ACTION IN AGROFORESTRY

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UMCA director helps to plant seeds for an advanced biofuel economy

This article is adapted from the original piece by Megan Cassidy that was published in the July 28th issue of the Columbia Missourian.

UMCA director Dr. Shibu Jose is part of a growing contingent of researchers who are working to establish a biofuel economy based in the floodplains of the Mississippi and Missouri Rivers.

The most recent proposal from Dr. Jose and his team would involve converting less than one percent of the 116 million acres of the floodplain area to biomass crops. This would create a "corridor of sustainable biomass and advanced biofuel production." The proposed crops include seven types of grass and tree plants: Cottonwood/Poplar and Willow (trees), Switchgrass and Miscanthus (grasses), Energy Cane and Sweet Sorghum and Biomass Sorghum.

These biomass crops are a viable alternative to corn and soybean crops that are currently cultivated in marginal areas, which are prone to failure due to flooding or soil erosion, and they must be replanted yearly. With the exception of sorghum, all of the crops listed above are perennials, which would help to reduce farmers' yearly workload.

Jose and his team of researchers and industrial partners are also sensitive to the food vs. fuel debate. That's why they are targeting land that would be high risk or unproductive for corn and soybean. They also believe that the lower-input perennial production systems that they propose will help reduce nutrient and sediment loading to the streams and rivers thereby easing up the hypoxia "dead zone" in the Gulf of Mexico.

The immediate goal is to unite the various players in the biomass and biofuel industry behind the common goal of creating a financially stable biomass and biofuel production system for the U.S. More than 50 partners from every area of the industry supply chain have agreed to back the effort.

"The technology to produce advanced biofuels is rapidly evolving; however, the development of a sustainable feedstock system has not been on pace with the technology development," Dr. Jose said. "The biomass crops that we have identified include both woody and herbaceous species that are both flood and drought tolerant," he added. "Many of them also require less chemical input, can hold the soil in place and provide habitat for wildlife while providing an income for landowners."

Rather than building a basic supply chain, Dr. Jose said the teams have added bankers, transportation experts and equipment manufacturers to the mix.

"There is no existing model that brings every player together like this in the region," he said.

He says if all goes as planned in the next five to 10 years, the Mississippi and Missouri river corridor could see:

- 1 million acres of biofuel crops
- The creation of dozens of advanced rural bio refineries (ARBRs) in the region, creating jobs and economic benefits in the states.
- A healthy, advanced biofuel industry producing 20 percent to 30 percent of the national goal of 21 billion gallons a year.

Dr. Jose's team has been awarded a grant from the Mizzou Advantage program. They are also applying for several federal grants worth millions of dollars, but the programs are highly competitive.

"We've decided as an institution to move forward with the consortium," he said.

(Top Photo) Ray Glendening, left, shows Shibu Jose how tall the new willow plants should grow in one year at the Horticulture and Agroforestry Center (HARC) in New Franklin. Photos by Columbia Missourian photographer Cherish Grimm.

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Kudos

Chung Ho Lin has recently had a book chapter accepted for publication by the American Chemical Society. He will also showcase two of his inventions; a Spore-Based Biocatalyst for Pollution Removal and Biofuel Production, and a Purification of A Bioactive Saponin from Phytolacca latbenia, at the 2011 Missouri Technology Expo, Sept. 8, 2011.

RESEARCH

The following presentations were given by UMCA faculty at the National Walnut Council 7th Research Symposium which was held July 31st - August 3rd in Madison, Wisconsin.

Shibu Jose: "Integrating Walnut into Agroforestry Practices"

Mark Coggeshall: "Breeding Black Walnuts in the Age of Genomics."

The following poster by UMCA external collaborators **William R. Reid** and **Andrew L. Thomas** was also presented at the Research Symposium.

"Influence of Foliar Fertilization on Black Walnut Foliar Zinc Levels and Nut Production."

SUMMARY— The impact of foliar zinc fertilizer application on nut bearing black walnut (Juglans nigra L.) trees was studied. Foliar sprays were applied three times per season during four growing seasons with 100 ppm zinc, starting at leaf burst and continuing at two week intervals. The fertilizer treatment significantly increased leaf zinc levels but did not impact nut production. Results from this trial indicate that the zinc standard for black walnut foliar nutrient analysis may be similar to the standard established for Persian walnut, 25 -100 ppm.

The recent experience of a commercial black walnut grower in Iowa has indicated that zinc foliar sprays may prove critical for reducing alternate bearing and increasing nut yield. Zinc foliar sprays have been used effectively to correct zinc deficiency and increase nut yield in pecan.

We detected no phytotoxicity related to the application of foliar zinc to black walnut at the concentrations applied in this test. Levels of zinc found in the leaves receiving zinc foliar sprays were significantly higher than those that did not receive treatment. Zinc levels were increased by foliar fertilization during all four years of this study with both cultivars responding similarly.

Black walnut yield was not influenced by zinc foliar fertilization. Yields harvested from 'Emma K' trees were more erratic (year to year) than yields of 'Sparrow' trees. The yield response from zinc fertilization observed by others may have been the result of the destruction of soil organic matter caused by his frequent tillage of the orchard floor. Zinc available to tree roots is largely held in the soil within the organic fraction. The destruction of soil organic matter by tillage can lead to zinc deficiency in pecan and most likely influenced the black walnut orchard in Iowa.

Ranjith Udawatta was invited by the Inner Mongolia Agricultural University (IMAU) in Peoples Republic of China to lecture on conservation agroforestry buffers. During his stay in China in July, he visited several agricultural, forestry, and replanting projects in the region. In the Dalou Research site in Zhungeer, he met with farmers and discussed multi functional riparian type buffer systems to protect water bodies and wind breaks to reduce water loss and wind erosion. The main concern was to conserve water from newly established agriculture, economic plants and forestry. Tomato and cucumber are grown inside polythene covered structures to reduce water stress. He also had an opportunity to visit tree planting programs in desert areas where irrigation is provided to improve survival during the first three years. The site consisted of mulberry plants to feed rabbits for additional income and forestry for long-term site restoration. The photo shows a Pinus sylvestris planting protected by a windbreak row. Water and soil conservation districts, forestry department and private sector participation for replanting has been impressive. He also discussed possible collaborative research projects with the Center for Agroforestry and IMAU.

COMING SOON...

Sept. 8	Missouri Technology Expo Christopher S. Bond Life Sciences Center, MU Campus
Sept. 24	CAFNR South Farm Showcase MU South Farm off of New Haven Rd.

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