

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 226-G

Project Title:

Native Hazelnuts: A Multifunctional New Crop for Minnesota

LCCMR 2010 Funding Priority:

G. Creative Ideas

Total Project Budget: \$ \$193,968

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$0

Summary:

Native American hazelnuts have great potential as a perennial food and energy crop. We will identify ideal plants in each sub-ecozone and propagate as an alternative to annual crops.

Name: Donald Wyse

Sponsoring Organization: U of MN

Address: 411 Borlaug Hall, 1991 Upper Buford Cir
St. Paul MN 55108

Telephone Number: (612) 625-7064

Email: wysex001@umn.edu

Fax: (612) 625-1268

Web Address: _____

Location:

Region: Statewide

County Name: Chippewa, Dakota, Fillmore, Redwood, Todd, Wabasha

City / Township:

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

MAIN PROPOSAL

PROJECT TITLE: Native Hazelnuts: A Multifunctional New Crop for Minnesota

I. PROJECT STATEMENT

The ultimate goal of this work is to develop hazelnuts (*Corylus spp.*), a native woody perennial, as an alternative to annual crops for their multiple environmental benefits. The benefits of perennial crops are outlined in the 2008 Minnesota Statewide Conservation and Preservation Plan (pp. 119-122): they cover the soil and protect it from soil erosion year round; they reduce runoff and leaching and thus protect water quality, both from sediments and nutrients; they increase soil carbon sequestration and enhance soil quality; they are less sensitive to drought and flooding than annual crops; and they provide habitat for wildlife. Additionally, they can occupy marginal lands, thus stabilizing agricultural incomes. Hazelnuts are a uniquely multifunctional crop with a four-tiered potential market: as high-value fresh-eating nuts, as ingredients in processed food, pressed for oil, and as a potential foundation species for a perennial plant-based bioeconomy. Hazelnuts have potential as a biofuel because their oil quality is superior to soybean oil for biodiesel and because their oil content is about three times as high as soybeans. As a biofuel, they would help to fulfill the recommendation of the Statewide Conservation and Preservation Plan that renewable fuel feedstocks be transitioned from annual to perennial crops (Agricultural Land Use Recommendation 4, p 119). It is likely that the ratio of energy produced to energy consumed for production of biofuels from perennial crops such as hazelnuts will be more positive than the ratios of 1.25 and 1.93 reported for ethanol from corn and biodiesel from soybeans, respectively, due to their lower requirements for energetically expensive tillage, fertilizers, and pesticides. Given the tremendous potential of bush-type hazelnuts as a specialty crop and foundation species for the bioeconomy, and the nature of the bottlenecks currently restraining the industry, targeted investment of public resources at this time is likely to have significant and rapid positive impact on development of the hazelnut industry in Minnesota.

This proposal outlines an approach toward development and commercialization of the hazelnut industry in Minnesota with the following objectives:

1. Identify hazelnuts with high yield potential through a cooperative plant selection program.
2. Develop low-cost commercially appropriate propagation techniques for hazelnuts.
3. Develop best-management practices for establishment and management of hazelnuts.

II. DESCRIPTION OF PROJECT RESULTS

Deliverables	Completion Date
Result 1. Identify hazelnuts with high yield potential through a cooperative plant selection program.	
Budget: \$63,850	
Deliverables:	
<i>I-1.</i> Develop a plant evaluation and selection program for <i>C. americana</i> hazelnut plants. We propose to identify superior hazelnut plants from 30 sites from across Minnesota. From these sites we will select 30 plants with resistance to Eastern Filbert Blight (EFB) and big bud mite (BBM), and high nut yield.	<i>30 plants identified Oct. 2010</i>
<i>I-2.</i> We will vegetatively propagate the elite plants identified in 1-1 by mound layering, and establish them in four evaluation nurseries, located in key ecozones, which will be the foundation of a long-term development program.	<i>nurseries established June 2011, evaluations on-going</i>

Result 2: Develop low-cost commercially appropriate propagation techniques for hazelnuts in the upper Midwest.		Budget: \$63,978
Deliverables:		
2-1. Stem cuttings. Building on previous trials with stem cuttings, we will use cuttings from unselected plants currently on U of M experiment stations to test the effects on rooting of pre-treatments of bushes, and misthouse temperature and humidity conditions.		<i>Sept. 2013</i>
2-2. Development of stool beds for commercial mound layering. We will use surplus rooted layers from 1-2 to establish stool beds on which to conduct trials on methods of mound layering that are suitable for commercial production.		<i>stool beds established June 2011,</i>
Result 3: Develop best-management practices for establishment and management of hazelnuts.		Budget: \$66,140
Deliverables:		
3-1. Stock plant type, site preparation, and weed control. In an experiment at three sites, we will compare 1- and 2-year old rooted layers with bare-root dormant seedlings, land prepared with tillage versus herbicide only, and five methods of post-plant weed control, including herbicide, cultivation, mowing, landscape fabric, and woodchip mulch.		<i>Trials complete June 2013.</i>
3-2. Nitrogen fertilization of bearing plants. We will compare three approaches to N fertilization of plants that are producing nuts: applying a fixed rate of N every year, applying N based on leaf N levels, and applying N based on N removed in the previous year's harvest. Four existing on-farm sites will be used for these trials.		<i>Trials complete Oct. 2013.</i>
3-3. Cover cropping for weed control and nitrogen fertilization. We will compare five types of cover crops seeded between hazel rows (a legume mix, an exotic grass mix, a native grass mix, a legume-exotic grass mix, and a legume-native grass mix) to see if they can adequately suppress weeds and fix enough nitrogen to fulfill the N requirements of the hazelnuts.		<i>Trials established June 2013.</i>

III. PROJECT STRATEGY

A. Project Team/Partners

- Donald Wyse, Professor, Agronomy and Plant Genetics, U of M, will be the PI on this project.
- Lois Braun, Research Associate, Agronomy and Plant Genetics, U of M, will manage the project.
- Norm Erickson, Hazelnut Grower, Lake City, will host evaluation nurseries and agronomic trials.
- Jeff Jensen, Acting Director, Minnesota Hazelnut Foundation, will be the grower liason.
- Jill Sackett, Extension Educator, U of M Extension, Fairmont will do outreach.

B. Timeline Requirements. Plant germplasm evaluation programs, are by nature, long-term, especially so for slow-growing perennial plants such as hazelnuts. Thus we will only be able to complete the establishment of the evaluation nurseries within the three year time frame of this grant. We should be able to make good progress on development of propagation methods within the grant period, and we should be able to complete at least the agronomic trial on establishment methods.

C. Long-Term Strategy. Because of the long-term nature of this project, we will need to seek additional funds in order to complete it. We will submit a proposal for five years of funding to the USDA Specialty Crop Research Initiative grant program in April 2010. LCCMR funding will enable us to reach the 100% match required by this federal program. Ultimately, we hope to generate sufficient funds to keep a hazelnut evaluation program going through a combination of support from the Minnesota Hazelnut Foundation and from hazelnut producers.

Project Budget

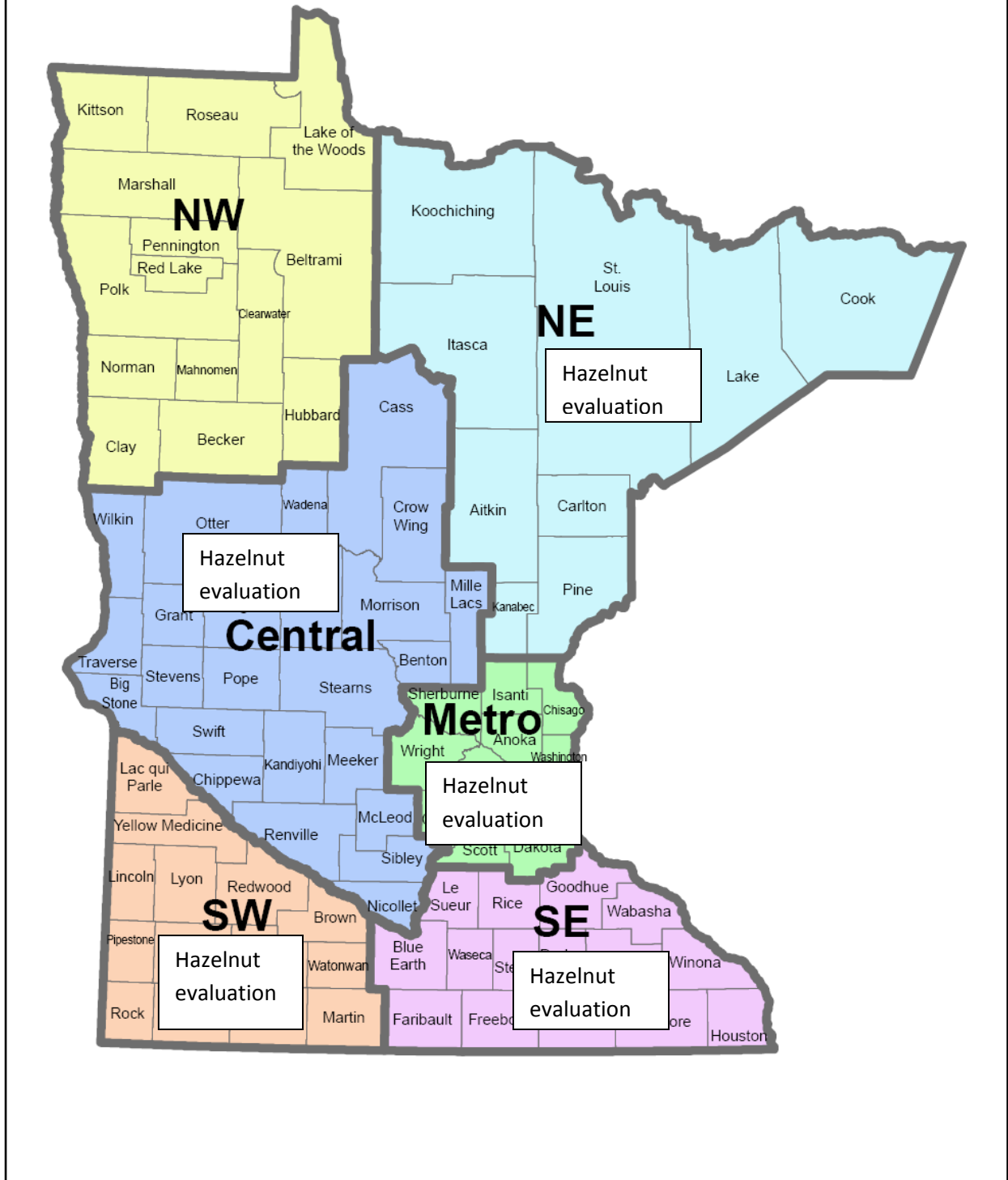
IV. TOTAL PROJECT REQUEST BUDGET (3 years)

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	\$ 170,989
1 Post-doctoral Research Associate \$38,940/yr. salary; \$17.14% fringe x 3 years + 3% increase = \$140,989	
1 University of Minnesota Extension Worker \$5,000/yr x 3 years = \$15,000	
1 Undergraduate Student Worker \$496/hrs/yr @\$10/hr + 7.14% fringe = \$15,000	
Contracts:	\$ 7,754
On-farm plot maintenance: to cooperating farmers for costs related to maintenance of on-farm research plots. \$400/yr x 3 years = \$1,200	
Leaf analysis: 800 leaf samples at \$1.80 each in lab of USDA-ARS scientist Michael Russelle = \$1,440	
Soil analysis: (14 complete soil analyses @ \$20 each = \$280) and (248 samples for organic matter only @\$5.50 each x 2 years = \$2,728) at the University of Minnesota soil analytical lab. Total \$3,008	
Greenhouse and growth chamber rental: (\$72/year misthouse rental x 3 years = \$216) and (9 growth chambers for 70 days each @ \$3/day = \$1,890). Total \$2,106	
Equipment/Tools/Supplies:	\$ 6,600
Supplies needed for field and greenhouse work: landscape fabric, mulch, drip hose, greenhouse supplies, fertilizer, cover crop seed, etc. \$6,600	
Acquisition (Fee Title or Permanent Easements):	N/A
Travel:	\$ 8,625
To hazelnut survey and experimental plot sites: 4,500 miles/year @ \$0.55/mile x 3 years plus \$400/year for lodging.	
Additional Budget Items:	N/A
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 193,968

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period:	N/A	
Other State \$ Being Applied to Project During Project Period:	N/A	
In-kind Services During Project Period:	\$ 5,057	
Donald Wyse, 1% effort, \$4,057 [Salary and fringe @32.3%] x 3 years		
Remaining \$ from Current Trust Fund Appropriation (if applicable):	N/A	
Funding History:	\$ 40,460	
Grant from Three Rivers RC & D for Productive Conservation on Working Lands (May 2008 through Oct. 2009)		

Minnesota (By Region)



BIOGRAPHICAL SKETCH

DONALD L. WYSE

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University of Minnesota, St. Paul, MN 55108
Phone: 612-625-7064, E-mail: wysex001@umn.edu

EDUCATIONAL HISTORY

The Ohio State University, 1970, B.S., Agronomy
Michigan State University, 1972, M.S., Crop Science (Weed Science)
Michigan State University, 1974, Ph.D., Crop Science (Weed Science)

PROFESSIONAL POSITIONS

Founding Director, Minnesota Institute for Sustainable Agriculture, Univ. of Minnesota, 1992-2000
Co-director, Center for Integrated Natural Resources and Agricultural Management, 1995-present
Professor, Dept. of Agronomy and Plant Genetics, University of Minnesota, 1986-present
Associate Professor, Dept. of Agronomy/Plant Genetics, University of Minnesota, 1980-1986
Assistant Professor, Dept. of Agronomy and Plant Genetics, University of Minnesota, 1974-1980

PROFESSIONAL ORGANIZATIONS AND HONOR SOCIETIES

North Central Weed Science Society
Weed Science Society of America
Sigma XI

Plant Physiology

HONORS AND AWARDS

Co-author of the Outstanding Paper published in Weed Science, 1987
Weed Science Society of America Outstanding Young Weed Scientist, 1987
Outstanding Teacher Award in the College of Agriculture, 1988
Weed Science Society of America Outstanding Teacher Award, 1991
Outstanding Faculty Performance Northrup King Award, 1991
CIBA-GEIGY Award for Outstanding Achievement in Agriculture, 1991

TEACHING EXPERIENCE

My responsibilities include teaching and supervising graduate student research in weed science and cropping systems.

AGRO 4503 (3 credits), Biology, Ecology and Management of Invasive Plants

RESEARCH AND MANAGEMENT EXPERIENCE

Donald Wyse is a Professor in the Department of Agronomy and Plant Genetics at the University of Minnesota, St. Paul, where he teaches and conducts research in weed management, cropping system development, and plant breeding and selection. His research concentrates on biological weed management, development of multifunctional agricultural systems, perennial crop breeding, and legume and grass seed production systems. He has focused his research efforts on the development of perennial cropping systems, cover crop systems, biomass prairie polycultures, and has studied their impact on soil and water quality. He has lead several multi-disciplinary research teams composed of university faculty and scientists from both state and federal agencies. He has experience in managing large multi year grants. Dr. Wyse was the founding Director of the Minnesota Institute for Sustainable Agriculture and currently serves as Co-director of the Center for Integrated Natural Resources and Agricultural Management at the University of Minnesota. Recent activities of the Center have led to the development of the Mississippi River—Green Land, Blue Water Initiative that includes universities, state and federal agencies, and NGO's that have organized to deal with the landscape issues that impact water quality in the Mississippi River and Great Lakes Basin. He was one of the founding organizers of the Midwest Cover Crops Council and is an active member of the Executive Committee.