

continued from previous page

tional savings, about 300 to 400 cubic yards of topsoil are generated a year. The composting operation takes about three hours per week, while the topsoil recycling program takes about 120 hours per year.

Filling A Niche

In Decatur, IL, Romer Brothers Tree Service began its recycling operations about three years ago. "Our first incentive was rising landfill costs," says Mike Romer. After researching ways to decrease costs, Romer discovered that there were no local companies that offered recycling services. They decided to take the plunge and purchase a tub grinder and front-end loader.

"We run all of our tree waste through the tub grinder, and it produces a nice, fine chip," says Romer. "It makes a great mulch." The material is sold to homeowners. The company delivers truckloads of mulch county-wide, and never has trouble making a sale. Romer estimates that they have sold between 12,000 and 15,000 cubic yards of mulch.

In addition to processing its own tree waste, the company also processes material for the local university, nurseries, schools, park districts and townships. Their portable tub grinder can be easily moved to any site. Townships often will accumulate green waste, call the company out to process it, and then allow residents to pick up truckloads for their gardens free of charge.

Romer estimates that if the company had to use the county dump, its tipping fees would now run about \$20,000. Although the initial investment was sizable, he says the move was a good one. "We get more and more requests for the service all the time," he notes. "In fact, we're planning to purchase another, larger tub grinder."

Recycling City Trees

"If we had to take our greenwaste to a landfill today, we'd probably be spending about \$300,000 a year," says Mike Ganues, forestry supervisor with the city of Toledo, OH. The city has more than 100,000 street trees and half a million trees in city parks. Ganues says the forestry staff of more than 30 people trims about 6,000 trees and removes about 2,000 each year.

"We double-grind our wood. We have both a whole-tree chipper and what's called a waste recycler. It can chip logs up to 7 feet in diameter," Ganues notes. The chips are then processed once more through a standard tub grinder to produce a fine finished product. The chips are sold to landscape companies, nurseries and homeowners.

"We sell both retail and wholesale," Ganues says. "If you purchase five yards or more, we'll deliver it for \$10."

Toledo also has a firewood program. "We market the wood for about \$90 a cord for mixed hardwood and \$120 for oak," Ganues says. "Homeowners also can buy a permit for \$10 a year and come into the yard and cut their own wood." Proceeds from both the mulching and firewood operations are turned over to the Toledo Urban Forestry Council.

"The money is used for helping reforest the city," Ganues says. "It's used for street trees and nursery trees, as well as education programs. It's also used to fund special planting projects, such as highway beautification. The extra funds are like icing on the cake."

Closing the Loop

The city of Laguna Beach, CA, has reached an enviable goal. With the help of Integrated Urban Forestry, a consulting firm, the city has reduced its green waste to zero.

"We've developed what we call the Green waste Reduction Implementation Plan, or GRIP™," says Tom Larson, president of the firm. The program was developed to follow several steps to implement a "closed loop," where the need to dispose of any green waste in a landfill is completely eliminated.

First of all, greenwaste is reduced up to 30 percent through source reduction. "This is accomplished through landscape management and design techniques," Larson explains.

A sophisticated composting program produces soil amendments, potting soil and mulch. "We process the materials through a tub grinder, and then compost it," Larson says. "We never use the chips until they're composted and we have

a horticultural-grade finished product."

The city has its own nursery, where it uses the composted material to grow plants and "soil-less" sod for municipal landscape projects. Larger wood is either split for firewood or milled into quality lumber. Many urban trees are considered "exotic" species, and woodworkers gladly pay the price for the unusual hardwoods.

Like the city of Toledo, cost savings in dump fees are estimated at about \$300,000. Additional city savings include the "free" compost and topsoil, as well as water conservation and healthier plants due to the top-quality amendments and mulches.

If you're ready to start recycling, the first step is to check for any local ordinances. Some communities require permits for even the smallest composting operation. Investigate whether or not your community has taken any steps to initiate a composting and/or recycling program, and get involved. Even if there are no existing programs, start your own. You will be ahead of the game when the inevitable regulations are initiated.

"If you come up with a new idea, see how you can phase it in," Ganues suggests. "If you never try, you'll never know how it will work."

TOOLING UP FOR RECYCLING: AN EQUIPMENT PRIMER

By Daniel Ingham

The tools available to turn yard trimmings into profits range in size and price from walk-behind mulching mowers costing a few hundred dollars to massive diesel powered tub-grinders costing \$250,000 or more.

Mulching Mowers

The benefits of grasscycling, to the environment and the pocket books of both contractor and client are numerous. To do it right, though, requires more than just taping a piece of cardboard over the discharge opening of your mower.

For starters, you may just want to get a mulching kit for your current mower. Most manufacturers make kits specially designed for their line of mowers, which consist of gates to block off discharge chutes and mulching blades designed to operate with a standard deck configuration.

True mulching mowers, though, are designed to cut and recut the grass many times. Different deck and blade designs are necessary to mulch efficiently and provide quality results. There are also some mowing and maintenance techniques to be followed as well. It takes more than just a good machine, it takes practice.

More horsepower is required to create the additional lift needed to mulch clippings. Crews may experience some initial problems with grasscycling because they are failing to run the engine fast enough for complete mulching. Or, they may be trying to cover the area too quickly, not allowing time for com-

plete mulching. Operators must slow down. However, because there are no clippings to collect, overall time and effort is reduced.

continued on next page



Tub grinders are used to produce a finely-shredded chip suitable for mulching or composting. Photo courtesy: Romer Brothers Tree Service



Kits are available from manufacturers to make conversion to mulching mowers a simple procedure. Photo courtesy: Excel

Chippers and Shredders

Chippers used to be the type of equipment reserved for the arbor industry, but no longer. Recognizing the need of the landscape industry to reduce and mulch yard trimmings less formidable than the average tree limb, manufacturers have designed multi-use machines capable of turning small tree limbs, shrub clippings and leaves into a manageable mulch that can be used as-is or composted for later use.

Chippers come in two basic types, drum and disc. Drum chippers have been around the longest and are capable of higher chipping rates than the newer disc-style chippers. For recycling purposes, the disadvantage of the drum chipper is the size of the chip produced. They are generally not as suitable for mulching or composting because their larger size requires further reduction or longer composting times. Often, the chips from larger drum chippers are stockpiled for processing in tub grinders, which can turn it into a suitable mulch.

On the other hand, disc chippers produce much more suitable chips for mulches and composts. If you are selling your chips, this will be a factor. The smaller units, which have the word "shredder" somewhere in the name, are designed not only to chip wood, but to cut and shred leaves and brush clippings that might pass uncut through larger units. At least one company has designed a combination chipper-grinder unit. This medium-sized unit is specifically designed to produce a fine mulch from whatever you put into it, while maintaining a high processing rate.

Some of the features to look for in a chipper are:

- Discharge chutes that rotate so chips can be blown in any direction and/or chippers mounted on turntables that allow brush to be fed in from any direction without moving the machine.
- Chippers and chip boxes that mount on the same trailer to ease storage problems and reduce

the number of towing vehicles. Once at the site, the truck can be un-hitched for other uses.

- Look for chipper knives that cover the entire width of the feed opening.
- On disc chippers, look for multiple knives that make more than one cut per revolution of the flywheel. The more productive the chipper, the more productive you are.
- Ease of maintenance and easy access to the chipper blades for sharpening. Maintenance will be reduced and engine life increased on the larger units if you opt for a diesel engine, making diesel worth the additional cost. Fuel efficiency is also greater with diesel.

One last option: some chipper/shredder units are built with vacuums that allow vacuumed material to be mulched on its way to a collection bin or bag. Depending on the landscaping job at hand, these units could result in a considerable manpower savings.

Tub-Grinders

The "Big Brother" of the chipper is the tub-grinder. These units come in a variety of sizes starting at big and progressing rapidly to *really* big. The large ones can handle stumps up to four feet in diameter and come with their own crane to load the material into the hopper. In addition to stumps, they can process wood pallets and other "soft" material at rates of up to one-ton per minute.

Variable screen sizes control the size of the processed chips and allow you to custom grind mulch to fit your needs. Soil can even be added during grinding to mix with green waste.

When, and if, you decide to get serious about green waste recycling, you should look into the purchase of a tub grinder. If you have enough space, you may even wish to start your own composting operation and begin processing waste from other landscape operations. A tub-grinder will be necessary to do it cost-effectively.

Log Splitters

For those that have to handle log disposal on a regular basis, a log splitter could be

the way to go. Rather than making chips for compost, you could produce firewood, which will increase your market for wood waste.

There are two basic configurations for log splitter: vertical and horizontal. Horizontal log splitters require the log to be lifted and centered on the log rack — all cuts must be made down the centerline. A vertical splitter requires much less lifting, since the log is set on a base plate resting on the ground.

Log splitters use one of three methods to split logs: screw, hydraulic and mechanical. The screw type, which is not being produced much anymore, uses a long worm screw driven by an engine to force a cone or wedge into the log to split it.

Hydraulic splitters are the current standard in the industry, but have certain disadvantages of their own. The main one is they're slow, relatively speaking. Cycle times range from 10 to 30 seconds and some models require the ram to be manually returned to the start position.

Perhaps the fastest and most efficient splitters on the market today are the mechanical splitters. These use the stored energy of a flywheel to engage a rack and pinion gear assembly attached to a splitting ram. When the pinion gear is engaged, the flywheel (powered by a small gas or electric motor) drives the ram forward at about two feet per second. Total cycle times are as fast as 2 to 3 seconds.

Skid-Steers and Front-Loaders

If you are going to get into recycling on a large scale (or even a medium scale), a good front loader will be very useful. For composting they will be necessary for moving, mixing and aerating larger compost piles. When using tub-grinders without a built-on crane, a front loader of some sort will be needed to load material into the grinder's tub.

For sheer versatility, skid-steer loaders are probably the best bet, and offer the widest array of options due to the number of manufacturers. Attachments make them cost-effective, because they can perform many different tasks for contractors, reducing the need for different, specialized machines.

Another option for larger jobs is an articulated-steer loader. They are generally capable of lifting heavier loads than skid-steers and are more stable in most situations. Articulated steer loaders are hinged in the middle of the chassis and steering is accomplished when the chassis flexes at this hinge.

Safety

Only properly trained and instructed personnel should be allowed to operate these machines. Eye protection should be considered a must for anyone working with or near these machines, since flying chips and debris are major hazards. Bystanders should not be allowed, or should be kept at a safe distance, even with mowers. Ear protection should also be used, since these machines generate a lot of noise. Gloves and work boots should be standard to protect against cuts caused by machinery or wood splinters.

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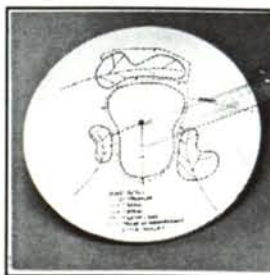
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