Final Report

RERF Spring 2008-09 Award for Equipment Proposal

Apparatus: NMR 20-23 MHz Spectrometer

Title: NMR 20-23 MHz Spectrometer for use in Determining Oil, Protein, and Moisture Content of Oil-Seed and Other Crops

(Award amount: $47,900)

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The RERF funds were expended with the College of Agricultural Sciences, the OSU Seed Services Program and the OSU Seed Lab sharing the difference between the full price of the NMR 20-23 MHz Spectrometer ($59,800) and the amount of the award ($47,900).

The scholarly activities made possible as a result of the RERF funding

- **Meadowfoam Research in the Dept of Crop and Soil Science, OSU**

  The NMR is currently used to determine the oil content of meadowfoam samples from the breeding and weed science projects in CSS. Prior to the purchase of the NMR, meadowfoam samples were sent to the University of Georgia for oil analysis. Having the NMR at OSU saved approximately a two-month processing period at GA and made it possible to select the best genotypes from the summer harvest in time for fall planting. Similarly, results from weed management trials can be interpreted and used to plan experiments for the next season. As a winter annual, meadowfoam fits well into grass seed rotation systems in the Willamette Valley and contributes positively to the economy of Oregon farmers. The Oregon Meadowfoam Growers contribute over $50,000 in annual funding to OSU and pay more than $40,000 in seed royalties on an annual basis.

- **Soybean Oil and Protein Research in Malheur County**

  Soybean variety development work has been conducted at the Malheur Experiment Station. The ultimate objective of this work is to provide an alternative crop option for Oregon growers. The NMR has been used to determine varieties with highest oil content. More than 300 acres of soybeans will be grown in western Oregon in 2011. Royalty income will be obtained from OSU developed varieties.

- **Soybean Oil and Protein Research with Washington State University and Iowa State University**

  WSU and ISU also have soybean breeding program. OSU scientists are doing cooperative work with them in genotype assessment for high oil content. This
work could lead to new varieties for Oregon use.

- **Canola and Camelina Research for Willamette Biomass Processors**

  Willamette Biomass Processors of Rickreall is the current western Oregon leader in biomass processing for biofuels use. The OSU Seed Lab is cooperating with WBP to evaluate meals of canola and camelina for use as animal feed following experimentation with various oil extraction techniques. The goal is to maximize profit in oil extraction of these crops which can be grown by Oregon growers.

**Additional activities the RERF funding made possible for the investigators**

Training of undergraduate students in the use of NMR equipment and techniques. Undergrads are the primary work force for crop science projects across the state. These student employees are running samples through this NMR instrument under the supervision of the Co-I.

Determined the oil content of Jetropha, a new crop that may have potential as an oil crop in the west coast.

Determined the oil content for various entries of sesame seeds. Results from OSU were compared with Texas A&M University results.

The NMR is expected to be instrumental tool in potential biofuels and bio-products research. Canola, camelina, flax, mustards, safflower, sunflower are among the crops that will be included in such studies.

There also is interest in breeding oat cultivars with high oil content as an oil source for high value human healthcare products. The NMR will be essential in this work.

**Research studies that have been developed as a result of the RERF funding**

See meadowfoam and Malheur County soybean work above – annual support and/or royalty income to OSU will result from both efforts.