Fertilizer Spreader Selection: Choice Distribution

The proliferation of spreader products provides options that allow the turf manager to match equipment to the specific needs of the facility and to the limitations of the available budget. Photos courtesy: John Deere Company.

By Steve and Suz Trusty

At one time selecting fertilizer spreaders for turf care was easy. The first mechanized broadcast spreader wasn't introduced until the late 1860s. It took until the mid-1950s to put that technology on wheels. Now the numerous products available for applying fertilizers, soil amendments, seed, topdressing materials and pesticides makes spreader selection a complex project.

This proliferation of products provides options that allow the turf manager to match equipment to the specific needs of the facility and to the limitations of the available budget.

The first step in the selection process is defining those needs. Prepare a list of activities for which spreading equipment will be required or could reduce time and labor expenditures. Then prepare a list of existing spreaders, the processes for which they are currently used, and their age and state of repair. The gap between the two lists defines needs.

The second step is exploring the options. Spreaders range from wheeled, hand-push drop and broadcast types to equipment-attached models with drop, broadcast or pendulum delivery methods.

Selecting spreaders isn't an easy process, but making the right match will pay off in increased accuracy, speed and efficiency.

Drop Spreaders

Drop spreaders generally have a long, narrow hopper. Material is fed to a series of openings that stretch along the base of the hopper. The material is agitated and channeled to the openings by the projections or blades attached to a shaft that turns with the motion of the wheels. A plate at the base of the hopper is manipulated to control the size of openings and thus the amount of material to be discharged through each one.

A drop spreader delivers a uniform amount of material across the width of the openings. The speed at which the spreader travels, the consistency of that speed, and the type of terrain, all contribute to the overall uniformity of application.

Because the hopper is placed between the spreader's wheels and material is spread directly from the openings at the hopper's base, it's necessary to overlap each swath for even coverage. Too much or too little overlap will result in too much or too little material being applied to the overlap areas. On some drop spreaders, the operator makes the calculations to calibrate the correct discharge opening setting and monitors the material application. On other drop spreaders, the area to be covered and amount of material to be distributed are fed into a mechanical control unit that automatically calibrates the settings and monitors the rate of material distribution. These systems alert the operator of uneven coverage that may be caused by erratic ground speeds, terrain fluctuations or equipment problems.

Drop spreader sizes range from 24 inches up to 12 feet or more.

Broadcast Spreaders

Broadcast or rotary spreaders generally have a taller, circular or conical shape. Material is channeled to an opening or a series of openings at the base of the hopper by a centrally mounted, single- or multiple-armed agitator. The agitator may spin in a clockwise or counterclockwise motion. The material is fed through the hole or holes onto an impeller that has a surface pattern of spines or ridges. The shape of the impeller and design of the ridge pattern combine to contribute to the trajectory the material follows as it is channeled from the impeller to the ground.

The material moves out from the broadcast spreader's impeller to the area ahead and to the sides of the hopper, in fan or modified bell pattern, creating a wider swath than that of drop spreaders. Normally, material distribution is heavier close to the spreader and lighter further from the spreader. The swath area and pattern and the distribution of material within the swath differ according to the spreader design and size. Spread pattern width can range to 40 feet or more. The agitator, number and placement of discharge holes, and shape and ridge pattern of the discharge plate combine to affect the uniformity of material distribution.

As with drop spreaders, the size of the discharge opening or openings can be manipulated to control the rate of material flow. Broadcast spreader models with multiple discharge openings also offer the option of closing some of the holes to block delivery of material to one or both sides of the application pattern. There are also special optional attachments for some models that block flow to one side of the application pattern.

The speed at which the spreader travels, the consistency of that speed, the fluctuations of the terrain, and the speed and direction of the wind all combine to affect the uniformity of material delivery. Again, the swath pattern must be overlapped to achieve uniform application.

Broadcast spreader calibration and monitoring can be controlled by the operator, mechanized equipment, or a combination of the two methods.

Pendulum Spreaders

Pendulum spreaders usually have cone-shaped hoppers. Material is channeled to a discharge spout located at the base of the hopper. As with broadcast spreaders, a single- or multiple-armed agitator stirs the material and sends it toward the surface of the opening. As the spreader travels, the spout swings back and forth distributing material over a swath that may range from quite narrow to 40 feet or more. Different-sized spouts are offered to accommodate materials in varying sizes and densities, from fine seed to fertilizers to de-icers, and to control the width of the swath. Agitator extensions may be available to ensure proper movement of fine materials such as powdered fertilizers, salt or sand.

Material distribution is generally heavier in the center of the swath, lighter at the outside edges. Again, overlap is necessary for uniform application. Calibration and monitoring may be controlled by the operator, by mechanized equipment, or by a combination of the two.

Factors for Consideration

Spreaders may be operated in conjunction with tractors, all-terrain vehicles, utility vehicles, and more. Specific requirements for proper operation vary with the individual spreader.

Depending on the sophistication of any mechanized spreader unit, the operator may watch a monitor for signals that ground speed is erratic and make appropriate adjustments, or material application rate may be adjusted automatically to compensate for changes in ground speed or terrain.

Spreader components vary with the size and complexity of the unit, the expectations for its use, and the adaptability of certain materials to the design of a particular model.

Hoppers may come in painted steel, epoxy-coated metal, galvanized steel. stainless-steel, polypropylene, or fiberglass. Material at the base of the spreader may be polypropylene, steel, galvanized steel, stainless-steel, cast-iron or nylon. Agitators may be steel or cast-steel. Tubing may be epoxy-coated metal, steel or stainless-steel.

Materials are basically chosen for their ability to withstand corrosion, their strength and durability, and their resistance to shock, heat and cold.

Design features such as the choice of bushings and axle bearings, the method of enclosing the gears, the size and type of wheels, the operational characteristics of the calibration unit, and the linkage system can increase efficiency and reduce maintenance time.

As every spreader operator quickly learns, little things make a big difference. For example, with push spreaders the ability to adjust the handle height, shape and comfort of the handle grips, and the

continued on page 12

Fertilizer Spreader Selection
continued from page 11

placement and ease of on-off, and calibration adjustment devices can lessen fatigue and shave a few valuable minutes from each use.

With the projected needs identified and an overview of the available spreader options, it's time for the third step: reviewing features in light of the benefits they can bring to the specific tasks.

What are the specific features required? Review the materials to be applied and the areas to be covered. Which spreader type — drop, broadcast or pendulum — will deliver those materials most accurately and uniformly in the shortest time with available personnel? What swath width and pattern variations will be necessary? How important is hopper capacity? Are a wide range of calibration choices needed?

How easy is the spreader to transport? With multiple sports fields or lawn areas, spreaders may need to be loaded and unloaded from trucks or trailers many times a day. Can larger units remain attached during the move from one area to another? Will the time saved with a faster, powered unit balance the time the tractor or utility vehicle could be used for other projects?

This proliferation of products provides options that allow the turf manager to match equipment to the specific needs of the facility.

What are the skills and efficiency levels of potential spreader operators? Will crew members with push spreaders retain the necessary degree of accuracy when application rates, terrain and weather conditions vary? Will complex units require specially trained operators?

How do budget considerations affect selection decisions? With limited funds available, will spreader versatility be more important than the speed and efficiency at which a specific task can be completed with a more specialized unit? Will more complex models or additional attachments extend spreader use enough to compensate for a higher initial cost? Will manual or power equipment-connected spreaders be more cost-effective?

What spreaders are you currently using? Will more spreaders of the same type and size enable crews to complete work more quickly and efficiently? Will a spreader of a different size and delivery method better augment existing equipment? Is a certain task repeated frequently enough to justify selecting a spreader with specific features designed to complete that task more efficiently?

How sturdy must the spreader be to fit the job? What's the anticipated life of the spreader? What maintenance and repairs will be anticipated? Are parts and service easily attainable?

Selecting spreaders isn't an easy process, but making the right match will pay off in increased accuracy, speed and efficiency. ❑

Editor's note: Steven and Suz Trusty are partners in Trusty & Associates in Council Bluffs, IA. Steve is an assistant chair of the Sports Turf Managers Public Relations Committee.

UNIFORMITY OF DELIVERY: BEYOND WHAT'S IN THE BAG

Uniformity of delivery is what spreaders are all about. Major innovations — alterations of form, construction materials and delivery apparatus, precision calibration devices, metered monitoring and control — all aim to ensure that material is applied as accurately and evenly as possible.

Besides the variables of equipment selection, cleanliness and maintenance, operator efficiency and consistency, type of terrain, and weather conditions, the material to be applied comes under scrutiny. Tests conducted by Agronomy Professor Dr. Keith Karnok of the University of Georgia in Athens, GA, in the late 1980s centered on the different fertilizer formulations had on the uniformity of material dispersement.

With blended or mixed fertilizers, nitrogen (N), phosphorus (P) and potash (K) are incorporated on different carriers that are then combined in the proper proportions to create the desired total formula. Homogeneous fertilizers incorporate the desired ratios of N, P and K on each particle.

Testing compared the results of applications of various types of blended and homogenous fertilizer formulas.

Initially it might appear that all blended products would by nature be less uniform in their delivery of N, P and K than the homogeneous materials. However, Dr. Karnok reported that where fertilizer blends were uniform in particle size and density, good distribution was achieved even if N, P and K were incorporated on separate granules.

Where blended materials contained wide ratios in size and/or density, individual particles were segregated out in the spreading process. Heavier particles moved further from the spreader source, while lighter particles didn't travel as far, tending to concentrate closer to the spreader — which meant that the different nutrients were unevenly dispersed.

According to Dr. Karnok, looks were sometimes deceiving. A blended material that initially appeared fairly uniform might not spread as well as another material that appeared less uniform. Particle size and density combined to determine uniformity of distribution.

"Other factors appear to be more critical than the fertilizer formula in spreading fertilizers easily," Karnok said. "Accurate spreader calibration, operator control, proper and consistent speed, the terrain, the cleanliness and maintenance of the spreader, all play major roles in uniform application. If everything else were done accurately, the material itself — a homogeneous material or a blend with uniform particle size and density — would be more of a factor. Uniformity of distribution would also be an issue to consider with combination products such as the incorporation of herbicides or insecticides with fertilizer."

With the time, money and effort expended on achieving the desired results, it just makes sense to shoot for the highest degree of uniformity when spreading material.