

Reed Canary Grass is a Practical Source of Heating Fuel for Michigan's Eastern Upper Peninsula
By Gregory Zimmerman, Dept of Biology, Lake Superior State University

Reed canary grass is an abundant, non-native species in Michigan's Eastern Upper Peninsula (EUP). Widely considered a nuisance species, it is not preferred forage for livestock nor is it preferred by wildlife. But it has potential as an alternative energy source that would reduce dependence on fossil fuel, reduced carbon emissions and as a boost to the local economy.

In a previous project, we showed that from an energy standpoint, reed canary grass has the potential to be a useful source of fuel for heat in the EUP. Air-dried reed canary grass contains 8000 BTU/lb, as does wood and other plant materials. The productivity of this grass can exceed 1 ton/acre in typical fields. In Scandinavia and even in New England and Canada, reed canary grass is being made into pellets for use in pellet stoves. Our previous work showed that here in the EUP, reed canary grass contains 32x the energy required to harvest and pelletize it.

This paper reports on the results of a follow-up project in which we tested the practicality, at a small scale, of producing reed canary grass-based pellets and then tested how the pellets burned in a multi-fuel pellet stove. This project (# PLA-09-36) and the previous project (# PLA-07-48) were funded by grants from the Michigan's Department of Energy, Labor and Economic Growth's Biomass Energy Office. Funds for these grants were made available to Michigan via US Department of Energy's State Energy Program.

In early November, 2008, we harvested reed canary grass from a field on Taylor Side Road, just south of Sault Sainte Marie, Michigan. This field appeared typical of the many fields of reed canary grass throughout the EUP. We harvested the material with a haybine, picked up the cut material by hand and stored it under a loafing shed roof until the following March when we had purchased our processing equipment. We did not dry it other than the natural air drying.

Later that winter, we ground the material to pass a ¼" screen, using a hammer mill. We also ground corrugated cardboard from used shipping boxes. We also obtained some used frier oil from Lake Superior State food service and some spent brewer's grain from a local microbrewery (Tahquamenon Brewery). We then began to experiment with producing pellets from these materials, using a small pellet press (Model PP-PTO from PelletPro's Kewaunee, Illinois). The pellet press attached to the 3-pt hitch of a tractor and ran off of the PTO.

We tried various combinations of ground reed canary grass and small amounts of the cardboard and oil and also reed canary grass with small amounts of brewer's grain. We were able to make pellets that stuck together well and were resistant to breakage. Pellet density was comparable to the 40 lbs/cubic foot standard for wood pellets. With lower amounts of binder, pellets did not stick together (they had a fuzzy appearance) with more of the fine (unpelletized) material coming out of the pelletizer. There is no upper limit of our binder material. In fact, one can make pellets with 100% cardboard or 100% brewer's grain, but the idea is to use the resource of reed canary grass. We also tried ground maple leaves and pine needles collected from a yard in town. We were unable to make pellets with either of these materials as binders.

We then tested the pellets in a multi-fuel stove (Mt Vernon stove manufactured by Quadrafire, Colville, WA) we purchased from a local dealer. Pellets made from either recipe fed through the stove's auger well, burned well and produced no clinkers in the ash. The stove is mounted on a trailer, which has allowed for easy demonstrations of the pellets' use in the stove at various events in the EUP. Demonstration sites have included Sault and Pickford Farmer's Markets, as well as a meeting of the LSSU Board of Trustees and the Chippewa/East Mackinac Conservation District Board. Demos are scheduled for the Chippewa County Fair and Farm Bureau.

This project shows that reed canary grass is a practical feedstock for making pellets for use in a multi-fuel pellet stove. Larger scale production, such as producing pellets for sale commercially, would require other methods of mixing material and other aspects of running large amounts of material through the process per hour. A commercial scale enterprise would also require a group to form to develop a business enterprise. Anyone interesting in more information about making pellets on an individual scale or in coming together to discuss commercialization of this technology should contact Gregory Zimmerman, Lake Superior State University, Sault Sainte Marie MI 49783, phone 906.635.2470 email gzimmerman@LSSU.EDU.