UNIVERSITIES USE SHREDDERS FOR RENOVATION AND COMPOSTING

Grounds maintenance at a university, particularly a large state university, requires mechanization — a considerable number of vehicles and other equipment. Tractors, loaders, mowers, spreaders, dozers, sprayers, scrapers, chippers. You wouldn't think, however, that a university would have use for a high capacity soil shredder. But several large universities have found ways to keep shredders busy and cut maintenance costs at the same time.

Two such schools are Penn State University and Georgia Institute of Technology, better known as Georgia Tech. Both are using shredders to reduce labor costs and improve the quality of grounds maintenance. Penn State has two shredders. One is used by the Joseph Valentine Turfgrass Research Center to prepare soil mixes for turfgrass experiments. The other shredder is used by the university's Landscape Operations department for a variety of construction and maintenance projects requiring clean, homogeneous soil mixes. Georgia Tech's principal use for its shredder is to convert composted leaves into "free" humus that's used for various purposes on campus grounds.

Penn State Turf Research Center

There were few turfgrass schools in the nation in 1928 when Joseph Valentine, superintendent at Merion Golf Club in suburban Philadelphia, traveled to Penn State to ask for the same kind of support and help for turfgrass problems that farm research was getting from the school. He apparently was a good salesman because a turfgrass program was started the following year. Through Joseph Valentine's continuing efforts, the school was supported through the difficult years of the Depression by state appropriations for turf research.

After turf experiments are completed, the top six inches of soil are removed, reconditioned and then replaced. During reconditioning the soil is shredded and screened.

In 1932, the school started the academic phase of turfgrass management by accepting the first students. Then, in 1967, Penn State officially named the turfgrass facilities the Joseph Valentine Turfgrass Research Center. Today, Penn State's Turfgrass Center in University Park is part of the Department of Agronomy and provides teaching and research programs on turf breeding, management, physiology, fertilization, soil physics, and weed control. Disease studies are done in cooperation with the Department of Plant Pathology.

Dr. Joseph Duich has headed the program at the Valentine Center since 1959. "A good proportion of students in our turf program are here because they want to be golf course superintendents," Duich says. "We try to teach them the basics they need to know to do that job well. Our studies dwell on the different types of grasses, soil chemistry, and soil physics, particularly from the point of modifying soils to achieve certain ends. We also stress disease and insect control."

At this time, the Valentine Turfgrass Center has approximately 110,000 square feet of close cut turfgrass devoted to its experimental bentgrass research program. Most of it is cut to putting green height because a large part of the school's current program involves putting greens research. Because the turfgrass research area isn't that large, its use must be managed wisely. After an experiment is completed, the area must be reconditioned quickly to make it suitable for the next round of experiments.

Reconditioning is necessary because of the nature of the experimental work. Fertilizer experiments, for example, might run continuously for four or five years. After the research, the area is checkered with hundreds of 6 by 16 ft. plots, all with different fertilizer and pH levels. To put the plots back into condition for more research, the entire area has to be dug up and all of the soil shredded and aerated.

The Valentine Center attacks this reconditioning by first rotovating the entire area to a depth of approximately six inches. Then loaders push the loosened soil into large piles. Next, the loaders dump the soil into a shredder for processing — shredding, mixing, separating non-shreddable material, and aerating. Because superfine soil mixes are needed for the reconditioning, the processed soil goes directly from the shredder into a powered screen. What the Turf Center ends up with is a homogenous soil mix from which nearly all stones have been removed. This results in an ideal base for turf research.

"We recently reconditioned about half our bentgrass research area," says Duich. "The soil

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Georgia Tech grounds crew takes leaves from oldest part of the compost pile for shredding and use on campus.

from a 50,000 square foot plot containing 243 different mixtures was shredded, aerated and screened so that it was all uniform to a depth of 12 inches. We wanted the soil to be as similar as possible to the modified soils found on most golf tees and greens. Because the shredder made the work so easy, we were even able to process a large supply of the same soil and set it aside in a protected bin for topdressing the turf later in the experiment. The research requires that the topdressing be exactly the same as the soil base."

Because so many new homes are built on plots from which all topsoil has been removed, Penn State is also getting involved in research on growing turf on subsoil. Many new homeowners try to establish high fertility grasses on such soils and the grasses don't do well. For that reason, the school is continually involved in research to develop low-maintenance grasses that can tolerate less than ideal conditions. In these homeowner turf programs, soil reconditioning follows the same soil processing procedures used for other plots in order to have uniform soil for research.

Penn State's turfgrass research programs have already paid off with the development of Pennlawn, Pennfine and Penncross grasses, soil modification procedures, and various management aids.

Shredding, mixing, cleaning, and aerating soil without harming its mechanical properties is vital to turf research. "We prefer a belt-type shredder to a hammermill because it does not pulverize the soil," Duich says. "If the soil is dry, a hammermill can destroy the mechanical properties by turning it to dust. By the same token, we purchase fibrous peat to mix with topsoil to construct new plots. We use fibrous peat precisely because it is so structured. If we try to mix fibrous peat and topsoil with a hammermill, it would pulverize the peat and reduce its effectiveness."

Methods to produce modified soil mixes for construction or renovation of golf tees and greens are stressed in the turfgrass program's curriculum. "No longer do we spread topsoil over a green and plant grass," says Duich. "We teach our students to analyze their situation and then mix the proper soil to suit the particular conditions. They can see how easily we do this work here on campus with a soil shredder, and I'm sure they will make use of shredders when they are called on to renovate areas under their responsibility."

Campus Maintenance

The main campus of Penn State is situated on a 4936-acre tract of land in the geographic center of Pennsylvania. Approximately 540 intensely landscaped acres of this tract make up the central campus. Streets, athletic fields and landscaped areas are maintained by the University's Landscape Operations. Penn State's Landscape Operations uses a shredder for a wide variety of jobs. According to Dave Rice, who heads up Landscape Operations, "The shredder is in operation approximately 50 to 60 days per year."

On a campus as large as Penn State's, there is usually a building under construction or a utility ditch being dug. Normally, whenever a trench is opened, the soil is stored off-site while the work is in progress. Once the work is completed, a final layer of shredded and cleaned topsoil is spread over the dug up area. This saves the time-consuming labor required to rake out stones prior to replanting grass.

Landscape Operations also uses the shredder to convert composted leaves to a beneficial leafmold humus for its flower beds and for mixing 2/1/1 with topsoil and sand for topdressing. Leaves are usually stored for approximately 3 to 5 years and then shredded.

Clay and sand for topdressing baseball fields are also processed by the shredder. The sand often has large rocks in it that must be removed and the shredder both cleans and mixes the dressing to the correct consistency.

The school's greenhouses and mushroom growing operations often call on Landscape Operations to provide clean soil mixes for their needs. This replaces a time-consuming hand screening operation used previously to get suitable growing media.

"The shredder has spoiled many of our people," says Rice. "Since they have experienced working with shredded and mixed soils, they don't want to put up with the stones and lumps in unprocessed soils. When they have a certain job to do, like reseeding a turf area, they want the soil processed so that all that has to be done is to put the soil down and level it."

Maintenance on the school's athletic fields keeps the shredder busy cleaning soil. Hundreds of tons of topsoil are processed each year just for this purpose. By not purchasing processed topsoil, Landscape Operations saves the University an estimated $35/cubic yard.

Georgia Tech

David K. Walker, Jr., is the staff horticulturist at Georgia Tech. Through his efforts, recycling programs have been started that aid the City of Atlanta and also benefit the school by reducing reliance on purchased mulches and soil amendments.

Walker believes that grounds maintenance people have to switch their thinking about some things. "We've got resources around us, like leaves and tree trimmings, but it's up to us to turn them into something useful, says Walker. "I've based my leaf and wood chip recycling programs on putting to good use what we used to pay to get rid of."

"Up to now," Walker says, "the easiest answer to a trash situation was to say, 'Let's throw it away.' That was the cheapest way to dispose of it. Then we began to realize that grass clippings, leaves and wood chips have nutrients and other qualities that can be beneficial to our grounds maintenance operations. It began to dawn on us that we were disposing of certain materials and then turning around and purchasing materials that were similar."

Georgia Tech's downtown Atlanta campus occupies 350 acres, or about 10 square blocks. Fine residential properties and businesses surround the school and keeping the grounds attractive is an important job.

Atlanta has a wealth of trees, with oaks and elms predominant. The annual leaf fall used to be trucked by city crews to landfill sites 10 or 20 miles from their pickup points. That was until Georgia Tech's Walker contacted city officials and told them he'd be happy to provide a free, close-by dumping place for a large portion of Atlanta's leaves.

Walker had recognized the value of leaf compost to the school's grounds maintenance operation and knew that he needed more leaves than accumulated on campus each year. With buildings and parking lots occupying a large proportion of the school's property, Georgia Tech's own leaf collection operation is not a big one. The school's vacuum sweeper and street sweeper collect about 300 cubic yards each fall. The city, however, more than makes up for the school's lack of leaves. Each fall city crews deliver about 1500 cubic yards of compacted leaves to the school's leaf composting area.

Georgia Tech's present leaf composting area occupies a 1¾-acre lot that someday will serve as a building site. It is well drained so that stagnant water never causes undesirable odors or mosquito problems.

"We employ a lazy man's approach to composting," says Walker. "Unlike some composting operations which windrow leaves and turn them regularly to speed decomposition, we turn the leaves only once. We do it about a month to six weeks after they are delivered. At that time, our people use a front-end loader or a bulldozer to lift and tumble the leaves and mix in a little of our good red Georgia clay. The leaves are left in a big pile until we need them. If the leaves sit there two years before we get around to shredding them, there's no problem. We simply work off the oldest part of the pile where the leaves are the most decomposed."

"We had to go through a learning cycle with our leaf composting program," says Walker. "We knew we had to shred the compost to get it to a particle size suitable for mulch, for mixing with top soil for lawn renovation, and for potting plants in our greenhouse operation. We tried to find the smallest and cheapest unit that could do the job. However, the 5 hp shredder we bought didn't have the capacity we needed. We now have a 18 hp shredder that handles up to 25 cubic yards per hour. Running it for a full work day gives us 200 cubic yards of material, a worthwhile amount to work with."

Georgia Tech's shredding crew consists of three men. One operates the front-end loader which feeds the composted leaves into the shredder's hopper. Another is positioned on the operating bridge of the shredder to watch over the operation of the machine and to keep the material falling freely onto the belt. The third man works on the

Shredders

ground and tries to keep large debris such as tree limbs and construction materials out of the way. The shredder processes the composted leaves and discharges the finished product directly into a dump truck. Since the composting area does not permit on-site storage of equipment, the crew tows the shredder back to the garage after they are finished for the day.

"You have to consider the economics of what we're doing," says Walker. "We get the leaves free. We save both the school and the city money because there are no hauling and dumping fees charged. We also save on labor, fuel, and wear and tear on our trucks since they don't have to travel to dumps.

"We shred the leaves when we need them, mostly during the late spring and summer months. I estimate we have a stockpile of about 2,000 cubic yards of compost on site. At the going rate of $7 per cubic yard for equivalent material, we own $14,000 worth of material. These numbers are very attractive to our operation. So far, we haven't has to buy any topsoil since we began our composting program. Previously, we purchased up to 4000 bales per year of pinestraw and other materials."

For mulching around shrubbery and flower beds, Georgia Tech's grounds crew applies a four-to-six-inch layer of wood chips and the leaves which drop to the ground each year are allowed to remain in place as extra compost. The chips are acquired in the same way the leaves are. The school has provided an all-weather free dumping area for local landscapers and tree surgeons to dump their chips. Almost 30,000 cubic yards of chips have been given to the school since 1971.

As part of a current research project, Walker is dumping leaves directly on a wide highway median strip to study how this affects renaturalization. He hopes the study will yield results on new ways to stabilize soil in problem areas. Other benefits anticipated are: reduced labor costs for maintenance; elimination of leaf blowing by passing traffic; increased moisture retention for shrubbery and trees, and regeneration of a natural flora from seeds brought in with the dumped leaves. The leaves are spread to a variable thickness ranging from 6 to 12 inches and are allowed to settle by natural means (wind shift and rain). Some portions of the median have been covered with a two-to-three-inch layer of wood chips to minimize the chance of fire during hot, dry weather.

A recent project called for shredding of 300 cubic yards of compost to be incorporated into the soil for a new four-acre athletic field. The availability of shredded compost eliminated the need to buy peat moss. Walker etimates that nearly one-quarter of the shredder's cost was amortized by this single project.

The success fo Walker's composting program has been recognized by the Georgia Chapter of the American Soil Conservation Society, which recently gave the school its Merit Award. If imitation is the sincerest form of flattery, then the city of Atlanta thinks the program is a good one, too. The city has begun its own composting operation and is using the finished material in its parks. **WTT**