Task 2: Feedstock Improvement for Perennial Energy Crops

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Overall Aim:

*Deliver cultivars with improved performance and expanded range on marginal lands, including reclaimed mine land*
Tasks to achieve our aim:

Task 2.1 *Breeding of non-invasive triploid hybrids of willow displaying hybrid vigor*

Task 2.2 *Genetic basis for pest and disease resistance in willow and perennial grasses*

Task 2.3 *Breeding and selection of cultivars adapted for NE conditions*

Task 2.4 *Breeding and selection of willow and switchgrass for yield on reclaimed mine land*
2008 Genetic Selection Trial - Geneva, NY

- 24-plant plots, 3 replicates, 76 genotypes
- Biomass harvested from middle 8 plants in Dec. 2011

Six new genotypes ranked higher than ‘SX61’
Top genotype produced 21% greater yield
Achievements to Date:

Task 2.1 Breeding of non-invasive triploid hybrids of willow displaying hybrid vigor

- Attempted over 60 crosses
- Produced over 4,600 seedlings
- Of those, almost 1,000 are triploid
- Seedlings established in nursery beds in Geneva
Achievements to Date:

Task 2.2 Genetic basis for pest and disease resistance in willow and perennial grasses

- Switchgrass mapping population segregating for anthracnose resistance has been planted/rated
- Switchgrass fungicide/no fungicide trial planted at Rutgers
- Choice/no-choice pest feeding assays conducted on willow
Achievements to Date:
Task 2.3 Breeding and selection of cultivars adapted for NE conditions
• Willow yield trials planted at Willsboro, NY (poorly drained) and Fredonia, NY (low pH)
• Willow family selection trial planted in Geneva (284 entries)
• Switchgrass breeding nurseries established at Cornell & Rutgers
Achievements to Date:
Task 2.4 Breeding and selection of willow and switchgrass for yield on reclaimed mine land

- Established switchgrass and willow trials on reclaimed mine land in Philipsburg, PA
- Planted 4 acre willow demo field on reclaimed mine land in WV
- 2012 willow trial on mine land in Morgantown has very low survival
NE Sun Grant / NEWBio Regional Trials

- Yield Trials (24 cultivars, 48 plant plots)
- ★ S. purpurea Genetic Mapping Trials
- ★★★ Polyclonal Mixture vs. Monoclonal Trials
Future Plans:

• Genotyping-by-sequencing to map traits in willow and guide breeding & selection
• Continued evaluation of pest and disease resistance in willow and switchgrass
• Evaluate existing trials – add new trials?