

NRRI Mission:

Deliver research solutions to balance our economy, resources and environment for resilient communities.

www.nrri.umn.edu



From the Executive Director:

The Minnesota Legislature provided bipartisan financial support to NRRI during the last session that allow our researchers to continue their mission to the state.

Two bills, introduced by re. Sandstede and Senators Tomassoni and Eichorn, will help fund eight projects to advance opportunities in minerals, forestry, the emerging bioeconomy, energy management and resource planning. We understand that state funding comes with accountability and an expectation of return on that investment.

Thank you to our state leaders and the staff and members of the Legislative Citizens Commission for Minnesota Resources (LCCMR) for your trust in our programs. We couldn't do our work without the aid and support of our advisory boards and stakeholder groups, including the Minnesota Forest Resources Council.

Our researchers are excited to move ahead and stand committed to deliver.



NRRI Leadership

Rolf Weberg, Executive Director

Directors:

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George Hudak, Minerals & Metallurgy
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Hybrid poplar research expands across Midwest

Foresters anticipate growth in markets for biomass resources

It's lonely out in front for NRRI forest researchers. But when it comes to growing trees, it's best to be ahead of the pack. What they're anticipating is a growing demand for cellulose and other biomass resources for environmentally friendly chemicals, materials, energy and fuels. What they're doing is preparing Minnesota to be a leader.

"The consumers of the future will demand products that have reduced environmental impact," said Eric Singaas, director of NRRI's Materials and Bioeconomy Research Group. "People are becoming more aware of the impacts of synthetic products that live forever in our waste stream and fuels that contribute to global warming."

And when the economics line up to commercially produce those bioproducts, NRRI will be ready with a family of fast-growing hybrid poplar trees to meet the biomass need.

NRRI has been working for 20-plus years to develop hybrid poplar tree families that are a cross-breed of locally native cottonwood and European black poplar. These trees can reach maturity in about 10 years, as opposed to a typical aspen which would take about 40 years to grow the same size. They are a non-invasive tree that can be



Poplar breeder Bernie McMahon kneels to plant while Program Manager Neil Nelson looks on.

planted and managed as an agricultural crop, requiring intensive weed management during the first three years.

Now the research team is comparing the trees growth in northern Minnesota, central Iowa and southern Indiana with a grant from the U.S. Department of Agriculture. Identically bred trees will be planted in all three climate zones to select trees with parallel growth across the Midwest. The program will demonstrate the economic feasibility from agricultural forestry to consumer products.

"We're looking for broadly adapted genotypes because that's more cost efficient," explained Neil Nelson, program manager. "It can be expensive to have different breeding types for all the different zones."

Getting out ahead of the

anticipated future markets is important because trees – even these super-fast growing trees – take time. Consider the well-funded corn industry that breeds new species of corn in one season. That "season" for the hybrid poplar is about a decade, so patience is key.

The hybrid poplars are interchangeable with aspen and can be used for traditional markets, like pulp and paper. But additional USDA National Institute of Food and Agriculture funding will use forest biorefinery technologies to test hybrid poplar's potential to produce both biofuel and renewable plastics.

"Our challenge is to develop the materials of the future that achieve the goals of the circular economy, the principles of green chemistry and reduced life cycle carbon emissions," Singaas added.

Researchers proactive to stop spread of AIS

Anglers aren't the only ones who need to worry about clean-drain-dry. NRRI researchers travel from lake to lake to study the impacts of aquatic invasive species, among other things, and they sure don't want to contribute to the problem.

The solution—a high temperature, high pressure wash station with a specially engineered drainage system—was expensive. So Aquatic Biologist Josh Dumke sought another solution off site that could benefit more than just NRRI scientists.

A local car wash had almost everything needed, except the super-hot water.

"Our target is water temp of 150 degrees Fahrenheit," said Dumke. "Hot, hot water and high pressure will get the job done fast. It can kill many aquatic species in seconds."

Mike Podgornik, owner of Corridor 53 Car Wash, had the truck and trailer length bay with two spray wands. Working with NRRI, a boiler was added to achieve the hotter temperatures with a controller that only NRRI researchers can activate under a 10-year contract to reimburse the boiler expense.

Most importantly, the water runoff goes to the Western Lake Superior Sanitary District for processing before being released into the St. Louis River, which flows to Lake Superior.

"The St. Louis River Estuary has the most invasive species in the whole region and we're doing a lot of work there," said Dumke. "Before we go anywhere else, such as inland lakes, we



Scientist Zach Wagner uses the high pressure, high heat wash station set up at Corridor 55 Car Wash.

decontaminate our gear, boats and trailers. And now we can do it quickly by just pulling into this car wash."

NRRI is working with Podgornik to expand safe invasive species decontamination services to other users, like agencies and Universities doing water research, or fire and police water rescue squads.

"This is a really creative and collaborative solution," said NRRI Executive Director Rolf Weberg. "And it's always great when we can extend great ideas beyond our own walls."