



Roadside Resource Studied for Sustainable Energy Crops: An IDOT Renewable Energy and Revenue Source

Illinois has approximately 16,500 miles of state highways. Along those many miles are Illinois Department of Transportation (IDOT) rights-of-way (ROW) which grow grass that is mowed with taxpayers' money. But what if those miles of grass were renewable energy crops? A team of scientists at the University of Illinois at Urbana-Champaign including researchers at ISTC helped IDOT consider the feasibility of these lands for use in growing renewable energy grasses to be converted into fuel.

Solid Fuel

ISTC was a key partner in evaluating native grass species for their suitability for use in commercial stoves to potentially provide heat in IDOT vehicle garages and other facilities. ISTC evaluated four native plants as possible feedstocks: switchgrass, big bluestem, Indian grass, and prairie cordgrass. Each species has varying moisture and energy content, and different ash profiles. Switchgrass, due to its high ash content, presented the most challenge for combustion in residential stoves. The study successfully identified commercially available residential stoves capable of burning switchgrass as efficiently as wood pellets. Emissions from the stoves were comparable to wood emissions.

Liquid Fuel

Fermentation was also studied to produce ethanol from grasses harvested from along roadways. Various native grass species were planted in discrete plots along an Illinois roadway (left) to compare the properties of each as feedstock for biofuel production. Measurements showed that 1 metric ton of cordgrass, for instance, can yield 76-77 gallons of ethanol precursors, which is about 70% of the yield of corn (108 gallons ethanol per metric ton corn).

Implementation

The team developed a variety of implementable and commercially viable options for using the highway corridor grasses. They explored which grasses, processes, products, and markets could be established. IDOT mows about 100,000 acres and the cost to IDOT is \$75 per mowed acre. The team estimated that the cost savings would be \$10 per mowed acre from using the biomass energy crop. The biomass grown on rights-of-way property has the potential to replace 160,000 barrels of crude oil and avoid CO₂ emissions of 68,800 metric tons (0.43 metric tons CO₂/barrel).

With recently acquired new project funding from IDOT in 2017, the team will take feasibility information previously determined for implementation and use it to develop:

- Pilot tests – Maintain and help harvest the current test plot near Rantoul, IL. Establish a new 10+ acre biomass production parcel on an IDOT ROW in Madison County near Edwardsville, IL, and document production activity.
- Procedural documentation – Develop standard operating procedures documentation for logistical operations along with a strategic plan for future expansion of production capacity.
- Biomass product tests – Assist IDOT with efforts to process and move products in various formats (bales, pellets and liquid fuel) into existing commercial markets.

Biofuels & Biodiesel

Carbon Capture

Waste to Energy

M-BREWW

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