PHOTOS: GREG GREICO

Seeding Energy Crops from the Air

Glen Cauffman wanted to get the word out about Penn State's aerial seeding of bioenergy crops on 300 acres just north and east of the University Park campus last September for two reasons.

First, he didn't want State College–area residents to be concerned about a small plane repeatedly swooping low over fields near town. Aerial agricultural applications are still rare enough in Pennsylvania that residents might have feared some sort of terrorism. He wanted to avoid any confusion.

But more importantly, the manager of farm operations and facilities in the College of Agricultural Sciences wanted the public to know that the University is serious about helping the country solve its energy crisis. "We want to lead the way in showing farmers how to intersperse energy crops with their crop rotations to produce food and fuel on the same land," he says. "By seeding from the air in late summer, we can establish an energy-feedstock cover crop before the food crop is harvested, effectively getting more out of the growing season. Penn State wants to demonstrate that society can have its biofuel and food, too."

In this case, the energy crop was canola, which must be planted in early September in central Pennsylvania to survive the winter. The food crops were standing corn and soybeans, which often are allowed to dry down before being harvested in November. A specially equipped aircraft precisely delivered the seed at a speed of 160 miles per hour utilizing GPS technology to pinpoint the right fields and the swath width.

From left, Brian Macafee, assistant manager of farm operations, Glen Cauffman, manager of farm operations and facilities, and pilot Jeff Chorman review maps to determine exact locations where seed will be dropped.

Canola was chosen, according to Cauffman, because the grain is 40 percent oil that can be used to fuel tractors and harvesters. "Canola typically can produce 125 gallons of biodiesel fuel per acre," he says. "Canola meal—what remains after the oil is extracted—is high in protein and can be used as a high-quality supplement to feed the University's livestock."

For several years Penn State Farm Operations has been growing canola and squeezing the seed to yield oil and meal, Cauffman notes. "The oil is being used in a collaborative study with machinery manufacturer New Holland to test straight canola oil [without chemical processing] in modified diesel engines," he says. "This concept will enable farmers to be self-sufficient for tractor fuel and will enhance food industry security by reducing dependence on foreign petroleum."

Canola is considered both an energy crop and a cover crop. Cover crops are important in preventing soil erosion and protecting surface and groundwater, Cauffman explains. "By aerial seeding in late summer, cover crops are given a jump start in germinating and accumulating biomass as the food crops are maturing and drying down. Canola is harvested with a combine in late June or early July, after which another food or feed crop is planted."

Making farmers adept and comfortable with implementing this food-fuel rotation is seen as a key to the nation's ability to lessen its dependence on imported oil. It is an environmentally sound practice as well, according to a recent Chesapeake Bay Commission report that encourages farmers to apply cover crops to their land, stressing that bioenergy cropping systems are beneficial to the water quality of the bay.

Another benefit, Cauffman points out, is that canola sequesters fertilizer that remains from the corn or soybeans, preventing it from leaching into streams or groundwater. Those fertilizer nutrients are held and made available for the next crop.

"Penn State's College of Agricultural Sciences hopes to demonstrate that canola can be both a viable winter energy crop and a winter cover crop when seeded in September," says Cauffman. "Canola has a taproot that grows deep into the subsoil, which enhances soil quality."

—Jeff Mulhollem