Midwest EXTRA

Miscanthus pellets have potential for home heating

By **JOSH FLINT**

UNTIL cellulosic ethanol becomes a serious competitor to corn-based ethanol, biomass crops appear to be without a viable market.

To get folks to consider growing biomass crops such as miscanthus in the near term, the University of Illinois is studying the efficacy of so-called "bridge" markets. One such contender could be pelletized biomass, which is burned for energy. U of I professor Madhu Khanna, along with student Emily Freeh, recently examined the possibility of using pelletized miscanthus as fuel for pellet stoves for the home heating market. Miscanthus is a perennial grass native to regions of Africa and Asia. It grows up to 10 feet tall and takes three years to reach maturity.

Khanna compared miscanthus pellets to traditional heating systems such as natural gas and electricity. Currently, 81% of Illinois residents use natural gas, 12% use electricity and another 7% use some other means for heating their home.

According to U.S. Census data, the average Illinois home is around 1,770 square feet and uses approximately 690 therms for heating. Averaging data from the past three years, this family paid just over $750 to heat their home with natural gas.

Key Points

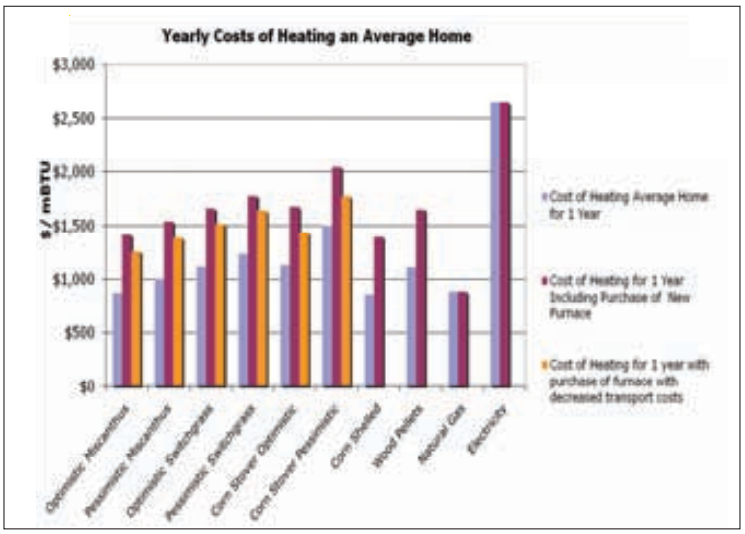
- To kick-start biomass crops, researchers are looking at bridge markets.
- Heating your home with miscanthus pellets, and not natural gas, has potential.
- There are still some cost unknowns when it comes to using biomass for heating.

Using pelletized miscanthus, Khanna says the same family could pay approximately the same or slightly more. Khanna detailed an annual miscanthus cost using both optimistic and pessimistic forecast factors (see chart). These factors include things such as miscanthus acreage expanding at the expense of other crops, and land costs. While the optimistic price forecast came out to $750 per year, the pessimistic one was $1,000 per year.

Adding fuel to the fire

Simply looking at heating costs on paper, pelletized miscanthus comes close to being competitive with natural gas. However, there's more to the story.

In Khanna's study, she examined the cost to heat Illinois' Christian County Extension center with miscanthus grown nearby. The extension center paid $95.50 for a ton of miscanthus pellets with the largest portion of the cost being transportation. Khanna explains the closest facility that would pelletize miscanthus was 272 miles away, in Indiana.



Furthermore, the cost for miscanthus pellets detailed above does not include the installation of the furnace. According to Khanna, the average homeowner can expect to pay $4,000 for the furnace, plus up to $2,000 for installation. Manufacturers claim the pellet stoves will last up to 20 years.

Conventional natural gas furnaces require little more than a monthly filter change when it comes to maintenance. With a pellet stove, there's a bit more hassle.

In the instance of Christian County's system, Khanna notes that the hopper is big enough to accept a week's worth of pellets at a time. However, that many pellets will still require a good chunk of storage space.

Interestingly enough, U of I professor Stephen Long explains the study did not compare pellet stoves to traditional wood stoves mainly because wood stoves require so much more daily attention than their pellet counterparts.

Pellets' future potential

Khanna's research also included figures where heating with miscanthus was more cost-effective than natural gas. These figures included the cost of purchasing the pellet stove.

"This would be the case if payments to farmers under the Biomass Crop Assistance Program for producing bioenergy crops were included, and if carbon emissions from natural gas were taxed," Khanna adds.

This model included a price of $50 per ton for carbon. As of press time, carbon was trading for 10 cents per ton on the Chicago Climate Exchange.

That being said, the possibility for a carbon offset does drive home an important point: miscanthus sequesters carbon, a claim natural gas cannot make.

Manage potassium for hay and pasture production

By **DAN UNDERSANDER**

Focus on Forages

LEGUME plants (alfalfa and clovers) require potassium for growth and winter survival. Alfalfa and clovers need about 50 to 55 pounds of potassium per ton of forage produced; grasses require slightly less. Plants require potassium for protein synthesis and for the opening and closing of stomata, which regulate the plant's air uptake and water loss.

Recycling potassium

The first step is to recycle as much potassium as possible. Potassium occurs mostly in the urine. It is very soluble, and can readily be leached from manure with any juices that are lost. In fact, in a study we did, cow pies that cattle left outside in October lost all their potassium by December, even though those cow pies were frozen most of the time. The high solubility means that potassium is lost from a manure pile as juices are lost, or whenever rain leaches potassium into the soil below the pile. Similarly, on pasture over summer, if cattle urinate in the shade of a tree, the potassium is moved from the pasture to the tree. Make sure that all liquid from manure is collected and spread across the fields or pastures to recycle as much potassium as possible. Every pound lost is one that must be replaced — at 60 cents per pound.

Good management can minimize the fertilizer that needs to be applied. The first step is to start with a recent soil test (less than 3 years old). First check to ensure that soil pH is adequate for alfalfa (pH 6.8 or higher). If soil pH is low, the stand will not yield well or persist, regardless of additional fertilizer applied.

Potassium soil-test categories are usually very low (VL), low (L), optimum (O), high (H), very high (VH) and excessively high (EH). When the soil test is optimum, the recommended fertilizer application rate is equal to the amount removed in the harvested crop. This is considered a maintenance application, resulting in little change in soil fertility levels. You can calculate whether or not you have applied potassium to match removal since the soil test by knowing your alfalfa yields after the soil test. You would take your yield (in tons) times 50 to 55 pounds of potassium, and then subtract the amount you applied. The difference is the gain (or loss) in soil potassium level.

Some farmers did not apply the necessary fertilizer last fall to replace last year's removal. Those fields will be below optimum. More importantly, going into winter with low soil potash will reduce winter hardiness and increase the risk of injury, to kill stands over winter.

Potassium is extremely water-soluble and moves quickly into the soil, so an application of potash at any time will rapidly show response in the growing crop. Consider applying potassium to fields of alfalfa this spring that did not receive potassium last year, especially if a soil test indicates low potassium. The nutrient, if lacking, will greatly decrease yield. Similarly, on pastures I often see lack of potassium causing the legume to die out, and then grass yield declines because there is little nitrogen being fixed.

Improving fertilizer efficiency

One method of improving potash fertilizer efficiency is splitting the annual application to reduce luxury consumption of potassium by the plants. While the second application is an extra effort, the split application will also cause lowered levels of potassium in the hay which many dairy farmers desire, especially for dry cows.

Remember to take credit for potassium from manure; this year, the potassium in the manure is worth more than the nitrogen. Dairy manure averages about 5% potassium (10 pounds of potassium per ton, or 21 pounds per 1,000 gallons). However, the potassium is mainly in the urine — so if that is not captured, most potassium is lost. You should test your manure to know the potassium content to allow taking full credit for that applied.

Thus, while potassium fertilizer costs have increased dramatically in the last couple years, it is still a necessary nutrient for plant growth and must be supplied, especially to alfalfa and clovers, for good growth and winter survival. Recycling as much potassium as possible and managing nutrients efficiently will reduce costs.

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