

valves. After each zone/station has been gone through once repeat the process one to two more times to make sure the water has been flushed out of the system.

Once the system has been blown out, open drain valves (if applicable) to drain any remaining water from the system. This will also discharge any back pressure left in the pipes. Drain the pump if applicable. Usually opening the drain plug on the bottom of the pump is sufficient, but 10 psi-15 psi of air through the pump will insure it is properly winterized. Do not put high amounts of air pressure through the pump as this may cause damage to the pump components. It is also a good idea to disconnect the pump wiring from the controller as well as disconnecting the power supply. This will keep the pump from operating dry if there is a power surge.

The next step is to winterize the backflow preventer. If the device was installed using unions it should be fairly easy to

remove the device entirely and place it inside for the winter. If removal of the backflow preventer is not an option, then you should close the valves on each end of the device and open the test cock valves on the device. There are usually four of these one-quarter-inch fittings sticking out from the device. Use a screwdriver to open these valves. Turn the slotted fitting a quarter turn until it is perpendicular to the backflow preventer and blow 10 psi-15psi of air through these valves to flush water from the backflow device. Leave all valves on the backflow preventer open at a 45-degree angle. This allows any water that may freeze to expand through the openings instead of cracking the brass fittings if the valves are left closed.

Winterizing a vertical turbine pump can be difficult, but is still important even if it is enclosed in a heated pump house. It is a good idea to check the heating source every couple of days to make sure it is operating properly. If your pump is not

enclosed/heated it is especially important to winterize the system before heavy freezing occurs to give it some time to dry out before winter sets in. If you are unfamiliar with your pump it is a good idea to contact the manufacturer's representative to see if they have any recommended procedures.

First, open the connections or valves for Check Valves, Flow Sensors, and "Z" pipe. Next, open the closed isolation valve to the mainline and use the backpressure from the piping system to flush water from these components. It may be necessary to put small amounts of compressed air through these components to completely flush them.

Following these steps to properly winterize your irrigation system will make the spring turn-on quicker and easier with fewer repairs to be made. ■

Jeremy Link, CSFM is the owner of EcoFriendly Irrigation, LLC, Cincinnati, OH, link@ecofriendlyirrigation.com

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Putting Turf to Bed

SHAWN MOORE, Albuquerque Isotopes

We are planning to do a lot this off season. Our biggest project will be replacing our infield edges with new sod. We have had several years' worth of edging wear out and now it is time to add a little grass. This process also allows us to remove any build up, from conditioner and infield mix, in our edges.

Next on the agenda will be pushing our grass hard to fill in our bare areas from the mass exodus of *poa*. We accomplish this with a lot of quick release N and a heavy dose of major, micros and minor nutrients. A big part of this stage will be inter-seeding the field with a hand-picked blend of bluegrasses, topdressing with 50 tons of sand to try and remove any low spots, and pulling a large, deep core. Irrigation (or "irritation" as we call it) audits will be performed. We are constantly adjusting our irrigation through the year. This fall we will make sure the heads are spraying correctly, replace any nozzles that aren't working perfectly and raise any heads that have become low due to topdressing.

Then, after all events are done around November 1, we will add material and laser grade our skinned areas as well as the warning track. We laser grade in the fall because college season starts in February when the weather is very unreliable. Finally when we take our Christmas break, around December 15, we will place turf blankets on the infield and sideline grass. Putting down a broad spectrum fungicide will protect us from disease while the blankets are on. The field then will be put to bed until late January when we take the blankets off.

PETER THIBEAULT, CSFM, Noble & Greenough School (MA)

With fall upon us and the growing season nearing an end I thought I would share some tips on how we plan to get through the fall and started in the spring. Keep in mind these are tips; not everything will work for everyone. This is related to the things that we do every day and never seem to have enough time to get accomplished exactly the way that we would like.

Not too many outside observers understand how much actually goes into mowing. When you are out there mowing you're covering every square inch of the fields and can see anything that is going wrong. (Chances are you're at least mowing something, even though we had one of the driest summers in 20 years.) We like to start the fall with a mowing height of 2 inches. This height I've found has given us an even canopy of Kentucky bluegrass and perennial ryegrass. Whatever height you mow at it is best to try and not remove more than 1/3 of the plant at a time.

For us to follow this rule all turf is cut at least two times a week sometimes three times. Our field hockey starts at 1 1/2 inches. As the fall progresses we will gradually decrease our heights to 1 1/2 and 1 1/4 by decreasing the height as we go. We are trying to keep turf growing as temperatures cool and sunlight decreases.

One of the worst things that we do to our turf is mowing, and with that being said, sharp blades are a must. We change blades weekly depending on conditions. If aerating or topdressing we may need to change more frequently. If your blades are dull, you're pulling and tearing at the plant, stressing it before the group of athletes gets out there to punish it more.

This brings up an important point that should take place at the end of every day or after leaving some diseased turf—washing the mower. We are not talking about rinsing the top of, but under the decks and under the mower taking care to get clippings out from brake system and from in between hydraulic lines. Be very careful to do a good job under the decks this is a breeding ground for bacteria and if not clean will create problems with disease and for the clippings to discharge. Keep you mower cleaned and greased daily and it will run and last the way that it was designed.

Next is aeration, something we never have time to do enough. Our aerator and tractor that pull it I think date back to the 70's or early 80's. The aerator is a pull behind type, so once it is down, that's the way it goes, so we generally use a pattern that mimics making ice on the Zamboni. The tractor that pulls it runs on biodiesel the kids in the school produce. We can't run this machine enough given the very low fuel expense. (My assistant, Dylan Satter, says the smell of fried food keeps him hungry all day.) Dylan, as does the other assistants I've had understand how we feel about aerating. In late March and late November we pull cores and break up the plugs. The rest of the season we use 6-inch slicing tines, which during the summer helps the rain and irrigation penetrate rather than run off. We are all environmental stewards, so by keeping up with aerating we are making sure our other inputs end up in the rootzone where they are needed.

During the fall season we will start with a pitchfork to the goals and team areas. We test compaction weekly with a penetrometer, so based off compaction and wear is how frequently we aerate. We will skip a mowing to ensure we get the aeration in. After all it is easier to aerate than to sod cut and install and who really has time for that? During the fall and spring we could aerate as often as every 2 weeks and usually broadcast seed after.

There are many factors that help us decide, Mother Nature being the biggest. If you have never aerated, I suggest at least 2 times a year with a plug type or hire a company to Verti-Drain. We use a company to do this process for us. We generally base this from event counts and compaction and wear levels. This service is generally not very disruptive to playing surface unless they are pulling boulders up everywhere. We have had this done on fields in morning and played in the afternoon. This service is not cheap, but is a lot cheaper than removing and replacing turf.

The last area is spring preparation. Most leave this until spring and

it usually creates difficult situations. Until the snow flies we will renovate all our worn areas and use covers to help speed up germination of the seeds and existing turf to recover. These covers will also defer traffic from happening as well. As always it is best to use signage to let people know what is going on. We will also go through our skin surfaces through the fall and weed and edge, making sure that we leave them ready to go for the spring. We find it easier to do weed removal and work the edges in fall when soils are cool and moist.

EDDIE WARCZAK, Wisconsin Timber Rattlers

We will core aerate and topdress immediately following the season. We only have a few wear areas that need to be re-sodded so that will be done following the aeration process. We then will go through the home plate area as well as our four bullpen mounds and game mound and make sure that they are all up to standard. Once we have them where they need to be we will put down 1-inch thick insulation over the top of them along with a tarp and sand bags so they will be all set to go in the spring.

We are trying Tenacity this year to try to knock out the bentgrass and *Poa trivialis*. We will be starting the first application the 17th of September with the last application on the 15th of October, spraying every 2 weeks. We also put down a snow mold application which usually occurs around the 3rd week in November. The snow mold

has been very bad the past few years so we are looking at a few different options with that. The last thing that we will do is put down rat poison along the warning track and under our tarps, a few years ago we had lots of vole damage coming out of the winter since we started to put down the poison we have not had a problem since.

LEE KELLER, University of Vermont

Our fall sports schedule will end the last of October or very early November. We will then shut down and winterize our irrigation systems. By mid-October I will have all heads marked and as fields are finished we will begin to core aerate in two directions/overseed and fertilize to harden off for winter.

In Vermont winter can close in real fast or we may be able to work well into December depending on Mother Nature. Ideally I plan to core aerate all our fields and overseed at a 4-6lb/1000 rate doing it as a dormant seeding. I plan on fertilizing with a higher potassium fertilizer to harden off for winter.

We try to mow short (less than 2 inches) for winter to help prevent snow mold. We have had success with this in past years but are always looking at new ideas and ways. One of our biggest problems in past has been ice, mainly through January or February thaw or warmer temperatures followed by rain or melting snow. The water cannot drain through the existing frost layer and becomes ice! ■

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Steps for increasing fleet productivity

MAXIMIZING FLEET PRODUCTIVITY starts with getting the most out of your vehicles. To a large degree, the best approach is driven by the type of fleet you operate and its drive cycles. In many cases, you may find that different techniques are required for individual groups of trucks within your fleet.

Making sure that you are using the right size vehicle for each application is a good starting point for optimizing vehicle productivity. If your trucks are fully loaded at the start of the day, but have to come back for a second load before the end of the shift, you may want to consider using larger trucks. This could save time and reduce total vehicle mileage. On the other hand, if your trucks start with a partial load and do not need to return during the day, consider using smaller, more fuel-efficient vehicles. Another right-sizing opportunity is to replace three trucks that operate in the same general area with two larger trucks. You may be able to equip the larger trucks with material-handling devices to speed up cycle times, making it possible to accomplish the same tasks in the same amount of time with one less vehicle.

If you are experiencing excessive downtime and on-the-road breakdowns, your trucks may be overloaded or improperly designed for the application. This not only destroys your fleet's productivity, it is also dangerous and expensive. Take the time to learn how to properly match your trucks to your application before buying another vehicle.

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Fuel Economy Techniques

ACCORDING TO ISUZU COMMERCIAL TRUCK OF AMERICA, INC., reducing emissions and fuel consumption is a vital aspect of fleet management. Fleet managers can vastly improve their mileage by applying these valuable fuel-saving techniques.

1 STARTING FROM A STANDING STOP

Accelerate slowly up to 1,000-1,500 engine rpm, before shifting. Fuel consumption is at the lowest level when the engine runs in this rpm range. The accelerator pedal should be depressed 1/2 to 2/3 of the way. The difference between sharp acceleration and steady acceleration is 14 percent in fuel savings.

2 STEADY-SPEED DRIVING

Keep engine rpm just above the point where the engine stalls. Varying speed by more than three miles per hour with repeated acceleration and deceleration diminishes fuel economy up to 27 percent. Using the cruise control improves fuel economy because it eliminates speed variances.

3 FUEL-EFFICIENT SPEEDS

The most fuel-efficient speed is between 25 and 38 miles per hour. Generally, drive in the highest gear possible when going more than 28 miles per hour. High speeds are big fuel wasters; fuel economy increases 20 percent by reducing vehicle speed from 62 to 50 miles per hour.

4 NUMBER OF STOPS

The amount of fuel consumed for standing starts is equivalent to driving up an incline at full power. To save fuel, reduce the number of stops by adjusting the time of arrival so that the light has already changed to green. Try as much as possible to keep tire rotation from stopping.

5 TIRE INFLATION

Fuel economy is reduced 8 percent when tires are under-inflated by only 20 percent. Always maintain proper tire pressure. Tubeless radial tires offer the lowest rolling resistance and can increase fuel economy 13 percent compared to bias tires.

6 PROPER ENGINE MAINTENANCE

A clogged air cleaner can reduce fuel economy up to 5 percent. Improper fuel injection timing also reduces fuel economy by 5 percent, as well as increasing heat loads and lowering engine reliability. Using summer engine oil with a 40-50 SAE viscosity in the winter can also reduce mileage; always change to an appropriate oil for a particular season, or use a multi-grade oil.



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designed to make work trucks more productive are constantly being developed and improved. If you haven't updated your components in a while, you may not be using the best components available for your application. Before you buy another truck, make a detailed review of your current and projected work truck requirements, then determine if there are newer products available that could improve your trucks' productivity.

If you are not currently using specialized bodies or equipment, see what's available. A combination of increasing labor costs and the availability of new components may make it worthwhile to upgrade to more specialized truck bodies and equipment. Take the time to research what's available. This may mean talking to your local truck equipment provider, doing research on Web sites, and/or attending a truck equipment trade show where you can compare what's new from a number of manufacturers all in one place.

REDUCING STATIONARY FUEL CONSUMPTION


One measure of productivity is the quantity of assets used to perform a specific task. This may be measured in hours of labor per unit, total cost per unit, or in the case of a work truck gallons of fuel burned per task. The Department of Energy has estimated that the typical Class 6 / 7 work truck has an equivalent fuel economy of around 6 miles per gallon. In many cases, a significant portion of that fuel is burned in non-productive operation (idling) or while

operating engine-driven auxiliary equipment (PTO operation). Anything you can do to reduce this type of engine operation will have a direct impact on your fleet's productivity. In addition, many cities, counties and even states have implemented idling restrictions for commercial vehicles. Expect even more areas to adopt these restrictions in the future.

Many newer trucks can be programmed to automatically shut down the engine after a specified period of idling. Aftermarket systems are also available, as well as systems that will automatically start an engine during PTO operations when there is a demand for power and then shut it down after a specified period of no demand. In some operating cycles, these systems can produce significant reductions in non-productive engine operation.

The need for auxiliary power at a job site does not necessarily mean that you have to operate your truck's engine for extended periods of time. Many soft hybrid technologies provide auxiliary power on demand. These include electric PTOs (E-PTOs), battery-powered static inverters to provide commercial-quality AC electric power (120- and 240-volt) and auxiliary engine-driven systems. Auxiliary engine power systems are available to provide commercial-quality electricity, welding capabilities, hydraulic power and compressed air.

In addition to the auxiliary engine-driven systems mentioned above, electric-powered (battery) systems are also available to support cab heating and cooling for shorter periods of time. Fuel-fired sys-



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tems maintain not only cab heat, but also keep the engine water jacket warm and even pre-warm hydraulic fluids. These systems are very effective in cold climates and can maintain acceptable temperatures for extended periods of time while consuming a small fraction of the fuel that would be burned by operating the truck's engine.

BEYOND THE TRUCK

Looking beyond the truck itself, anything you can do to make your drivers more productive will help them accomplish more work in the same period of time. In certain operating and drive cycles, the use of telematics (including GPS systems) can significantly increase productivity. At the same time, some systems will allow you to monitor vehicle operation and identify potential problems before they result in on-the-road failures.

Electronic data collection and management systems allow for almost instantaneous collection and tracking of data in areas such as inventory control, job-specific component selection, and pickup and delivery. These technologies include radio frequency identification (RFID), optical bar code scanning, GPS location interface, and computer-generated parts picking lists. All of these systems are designed to improve inventory control and reduce the amount of time crews spend performing administrative functions. This, in turn, means less time chasing forgotten materials and more actual productive time.

These technologies have proven effective and their cost has lowered, making them affordable to almost any company that could benefit from their use.

There is no denying the fact that "green" is in. Many fleets have incorporated some type of mandate or purchasing philosophy to increase the green elements within their operations. Many of the same steps that improve fleet productivity also can contribute to greening your fleet. Using smaller vehicles, improving fuel utilization, reducing idle time and using lighter-weight equipment for upfits all contribute to reducing fuel consumption and greenhouse gas emissions. ■

Robert "Bob" Johnson is director of fleet relations for the National Truck Equipment Association, www.ntea.com.

Keeping Up With Technology

FLEET MANAGERS are faced with a seemingly impossible task when it comes to staying current on all of the new technologies found on today's vehicles. There is literally not a single component on a new truck, truck body or unit of truck-mounted equipment that has not been touched by technology in recent years. These changes can impact the way you operate, maintain and repair your fleet. They can also affect how you design and specify your vehicles. However, to properly adjust to these new technologies, you must first be aware of them and understand how they impact your fleet.

Advances in electronics and integrated technologies like hybrids and vehicle emissions systems have been getting most of the headlines in recent years. But behind all the glamour, there has been a revolution in materials, manufacturing processes and vehicle and equipment design. Fleets are now part of a "high-tech" industry that requires constant efforts from fleet managers and maintenance personnel to stay current.

➤ UNDERSTANDING NEW TECHNOLOGY

To keep up with current and future changes, make sure you are aware of new technology; understand how it impacts your operations; and know how to use, maintain and repair the components that utilize the new technology. One thing you don't have to do is fully understand how new technology works. Some industry professionals become so involved in studying how a new technology operates that they either lose site of the real objectives — learning how to use, maintain and repair it — or just give up in frustration.

➤ BECOMING AWARE OF NEW TECHNOLOGY

Some technological advances, such as diesel engine emissions systems, have received so much attention that it would be almost impossible to find a fleet manager who has not heard about them. However, to become aware of the more mundane changes in vehicle and equipment technologies, you need to make a conscious effort.

Once you become aware of a new technology, determine how it will impact your operations. In many cases, you will have no say as to whether or not you adopt a new technology — it will just come with the vehicle (like electronic power train control systems), and it will be your responsibility to learn what you need to know. In other cases, the new technology may be optional. In this instance, a sales representative may tell you that the new technology is the greatest thing since sliced bread and that you cannot live without it. But remember, you know more about your business than anyone else. A new technology may be wonderful in the proper application, but this may not be yours.

If you think a new product or technology may have an application in your business, learn about it and then make your own decision as to whether it should be implemented. In many cases, new technologies also mean increased acquisition costs, so you will need to factor in the life-cycle cost benefits of the proposed innovation. Many industry trade shows offer extensive educational opportunities to learn more about these new technologies through formal educational seminars and the opportunity to talk one-on-one with manufacturer representatives, engineers and technical experts on the show floor.

➤ IMPLEMENTING NEW TECHNOLOGY

Whether a new technology comes to you by default (already on the vehicle) or through your own decision to implement it, be sure to determine how it will impact your daily operations, maintenance practices and repair requirements. Also, educate the employees impacted by the technology as necessary and acquire any new tools and test equipment needed to properly work with the technology. Lack of training and understanding are among the biggest reasons a new technology is resisted in a fleet application. For example, when electronic ignition systems were first introduced in regular production vehicles, aftermarket vendors actually sold kits to replace the electronic systems with conventional breaker point systems. Inside of three years, as people grew to understand the benefits of the electronic systems, these kits disappeared from the market. If your workers know the benefits and how to work with the new technology, you'll likely have minimal problems. -Robert "Bob" Johnson

Background illustration courtesy of istockphoto.com



JOHN MASCARO'S PHOTO QUIZ

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Light green turf between curved lines
Turfgrass area: Football/Soccer Field Surrounds
Location: Callaway, Florida
Grass Variety: Tifway 419 Bermudagrass

Answer to John Mascaro's Photo Quiz on Page 31

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By **Dr. Peter Landschoot**



Late fall fertilization

FALL IS THE TIME OF YEAR when cool-season turfgrasses recover from summer stress related conditions; such as drought, heat, and disease. For athletic fields, fall is also the time that turf takes a beating from football and other school sports activities. This year, many athletic field managers will be making late fall fertilizer applications with the hopes of improving turf vigor and recovery from injury next spring. Here we examine how late fall fertilizer applications influence turf performance, when to make your applications, as well as the types of fertilizers and rates which provide the best turf response.

Late fall fertilization has been promoted as a means of prolonging turf color of cool-season grasses into early winter without increasing the chance of winter injury and disease. Winter color is more noticeable in regions where winters are warmer (Mid-Atlantic and transition-zone states) and during mild winters. Late fall fertilization will also enhance spring green-up without the excessive growth that often accompanies early spring fertilization. This green-up often will last into mid spring, so an early spring fertilizer application is not needed. A fertilizer application in mid to late spring is usually required to sustain turf color and growth into the summer months.

A small but potentially important increase in the plant's carbohydrate reserves occurs when fertilizer is applied in late fall instead of early spring. Turfgrasses accumulate carbohydrates in stems and rhizomes during fall. These carbohydrates help turf resist winter injury and aid in disease and environmental stress resistance the following spring and summer. Because carbohydrates are tapped for energy by roots and shoots during periods of rapid growth, forcing excess growth with early spring fertilizer applications can deplete carbohydrates quickly, leaving turf vulnerable to spring and summer stresses. Late fall fertilizer applications do not force as much leaf growth in spring as equal amount of early spring fertilizer, thus carbohydrates are not exhausted as quickly. The result is a slight advantage to the turf in the form of better stress tolerance and disease resistance.

Another reported benefit of late fall fertilization is an increase in rooting, though precisely when and how this increase occurs is a source of some debate. Maximum root growth of cool-season turfgrasses occurs in spring and fall. Some root growth will occur in winter if temperatures are above freezing, whereas little if any growth occurs in summer. Fertilizer applications are made in spring and late summer in attempts to promote root growth. One problem in using this approach is that much of the fertilizer is used by the shoots, sometimes preferentially over roots. One reported advantage of late fall fertilization is that roots are still growing at a time when shoot growth has ceased, thus allowing the roots to make full use of the fertilizer. However, during this period root growth is very slow, and if the soil is frozen, they do not grow at all. Consequently, the benefit of increased root growth in response to fall fertilization is questionable.

One study in Virginia showed that moderate rates of soluble nitrogen (1 lb nitrogen/1000 sq ft) in late fall increased rooting of turfgrass without a noticeable increase in shoot growth. In contrast, a study in Ohio showed no increase in root growth during late fall or winter following late fall fertilizer applications. However, when compared to early spring applications of nitrogen, late fall fertilization allowed more rooting in spring. Presumably, this benefit was due to early spring green-up from late fall applications, which alleviated the need for early spring fertilization. When fertilizer was not applied in late fall, but instead, in early spring, excessive shoot growth occurred, depleting carbohydrate reserves that would have otherwise gone into root production later in spring. The take-home message from the Ohio study is that while the net effect of late fall fertilization on rooting is slight, application in late fall may be more beneficial with respect to rooting than an early spring application.

Late fall fertilization is occasionally blamed for increased winter injury, snow mold, and annual bluegrass encroachment. A few studies have been designed to examine the influence of late fall fertilization on winter injury. But to my knowledge, none have conclusively demonstrated detrimental effects. Heavy fertilization in mid-fall, when grass shoots are actively growing, can enhance snow mold diseases (presumably due to reduced pre-winter hardening and increased succulence of plant tissue). Increased plant succulence should not occur with late fall fertilization. In fact, some research has shown that late fall fertilization may actually reduce winter diseases.

While some studies have shown increased annual bluegrass populations in fall, there is no good evidence to show that this increase is related to late fall fertilization.

WHEN TO APPLY

Most experts agree that late fall fertilization should take place when foliar growth stops (or slows to the point that turf no longer needs to be mowed), grass is still green, and before the soil freezes. In Pennsylvania, this period usually occurs around Thanksgiving. Application timing may vary from year to year depending on weather conditions.

Most late fall fertilization programs include moderate amounts of nitrogen, phosphorus, and potassium. Rates of 1 to 1.5 lb of mostly soluble nitrogen/1000 sq ft are suggested over higher rates (assuming a late summer application was made) to avoid excessive growth in spring and nitrogen leaching or runoff. One study at the University of Illinois showed that when nitrogen was applied at moderate rates in late fall (1 lb of nitrogen/1000 sq ft) both urea and sulfur-coated urea provided a better early spring color response than Milorganite. However, when Milorganite or sulfur-coated

urea was applied in late fall at a higher rate of nitrogen (2 lb of nitrogen/1000 sq ft), spring green-up was similar to that obtained from applying urea at a lower rate (1 lb of nitrogen/1000 sq ft in late fall).

Slow or controlled-release nitrogen sources may be a better choice than soluble sources on sandy soils because of reduced potential for leaching. Nitrogen fertilizer should never be applied to frozen soil due to the increased chance of nutrient runoff.

Although application timing is not as critical with phosphorus and potassium as it is with nitrogen, these elements can benefit turf when applied in late fall. Phosphorus is important for root growth and maturation of turfgrasses and application rates should be determined according to soil test recommendations. If your soil test report indicates a need for phosphorus, late fall is a good time to fertilize. However, there is no need to apply additional phosphorus if it is present at sufficient levels. Turfgrasses require potassium in relatively large amounts, so annual

applications are usually required. This element may enhance cold-heartiness, disease-resistance and wear-tolerance. Late fall is an ideal time to fertilize with potassium.

Late fall fertilization should take place when shoot growth ceases, the grass is still green, and before the soil freezes. Benefits of fertilizing in late fall include better winter color, enhanced spring green-up, and possibly increased rooting.

Typically, moderate amounts of soluble nitrogen provide good turf color without excessive shoot growth in early spring. However, slow-release nitrogen sources can also provide a good color response in early spring when used at higher rates. To avoid potential leaching and runoff problems, use slow-release nitrogen sources on sandy soils. Do not apply fertilizer to frozen soils. ■

Dr. Peter Landschoot is professor of turfgrass science in Penn State's Department of Crop and Soil Sciences, and he originally wrote this article for a Cooperative Extension publication.



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▶▶ TORO POWER MAX TWO-STAGE SNOWBLOWERS

Toro Power Max two-stage snowblowers can throw up to 2200 pounds of snow per minute up to 45 feet away, and are engineered with patented features that make them much easier to maneuver. Innovative features include freewheel power steering that allows operators to turn on a dime and an auger system that powers through deep drifts and compacted snow. Other features include a Quick Stick joystick that allows operators to quickly and easily change the direction the snow is being thrown. The system includes handle-mounted triggers that give the operator the ability to clutch the wheels independently or simultaneously with just the flex of a finger enabling the wheels to "freewheel." The system also makes it easy to move the snowblower in and out of tight storage areas.

www.toro.com



▶▶ NEW WIRELESSLY CONTROLLED SPREADERS

SnowEx introduces the new SR-110 and SR-210 utility spreaders, compact units equipped with wireless controls that allow simple plug-and-play operation. Both models attach to a variety of vehicles and feature a 3-cubic-foot capacity hopper. The pocket-sized wireless remote controls the rate of the two-speed spinner and toggles the electric motor on and off. The SR-210 spreads up to a 25-foot range. It features a vertical high-flow auger that works in conjunction with the spinner and allows the unit to spread bulk materials, such as bagged rock salt or calcium flakes, whereas the SR-110 spreads material up to a 20-foot range and uses a gate feed system, allowing it to handle small calcium chloride pellets or bagged ice melters. The SR-110 includes a cable to open and close the gate from the cab.

www.trynexusfactory.com



▶▶ TURF TEQ PLOW

Turf Teq has introduced the 46-inch wide Model 1305PL Plow. The Plow's angle (left/right) can be easily adjusted from the operator position and it has the capability to allow the blade to oscillate or to be locked into position. The 1305PL features a spring loaded trip release and a replaceable cutting edge while employing a fully hydrostatic transmission with forward/reverse and a 13-hp Honda engine. The Plow can also be easily converted into a Power Edger, Power Broom, Power Rake or Brush Cutter for all season use.

www.turfteq.com

▶▶ Before you store

Here are simple, routine steps you should take when preparing to store your equipment for the winter.

- ⊙ Drain fuel if possible, or fill tank with fresh fuel and add fuel stabilizer then run engine for a short period of time;
- ⊙ Check equipment for damage and make repairs;
- ⊙ If paint is chipped or damaged, touch up to prevent rust;
- ⊙ Check for any fuel or oil leaks and repair if necessary;
- ⊙ Check blades, tines or belts and repair or replace;
- ⊙ Keep maintenance records handy for easy reference at the beginning of the next season.