2010 Annual Meeting of NEBCSA BioEnergy Tour
June 29, 2010

Tour leader:
Joe Lawrence
Field Crops Educator
Cornell Cooperative Extension of Lewis County

Joe Lawrence grew up on his family's dairy farm in Northern New York State (NNY). He earned degrees from SUNY Canton, Civil Engineering, AAS; SUNY Cobleskill, Plant Science, BT; and Cornell University, Soil Science, MSc. Since 2008 he has been part of the Agricultural Team at Cornell Cooperative Extension of Lewis County. In addition to his main focus in Field Crops and Nutrient Management, working with the counties large dairy industry, he has responsibilities in Renewable Energy for Lewis County and as part of a 6 county regional team in NNY. Much of this work has involved developing and enhancing the local utilization of woody and agricultural biomass crops for thermal applications and working with the Lewis County Community Digester Work Group on a proposed community anaerobic digester to enhance the dairy industry in Lewis County.

8:30 – 9:45 –
Biofuels Research Facility
Larry Walker – Department of Biological and Environmental Engineering
Riley Robb Hall

9:55 – 10:25 –
Grass Energy Crop Plots
Jerry Cherney, Department of Crop and Soil Sciences
Caldwell Field House

10:35 – 11:55 –
Cornell University Renewable Bioenergy Initiative (CURBI)
Award winning energy initiative of the College of Agriculture and Life Sciences
Drew Lewis, Operations Director, CUAES
Cornell Compost Facility

12:15 – 1:00 –
Lunch
Mt Pleasant

1:00 – 1:55 –
Grass Bioenergy
Jerry Cherney, Department of Crop and Soil Science
Mt Pleasant

2:00 – 3:30 –
Warm Season Grass Trials for Bioenergy
Hilary Mayton/Don Viands – Department of Plant Breeding and Genetics
Mt Pleasant and Hanshaw Road Plots

4:00 – 9:00
Happy Hour, Dinner and Awards
Myers Park, Lansing, NY

"Biofuels Research Facility"

Larry Walker – Department of Biological and Environmental Engineering

Our nation's success in developing sustainable biofuels hinges on creating effective multidisciplinary teams of biological and physical scientists, engineers, policy specialists, and economists. This need for a multidiscipline approach is apparent when one reviews the various agricultural, physical, chemical and biological components of a biofuels production system. Cornell is one of very few institutions in the world that can bring together so many physical and life scientists, engineers, and social scientists with the talent and interest in sustainable biofuels development. In 2009, Cornell University opened a state of the art biofuels laboratory to carry out biofuels research. The laboratory allows the University to strengthen its capacity in pretreatment, enzymatic conversion of cellulose to glucose and the co-fermentation of glucose to xylose to ethanol or butanol. The strategic goals in developing this laboratory are to:

- Expand Cornell's biomass pretreatment research and development capacity;
- Expand the research and development capacity for enzymatic conversion of cellulose to fermentable sugars and for fermentation of mixed sugar streams;
- Integrate pretreatment, enzymatic conversion, and mixed sugar fermentation around New York State energy crops.

At this tour stop, the group will visit with Research Support Specialist, Mr. Ed Evans, to learn about biofuels research and to tour to facilities.

"CURBI (Cornell University Renewable Bioenergy Initiative)"

Award winning energy initiative by the College of Agriculture and Life Sciences, Cornell University

Drew Lewis, Operations Director, Cornell Agriculture Experiment Station (CUAES)

The Cornell University Renewable Bioenergy Initiative is developing a state-of-the art research, education, and production facility that will demonstrate and evaluate multiple renewable energy technologies for conversion of locally generated biomass resources into heat, power and biofuels. The facility will provide a platform for research and an educational venue for students from Cornell and elsewhere, energy businesses, farmers, and community and economic developers. CURBI will take the organic waste generated by Cornell and turn it into energy, using multiple waste streams, including animal and food waste. Additionally, the Cornell University Agricultural Experiment Station, which is leading this initiative, manages extensive acreage of farmland and forests surrounding campus, from which appropriate agronomic crop and wood waste could be gathered. Dedicated biomass energy crops could also be produced in a sustainable manner to supply biomass for CURBI. The energy generated by CURBI will be used to heat larger facilities, such as greenhouses, or piped directly into Cornell's combined heat and power plant, or converted to electricity to supplement campus needs. CURBI will reduce Cornell's carbon footprint by supplying some portion of energy through green technology.

"Grass Bioenergy"

Jerry H. Cherney – Department of Crop and Soil Sciences, Cornell University

Grass bioenergy has many positive characteristics. Pelleting grass allows for efficient transportation of the fuel and efficient combustion. There are now a variety of mechanical mechanisms in pellet combustion appliances used to manage ash, either to keep it moving and prevent/minimize clinkering (ash melting), or to simply break up clinkers that form. Grass and other utility pellets have additional concerns. Grasses have higher (in some cases much higher than wood) N, K, Cl, S, each with its own concerns. N = NOx emissions. K = corrosion and buildup, and particulate emissions. Cl = catalyzes corrosion, particulate emissions, potential for chlorinated hydrocarbons, dioxins etc. S = particulate emissions and sulfate buildup issues. These issues are best dealt with by having a very high efficiency boiler, as well as having anti-corrosive components. We are testing pellet stoves and indoor and outdoor pellet boilers at the Mt. Pleasant facility for functionality and emissions when burning grass pellets. Emissions measurements include particulates, NOx, SO_2, O_2, CO, and CO_2. Desirable features on some European pellet boilers include: 1) feeding from a bulk hopper, 2) some type of suppression system to prevent burn-back in the storage hopper, 3) auto ignition, 4) some method of automated burn chamber cleaning, 5) auto ash removal, 6) auto cleaning of the heat exchanger elements, 7) some type of water tank heat storage system to buffer demand, 8) sufficient computer control to auto start/stop and adjust feeding and combustion air to optimize the burn process for high efficiency, and 9) some type of resistance to corrosion. Testing is being funded by the NYS Energy Research and Development Authority (NYSERDA).

"Warm Season Grass Trials for Bioenergy"

Hilary Mayton and Don Viands – Department of Plant Breeding and Genetics, Cornell University

The Forage Breeding Project, in the Department of Plant Breeding and Genetics, is part of a multi-disciplinary (plant breeding, plant pathology, seed science, soil and crop science, agricultural economics, agricultural education, weed science, plant biology, biological and environmental engineering) renewable energy research effort on the production of perennial grasses for use as bioenergy feedstock for conversion to liquid fuels, gases and combustible products. As part of a broad outreach, extension and education program, field trials have been established on producer's farms, at multiple SUNY institutions, and secondary school systems in New York. Through these on-going trials the research program has been able to collect data on yield potential, disease susceptibility/resistance, seed quality, nutrient use efficiency, input-output ratios, and plant biomass compositional characteristics relevant to the conversion industry such as lignin, hemi-cellulose, cellulose, ash and mineral concentrations. A best practices and management guide for perennial grass production for future producers and Cornell Cooperative Extension field crop educators is currently under development for the region.