

Cleaner air, cleaner engines targeted with biodiesel study

CLEANER ENGINES, CLEANER AIR AND MORE USES FOR LOCAL products are the focus of a study using biodiesel as an alternative fuel product on select farms across Ontario. This province-wide initiative involves six farms to consider the effectiveness of using biodiesel in farm machinery.

Bob Peden, Central Ontario Energy Alliance, helps oversee the study and says incorporating biodiesel on farms has been uncharted territory until now.

"There hasn't been a lot of research done with farm use for biodiesel before," says Peden. "We want to look beyond research on cars and highways to consider on-farm applications with emphasis on engine quality and on-site storage."

One study farm, Wintermar located in West Montrose, has been running a two per cent biodiesel blend in three tractors for the last year. Peden says this spring the research team began monitoring factors such as the effect on engine output and emissions. The biodiesel's lubricity qualities could help extend an engine's lifespan says Peden; more research is being done to better understand these effects.

Wintermar's biodiesel use is also helping establish the fuel's storage capabilities, with particular consideration to how the fuel will

react to colder winter temperatures. Peden says biodiesel -- similar to regular diesel -- has the potential to 'gel' in cold temperatures. He says the type of materials used to create biodiesel play a role in how cold the fuel can get without gelling.

Biodiesel is made from local sources including vegetable oils and animal fats. It can be blended with regular diesel fuel at different levels and used in any diesel-run engine. Peden says the fuel has been found to run cleaner than normal diesel engines, which helps to reduce hydrocarbons and particulate emissions. It also helps find alternative uses for recycled materials and oils by incorporating them as ingredients in the biodiesel.

Dr. Dave Hume, Bioproducts Coordinator at the University of Guelph, says interest is growing among farmers to use biodiesel, particularly in older tractors because warranties on new tractors are voided by this practice. He says the future for biodiesel use on farms will grow.

"With the price of fuel escalating, interest in on-farm biodiesel will also keep going up," says Hume.

In further research Wintermar will be implementing five per cent biodiesel in its tractors this summer.

This research is sponsored by Natural Resources Canada.



Farm equipment is being fueled with biodiesel for a study involving select farms across Ontario.

Cattle feeding strategies reduce greenhouse gas

Dietary strategies to reduce methane emissions

- Increase grain content of total mixed rations
- Utilize dry rolled corn in place of steam flaked corn
- Increase forage quality by replacing grass forage with alfalfa
- Feed oilseeds such as sunflower seeds, processed canola seeds or flaxseed
- Use ionophores such as monensin
- Increase milk production per cow to improve efficiency and reduce cow numbers

FEEDING DAIRY COWS DIETS TAILORED TO reduce greenhouse gas emissions could result in animals exhaling cleaner air and improving profits.

The fermentation of high-fibre diets by ruminants produces elevated quantities of methane, a greenhouse gas linked to climate change and global warming. Animal scientists at the University of Guelph have been feeding cows a variety of diets and measuring their gaseous outputs to pinpoint which ingredients most reduce methane emissions.

Prof. Brian McBride and research associate Nick Odongo, Department of Animal and Poultry Science, say incorporating ingredients such as dry-rolled corn or myristic acid (an extract from palm oil) can greatly reduce methane emissions. In particular, dry-rolled corn can nix methane emissions by seven to 14 per cent per day, per kilogram of milk produced. And that's without affecting dry matter intake, milk yield or milk composition.

McBride says methane-reducing feed strategies benefit the health of the cows and the environment, and are easy to implement. Farmer Tim May agrees – as part of the study, dry-rolled corn was fed at Mayhaven

Farms near Rockwood, Ontario, where co-owner May says the implementation on his farm went smoothly.

“The cows have been behaving well,” he says. “They have adjusted to the diet, which was a slight change from their typical feed.”

May says the dry-rolled feeding strategy could be incorporated by other producers, whether they grow and process their own grains or purchase their feeds.

Ultimately, McBride says these feeding strategies could help the agriculture industry meet its commitment to reduce greenhouse gas emissions by six per cent as part of the Kyoto Protocol.

“We'll never be able to get to zero per cent,” says McBride, “but there's room to reduce methane emissions in a sustainable way.”

Others involved in this project include doctoral student Ousama AlZahal, and masters students John Las and Annemarie Kramer.

Support for the study is provided by the Dairy Farmers of Canada with cooperation of the Dairy Farmers of Ontario and the Ontario Ministry of Agriculture, Food and Rural Affairs.

Dairy cows fed diets with dry-rolled corn produced less greenhouse gas in a University of Guelph study.



White corn increases market potential

Ontario corn producers are looking at ways to help identify market niches. To this end, crop scientists at the University of Guelph are breeding improved white corn hybrids, used extensively in the processing industry. Early-season white corn will flower earlier and mature much faster. The scientists have released 28 different inbred lines, and a prominent seed company tested hybrids involving three of the inbred lines in pre-commercialization trials in Ontario in 2005. The white corn inbred lines that were developed are high yielding, averaging 160-200 bushels per acre. These new Ontario inbred lines allow plant scientists to compare the quality, maturity and yield capabilities of corn hybrids developed for an Ontario climate with hybrids already created for, and used in, Ontario fields.

Satellites watch and predict soil moisture

Weather experts believe soil moisture levels may be the next wave in predicting long-term climate and weather trends. Space agencies are working towards a satellite that will survey locations 10 to 40 kilometres in area, taking images of Earth's soil moisture conditions to a depth of five centimetres. University of Guelph climatologists will complement the satellite's findings with a land-based network in both Ontario and Saskatchewan. At the network stations, weather monitoring equipment will be used to observe any variance within the survey locations that the satellite may not catch. The satellite data will be combined with other models to help determine soil moisture levels down through the root zone. The network and satellite will have immediate impacts on long-term climate and weather prediction, drought monitoring and potentially flood prediction.

Virus-free seed key to boosting allium sector

Effective and innovative technologies are being developed at Guelph for the allium sector, which includes leeks, onions and garlic. Scientists have their sights on cultivating a virus-free garlic seed stock through tissue culture techniques, which could increase yields up to 50 per cent. Currently, most garlic in Canada is imported, and local production is limited by the hardships of viruses and fungi, which reduce quality and yield. New technologies such as the virus-free seed will benefit allium cultivation, processing and marketing across the industry. The scientists are also

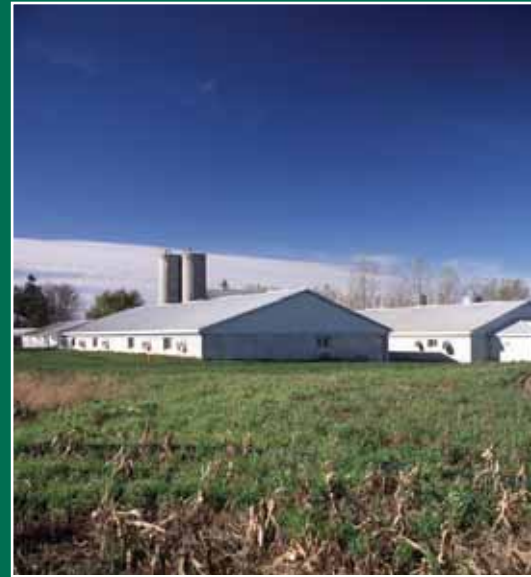
developing a tool that can measure the onion pungency, which they believe could help open up a market for mild Ontario onions. Growers, brokers, distributors, retailers, spice and extraction producers, and food processors will be the primary users of these new technologies.

Valuable nutrients in factory waste could help as fertilizer

Environmental scientists from the University of Guelph's Kemptville campus are working with factories around Eastern Ontario to determine if specific industrial byproducts can be used as an organic matter or nutrient supplements for farm land. By investigating the soil-building properties and nutrient concentrations of various bio-solids from pulp and paper mills, the starch industry, milk industry and fibre manufactures, researchers will determine if such applications are dangerous to the water or soil. Using factory byproducts could ease the pressure on landfills, by promoting an environmentally safe alternative and viable marketable product. Byproducts used in place of commercial fertilizer or manure need to be compatible with agricultural production. To that end, this research aims to ensure that byproducts are free of toxins and metals that could be damaging to crops. The scientist wants to find products that will promote crop growth and decrease environmental degradation while addressing the economical constraints of farmers and factories.

Low-phytate barley to the rescue

Healthier pigs and a healthier environment are the goals of University of Guelph plant scientists who are breeding new barley grains with lower levels of phytate – an indigestible form of phosphorus – for pig feed. Phytate is a problem: besides interfering with mineral absorption in pigs, it also leads to manure that releases large amounts of phosphorus in soils. This excess phosphorus causes algae overgrowth when it runs off into waterways, depleting oxygen and harming aquatic life. But there's more to this new barley than an environmental advantage – scientists are developing it without hulls, so it will be more economical to process, transport and store. The scientists hope this crop will help farmers reduce feeding costs and comply with nutrient management legislation while boosting animal health.



Drift, residual effects found in herbicide applications

HERBICIDES PLAY AN IMPORTANT ROLE in maintaining healthy crops, but a University of Guelph researcher says application procedures must consider drift and herbicides' residual effects between various crops.

Prof. Clarence Swanton, Department of Plant Agriculture, has found drift of corn herbicides in particular can have an impact on soybean productivity.

"Whenever we apply a chemical to the environment, it moves," says Swanton. "We wanted to see the effects of corn herbicides on soybeans, and if in any given year it changed the yield potential of soybeans."

Swanton designed trials to have corn and soybean herbicides drifting onto soybeans at research sites in Woodstock and Ridgeway. He found drift caused 20 to 40 per cent of soybean injuries such as stunting, leaf burning and poor emergence. In areas where the highest drift rates occurred, soybean yields were reduced by 14 per cent. Injury to the soybean plants was further increased when soy-specific herbicides closely followed drifting

corn herbicides.

In related research, Swanton studied how soybean production was influenced by sudden changes in planting routines (for example, in situations where the soil has already been treated with corn herbicides, and then due to weather or other restrictions, soybeans have been planted instead).

In this study, corn herbicide was applied at established time intervals of 14, 28 and 42 days before planting soybeans. Swanton found that the longer the corn herbicide was on the ground, the less stressful it was for

soybeans to grow. He says knowing the influence of time intervals could help farmers determine the optimal time to plant when in a similar situation.

"These research trials were designed to reflect real production problems that could affect Ontario farms," says Swanton. "I hope the results can serve as a knowledge base to help guide decisions for farmers."

This research is sponsored by Agriculture and Agri-Food Canada, E.I. du Pont Canada Company, the Ontario Soybean Growers and BASF.



Soybean production can be damaged by herbicide drift from neighbouring crops.

Mix Roundup Ready crops with others to prevent herbicide resistance

Crop rotation practices composed only of Roundup Ready varieties allow the continuous application of Roundup (glyphosate) herbicide, which increases the risk of weeds developing glyphosate resistance. So, University of Guelph crop scientists are searching for a way to incorporate Roundup Ready products into classic weed control techniques, such as crop rotation, to maintain effective and economically sound weed control. The scientists will provide a working model that promotes the best herbicide method by comparing Roundup Ready crop rotations, Roundup Ready crops rotated with traditional brands, and crop rotations using no Roundup in a test plot study. They encourage farmers to consider options, to weigh the immediate benefit of continued Roundup use with approaches that include a combination of old practice and new technology, to prevent resistance.

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