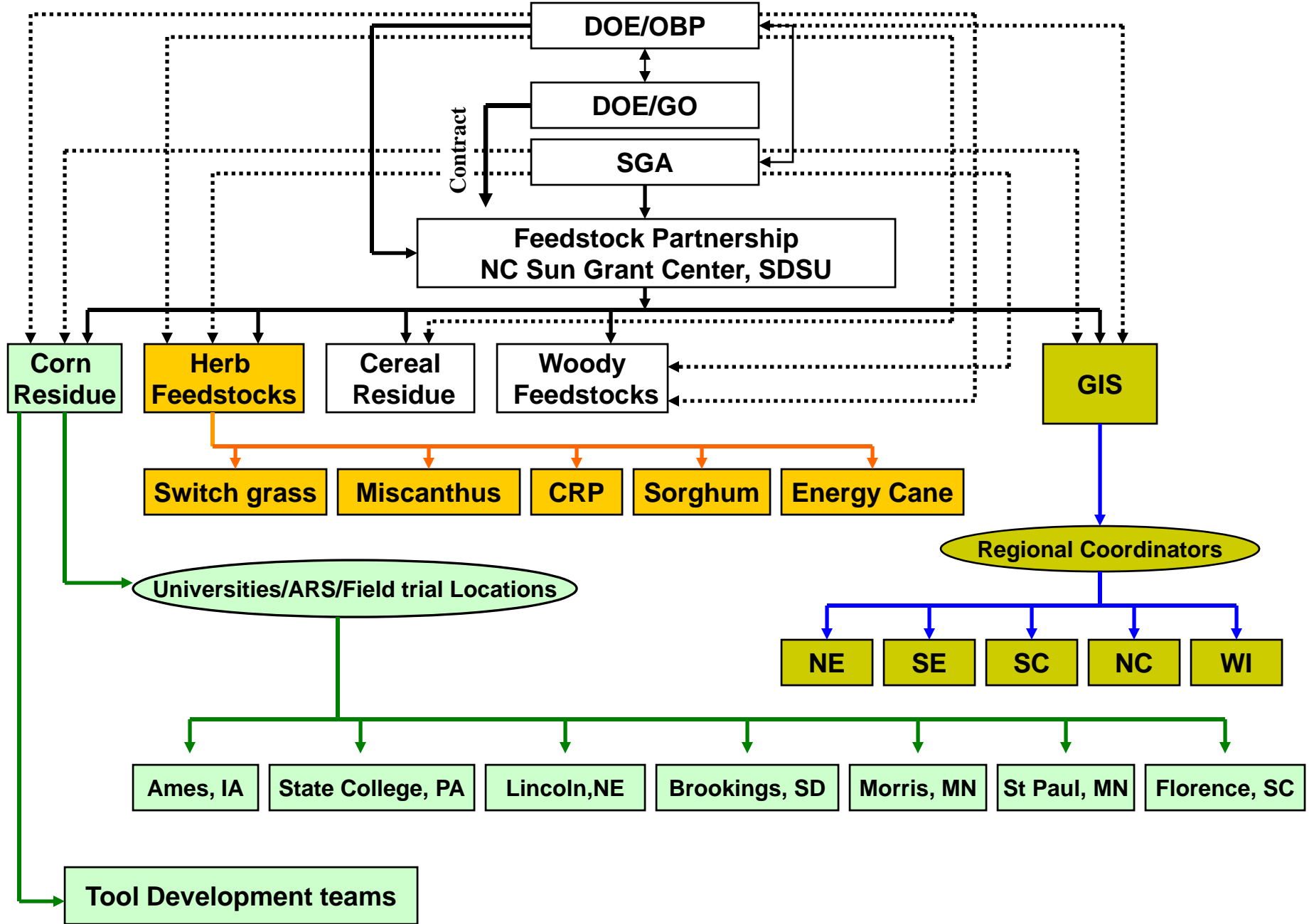
Cereal Residue Objectives/Outcomes

- Conduct replicated field trials across regions to determine the impact of residue removal on grain yield (in subsequent years).



Education & Outreach Outcomes

- BioWeb – Online Encyclopedia for bioenergy & bioproducts
 - Continue to update and add reviewed content
- National Sun Grant Web Page
 - Communicate activity and outcomes from the Feedstock Partnership
- Coordinators = Kim Cassel & Sam Jackson
- SGA Advisor = Jim Doolittle



Current Feedstock Partnership Structure



Outcomes for this Working Meeting

- Task teams present their current planned approach including experimental design for field plots and plot locations to other Task Teams and Feedstock Partnership Leadership.
- Open discussion leading to revision and finalization of experimental design & plot locations
- Coordination of activity among Task Teams, SGA, and DOE



Outcomes for this Working Meeting

- Final selection of 2008 research plot locations and understanding of what information is needed for NEPA review so sub-awards can be released.
- Develop a time-line for 2008 Task Team activities. Need to know roles and responsibilities and who (PI and Institution) is to receive funding.



Executive Summary Biomass Feedstock Partnership Workshops

Jim Doolittle, Director

NC Region Sun Grant Center



Workshops

- One held in each Sun Grant region.
- Partnership with US Dept of Agriculture, US Dept of Energy, National Biomass State and Regional Partnership and private and industry stakeholders.
- Executive summary has been made of the summaries from each workshop.



Two Common Issues

- Feedstocks vary across the country but emphasis was on those that can be produced in an environmentally sustainable manner and be economically deliverable to a biorefinery.
- Water availability is a concern across all regions, with limited water of particular interest in the South Central and Western regions.



CROP/ANIMAL RESIDUES

- The majority of the 17 residues identified in NC Region expected to come from small grain (wheat) straw, corn stover, manure and DDG.
- Residue sustainability critical, may be enhanced by breeding, agronomics, management, equipment modification, education, and outreach.



Crop/Animal Residues

- ❑ Cottonseed meal seen as viable in Mid-South – potential 19 trillion Btu per year.
- ❑ No competition for cotton gin trash.
- ❑ Broken rice – potential 14 trillion Btu per year with rice hulls and trash 32 trillion Btu per year.
- ❑ Poultry litter and manure possible sources but barriers to use.

Starch and Oilseed Crops

- NC region projected 65 billion gallons transportation fuels by 2030 while still meeting food, feed, and export markets. Ethanol from crop residues would provide 24 billion gallons. Starch and oilseeds would provide 41 billion gallons.
- Mid-South – limited acreage for biomass. Weather concerns. Estimate 20 billion gallons ethanol from starch crops.
- Mid-South recommends looking to summer annuals such as sunflower and also brassicas.

Lignocellulosic and Perennial Feedstocks

- NC region can exceed biomass production outlined in Billion Ton Study if economic return exceeds existing ag production systems.
- Land base will come from marginal lands and existing cropland.
- Many areas in NC region can supply a 50 million gallon per year biorefinery with lignocellulosic feedstock from within a 25 mile radius.

Lignocellulosic and Perennial Feedstocks

- Three gaps to address in NE region
 - extent of land base
 - who manages land
 - availability of agronomic adaptation inventories for numerous species on a range of land and ecological zones

Lignocellulosic and Perennial Feedstocks

- Other constraints, not limited to NE:
 - lack of organized feedstock organizations
 - fluctuating biomass supplies
 - low-energy-density feedstocks
 - transportation, storage, siting
 - lack of public knowledge
 - perceptions of feedstock prices



Woody and Forest Crops

- ❑ NC region crops include hybrid poplar, cottonwood, and willow.
- ❑ Advantage is year round harvest .
- ❑ Conceptual model suggests 400,000 dry tons biomass where each year 8-10 thousand acres of woody crops are planted.
- ❑ NC region projects 5-10 million dry tons per year but a barrier may be policies that restrict supply from public lands.

Woody and Forest Crops

- In the NE region where the resource is more dominant, and data on forest biomass and yield are very good. Data on removal are not strong. Data on wood products are even weaker. Knowledge gap that a GIS layer of wood-consuming facilities could go far to resolve.
- Other more serious knowledge gap is lack of understanding of landowner attitudes and management choices.
- Forest land not bought for harvest.



Woody and Forest Crops

- ❑ Infrastructure needs to be improved in NE to handle forest resources.
- ❑ Will national policies apply at the local, state, and regional levels?
- ❑ Major categories of woody biomass are forest restoration thinnings, logging slash, hazardous fuel reduction, rangeland restoration, urban wood waste, orchard, vineyard, nursery, Christmas tree residues, and energy crops like poplar.



Woody and Forest Crops

- ❑ Making fuel from cellulose is not yet economical and there are a number of technology hurdles.
- ❑ Policy incentives are needed.
- ❑ Barrier in Western Region is that forest resources are public and far removed from processing sites.
- ❑ Western region has large variety of potential woody feedstocks.



Woody and Forest Crops

- Gasification and pyrolysis accommodate a wide range and quality of feedstocks with more product options like alcohol and hydrocarbon fuels.
- Technologies could be easily adapted to Western region.



Economic and Engineering

- What feedstocks will be available and at what price?
- Large scale biorefineries do not make sense for all areas.
- Viable distances? End uses? Diversion to bioenergy and impact on price of other products?



Economic and Engineering

- In woody crop development, funding is needed more for people than trees – public education, landowner education, geneticists, silviculturists, process engineers.
- If first few enterprises not successful how do you sustain public confidence?

Cross-Cutting Concerns

- Are the assumptions of the Billion Ton Study accurate? They should be re-examined and refined. The 50% yield increase assumption is of greatest concern.
- What are long-term impacts of consistently removing the majority, if not all, of the biomass from a parcel of land on soil carbon, soil quality, water quality and quantity, nutrient cycling, and erosion?
- Impact on wildlife and biodiversity?
- Will biorefineries add to air pollution?



Cross-Cutting Concerns

- ❑ Public perception of biorefineries?
- ❑ False sense of improved economy?
- ❑ Will issues arise related to food production, food security, and food prices?
- ❑ Land use change – taxes, policy, government incentives?
- ❑ Audience targeting with message and education using folks at the land grants – eXtension and Bioweb.



Cross-Cutting Concerns

- Key to success of biomass feedstocks is the emergence of the biofuel market.
- Challenges many – technology, siting complexity, high capital requirements, fuel commodity market, difficult resourcing, pricing, and geographic distances.



Research Needs

- A repository of existing literature.
- Crop breeding and genetics.
- Investigation of long-term management systems for perennial and woody crops.
- Integrated systems research involving several feedstocks – diverse ag, forestry and urban landscape.
- GIS framework to assess potential supply curves for various feedstocks – land and climate changes.



Research Needs

- ❑ Best Management Practices for biomass and residue harvest.
- ❑ A new investment into sustainable bioenergy feedstock development – not a redirection of funds. Would require minimum of \$25 million per year in NE alone.
- ❑ Economic impact analysis of various biomass production and processing systems at state and regional levels.



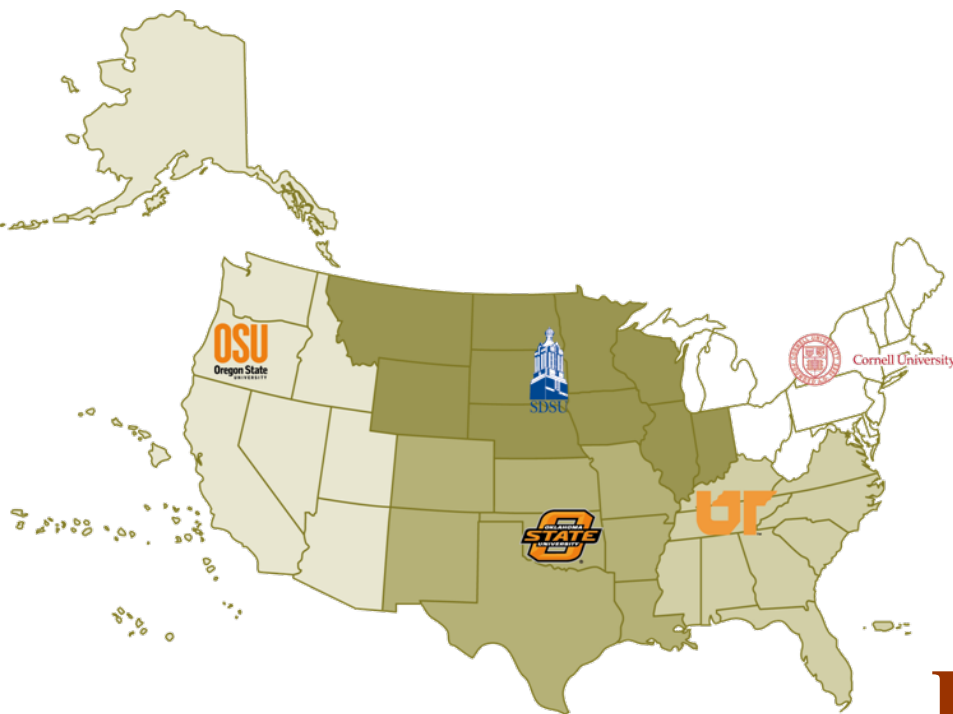
Research Needs

- Partnerships with industry and producer groups and with tribal governments to scale-up laboratory successes to pilot plants.
- Graduate and undergraduate programs to train future scientists and biorefinery managers.
- Complementary state and federal policies affecting biomass bioenergy and streamlining of the permitting process.

National Sun Grant Activities

■ BioWeb

- An online resource for bioenergy and bioproducts
- All reviewed content
- Went live April 1, 2007
- Will be continuously updated and expanded



BioWeb.SunGrant.org



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Welcome

The Sun Grant BioWeb is a non-commercial, educational website that provides current information about using biomass resources for bioenergy and bioproducts. This site is designed to help you understand:

- What biomass is, where it is, and how much is available
- The ways it can be converted to biofuels, biopower, and bioproducts
- The current state of biomass technology, research, production & use
- Biomass economics and policy

BioWeb's content authors, web, and database design teams are hard at work behind the scenes refining the system and content. Additional content will be added as it is available.

News

4.18.07: BioWeb has launched! A significant amount of our content is now available. Most current content is in the Technical Level, but more is added every day. If content you are seeking does not appear in the At a Glance or General levels, please shift to the Technical Level. As the system is being finalized over the upcoming weeks, additional pages will be accessible.

4.1.07: Authorized project participants (authors, reviewers, editors, & advisors) may log in using the "Contributors" link at left to submit, review or edit content.

Author Spotlight



Dr. Wallace E. Tyner
Purdue University

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