Evaluation Of Alternative Bioethanol Feedstock Crops
John A. Rodgers*, Michael K. Bomford, Brian Geier, Anthony Silvernail

Introduction
Growing concern about foreign energy dependence has led to increased interest in biofuels as domestically-produced alternative energy sources. The United States is now the world’s largest producer of ethanol fermented from plant carbohydrates. More than 95% of this ethanol is currently made from the grain of corn (Zea mays L) through a production process that consumes 75-90% as much energy as is available from the fuel. 1 Other crops may offer superior energy returns, or be more compatible with sustainable production systems suitable for adoption by limited-resource farmers.

Materials and Methods
Corn, sweet sorghum (Sorghum bicolor L), sweet potato (Ipomoea batatas L), and Jerusalem artichoke (Helianthus tuberosus L), were grown in 2 x 4 m plots on land in transition to organic production at the Kentucky State University Research and Demonstration Farm. Each plot contained three crop rows, spaced 90 cm apart. Treatments were replicated four times. Jerusalem artichoke tubers were planted 30 cm apart on 1 June, 2007; sweet sorghum was seeded with a push seeder on 6 June; sweet potato stumps were planted 30 cm apart on 8 June; and sweet corn was hand-seeded 15 cm apart on 12 June. All rows were irrigated with drip tape as needed, beginning on 12 June.

Corn was hand harvested on 6 September. Grain was dried and removed from cobs. Sweet potato was harvested on 8 October using a potato digger attached to a walk-behind tractor. Sweet potatoes were cured in a warm (~26°C), humid high tunnel for 10 days, before storage in a cool dark location. Jerusalem artichoke tubers were dug and removed from stems and leaves on 10 October. Sweet sorghum was cut on 10 October. The stalks were pressed to extract juice on 11 October.

Results
Top graph illustrates overall yield data with Standard Error. Bottom graph illustrates carbohydrate and expected ethanol yield. Conversion values from Matheson (1980) were used to convert crop yields into carbohydrate yields and expected ethanol yields.2

Conclusion
• Sweet potato and sweet sorghum are potentially superior alternatives to field corn as a bioethanol feedstock.
• Sweet potato and sweet sorghum are compatible with sustainable production systems suitable for adoption by limited resource farmers.

References