Lawnmowers

Selection, Use, Maintenance and Safety

LSU AgCenter Research & Extension

Introduction

Lawnmowers (Figure 1) are used in urban, suburban and rural environments. People who have no other type of lawn or garden equipment often have a lawnmower. Even though lawnmowers are so common and most people have some experience with them, selecting the best mower for a particular lawn and using it correctly may not be easy or obvious. The objective of this publication is to provide information that will help you select the best lawnmower for your needs, use it correctly and safely, and maintain it properly.

Figure 1. Typical rotary lawnmower

This information is limited to a discussion of consumer walk-behind lawnmowers. Riding lawnmowers, lawn/garden tractors and compact utility tractors with mower decks are covered in other publications.

Do You Need a Lawnmower?

This question is being asked more often as more and more homeowners decide to hire a lawn care service to do mowing and other lawn chores. Economically, it is always cheaper for a homeowner to own a mower and do his or her own mowing than to hire a lawn care service, but many homeowners are willing to spend the extra money necessary to hire a professional. In many neighborhoods, nearly every lawn is professionally maintained. If you have a professional service mowing your lawn, you don't need to own or maintain a lawnmower. You may, however, own and maintain a lawnmower and just hire someone to operate it for you.

Factors to Consider in Choosing a Lawnmower

If you do need a lawnmower, many factors can enter into your decision on what lawnmower to buy. Size of the lawn to be mowed is probably the first factor to consider. Small lawns (up to about 2,000 square feet are good candidates for non-power reel mowers or electric mowers; intermediate lawns (2,000 to 15,000 square feet) are suitable for walk-behind power lawnmowers, either push-type or self-propelled; larger lawns may justify a riding mower.

Also important in your decision is the type of turfgrass in your lawn. Some turfgrasses such as hybrid Bermuda, some Zoysias and bent must be cut very short (and very often) to maintain a decent appearance. These grasses usually require a reel mower to cut below a 1-inch height, but few homeowners have these high-maintenance grasses. St. Augustine and some of the tall fescues should be cut fairly high (about 3 inches or more), so a rotary mower is essential. Grasses such as centipede in the South and Kentucky bluegrass in the North fall in the middle and can be cut with most types of mowers. Zoysia is a tough grass and is best cut with a reel mower.

The slope of your lawn also plays a part in your decision. A non-self-propelled mower is more suitable for a flat lawn than for one on a hillside.

Whether the lawn is irrigated on a regular basis can also play a role in your decision process. Irrigated lawns may be softer, thus making a mower harder to push, and they will need mowing more often with more clippings each time. On the other hand, clippings will decompose more rapidly on an irrigated lawn.

Closely aligned with irrigation is overall turf quality. A well-maintained lawn will grow faster, be denser and have more clippings than a poor lawn. Also, if you strive for a quality lawn, you will want a mower that will yield a quality cut.

Do You Need a Power Lawnmower?

Many people buy self-propelled lawnmowers, but pushing a mower can be good exercise. If you have a small lawn, you should consider a push mower. A manual reel mower can be a good choice for very small lawns.

Manual reel mowers (Figure 2) are making somewhat of a comeback. Testing has shown that the push effort for a ***good*** manual reel mower is no greater than the push effort for a powered but non-self-propelled rotary mower. The width of a manual reel mower, however, will normally be less than a rotary (16-18 inches versus 20-22 inches). There are major differences in quality among manual reel mowers.

A good manual reel mower will have a very thin clearance between the reel blades and the bed knife when properly adjusted, thus eliminating blade drag. Excessive clearance will cause a deterioration in quality of cut. With low-quality reel mowers, the blades may drag on the bed knife, increasing push effort, noise and wear. The cost of a good manual reel mower may exceed the cost of a powered discount store rotary mower.

Figure 2. Push-type reel mower (photo from People Powered Machines).

It is tempting to think that maintenance costs will be less for a reel mower since there is no engine to maintain, but this is not necessarily true. Reel mowers must be professionally sharpened and back-lapped, and this should be done reasonably often. The cost of frequent professional sharpening can easily exceed the cost of maintaining a small engine. Some manual reel mowers allow catching clippings, but you can't mulch with a reel mower. Reel mowers are designed for high-quality turfgrass. They will not handle tall grass (taller than axle height) or coarse weeds.

If you have a small lawn and are willing to get a little exercise while mowing, a good manual push mower can be a viable alternative to a powered mower. For somewhat larger lawns, a non-self-propelled power rotary can be a good choice. Selecting a model with tall rear wheels can reduce push effort. For larger lawns or minimum effort, you will need to spend enough to get a self-propelled rotary mower.

Propulsion

Most top-of-the-line power mowers are self-propelled. This increases the cost of the mower but can make the mower easier to use. Be aware that not all self-propulsion systems work well; some are unable to pull the mower along, and you end up pushing harder than you would with a non-self-propelled mower. Models with large, powered rear wheels generally have plenty of traction, but some front-drive models also pull adequately. You need to try out a model before buying it. Models that rely on tightening and loosening a belt drive to provide power to the wheels can be problematic. On some of these, it is difficult to adjust the mower to provide adequate driving power and still get full release of the drive without drag.

Variable speed drives are found on higher-priced lawnmowers. This can be helpful in two ways. First, it will allow you to find a speed that is comfortable for you rather than having to adjust your pace to the speed of the mower. Second, it will allow you to speed up in light cutting, if desired, and slow down when the turf is lush and heavy.

Non-self-propelled (push) mowers (Figure 3) are lighter and less expensive. They usually require more effort than a self-propelled model, but a light-weight model should not require too much force unless a grass catcher is used. Pushing one on a small lawn can be good exercise. If the mower has large wheels on the rear, it will push considerably easier. Not only are these mowers less expensive to buy than self-propelled models, they are also less expensive to maintain, since they are much simpler.

Figure 3. Push-type (non-self-propelled) rotary mower.

Wheels

As a general rule, a mower with large-diameter wheels (Figure 4) will push more easily than a mower with small wheels, and a self-propelled mower with large-diameter drive wheels will pull better than one with small wheels. Large wheels have lower rolling resistance in turf and thatch. A large wheel tends to roll over the turf, and a small wheel is, in effect, continually trying to climb out of the thatch into which it settles.

Figure 4. Lawnmower with large wheels.

One disadvantage of large wheels is that they may require more room to maneuver, thus putting large wheels at a disadvantage in a small lawn or in tight areas of a large lawn. In general, large wheels are the best way to go with Southern turfgrasses.

Most lawnmowers allow adjustment of the wheels to vary cutting height. Some inexpensive models require using wrenches to move each wheel. Others have lever-operated mechanisms at each wheel position to allow easier height adjustment. The easiest to adjust are mowers with a single lever to raise or lower all four wheels at once.

Handle

Many current models of lawnmower have long handles (Figure 5) that extend a long way behind the mower deck. Manufacturers make the handles this way for safety – to keep the operator further away from the deck and thus reduce the chance of injury. Although this safety feature is desirable, a long handle can make a mower very difficult to maneuver in tight areas – near buildings, fences, trees, etc. You should try to maneuver several mowers before buying one to get an idea of how each will work for you. Some lawnmower handles are adjustable.

Figure 5. Long handles on lawnmowers.

Some mower handles are designed to fold easily for storage. They cannot, however, be used with the handles folded.

Mulch, Bag or Throw?

Walk-behind rotary lawnmowers can handle clippings in one of three ways: they can mulch (Figure 6), bag to the rear or side (Figure 7) or discharge to the side (Figure 8). Some mowers can do any of the three with minimal adjustment. Any of the three modes can be useful in some situations.

For many years, mulching has received the best "press." Mulching involves holding the clippings under the deck longer so that they can be cut multiple times into small pieces and then discharging

Figure 6. Lawnmower equipped for mulching

them directly down. The two primary advantages of mulching (compared with bagging) are the elimination of bags of clippings to be disposed of and recycling of nutrients, primarily nitrogen, back onto the lawn.

Figure 7. Lawnmower equipped for bagging.

The main advantage of mulching compared with side discharge is that mulching chops up the clippings and blows them down into the grass instead of leaving them on the surface. Mulching generally requires more horsepower than the other modes since the clippings must be cut multiple times. Mulching works best with dry grass that is not very tall; tall, wet grass will readily plug the mower. Dedicated mulching mowers use a special blade that holds the clippings in suspension longer and recuts them more effectively. Research studies have shown that mulching (also called "grass recycling") does not contribute significantly to thatch buildup; thatch is primarily comprised of tillers, roots, rhizomes and stems, not leaves.

Bagging of clippings has been popular for many years. Depending on the model, the collection bag is mounted on the rear or the side of the mower. The advantages of bagging are primarily visual; the clippings are removed and thus out of sight. The clippings collected are also good for compost. The disadvantages of bagging are the extra work required to empty the bag and dispose of the clippings and the problem of clippings filling landfills (if you don't compost them).

Figure 8. Lawnmower equipped for side discharge.

Bagging is probably not the best routine practice for lawns. It will be useful if the turf gets ahead of you and is too tall or if you need to cut the turf shorter than usual (before dethatching, for instance). Bagging does put extra stress on the mower because of the weight of the clippings. With some self-propelled mowers, the propulsion system is not adequate to handle the extra weight, and you must help push the mower by hand when bagging. Probably the best use of bagging is shredding and collecting ***dry*** leaves for compost.

The oldest way of handling rotary mower clippings is to discharge them out to the side. This system is simple, cheap, requires the least power and puts the least load on the mower. A properly designed side discharge deck with an appropriate blade will throw ***dry*** clippings from a normal cut out to the side and distribute them so that they are barely noticeable. If the grass is wet or very tall, the discharge may partially plug and spurt out unattractive clumps of clippings. Also, not all discharge decks are properly designed; some will not distribute clippings evenly under the best of conditions.

Some mowers are designed specifically for one mode of operation such as mulching or side discharge; others can handle two or even all three modes with minor adjustments and attachments. For many people, a side discharge deck will be the most attractive (and lowest cost) option. If you really want to optimize the appearance of your grass-cycled lawn and hide the clippings, consider a more expensive mulching mower. A mulching mower will also get into narrower spots than a side-discharge deck and can trim with either side.

Generally you should not plan to bag all your clippings, but having the option of bagging occasionally, as noted above, might be a consideration. Buy a mower that does a good job of side discharging and/or mulching, and consider ability to bag as a possible option.

2-Stroke vs. 4-Stroke Engines

Most lawnmowers are powered by 4-stroke engines. This means that the engine makes four strokes per complete combustion cycle. A few lawnmowers have 2-stroke engines. These engines make only two strokes per complete combustion cycle. A major difference in the two types is that 4-stroke engines have a separate crankcase for engine oil, whereas 2-stroke engines require mixing oil with the gasoline. This should affect your selection decision if you are going to mow on steep slopes. Four-stroke lawnmower engines do not have oil pumps like cars do; they rely on splash lubrication. If the engine is operated on a slope, the splash system may not be effective and may not lubricate adequately. With a 2-stroke engine, the oil in the gasoline provides lubrication regardless of slope.

Two-stroke engines also tend to be lighter, thus somewhat more desirable on non-self-propelled mowers. Smoking and pollution are more of a problem with 2-stroke engines, and they require the hassle of mixing oil with gas. On the other hand, 2-stroke engines do not require oil changes like 4-stroke engines. Two-stroke engines do require more frequent spark plug changes.

Deck Material

Most lawnmower decks are now diecast from an aluminum alloy or stamped from steel. In the past, some mowers had fabricated (welded) steel decks, and a few heavy models still do. Some mower decks have even been molded from plastic, but this is less common. Steel is strong, but heavy and susceptible to rust. Aluminum can be strong, if thick enough, but may be more brittle and prone to breakage. It is less likely to corrode.

Quality Factors

We've all heard the old saying: You get what you pay for. Is that really true for lawnmowers? There is certainly a wide range of prices; in fact, you can easily pay twice as much for a lawnmower from a major manufacturer as you would pay for a lawnmower with the same horsepower and mowing width at a discount store. What do you get for the additional money?

Price tends to increase with more features and with higher quality. Additional features such as self-propulsion, larger wheels, bagging capability and electric starter add to the cost. Beyond these general trends is the dramatic

difference in price among lawnmower brands. Some of the factors that lead to a cost difference among brands are:

Engine quality varies. Some engines of the same size are more reliable and designed for longer service life.

Decks Lower-priced mowers typically have stamped steel decks. More expensive machines may have diecast alloy decks for lighter weight.

Transmissions for self-propulsion come in different quality levels, and some work considerably better than others. Some will work more smoothly and hold up longer than others. Some belt drives are hard to adjust and prone to either slippage or dragging in neutral – or both.

Overall reliability can vary a great deal. In some cases, the more expensive machines are just built better all the way through and will give longer service with fewer problems.

Service should be a consideration. The less expensive machines typically have a shorter warranty, and getting repairs done under warranty may be difficult; dealers and manufacturers tend to stand behind the more expensive machines.

Parts availability can be a big issue. The more expensive machines generally come from dedicated lawn and garden or farm equipment dealers who stock plenty of parts and have ready access to even more parts. The less expensive machines are often sold by discount stores and mass merchandisers who have no long-term relationship with the manufacturer, so future parts availability is questionable. The lawnmowers at discount stores and mass merchandisers may carry the house brand name, but the actual manufacturer (and the entire design) can change annually.

This whole issue becomes a question of value. You have to balance the quality features against the price for the various brands and models, and then determine ***what is the best value for you.*** What is right for you might not be right for your neighbor. If you have only a small lawn to mow, you might be entirely satisfied with a low-cost push mower. If you will use the mower more extensively, you might want higher quality to increase longevity and reduce downtime and repairs. If you want a self-propelled mower, you should consider a higher quality model.

Yes, with lawnmowers you usually do get what you pay for.

Where to Buy

You have a wide choice of places to buy a lawnmower. Some offer low prices; some offer a wide selection; some offer high quality; some offer excellent service; some offer convenient evening and weekend hours; and some offer knowledgeable sales staff. You may find several of these characteristics at one store, but you will seldom find all of them at any one place.

Discount stores often sell one or more brands of lawnmowers. The mowers may carry the store brand or may carry the manufacturer's brand name. The mowers tend to be lower cost and of lower quality than you will find at a dedicated dealer. In many cases, parts and service are not available. You will probably have to deal with the typical discount store employee, so don't expect much helpful advice. Delivery may or may not be available. Quality of predelivery service is questionable. The advantage here is price and convenience (of the original purchase).

Mass merchandisers often sell lawnmowers with a house brand name, but different models may come from different manufacturers; manufacturers can change from year to year, so parts availability is problematic. Salespeople may be somewhat more knowledgeable than at discount stores. The mowers are typically equivalent in quality to discount store mowers, but the sales staff may be more knowledgeable, and parts and service may be available.

Dedicated lawn and garden equipment dealers tend to have higher quality lawnmowers, although a given dealership may carry both inexpensive and high-quality lines to appeal to a broader range of customers. Some of them carry top-of-the-line equipment from ag machinery and grounds maintenance equipment companies. Quality of sales and service staff, and parts availability, can be very good. You should be aware that some of these dedicated dealers cater primarily to grounds maintenance professionals, and they will schedule service of commercial equipment ahead of homeowner equipment, rather than on a first-come, first-served basis.

Farm equipment dealers generally offer high quality equipment, knowledgeable sales people, good service and good parts availability – for a higher price. Some ag equipment companies have separate lawn and garden dealerships in addition to their ag dealerships. Some also offer more than one line of equipment. These second-tier brands are designed to compete with mass merchandisers while still offering the sales, service and parts advantages of a dedicated equipment dealer.

Once again, you have to decide what is important to you and what you are willing to pay for it. You will save money in the short run at discount stores and mass merchandisers; you will pay more but get better quality equipment and service with dedicated lawn and garden dealers or farm equipment dealers.

When to Mow

Turfgrass should be mowed before it gets excessively high. The LSU AgCenter recommends that you never cut off more than 1/3 of the height of the grass in any one mowing. In other words, if you have your mower set at 2 inches, you should not let the grass get more than 3 inches high before you mow. If you have your mower set at 3 inches, you should not let the grass get more than 4 1/2 inches high.

Unless you irrigate your lawn, your frequency of mowing will vary greatly depending on temperature and rainfall. Southern grasses like hot weather with plenty of rain. Under those conditions, you may have to mow every four to seven days. On the other hand, if the weather is cool or dry, you may need to mow only every 10 to 14 days – or even longer intervals during severe drought.

In some cases, you may want to mow before the turf really needs cutting to remove unsightly seedheads, weeds or dropped tree leaves.

If your lawn gets away from you and gets too tall, it is better to set your cutting height higher and remove a third of the growth, then mow again a few days later at the regular height, rather than cutting it all off at once.

It is best not to mow when the turf is wet. Wet clippings will tend to clog your mower. The clippings will build up under the deck and interfere with bagging, side discharging or mulching (grass cycling). Your mower will have to work harder when the grass is wet. Wet clippings weigh more and take more power to handle. Furthermore, mowing when the ground is wet can damage turf and lead to rutting of the lawn.

Don't mow at a time that is discourteous to your neighbors. Your neighbor may not appreciate the sound of a lawnmower at 6 a.m. on Saturday or during an evening party on his patio.

Mow Like a Pro

Does your lawn have ruts or stripes caused by mower tires? Have you ever envied the beautiful checkerboard and diagonal patterns on golf greens and other sports fields? It is not difficult to improve the appearance of your lawn by varying your mowing pattern. Whether you mow with a small walk-behind mower, a garden tractor or a large commercial mower, the same principles will apply.

The Problem: Most lawns and sections of lawns are shaped such that one way of mowing is easiest and fastest – perhaps back and forth east/west, or around the periphery in a circuitous pattern. Because it is easier, we tend to mow that way time after time. After a few mowing cycles, your repetitive tire tracks will show in the turf. If you do it long enough, or if you mow when the ground is wet, you may actually get ruts where you always run the mower.

The Solution: The solution is to mow the way the pros do it: Alternate or vary your mowing patterns. If you mowed back and forth east/west last week, mow back and forth north/south this week. Or, try mowing at an angle: southeast to northwest or southwest to northeast. Alternating your mowing pattern will have two beneficial effects. First, you will minimize tire marks and ruts since you will run the tires in different places each time. Second, the alternate or varying patterns tend be very attractive since the previous pattern or two will still be visible after mowing and thus your lawn will take on a checkerboard appearance (Figure 9) somewhat like the beautiful sports fields you see on TV. In most cases, it will take you somewhat longer to mow in the less-efficient patterns, but the results can be well worth it.

Figure 9. Cross pattern resulting from mowing in different directions.

Odd Areas: Varying mowing patterns works very well and is easy to do in large, open turf areas. It can be much more difficult in small areas, particularly those that are long and narrow like some city side-yards and the tree-lawns between sidewalk and street. Even though it is difficult, varying the pattern as much as possible on these odd areas is still beneficial. In the case of tree-lawns, it is often possible to just mow right over the sidewalk and include the tree-lawn in the main front lawn pattern. In the case of narrow side-yards, it is usually possible to fit in at least two patterns, and thus minimize tracking.

Don't Overdo Your Expectations: There is a caveat to all this. Alternating mowing patterns will certainly improve the appearance of your lawn, but you can't expect your lawn to match the dramatic patterns you see on sports fields on TV. The grounds managers on professional sports fields and golf courses use reel or rotary mowers with rollers on the rear to lay the turf over and create the highly visible patterns. You can get a somewhat similar appearance using a rotary mower with a flap on the back, but your results with a rotary mower without a rear roller will be much less dramatic than is possible with a rear roller.

Varying your mowing pattern can cause you to spend a little more time mowing, but the result will be a greatly improved appearance for your turfgrass. In larger turf areas, it is good to rotate among four patterns: back and forth east/west, back and forth north/south, diagonal southeast/northwest and diagonal southwest/northeast. In long, narrow, awkward areas, even alternating between two patterns will help reduce tire tracks and make your lawn look better. In other words, mow like the pros!

Lawnmower Maintenance

A lawnmower requires regular maintenance if it is to continue to provide reliable service. Most of the maintenance steps are easy and can be done by a reasonably handy homeowner. All of these steps should be done at the end of the season before storage, and some should be done more often. Consult your operator's manual for specific recommendations on when and how to perform service and maintenance.

Do you just park your lawnmower in the shed at the end of the season and hope it will start next spring? If so, you probably have experienced problems in getting the machine to run after storage. There are some simple steps you can take before storage to make your equipment easier to start when you need it again.

Blade Sharpening: Rotary lawnmower blades are easy to sharpen. Before removing the blade, remove the spark plug wire so there is no danger of accidentally starting the engine while turning the blade. If you are going to change the oil at the same time, it is helpful to go ahead and drain the oil before turning the mower on its side. If you leave the oil in the mower, check your operator's manual to see which way it is better to turn the mower to prevent oil leakage. Most blades can be removed by loosening one bolt on the drive shaft. You should either block the blade with a chunk of wood or use a wad of rags (or heavy gloves) to hold the blade and keep it from turning. Don't hold the blade bare-handed; you might be cut.

Once the blade is removed, it must either be sharpened or replaced. Most blades can be sharpened many times before replacement is needed. If the corners of the blade are rounded off or the cutting ends of the blade are thin, the blade should be replaced. If the blade is still good, you

can sharpen the blade with a bench grinder (Figure 10) or a small angle-head grinder (hold the blade in a vise while sharpening), use a file (again with the blade in a vise) or take it to be professionally sharpened. Always wear eye protection and gloves while using a grinder.

Figure 10. Sharpening a rotary mower blade on a grinding wheel.

After sharpening, the balance of the blade must be checked. This can be done by hanging the blade on a round rod, nail or peg through the hole and seeing if it balances. If not, the heavy side will require more grinding or filing. Reinstall the sharpened and balanced blade and tighten the bolt. If the operator's manual gives a torque spec, use a torque wrench.

Reel mowers must be professionally sharpened and should be back-lapped.

Cleaning: One of the best things you can do for your mower is to keep it clean. Grass clippings are very corrosive; if you allow them to build up under the deck, they can corrode your deck rapidly. You should keep both the top and the underside of your mower deck clean. (Note that if you mow only when the grass is dry, this problem will be minimal.) If the clippings are not wet and stuck to the deck, a leaf blower or air compressor will clean the deck very effectively; if the clippings are wet or stuck, you will need a water hose.

Figure 11. Cooling fins on engine head.

It is also important to keep the engine clean. Lawnmower engines are air-cooled, and the cooling fins (Figure 11) must be kept clean to be effective and prevent overheating. It may be necessary to remove some of the engine shrouding to clean the cooling fins. Compressed air is the best way to clean the fins, but a soft brush can be effective.

Oil Change: You should change the engine oil using the frequency recommended by the operator's manual. For typical home lawn use, once a year is probably adequate. If it takes more than an hour to mow your lawn or if you operate in very dusty conditions, you should change oil at least twice a year. Just drain out the old oil into a suitable container for recycling, and add new oil of the correct viscosity and API rating (Figure 12). Some engines can be drained from the bottom; on others, it is necessary to turn the mower on its side to drain the oil. It is helpful to drain the oil while the engine is warm; this makes the oil flow better and also gets any dirt particles into suspension so they will come out with the old oil. Add the recommended amount of oil and then check the level. Be careful not to get dirt into the crankcase while adding oil.

Figure 12. It is important to use the correct oil in your lawnmower engine.

Other Lubrication: Some mower operator's manuals will recommend oiling axles or other components. Some mowers also have grease fittings that should be serviced with a grease gun as recommended in the manual.

Figure 13. Air filter element and foam pre-cleaner element.

Air Filter: The air filter (Figure 13) must be cleaned or replaced regularly (Figure 14). The dustier your conditions, the more frequently the air filter will need service. Be sure to service the air filter during your end-of-season service.

Spark Plug: End of season is the best time to inspect your spark plug(s) (Figure 15) and service or replace them. If the plug tip or electrode is worn or burned or if the threads are rusty, replace the plug. If the plug is covered with soot, oil or a white deposit, clean, regap or replace it. Check your manual for the correct plug gap and use a plug gap tool to regap the plug (or to gap new plugs). Also check the manual for the correct spark plug torque and use a torque wrench to reinstall the plug (Figure 16). Many small engine heads are made of aluminum and the threads can be easily stripped if over tightened. You can buy a torque wrench for as little as $10, and one stripped head will cost you far more than that.

Figure 14. Clean or replace the air filter regularly.

Figure 15. Remove spark plug and examine for problems.

It is helpful to squirt a teaspoon or less of oil into the spark plug hole while the plug is out, then turn the engine over a time or two (with the plug out) to lubricate the cylinder. Expect a puff of smoke from the oil when you first start the engine in the spring. Do not add more than about a teaspoon of oil. Too much liquid in the cylinder can cause severe engine damage on startup since liquids are incompressible.

Drain Gasoline: The volatile components of gasoline evaporate over time, thus old gasoline will make your engine difficult or impossible to start in the spring. Probably the best way to avoid this problem is to run the engine dry before storage. Plan ahead and don't put in any more fuel than is needed for your last use, then run the engine dry when you finish using it. This will prevent

Figure 16. Use a torque wrench to tighten the spark plug to avoid stripping threads.

both stale gasoline in the fuel tank and varnish buildup in the carburetor from evaporating gasoline. If you then fill up the tank with fresh gasoline in the spring, it should start readily.

Stabilize Gasoline: An alternative approach is to fill the fuel tank at the end of the season with ***fresh*** gasoline to which a gasoline stabilizer has been added (Figure 17). Note that you must add the stabilizer to fresh gasoline; the stabilizer can only stop deterioration; it can't reverse it. It is best to add the stabilizer to a gallon (or more) of fuel in a storage can since it is easier to obtain the correct rate that way rather than trying to figure out how much to add to a small tank. Storing an engine with stabilized gasoline in the tank will prevent the problem of seals drying out.

Figure 17. Gasoline stabilizer should be added to fresh fuel before storage.

Extra Gasoline: If you have gasoline left at the end of the season, it is best to use it in some other engine rather than keeping it over the winter. Gasoline mixed for a 2-stroke engine should not be used in most 4-stroke engines (and especially not in a vehicle with a catalytic converter). If you must store gasoline, be sure to add a stabilizer while it is still fresh.

Following these simple steps can go a long way toward making your mower easy to start and keep it running well for many years. A little maintenance and preparation in the fall can make a small engine much easier to start next spring. The most important step to easy starting is to avoid leaving stale gasoline in the tank.

Lawnmower Safety Standards

When you buy a walk-behind lawnmower, you benefit from safety standards and regulations from two sources. The American National Standards Institute (ANSI) has issued ANSI B71.1, Walk-Behind Mowers and Ride-On Machines with Mowers - Safety Standards. This ANSI standard was developed by engineers within the lawnmower industry, and most manufacturers adhere to this standard. If a mower has been certified by an independent testing facility to comply with ANSI B71.1, the mower will carry a decal from the Outdoor Power Equipment Institute (OPEI) certifying compliance.

The U.S. Consumer Product Safety Commission (CPSC) has also issued regulations covering walk-behind lawn mowers. Unlike the ANSI consensus standard, the CPSC regulations are not optional; manufacturers are required to comply. Some of the important features of the ANSI standard and CPSC regulations are listed below.

Operator presence control (OPC): Mowers must be equipped with some type of handle-mounted control bar or lever (Figure 18). The operator must hold the bar or lever in place for the engine and/or blade to operate. On less expensive mowers, releasing the bar or lever stops the engine and the blade; on more expensive mowers, releasing the lever disengages a clutch, allowing the engine to remain running while the blade is stopped by a blade brake.


Figure 18. Controls for operator presence control- bail and secondary release lever.

Actuation of OPC: The mower must have a secondary control that must be activated before the OPC can be engaged. This is often a thumb-lever that must be depressed.

Blade brake control: A mower must be equipped with a brake to stop the blade within three seconds after the operator presence control is released. This is to prevent an operator from leaving the operator position behind the handle and coming around close to the deck while the blade is running.

Restarting: If the mower has a manual starter, releasing the operator presence control must allow the engine to remain running unless the manual starter is within 24 inches of the top of the handle (unless the mower has a 360 degree foot shield).

Foot shield: The rear of the mower must be shielded by either a flexible shield (Figure 19) or a hinged solid flap to prevent a foot from being inserted under the deck. If the shield must be opened or removed to install a grass catcher or mulching plate, there must be either automatic closure or a switch to prevent blade operation when open.


Figure 19. Flap at rear of lawnmower deck to reduce the risk of foot insertion.

Labels: Several safety warning labels are required on mowers.

Thrown objects: The ANSI standard requires testing of mowers for potential to throw objects from under the deck. A whole series of tests are specified to assure that mowers are safe when the blade encounters objects.

Other: The ANSI standard also covers many other safety areas such as shielding for power drives, direction of operation of self-propulsion controls, heat protection, fuel ignition protection, battery safety, etc.

Some of the above items may be frustrating to work with, and they may not always work well, but they are there for one reason - ***to protect you!*** Please don't disconnect or try to work around these safety features!

Lawnmower Safety

Walk-behind home lawnmowers are covered by safety standards and regulations, but the real responsibility for safety rests with the operator. No matter how much a mower is shielded and guarded, it still has to be capable of cutting grass or it is useless. If it can cut grass, it can cut you, too! These suggestions can help you use your mower safely.

Fuel: Fill the fuel tank before you start the mower so that the engine is cold. Do not fuel a hot mower! Do not remove the fuel tank cap on a hot mower!

Objects and debris: Pick up toys, dogs' bones, sticks, trash, etc. before you start the mower. Objects can be picked up and thrown at high velocity by a mower.

Kids and pets: Keep children and pets well away from mowers. Not only is there danger from being cut by the deck, but thrown objects can be dangerous 100 feet or more from the mower.

Safety features: Never try to override or disconnect the safety features such as the operator presence control or the devices that prevent operation when the bag, discharge chute or mulching plate is removed. Admittedly, they can be frustrating, but the devices are there to protect you.

Tune-up: Yes, a tune-up is a safety consideration. If your mower is not properly tuned up, it will probably be hard to start and that will tempt you to bypass safety equipment and/or procedures. Keeping your mower properly tuned up and maintained is one of the most important steps toward safe operation.

Young operators: Don't allow young children to operate mowers, and never let children ride on a mower while operating.

Push, don't pull: Mowers are designed to be pushed forward. Pulling them backward increases the risks of blade contact. Obviously, you will need to pull the mower backward occasionally while maneuvering, but otherwise you should not mow backward.

Slopes: Unlike a riding mower or tractor, it is safest to mow across the slope (Figure 20) rather than up and down with a walk-behind mower. That way, if you slip you won't slide into the mower nor will the mower roll onto you.

Figure 20. Mowing around the contour of a slope.

Blade sharpening: This may not seem like a safety point, but a sharp blade will allow your mower to operate more efficiently, thus reducing fuel fill-ups and maneuvering.

Bagging: If you use a bagger, be sure to stop the blade before emptying the bag. Stop the engine before reaching into the discharge chute - even if you think the blade is stopped.

Height adjustments: Always make height adjustments with the engine shut off.

Unattended mower: Shut off the engine if you are going to leave the mower unattended, even briefly. The OPC on some mowers will automatically kill the engine if you let go of the handle.

Service safety: When working on a mower, remove the wire from the spark plug to prevent accidental starts. This is especially important if you are removing the blade. Turning the blade bolt with a wrench can turn the blade and crank the engine.

Remember, no matter how many safety features your mower has, ultimately safety depends on you.

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