

LESSON 2

MOWING

AIM

Select, use and maintain mowing equipment, appropriate to different types of sports turf situations.

INTRODUCTION

Mowing removes part of a plant and reduces the amount of leaf available for photosynthesis. In so doing, this obviously affects the physiology and development of the turf. It will always damage the turf. The question is, how much? And how well can the turf plant recuperate?

When the turf plant is cut, severed organic material falls to the ground. In some instances most of these clippings are removed, but in others they are left to lie where they fall. Chemical substances will exude from the cut portion of the plant, for example, glutamine, carbohydrates, and other chemicals. The clippings and the 'exudates' can have an effect upon the physical and chemical nature of the soil. In the worst case scenario:

- Clippings create an impermeable barrier to water.
- Exudates from clippings may enhance the spread of disease or pest organisms.
- The cut part of the turf plant is a wound, and through this wound disease may infect the turfplant.
- An inferior mower can bruise or tear the turf plant, causing discolouration or 'browning off' of the turf surface, and further increasing the chance of diseases occurring.

TYPES OF MOWING EQUIPMENT

Different types of mowers include:

- Gang mowers
- Cylinder, flail and rotary
- Tractor mounted
- With roller on mower and without
- Ride on units
- Walk behind (self or hand propelled)

As you can see, there is a large variety of machinery and equipment on the market which can be used to assist with horticultural maintenance. Whilst all of the basic concepts are sound, individual types of equipment have both good and bad points.

Do not buy anything without first shopping around and talking to a number of people who have used different models.

MOWER TYPES

Turf cutting equipment falls into several groups which contain both small and large examples.

Slasher type

The blades cut in a horizontal plane. These are relatively cheap and robust but tear grass. The cut is not clean and the area can look brown after cutting. This group can include the cheap 2-stroke push type mowers some of which are unsuited to commercial use, the more robust self-contained units, and the larger tractor mounted type slashers.

Cylinder mowers

The blades are mounted on a cylinder, or several cylinders, which rotate providing a very clean cut. These are suited to use on quality turf such as bowling greens and they may become damaged if used on rough surfaces. Cylinder mowers are more expensive than other types.

They are normally self-contained models today but older tractor drawn models are available.

Because they differ in design from the more common rotary mower, they have specific maintenance requirements. Cylinder mowers are also generally very expensive to repair if the blades become damaged.

When using a cylinder mower, the height may have to be adjusted using the locknut and screw to set the gauge bar. The cylinder itself may also need to be adjusted so that it makes a clean cut when it passes the bottom blade. Check the cut by manually passing a piece of paper through the machine.

Transport cylinder mowers from the storage shed to the green using a trolley or by using the roller that is not used for cutting. When operating a cylinder mower, do not leave it running when not in use. The turf may be scalped and the cutting cylinder can be damaged.

Flail type

The blades are attached to a central shaft which rotates giving a cylindrical cutting action. They are tractor mounted or self-propelled and the cost is somewhere between that of the other two types. Flails need to be replaced every so often but they provide a clean cut and will mow rough ground however, the blades will deteriorate faster in these situations.

BEFORE MOWING

Keeping machines properly maintained is an important aspect of turf management. Well maintained equipment will ensure that work can be carried out efficiently and will reduce the likelihood of accident or injury to workers. Before use:

1. Check that the mower is clean and free of any debris.
2. Check fuel and lubricant levels are adequate
3. Ensure the mower is set to the correct cutting height.

How to Mow

- Never mow wet grass with a rotary mower
- Avoid mowing wet grass with a cylinder mower
- Cut twice weekly when grass is growing fast
- Cut every 2-3 weeks if grass is growing slowly
- Cut grass up to 4cm tall when not growing fast (e.g. under drought conditions or in cool weather)
- Avoid cutting grass shorter than 1cm high
- Clean sticks, stones or other rubbish off the surface before mowing
- Mow backwards and forwards across the turf in parallel lines and at right angles to the lines you followed on your previous cut.
- Avoid mowing on days of extreme heat or cold since this can scorch the cut tips of the grass.

Leaf Rakes/Vacuums

These include small manual models through to large power models. Small machines are very limited, particularly if there is a lot of material or if it is wet. In these situations, raking by hand can be faster. Larger power models work well picking up grass, leaves, papers, and so on. These machines may be used in appropriate situations to clean rubbish from turf before mowing or to pick up any rubbish from turf prior to play.

After Mowing

1. As soon as you finish mowing, switch off and disconnect the power supply on electric mowers OR turn off the fuel line tap on petrol mowers
2. Wipe grass clippings and dirt off the mower, particularly from the blades and from around the wheels
3. Empty and clean the grass catcher
4. Check the blades and make sure they are not damaged or loose
5. Resharpen blades if blunt
6. Oil or grease moving parts if needed
7. Store the mower in a dry place under cover
8. Regularly change lubricants, air filters and spark plugs.

Changing Mower Blades

This common mower maintenance task can often be a troublesome, even painful task. Injuries, such as skinned knuckles, can usually be avoided by following a few simple rules:

- Always disconnect the spark plug lead when working on the parts underneath the mower. This will prevent the accidental starting of the mower. If the engine is a 4-stroke it is important that when you tip the mower on its side that you keep the spark plug side uppermost, otherwise engine oil will get into the cylinder above the piston making subsequent starting very difficult.
- Be careful when setting the cutting height adjustment whilst mowing. If it is set too low, the blades will be more easily damaged and hence require changing more often. Also, the nuts holding the blades may become burred as they hit objects in the grass and the soil. This makes them harder to remove. Ideally nuts and washers should be replaced each time the blades are replaced.
- Make sure you fit and remove the blades according to the manufacturer's instructions.
- Use the correct blades.
- Keep the nuts and washers holding the blades well lubricated to prevent them seizing or rusting.
- Use ring spanners where possible as open ended spanners slip more readily.

MOWING SPORTS TURF

The way in which a turf is mown can have a profound effect upon the useability and health of the turf. Major problems can be caused by mowing turf at the wrong height. Each variety has its own preferred height and when dealing with each turf this knowledge is very important.

Best height to cut different grasses:

Variety	Ideal Height (approx.)
Bent Grass	0.5cm (on a bowling or golf green)
Bent Grass	1cm (in a garden lawn)
Kentucky Bluegrass	3.5cm
Creeping Fescue	3.5cm
Tall Fescue	6cm
Perennial Ryegrass	3cm
Bermuda Couch Grass	2cm
Buffalo Grass	3cm
Kikuyu	2cm

Scalping, which is cutting too low and removing most if not all leaves of the grass in places, will result in poor turf health. Scalping may occur if the lawn surface is uneven or bumpy. Infrequent mowing and thick and spongy thatch can also encourage scalping.

The frequency of mowing depends upon the time of year due to rate of growth, the height of cut, the quality of turf you seek, and the variety of grass you are dealing with. If you want the best quality turf you must mow more often.

The pattern of mowing will affect the way the turf plants grow. If you mow in the same direction every time, the grass will tend to lie over and grow in the direction which you mow. The resultant effect, which might not be overly obvious, can affect the way a golf ball rolls or the subtle appearance of a turf. Alternating the direction of mowing or cutting the grass higher will eliminate this effect. It is common to see golf courses and other sporting turf areas with obvious lines indicating the direction of mowing. To many people this looks attractive, but functionally it may affect ball movement and direction.

Grass clippings should be removed from the site as soon as it is mowed by way of catchers and hoppers. Grass left lying on the turf may also affect ball movement, especially golf balls or bowls. It also looks unsightly and can reduce the health of grass lying beneath the small heaps or rows. Frequent mowing will result in fewer clippings to be removed.

SPORTS TURF MOWERS

There are two main types of mowers used for sports turf:

- The reel or cylinder mower cuts grass clean like a pair of scissors, hitting the grass at a sharp angle, say 45 degrees, and wedging it against a metal plate. This results in a clean cut with minimal bruising or tearing. Blades can be damaged easily by rough surfaces and by stones, sticks etc. Cylinder mowers are generally safer to use than rotary mowers. They produce a better finer cut on the lawn, and are essential for cutting bowling greens, golf greens, cricket wickets or any other surfaces which require reliable and predictable bouncing or rolling of a ball.

- The rotary mower cuts the grass by hitting it at a 90 degree angle with a sharp blade mounted on a rotating horizontal plate. If the blades are kept very sharp, and the grass is not too soft, this cut can also be sharp, but otherwise, a rotary mower can tear grass leaving a jagged edge which can cause the grass to brown off a little. This is not as healthy for the grass, and often leads to rotary mown lawns losing their lush appearance within a few days of being cut.
- Rotary mowers will handle rough surfaces better than cylinder types and are generally less expensive and easier to maintain than cylinder mowers. These mowers may be acceptable for cutting large areas such as a playing field. However, due to the risk of turf damage and discoloration which is not acceptable for a high quality sportsgrounds, for instance televised matches of elite sports, they are not the mower of choice for these types of sports surfaces.

Both types of mowers can be powered by either petrol or electric motors. Hand powered versions of the cylinder mower are also available. These are the most inexpensive mowers to purchase, but are really only practical for a relatively even surface and small areas such as around the club house or close to resort buildings.

Electric powered mowers are usually cheaper than petrol mowers, and for anyone who is not mechanically minded these may be more reliable. The main disadvantage is that an electric mower has a power cord which needs to be kept behind the mower at all times, away from the blade. Also, electric mowers often do not have the same amount of power as a petrol mower and may struggle with longer grass and extensive use. On the commercial scene, electric mowers are rarely used. New rechargeable, battery powered mowers are now appearing on the market. These are relatively expensive at this stage. Nevertheless, they do have the advantage of being very quiet in comparison to most petrol driven mowers, and they may become more widely used in the future.

PROBLEMS THAT MAY OCCUR WITH MOWING

- Potential damage to turf
 1. Soil compaction: repeated use of heavy mowers can result in soil compaction over time.
 2. Tearing or bruising grass: caused by poor selection of mowing equipment, or poorly maintained equipment, for example, blades not sharpened, or poorly adjusted.
 3. Transmitting pests, diseases or weeds: this can be a problem when mowing, particularly if equipment is used on a wide variety of turf types and standards. Problems associated with poorer quality turf can be readily transmitted to better quality turf in debris picked up by the mowers, such as weed seeds, or on the blades of the mower, particularly disease spores.
 4. Scalping: caused by uneven surfaces, incorrect cutting heights, poorly adjusted or maintained equipment, such as height adjusters, or loose blades. Scalping can be a real problem when surfaces to be mown are very soft since the wheels of equipment may sink into the ground resulting in the cutting blades being too close to the turf surface, or wheel tracks can push up the surface resulting in high spots known as ridges.
- Potential damage to equipment
 1. Debris on the turf surface can readily damage equipment through such means as plastic, or twine becoming entangled in moving parts.
 2. Stones and rocks can be propelled at high speed, after being hit by fast moving mower blades, chipping mower bases or guards, or even flying out from beneath the mower like a bullet posing a high safety risk to anyone nearby, or to windows.
 3. Raised tree roots, particularly those of surface rooting species, low branches, and tree trunks, can pose real obstacles to mowing, and collision with any of these can readily damage equipment.
 4. Likewise, raised or uneven paving or paths can also cause problems particularly to blades.

- Requirements for different types of turf and different grass varieties result in different heights of cut, and direction of cut.
- The time of day mowing is carried out: is there heavy dew on the turf, is it very dry?
- Weather conditions: is it raining, or has it recently rained, causing grass to lie flat, or cut grass to clog up machinery, or to be thrown out in solid wet clumps? Is it very dry, with potential fire risks?
- What to do with clippings? Do you remove them or let them lie? Grass or weed seeds can be carried in clippings from place to place on mowers. Weed seeds in clippings left to lie may germinate and create increased weed problems. Clippings may create water impermeable barriers. Dried clippings may pose a fire risk. In most sports turf situations clippings must be disposed of.

EDGING

Lawn areas may be edged to make mowing easier. Types of 'edging' include:

- Sprayed strips, such as around trees where it is difficult for mowing equipment to get close to trunks.
- Mowing strips comprised of a thin edge of concrete (perhaps 10-15cm wide), pavers, or lengths of timber along which mower wheels can run and which must be level with the lawn.
- 'Natural' edges may occur in dry areas below eaves of buildings.
- Edging machines may be used to create neat edges between the turf and non turf areas, and where the turf meets paved areas or kerbing.

MORE ON MOWER TYPES

Motorised, self-propelled mowers are normally used exclusively in a commercial situation.

For small areas, a push type mower may be used. These are cheap to buy and cheap to run, and they can give an excellent finish to a turf surface. Hand mowers are normally powered by a 2 or 4 stroke motor or an electric engine. For larger areas, ride-on mowers, tractor drawn ganged cylinder mowers, or powered cutters (slashers) are commonly used. Generally, ride-on mowers are used by commercial operators for large domestic gardens, parks where it may be difficult for tractors to manoeuvre, and sports fields. Tractor operated cutting equipment is generally used for larger park areas, golf courses, sports fields, and for heavy uses such as slashing.

Options for Power

Petrol Mowers

These mowers use fuel which you can purchase from your local petrol station. There are two types according to the engine construction:

2 Stroke Petrol Mowers

Normally used only on rotary mowers, the engines are easier to maintain than 4-stroke engines and usually cheaper to buy than 4 stroke engines, but are generally not as powerful.

4 Stroke Petrol Mowers

These can be rotary or cylinder mowers. These are normally more expensive than 2-stroke models but they are generally longer lasting mowers.

Electric Mowers

Electric powered mowers are generally cheaper than petrol mowers, and for anyone who is not mechanically minded these may be more reliable. However, they usually don't last as long as petrol powered mowers. The main disadvantage is that most electric mowers have a power cord, which needs to be kept behind the mower at all times to avoid the risk of electrocution and rendering the machinery inoperative.

New self-contained cordless electric powered mowers are available. These can be plugged into a mains power point until they are fully charged, then disconnected and used like a petrol mower. Electric mowers are a lot quieter than petrol mowers, but often lack the power of petrol mowers. For a small area however, this type of electric mower may be better suited.

Manual (Human Power) Mowers

These are suited to small areas where air or noise pollution is an issue. Hand propelled mowers require more physical activity because the cutting mechanism is powered by the user's walking pace. There is a cylinder mower version that is sometimes used for small turf areas.

Hover Mowers

These are wheel-less mowers that float like a hovercraft on a cushion of air created by movement of the rotary cutting blade. They can be powered by either a petrol or electric motor. Hover mowers will not cut long grass or slightly damp grass very well but they are very good on steep slopes and on rough ground where the grass is not too long. Hover mowers generally cut faster than other mowers where the grass is of average height.

Ride-On Mowers

There are many different types of ride-on mowers. Some are notorious for breaking down, and in general you get what you pay for. The cheaper machines may not last very long. You are strongly advised to shop around and talk to people who have used ride-on mowers before purchasing one. Talk to representatives from several different mower repair outlets. You might also get some useful advice from your local parks department. Ride-on mowers are not very manoeuvrable in tight corners such as around trees, and can cause compaction on heavy wet soils. You will almost certainly need a hand mower to cut grass in inaccessible places. The ride-on mowers are fast however, and will save a great deal of time and effort on larger grass surfaces.

Deciding What You Need

- Most small to average domestic gardens would use a mower with a cutting width between 30 and 35 cm. Large properties may require a much larger mower

Area you can mow in 1 hr	Cutting width required
800 square meters	30 centimetres
1600 square meters	40 centimetres
2400 square meters	60 centimetres

- Cylinder mowers are safer to use than rotary, or hover, mowers.
- Rotary mowers cut overgrown grass better than cylinder or hover-type mowers. If you are mowing irregularly, a rotary motor mower is probably the best choice.
- Front mounted catchers are the most efficient for catching lawn clippings.
- Self-propelled or hover mowers require less physical effort to move over the lawn.
- The more complex the machine, the more that can go wrong with it. Self-propelled, ride-on and four stroke cylinder mowers are susceptible to a greater range of problems than a basic two stroke rotary.

Choosing Your Mower

Often you may need to compromise as there are a number of factors you should consider when choosing which mower to buy.

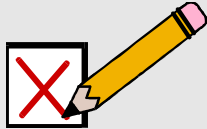
- Cost: consider comparable mowers to see which is the cheapest.
- Features: often it is better to pay a little more to get extra features.
- Quality of construction: paying a little more will often give you a much more durable mower.
- Service: how often does it need servicing, what costs are involved in servicing (parts, labour), can you service it readily yourself?
- How long does the warranty last and what does it cover?
- Parts: are these cheap or expensive, are they readily available?
- Will it do the things you want it to do?
- Is it easy to operate? Consider handle height adjustment, weight, location of grass catchers, and so on.

SET READING

Refer to, and read any reference material you have access to that relates to the aim of this lesson. This may include any of the following:

- Books in your own possession, or which you find in a library
- Periodicals you have access to (magazines, journals or newspapers)
- Web sites

Spend no more than 2 hours doing this.



SELF ASSESSMENT

Perform the self assessment test titled 'Test 2.1'.

If you find yourself getting the answers wrong, revise the notes from this lesson and repeat the test.

SET TASK

1. Investigate mowing equipment available for sports grounds, including:

- gang mowers
- cylinder, flail and rotary types
- tractor mounted
- with roller on mower and without
- ride-on units
- walk-behind mowers (self-propelled, and push type)

Compare the different types of machines in terms of

- cost
- application for different types of sports turf
- manoeuvrability
- reliability

You may be able to investigate this by using resources which you already have access to. Alternatively, you may need to contact several mower companies and/or sports turf facilities, to determine which mowers are being sold and used in the turf industry. If you have difficulty with obtaining such information, contact the school. We may be able to send you some information.

2. Visit and investigate two different sports turf facilities in your locality, including a green and a sports ground. Attempt to determine the condition of the turf, and its mowing requirements (i.e. is the surface smooth or rough, is the grass tough or tender, what type of mower would do the best job for the situation; and in what way should that mower be used to achieve the best result).



ASSIGNMENT

Download and do the assignment called Assignment 2.