Scutching machine consists of counter-rotating steel turbines with 18 edges. It scrapes and shakes out the broken shive, leaving raw fiber.

Small Scale Plant Fiber Processing

A heavy infestation of stinging nettle started Patricia Bishop and Josh Oulton down the road to building small-scale plant fiber processing equipment. The first step was discovering that stinging nettle, like flax, was a great source of thread, preferred by the early Romans and others for cloth.

"Our farm was full of nettle, and we wanted to add value to it," says Bishop. "It makes beautiful long fibers and a beautiful fabric. We also started growing flax, as it's similar to nettle but more mainstream."

Bishop quickly discovered there were only two options for processing plant fiber, whether nettle, flax or hemp. One was labor-intensive hand work. The other was industrial scale, with large and very expensive machines designed for high volumes of material.

"I wanted to find something in the middle, but no machines were being made, and none of the manufacturers were interested in making them," says Bishop.

Bishop and Oulton operate TapRoot Farms in the Annapolis Valley of Nova Scotia. They raise and market organic fruit and vegetables, as well as pigs, chickens, goats and sheep. They also produce multiple grains, alfalfa and flax and wool fiber. As part of the farm operation, they offer farm tours, on-farm vacation rentals, dinners on the farm, and more.

Bishop's interest in fiber led to the development of TapRoot Fibre to create and distribute small batch linen and wool fiber produced on the farm. The greater goal is to grow the fiber, process it and make clothing on a community scale. To make that economical for themselves and others, they needed to mechanize.

"We created TapRoot Fibre Lab, hired an engineer, and started working with him to make machines," says Bishop. "The goal was machines that could be used by small to medium-size farms on a community scale."

The effort started in 2014, and by 2018 they had the first iteration of machines. "We want to go from retted flax (flax plants that have been left to rot away the woody stems and inner pith) to spun yarn, but we haven't finished the journey," says Bishop. "We have the first three - breaking, scutching, and hackling machines. They produce nice clean flax fiber ready to be drawn out and spun. We don't have the machines to do the drawing out or the spinning."

The breaking machine crushes and cracks retted flax straw to release the fiber from the shive or plant stem.

The scutching machine consists of counter-rotating steel turbines with 18 edges. It scrapes and shakes out the broken shive, leaving raw fiber.

The hackling machine combs, straightens, cleans, and separates the fiber bundles to produce the highest quality thread. It consists of two counter-rotating belts with rows of hackles (pins) of varying density from less than 1 pin per in. to 40 pins per in.

The three machines can separate short fiber from long, which needs further processing. It's the long fibers that are in the highest demand. They make the highest quality linen, explains Bishop.

"Long fiber linen has much more luster and makes a more beautiful fabric," she says.

Taproot Fibre also does custom processing of retted flax and animal fiber. The ability to mechanize the last two steps is one more reason Bishop is looking forward to completing the project.

Bishop acknowledges that it would be difficult for an individual or small organization to justify the investment without the final two machines.

"We have a lot of interest, but we don't feel we can market the machinery without the full set," says Bishop. "The first three are available for sale. If we sell some, we'll be able to invest the money in research for the next step."

Bishop and Oulton have their eyes set on changing textile production. "It would be great to build out a small scale bast (plant fiber) infrastructure at a community scale to shift from global production to local," says Bishop.

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Walk-Behind Snow Blowers Mounted On Front-End Loader

To blow snow off his driveway, Russ McCallum first looked at manufactured blowers that connect to a tractor's front, but many required the removal of the front-end loader for hook-up. Most also used driveshafts which limited their raised height.

Because of these limitations, McCallum decided to build his own front-mounted unit to fit his Kubota 2370 tractor.

He began by purchasing two used walk-behind Craftsman 10-hp., 28-in. gas-powered blowers from a scrap yard for $175 combined.

"I removed the blower's two original 110-volt motors and replaced them with two 12-volts pulled from lawn tractor engines," says McCallum. "I hooked these up to start from my tractor's cab. I also added a bigger pulley off the motors to speed things up and throw the snow farther."

He removed the drive systems from the blowers eliminating the power to the wheels, positioned them around a center divider, then fastened the pieces together with bolts and brackets.

McCallum used actuators from an old car's power seats to engage and disengage the augers and to turn the snow deflectors. 12-volt car wiper motors were adapted to rotate the chutes.

To power the units, he mounted a control box in the cab containing 18 wires plus the positive and negative from the tractor. The units run independently with designated switches for starting and stopping the motors, engaging the augers, and controlling the chutes and deflectors.

"I built a mounting bracket on the blowers to match the one on my tractor," McCallum says. "I just take off my quick attach bucket, drive up to the blowers, put in two pins, and plug in the power cord from the tractor. Since there are no drive shafts, I can lift them as high as I want."

McCallum says time was his largest investment in the project, as the costs above the price of the scrap motors were minimal.

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"I built a mounting bracket on the blowers to match the one on my tractor," McCallum says. "I just take off my quick attach bucket, drive up to the blowers, put in two pins, and plug in the power cord from the tractor."

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Whalen designed a system to measure the pressure change and calibrate it to the amount of grain in hopper bottom trailers.

Add-On Scale Helps Fill Trailers

Denny Whalen has the answer to underfilled and overloaded hopper bottom trailers. His patented scale system accurately weighs air suspension trailers as they load. No problems have been reported since the first one was installed in 2017.

"My scale system lets you leave a remote bin or field with a legal load of grain within 1 percent of 80,000 lbs.," says Whalen. "It's a simple solution with an on/off switch that can be mounted on any air ride trailer."

Whalen came up with the idea when hauling grain for an area farmer. Retired from a career in construction, he would help at harvest or as needed.

"I ran the grain cart, but I couldn't figure out how to get an accurate load on the semi-trailers," says Whalen. "With the price of fuel, you don't want to be underweight. At the same time, you don't want to be overweight and get fined."

Whalen recognized that the pressure in the hopper bottom's air suspension system increases as the trailer fills. He designed and patented a system to measure the pressure change and calibrate it to the amount of grain. It consists of a brass compression fitting mounted to the trailer's air suspension system. A 3/8-in. air line runs from the fitting to a signal processor in a polycarbonate box.

"The box is mounted on the front of the trailer to keep it out of salt and dust," says Whalen. "It has a high visibility display that is easy to read, whether loading from an auger, an overhead bin, or a grain cart."

Whalen set out to keep the system simple without a lot of bells and whistles, and he succeeded. It requires no app, transducers, weigh bars, or electronics beyond a DC power source. Even that seems to be idiot-proof.

"It connects to the battery through the trailer running lights," he says. "We don't want to run the battery down by accidentally leaving the scale on."

After 3 years of fine-tuning the calibration system, the pandemic hit as Whalen was ready to start marketing. Word of mouth has sold systems throughout southern Minnesota, much of Iowa, and into South Dakota. The turnkey system often needs no calibration beyond what is done before shipping.

"Install it, turn on the power and it is ready to go," says Whalen.

The price of a system is $3,200 plus installation.

"Each system takes from 2 to 3 hrs. to install," says Whalen. "We have an installer or will suggest using a local truck shop to install it. Lots of farmers do the installation themselves. If they have questions, I can guide them through it by phone."

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