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## Developing Hazelnut Germplasm for the Upper Midwest

**Project Title:** Developing Hazelnut Germplasm for the Upper Midwest

**Coordinator:** Lois Braun

**Location:** University of Minnesota, St. Paul, MN

**SARE Grant:** \$175,000

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To read the full project report, go to [www.sare.org/projects](http://www.sare.org/projects) and search for project number LNC10-328.



*These hazelnut plants in Lake City, Minnesota, have been part of a larger study to identify and propagate high-performing and locally adapted hazelnut plants for the Upper Midwest. Photo courtesy of the Minnesota Clean Energy Resource Team.*

Known for the flavor and aroma they lend to coffee, nut pastes, confections, and pastries, the hazelnut is an alternative crop that has garnered interest in the North Central region. Turkey currently produces 75% of the world's hazelnuts, and Oregon's Willamette Valley produces 3%. Growers and researchers are hopeful that hazelnuts can fill a niche in the Upper Midwest as well.

Decades ago, hazelnut breeders crossed the native American hazelnut (*Corylus americana*) with its European cousin (*Corylus avellana*), attempting to combine the productivity of the Europeans with the disease resistance and winter hardiness of the Americans. Lois Braun,

a research associate with the University of Minnesota, has been building on their work to develop hazelnuts into a commercial crop in the Upper Midwest. She said the primary obstacle to a viable hazelnut industry in the Upper Midwest is the lack of consistent high quality adapted germplasm. The hazelnuts currently available in this region are seed-propagated, which means that they do not come "true to type". Although genetic diversity is desirable from an ecological perspective, a degree of predictability and uniformity is needed for a commercially viable crop. Almost all woody crops are vegetatively propagated, usually by grafting, which does not work with bush-type American hazelnuts and their hybrids, though it can be used with European hazelnuts, which are trees. Developing methods of vegetative propagation is one of the goals of other members of Braun's hazelnut research team. But first, genotypes that combine all of the traits needed for a commercial crop must be identified—that's Braun's job.

Braun started her hazelnut research as a graduate student working on nitrogen fertilization, which was funded in part by a 2005 NCR-SARE Graduate Student grant. That work led to the realization that improved germplasm was needed, which led to a recently completed 2010 NCR-SARE Research and Education grant on germplasm development.

Braun said her overall goal of working with hazelnuts is to diversify agriculture and enhance ecological and economic sustainability in the

Upper Midwest. Woody perennials such as hazelnuts have many ecological benefits. They cover the soil and protect it from soil erosion year round to reduce runoff and leaching. This protects water quality both from sediments and nutrients. They increase soil carbon sequestration and enhance soil quality, and provide habitat for wildlife. She also pointed out that hazelnuts can help stabilize agricultural incomes because they can provide economic return from windbreaks, shelterbelts, living snow-fences, lake and stream-bank buffers, and marginal land. They are more resilient than annual crops because they are less sensitive to drought and flooding, they have lower requirements for tillage, fertilizers, and pesticides, and timeliness of most of their management practices is not critical.

“The multifunctionality of hazelnuts makes them a potential foundation species for a perennial plant-based bioeconomy,” said Braun. “They have a four-tiered high-value potential market: growers may sell them as fresh-eating nuts, as ingredients in processed foods, or for pressing into oil, and may also collect payments for the conservation services they provide.”

Braun is part of the Upper Midwest Hazelnut Development Initiative (UMHDI), a group of growers, researchers and extension educators who are working to support the growth and commercialization of the hazelnut industry in the Upper Midwest through grower support, targeted research, and technology transfer. They conduct outreach at conferences, and maintain a website to help keep interested parties informed and connected. According to UMHDI, there are at least 130 hazelnut growers in Wisconsin, Minnesota, and Iowa. UMHDI hosts an annual Upper Midwest Hazelnut Growers Conference that attracts many of these growers.

UMHDI’s efforts to develop high-performing and locally-adapted hazelnut cultivars for the Upper Midwest started in 2006 as they scouted for superior hybrid hazelnut (*Corylus avellana* x *americana*) plants on farms and experiment stations in Minnesota, Wisconsin, and Iowa. In 2008, they started to propagate the best they identified. In 2010 they started a similar process with wild American hazelnuts (*Corylus americana*), which they then started to propagate in 2013.

With new germplasm being added every year, as of fall 2015 the team has assembled a total of 172 accessions in five germplasm performance trials, of which 150 are hybrids, 17 are pure American hazelnuts, and five are named varieties of European hazelnuts. These trials are located at Saint Paul, Lake City and Lamberton, Minnesota, and at Bayfield and Tomahawk, Wisconsin. The next step is to propagate the best genotypes to come out of these trials for further testing, some of it on farms. Because hazelnuts are slow-growing perennials, with a breeding cycle of 17 years, it will be a few years before named varieties are available.

Jason Fischbach, an agriculture agent with the University of Wisconsin Extension and a UMHDI program partner, was recently awarded a \$198,569 NCR-SARE Research and Education grant to take that next step.

“Previous SARE funding established replicated performance trials of superior hazelnut germplasm identified on grower farms,” said Fischbach. “This new project will continue the collaborative cultivar development work through establishment of on-farm trials of the best genotypes identified in the performance trials. In addition, this project will develop optimal post-harvest handling practices to optimize product quality and quantify chemical and flavor attributes of candidate hazelnut germplasm to enable market differentiation.”

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