U.S. Department of Transportation

SunGrant INITIATIVE

Northeast Region

DEVELOPING THE POTENTIAL OF HAZELNUTS AS A FEEDSTOCK FOR BIODIESEL AND OTHER OLEOCHEMICALS IN THE NORTHEAST

Dr. Thomas J. Molnar, Rutgers University

This project investigated the tree-seed, hazelnut, as a potential feedstock for biodiesel. Calculated yields per hectare are estimated to be 0.89 tonnes of oil (compared to 0.5 tonnes per hectare for soybean) based on production in the North Western US. Production in the Northeast has been limited by the disease, Eastern Filbert Blight (EFB).

A collection of hazelnuts at Rutgers, the State University of New Jersey, has over 5,000 hybrid plants with 200 identified that are well-adapted, productive, and resistant to EFB (Eastern Filbert Blight)..

The project taps into this resource and performed the following analyses:

1) Evaluated kernel percentage and crude kernel oil content in the top 200 genotypes.
2) In the top 25 performers, evaluated fatty acid content and types
3) In the top 10 performers, clonally propagated and established a replicated yield trial.

PI: Dr. Thomas Molnar
Rutgers, The State University of New Jersey,
Department of Plant Biology and Pathology

Co-I: Dr. Joseph Goffreda
Rutgers, The State University of New Jersey,
Department of Plant Biology and Pathology

Funded: $58,062
Start Date: 09/01/2007
End Date: 12/31/2009

Sun Grant Funding Source:
United States Department of Transportation

Other Sources of Funding:
Rutgers, The State University of New Jersey

RESEARCH FINDINGS AND IMPACTS

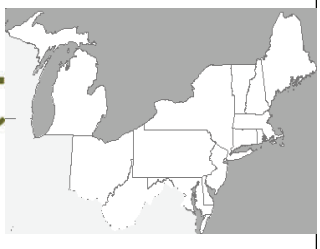
At the conclusion of this project, 15 superior hazelnut genotypes (clones) that showed the greatest potential for kernel and oil production in the northeast were selected from more than 200 adapted disease-resistant plants growing in field nurseries at Rutgers. Nuts were harvested and evaluated over three seasons (September 2007, 2008 & 2009). The 15 superior genotypes were chosen from a diversity of genetic backgrounds and sources of complete resistance to the major disease eastern filbert blight (EFB), which should prove to enhance durability of resistance in production orchards in the long-term, eliminating the need for fungicide applications for EFB control (select individuals were chosen from resistant lines described in Molnar et al., 2009). Each genotype (based on single plant accessions) demonstrated consistent production of nuts over the three year period and each had a kernel oil content of more than 60%, an average single kernel mass of 1.2 grams or larger, and an average kernel to shell ratio of over 50%. While kernel oil content and kernel percentage were generally less than that of the cultivar 'Casina' known for its high oil content and thin shells 'Casina' is highly susceptible to EFB and cold sensitive in the northeast U.S. and the kernel mass of our selections were greater. The genotypes identified in our program represent the most improved, EFB resistant, cold-hardy plants adapted to the northeast with the highest likelihood to yield economically valuable amounts of oil.

These genotypes have been clonally propagated for replicated yield trials in multiple locations, including several sites in New Jersey, three in New York (western NY and two in eastern Long Island), one in south central Pennsylvania, and one at the University of Nebraska, Lincoln. Four of these replicated trials are being sponsored in part by a Northeast SARE grant as well as by private donations of land and time from cooperating farmers. These trials, located at research institutions and private farms, will be under intense evaluation for seven years (2009-2016) to provide sufficient data to identify the most widely-adapted, disease resistant, reliably high-yielding clone(s) suitable for patenting and subsequent release to commercial growers.

The work funded by this seed project allowed for the implementation of these replicated trials, representing a fundamental step in commercializing hazelnuts as a potential oil crop in the northeastern U.S.

USDA Specialty Crops Research Award "Enhancing Hazelnut Production, Feedstock, and Biofuel Potential through Breeding for Disease Resistance and Climatic Adaptation ($1.39 million; Rutgers, Oregon State Univ., University of Nebraska, Lincoln, the National Arbor Day Foundation). Rutgers contribution to this proposal was significantly leveraged by data generated through this Sun Grant seed project.

Molnar, T.J., J.M. Capik, and J.C. Goffreda. 2009. Response of hazelnut progenies from known resistant parents to *Anisogramma anomala* in New Jersey, U.S.A. Acta Hort (ISHS) 845:73-81

U.S. Department of Transportation

SunGrant INITIATIVE
Northeast Region