CHAPTER 5. ESTABLISHING NEW TURF

INTRODUCTION

Rapid establishment of turf, whether from seed or by laying sod, is desirable: it quickly stabilizes the soil and controls erosion, it suppresses germination of weed seeds in the soil 'seed bank' and it satisfies the customer. The following chapter covers preparation of the site and tips for successfully establishing lawns from seed and from sod.

Rapid Establishment Reduces Erosion

A key step to reduce erosion is to establish turf cover on a site as quickly as possible. This can be accomplished by:

- seeding when natural rainfall can be expected to water the site (before mid-June, or between mid-August and mid-September),
- irrigating if seeding is required outside the window for best natural establishment, and
- increasing the amount of annual ryegrass applied during seeding.

Initial growth will be enhanced by light nitrogen applications or 10-20 kg N/ha (10-20 lb N/acre) in May, early June, early September or early October to take advantage of natural rainfall. This should be discontinued after the first year in low maintenance areas; other areas should continue a normal fertilizer program (*see* Chapter 3, Fertilizing the Soil).

Choosing Seed or Sod?

Turfgrass can be established by planting seed directly or by laying sod. Since the long-term results of either method are the same, the decision depends on such factors are:

- available budget,
- size and topography of the area to be covered,
- resources available for post-planting maintenance,
- whether a short time-to-use period is required, and
- preference of the property owner.

Table 5-1. Comparison of direct seeding vs. laying sod for initial establishment of turf.

Seeding	**Sodding**
Cheaper	Faster establishment
Allows wider choice of species	Good weed suppression
Can be established without follow-up watering	Requires substantial watering if placed in dry weather
	Offers some erosion protection
	Gives better results in low OM soil or subsoil for the first 3-5 years

It is important to realize that most of the long-term success of either approach is determined *before* any planting takes place. Effective site and soil conditions are covered in Chapters 2 and 3, and in other references (*see* Further Reading at the end of the chapter).

PREPARING THE SITE

An adequately prepared surface is important for successful establishment of turf. The requirements are the same for both directly seeded and sodded lawns. As long as a friable seedbed, some nutrients, and follow-up watering are provided, the new grass will grow well in the short-term. (These conditions also work, short-term, on a jute doormat or a moist towel!) Ensuring long-term, sustainable growth, however, is more demanding. It involves amending the top layer of soil to provide adequate nutrient levels, pH and organic matter, as determined by soil tests (*see* Chapters 2 and 3).

Ideally, site preparation begins with saving and stockpiling the site topsoil near the construction site. If screening is needed to clean it up, it can be done any time the soil is reasonably dry.

Begin rough grading by removing as much construction debris, tree stumps, and rocks as practical, and installing any service, drainage, or lighting conduits. This is the time to look for, and correct, problems with surface or underground water moving onto the site. For example, it may be necessary to divert possible water flows using berms at the top of slopes or by adding extensions to eaves trough downspouts.

It is important to allow for the fact that soil expands in volume by as much as a third when it is moved around. Settling will occur unless all disturbed areas are compacted to the original soil density during rough grading operations. Since a lot of settling will take place over the first winter, even a perfectly finished surface will appear uneven by the following spring. This is more obvious if significant amounts of rock or root debris remain in the subgrade. It is also particularly noticeable over trenches and next to foundations. In both of these situations, the settling indicates that not enough care was taken to compact the sub-base properly.

Attempting to correct surface unevenness later, by surface rolling after seeding or sodding, has little effect. This is because the weight and ground pressure of commonly used rollers have little impact below 5 cm (2 in). Although waiting is not always practical, results will be much better if the subgrade can be left over winter and finished the following year.

Ideally, soil amendments, nutrients and lime (*see* Chapter 3) should be incorporated into the top 10-15 cm (4-6 in) of soil, while the surface is being prepared. Applying lime and nutrients to the surface, however, as done with hydraulic seeding, has proven reasonably effective. Early results from 2002 trials in Fredericton showed higher leaf tissue yields on sites with surface nutrient applications than those where nutrients were incorporated to a depth of 15 cm (6 in). This may be a short-term response, however, and later years may show different results.

The ideal finished surface for either seeding or sodding is a 2.5 to 5 cm (1-2 in) layer of loose soil with a reasonably smooth surface. Ridges from gaps in the rake teeth are not a problem, but a 2-5 cm ridge left by the edge of a rake will remain as bump in the final surface.

SEEDING

Once the seed is chosen (*see* Chapter 4), long-term success depends on the care taken to apply seed evenly, as well as on the care of the lawn during the critical germination and early growth stages.

Timing

Moisture for germination is required to establish turf successfully from seed. Moisture must also be available for long enough after seeding to allow the slowest germinating species (i.e., Kentucky bluegrass) to develop enough strength to survive the winter.

Where irrigation is not available or water must be conserved, it is best to place seed either before mid-June or between mid-August and mid-September. In most parts of the region, there is enough natural moisture for seed establishment until about mid-June; rainfall normally returns in September. If irrigation is available, seeding can be completed at any time through the season with reasonable success.

Seeding after September 15 in Fredericton results in a marked reduction in bluegrass survival. It may be possible to seed up to two weeks later in coastal and zone 5 regions because freeze-up is later in these areas, but there is no research supporting this. In any case, the cooler temperatures in these regions may offset any benefit from a longer fall growth period, so the net result may be the same.

Current recommendations for clover suggest that it is necessary to plant in the spring for successful establishment. Therefore, if a clover is included in the mixture, seeding should be done before mid-June.

Seeding Rates

Commonly recommended seeding rates range from 1.5 to 2.5 kg of seed per 100 m^2 (3 to 5 lb/1000 ft^2 or 130-220 lb/acre). Nursery sod has been successfully established using rates of 0.5-0.75 kg of seed per 100 m^2 (1-1.5 lb./1000 ft^2 or 50-75 lb/acre).

In healthy, established turf, shoot counts of 100 to 250/dm^2 (6-15/in^2) have been reported.[1,2] Since the recommended seeding rates, above, supply about 325 – 600 seeds/dm^2 (20-35/in^2), there is a substantial margin to compensate for low germination rates, poor seeding practices, consumption by birds or poor follow-up watering.

A healthy, strongly rooted turf can be established over time from counts of permanent species as low as 1 seedling per square inch, because most turfgrasses spread from the roots.

Using seeding rates higher than the recommended rates (above) gives a filled-in appearance more quickly, but is not necessarily desirable. This is because competition between the crowded seedlings can actually suppress root development.

When establishment fails…….is the seed really to blame?

When a failure occurs in a seeding job, it is easy to blame the seed. One of the authors had a number of seeding failures over nearly 50 years, and – of course – felt the seed was always to blame. Later, when using the blotter test (like the bean germination experiment in science class) to check the seed germination, the seed *always* grew.

It appears that most establishment problems are moisture related: either there is insufficient watering after seeding in dry weather, or there is enough watering to get seeds started, but then the new seedlings are allowed to dry out and die. Late seeding has also resulted in some failures. In one stubborn case, after four repeated hydraulic seedings failed, the probable cause was found to be a Killex™ application the previous season, which had been buried by 10 cm of topsoil before seeding.

Seeding Techniques

Seed must be uniformly distributed over the area. It must also be lightly covered – ideally about twice the seed's diameter. The following section describes four techniques for applying seed: broadcasting and hydraulic seeding are the most widely used; using a Brillion seeder and compost seeding are other possibilities.

Broadcasting: The seed is applied with a drop-type fertilizer spreader, rotary spreader, or by hand. For even distribution, spread half the seed over the whole site, moving in one direction; then apply the remainder, moving at a right angle to the first direction. A leaf rake works well for incorporating and covering the seed. The area may also be rolled lightly to improve seed to soil contact. Lightly covering the area with straw mulch, before rolling, helps germination by shading the soil and reducing evaporation. Use about 2 bales or 50 kg of straw per 100 m^2 (or 100 yd^2). This process introduces some foreign seeds into the turf, but in most cases this is overshadowed by the seed in the soil seed bank.

There are a couple of drawbacks to broadcast seeding:

- Because of the light weight of the seed, windy conditions can cause misses in the seeded area.
- The raking process can leave gaps: each time the rake is dropped onto the surface, it moves soil (and seed) away from the contact point.

These problems may be overcome somewhat by making multiple passes (at right angles) with the spreader and raking lightly between each pass. The seeding rate for each pass must be adjusted accordingly to reach the target seeding rate.

Hydraulic Seeding: Hydraulic seeding is a method of pumping seed mixed in water through a hose or gun onto a prepared surface. The process is popularly called 'hydroseeding', but this term is a registered trademark of Bowie Corporation, an equipment manufacturer.

This method was originally developed as a quick method for seeding slopes, hard to reach areas, and large areas, such as roadside rights-of-way. It is now commonly used for residential and commercial seeding operations. While unit costs are significantly higher than conventional seeding methods, the higher costs are justified because of improved efficiency and customer satisfaction, with fewer call-backs to correct deficiencies.

Figure 5-1. One-step Hydraulic Seeder at an NBHTA Topsoil Conservation Project.

The application can be done either as a:

- single-step process, with the mulch (shredded paper or wood fibre) added to the seed-water-fertilizer mix to create a slurry, or
- two-step process, with chopped hay or straw mulch blown onto the area after it has been hydraulically seeded with a seed-water-fertilizer mix. The two-step process is not practical for areas under 4-5 ha (10 acres), because the higher equipment costs and difficulty of controlling application in small areas.

There are two basic types of hydraulic seeding equipment:

- recirculation mixing units, which are smaller units, have water tank capacities of 250-1000 US gallons. These mix the ingredients in the tank by pumping water back into the tank through strategically placed jets,
- paddle mixing units, which are larger units, have tank capacities of 800-3000 US gallons. These have a large rotating auger in the tank to mix the ingredients.

For a given sized unit, the paddle mix unit covers twice the area per tank of water in the single step seeding process, because it has a higher slurry concentration. It is also more expensive because of the complexity of the auger system.

In the single step process, the limiting factors for using any unit are the availability of water and capacity of the mulch delivery system. Application rates of mulch range run from 750 to 1500 kg/ha (or lb/acre). The recirculating units can only handle up to 2.5% concentrations of mulch by weight, while the paddle mix units can deliver 4.5 to 5% concentrations of mulch. Thus an 800 gallon recirculation unit can hold 150-160 lb of mulch and cover between 400 and 850 m^2 (500-1000 yd^2) per load. An 800 gallon paddle mix unit delivers twice the coverage for the same volume of water. Since water normally has to be trucked to the site, the paddle mix units save travel and refilling time.

Although water is applied during hydraulic seeding, not enough is used to count as irrigation. At the 1500 kg mulch application rate, the recirculation units apply 5 litres per m^2 (about 1 gal/per yd^2). This is equivalent to about 5 mm (0.2 in) of rainfall. Paddle mix units at the 750 kg rate apply about 2 litres per m^2 (1/3 gal/yd^2), equal to about 2 mm (0.05 in) of rainfall.

The quantity of mulch used in hydraulic seeding mainly helps the operator to control the seed application; mulch rates below 2500 kg/ha appear to do little to conserve moisture. Experience shows that the 750 kg/ha application rate provides satisfactory results. Little cultural benefit has been reported from the higher rate of 1500 kg/ha,[3] however, customers may be more satisfied because the green dye in the mulch remains visible a few days longer at the higher application rate.

Erosion control agents, such as Benovert™ or Terratack™, can be incorporated with the mulch or added to the tank mix to improve the stability of the seeded area. In the experience of one author, it is questionable whether the additional cost of these products is justified. Limited testing in side-by-side situations showed there was little benefit to using erosion products – if there was enough water flow to disturb the earth, erosion resulted anyway. Blowing 3000 lb/acre of chopped hay or straw, followed by 750 lb/acre of wood fiber mulch, has been found to be an effective stabilization method.[4]

Hydraulic seeding allows seed to be presoaked, which speeds up germination. Soaking the seed for 24 hours can shave two days off the time before new seedlings become visible (and makes customers happier).

The Benefits of Hydraulic Seeding

Wetmore's Landscaping had the first commercial one-step hydraulic seeder in Atlantic Canada – purchased in 1976. Experience with this unit has found the lower application rate (750 kg/ha) works well and is cost effective. Under the same watering program, establishment time appears to be about same for hydraulic seeding and conventional seeding, although the hydraulically seeded lawns might need to be mowed a day or two sooner.
There are also other benefits to hydraulic seeding:

- faster seeding operations,
- fewer holdups from weather,
- more uniform establishment with less skilled applicators, resulting in fewer callbacks and improved customer satisfaction, and
- the process seems to keep the birds off, probably because the fertilizer in direct contact with the seed in solution gives the seed a bad taste.

Many customers feel that hydraulic seeding gives better results than conventional seeding. Maybe the "high tech" aura of the process encourages them to pay better attention to follow-up watering?

Most of the larger units have the choice of delivery through a nozzle or a hose. On residential sites, the hose gives closer control of the spray pattern and makes it easier to avoid overspray onto buildings and walkways.

Brillion Seeder: This is a mechanical seeding unit mounted on the three-point hitch of a tractor. It plants the seed at optimum depths in friable seedbeds. It is not readily adapted to residential or confined commercial situations because it cannot work close to obstructions.

Compost Seeding: This is a new concept gaining popularity in the US, but not yet seen in this region. The process uses a blower type applicator that mixes the required amount of seed into compost. The operator then applies the mixture through a hose, leaving a 15-50 mm (0.5- 2 in) layer

on the surface. The deeper, 5 cm (2 in) layer is reported to be effective both for establishment and for erosion control.[5]

ESTABLISHING SOD

Sod comes in a variety of lengths, widths, and thickness. These include 1 yd^2 rolls or about 0.6 yd^2 slabs for manual handling, and large rolls (up to 30 yds^2) for mechanical laying. Normal widths are 16, 18 and 24 inches (measurements are commonly in imperial units in this sector of the industry, because harvesting equipment is normally of US manufacture).

Various turf mixtures are available as sod, from pure bluegrass blends to bluegrass-fescue mixtures, depending on the supplier.

The recommended maximum thickness for the soil layer on sod is about 1.5 cm (½ in).[6] A thinner sod is preferable because it:

- establishes faster as root growth "explodes" from pruned points. The thinner the sod, the more root pruning has occurred, with the more potential growth points,
- is also more economical to handle and transport due to lighter weight,[*] and
- conserves topsoil in sod production fields.

On the other hand, thinner sod has less soil attached to store moisture, and therefore requires more attention to watering.

For best results, the soil texture in the sod should be similar to that of the site. Soil textures that are more than two textural classifications apart (*see* Chapter 2) create a boundary layer that hinders the movement of moisture and slows root development. In a case in Fredericton, there was complete failure when sod grown on organic soil (peat sod) was laid on silt loam. Other reports from field experience indicate that peat sod dries out more quickly than sod grown on mineral soils and needs more attention to follow-up watering.

Installation of Sod

Sod can usually be installed at a rate of 25-40 yards per person-hour. The weight of sod ranges from 7 to 22 kg per yard (15-55 lb), depending on thickness and soil moisture content. Sod weighing less than about 10 kg (20 lb) per yard is quite dry. Such sod must be delivered quickly after harvest and placed and watered immediately to avoid failure. If lightweight sod remains on pallets for more than 24 hours after harvest in hot weather, it may be damaged from "stack burn", caused by overheating that kills the roots. Suppliers are generally aware of this, and usually cut sod immediately before delivery, to assure the customer of a fresh product. If laying operations are held up for any reason in hot weather, the sod should be removed from the pallets, the rolls or slabs spaced out (not necessarily unrolled) and watered thoroughly.

[*] A 1.6 mm (1/16 in) change in sod thickness represents a weight difference of 2 tonnes (4400 lb) per 1000 yds^2 with dry sod, considerably more if the sod is wet.

When laying lightweight (low soil moisture) sod in dry weather, it is strongly recommended that the soil surface be moistened just before laying. This dramatically reduces transplant shock and results in faster establishment under these conditions.

The soil should be saturated 7-10 cm deep (3-4 in) immediately after the sod is placed. This softens the soil, makes rolling more effective, and insures that the first sod placed stays moist while the job is completed.

There is some controversy over whether sod should be placed horizontally or vertically on slopes. If the sod is properly placed with tight joints, experience shows there is little difference between these methods. It also doesn't seem to matter once it is established whether the joints are staggered, as long as they are tight.

Sod may be installed successfully at any time of the year (even over frozen ground) if the surface is adequately prepared. In one case, a Fredericton contractor successfully placed several thousand yards of sod in January on a nearby site. Topsoil was stored in a heated warehouse, and the sod (cut in December and allowed to freeze) was moved inside for several days to thaw. The site surface was graded, and the topsoil and sod was placed quickly during a mild spell.

Tips for Laying Sod Efficiently

- Spot the pallets in the centre of each 50 to 75 yd^2 area covered by the pallet, rather than at the edge; this saves 10 to 20 minutes of labour per pallet by reducing carrying time.
- When carrying rolls from the pallet to the laying area, drop them so they unroll correctly. They can unroll to the right or to the left. Orienting them correctly, so that they unroll in the desired direction, saves labour, as they don't have to be picked up again to turn them around.
- Start laying from the back edge of the site to minimize traffic on the new sod.
- Start against the longest edge of an area to minimize the amount of cutting.
- Avoid overlapping edges, which results in dead sod.
- Place full-width strips at the edges next to drives, curbs and walkways, and move fitting and trimming activity in one sod width from the edge. This will minimize the risk of foot traffic flipping the narrow pieces.
- Thin, damaged areas or weeds are easily spotted when laying. Tear these open and fold the flaps back to mark them clearly so they can be patched later.
- When patching, place a piece of good sod on top and cut through both layers (linoleum knives work well for this) to create a patch with a perfect fit.
- Check the moisture at the soil surface by lifting a corner of a roll in the sunniest area. If it's dry, more frequent watering is needed.
- Note that sunny slopes and the outer perimeter of sprinklers can dry out more quickly.

Erosion Control with Sod

Sod can provide some erosion control on slopes, particularly when it is staked or pegged in place. It will not protect slopes where there is enough water flow to move the soil beneath the sod. This can occur when runoff from the surface above the slope is concentrated into a relatively narrow

drainage (e.g., a low spot at the edge of a parking lot). It may be necessary to protect sod from washout in such situations with a berm or a sandbag dam.

MANAGING THE NEW LAWN

Watering

Roots of germinating seeds, and freshly placed sod, are very susceptible to drying out—they must be kept moist or they die. Experience in our region has shown that for every hour a seedbed dries out, a day of growth is lost; a day's drying out will cost a week of growth. It is important for the first week or two to keep the top 6 to 12 mm (¼ - ½ in) of soil moist to sustain new seedlings. Sod requires a continuous supply of moisture in the sod layer and in the soil just below the sod to about 2.5 cm (1 in) deep. Watering deeper is largely wasted, and has resulted in loss of nitrogen as the soluble component is dissolved and moved below the root zone.

After the first week or two, as the roots begin to grow, watering practice should be modified to promote deeper root growth. Roots go where the water is, therefore keeping a seedbed continually moist also keeps root shallow. Instead, force the roots to grow downward by providing a good soaking to a depth of 10 cm (4 in), then allow the surface to dry out for a day or two between watering. Maintain this program until the first mowing for seeded lawns, or for 3 to 4 weeks for sod.

Mowing

If the turfgrass is established from seed, the first cut should be delayed until the grass reaches a height of 10 cm (4 in) or so (depending on the owners' preference). Ryegrass grows considerably faster than the permanent species. This means that a newly seeded lawn needs to be mowed more often for the first year or so, until the ryegrass dies out. Frequent mowing after the first cut, leaving the clippings on the lawn, not only keeps the lawn attractive, but also helps to encourage root development and faster fill-in.

For sodded lawns, begin a normal mowing program as soon as the grass reaches the desired height (50% above mowing height). This usually occurs within a few days after the sod is placed.

Follow-up Fertilizing

All new turf will benefit from a light, follow-up application of nitrogen 4 to 6 weeks after establishment. If irrigation is not available, and the application would fall in the dry, summer period, the application should be postponed until natural rainfall returns in September.

LONG TERM SURVIVAL OF LAWNS

What species and cultivars continue to grow in the lawn depends on which ones survive the establishment stage and how well the plants are adapted to the site and the management regime. The survival of the turfgrass depends on the following factors:

Timing

When the seed is planted can make a large difference. For example, bluegrass requires 6 to 8 weeks of good growing conditions to become established. If planted after September 15, in most areas of the region, bluegrass survival decreases. While fall moisture conditions are normally adequate, if the fall is cool, the plants may be too weak to survive the winter.

Dormant seeding (i.e., in November) is not a reliable technique for establishing turf and cannot be recommended for most of the region. For example, in Fredericton, only the fescue component in the seed mixture survived to the following spring after seeding operations were carried out by one of the authors in October and November. Another dormant seeding operation in Nackawic was a total failure.

Moisture conditions

Availability of water after seeding has a major impact on the survival of the various components in the seed mixture. In a typical bluegrass–fescue–ryegrass mix, the bluegrass seems to be most sensitive. It requires 6 to 8 weeks of adequate moisture to become established. A late June seeding under natural moisture conditions (i.e., no irrigation and limited rainfall in July) can result in a complete failure of the bluegrass. This is typically masked by the ryegrass in the mix until the following spring when the ryegrass disappears, leaving the remaining stand nearly all fescue.

Growing Conditions

Seeding (and sodding) might be compared to a paint job on a car: the quality of the results depend on how well the surface is prepared. The surface preparation for a car compares with the soil foundation for turf. Unless good growing conditions are established before seeding (*see* Chapters 2 and 3), even planting high quality seed blends will disappoint the end user.

Adaptation to the Site

Regardless of the care taken in initially establishing turf, the long-term composition of the turf depends on survival of the fittest plants. The composition of the turf changes over a period of years depending on growing conditions and maintenance practices; Beard describes this characteristic as plant succession.[7] For example, poor soil and low soil moisture reserves favour fescues, while poor soil, coupled with nutrient and pH deficiencies, favours aggressive weed growth that can suppress both fescues and bluegrasses.

While nursery sod is fully established at installation time, succession still occurs as the plants adapt to maintenance practices and soil conditions that differ from conditions in the nursery. For example, pure bluegrass sod will decline if placed over poor or droughty soil. Such conditions favour fescue, so if there is a fescue component in the sod, it becomes the dominant species over time. Plant succession also explains why a seeded or sodded patch in an established lawn stands out at first, but blends into the lawn after a few years.

RENOVATING EXISTING LAWNS

Existing lawns occasionally need to be repaired or renovated for a variety of reasons. In severely degraded sites it may be necessary to replace (renovate) the entire lawn. In other cases, the existing lawn may be enhanced by overseeding.

Overseeding

Overseeding is the application of seed to an existing lawn. It is done to repair thin or damaged areas or to introduce new species or cultivars. The same principles apply to overseeding as to seeding a new lawn. The seed must be in firm contact with the soil and sufficient moisture must be available long enough to allow the seed to germinate and develop a healthy root system.

There are several ways to overseed, including:

- applying seed before or after aeration,
- incorporating seed with, or followed by, topdressing, or
- applying seed using a slit seeder, which cuts a slit in the soil and drops seed into the cut.

The success of any method depends on how good the contact is between the seed and the underlying soil. If, for example, a topdressing mixture is applied, but the existing grass and thatch prevent the mixture from reaching the soil, little of the seed will grow. It has been suggested that overseeding may help to enhance the soil seed bank with desirable species, which will then emerge if conditions permit.[8]

Overseeding is most successful before mid-June or in early September, when there is enough natural moisture to ensure establishment.

It should be noted that overseeding only provides a short-term fix in cases where the thin turf areas are caused by cultural deficiencies.[9] In these situations, it is essential to diagnose and correct the underlying problems. If the problems are nutrient related, this will stimulate the natural spreading characteristics of the existing turf plants to fill in the turf and may restore the lawn without the need for overseeding. If shallow soil or capillary barriers cause the problems, a major reworking of the soil foundation will be needed.

Renovating

Renovation is a more drastic approach to correcting turf problems. It involves getting rid of the existing turf, cultivating the surface and reseeding. It is most often used:

- to remedy sparse turf, or
- to repair a surface that has become too uneven to mow or use as intended.

If sparse turf is the problem, the causes are most likely soil or nutrient deficiencies. To ensure long-term success, these must be explored and corrected.

KEY POINTS

- Seed before September 15 to assure good establishment of bluegrass.
- Seed before June 15, or between August 15 and September 15, to conserve water.
- Take the extra time and care to establish a good soil foundation.
- Take soil tests, and adjust pH, nutrients, and possibly organic matter content, as recommended from the test results.
- For the fastest seed establishment, keep the top 6 to 13 mm (¼-½ in) of soil moist for the first week or two. Deeper watering is wasted.
- To assure successful establishment of sod, keep the soil in, and below, the sod layer moist for the first week or two.
- Train deep roots by watering correctly. After the initial couple of weeks, reduce watering frequency and increase the duration to allow moisture to penetrate 6-8 cm (3-4 in) deep. Let the surface remain dry for a half-day or so before watering again.
- Begin mowing when the grass reaches a height of 10 cm (4 in).

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