

Cricket pitch pre-season rolling

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The first thing to understand is what pre-season rolling is all about. Pre-season rolling is the term used when we use heavy rollers to consolidate the soil at depth. Pitches that have very dense soil at depth tend to provide more uniform bounce during matches and allow pitch preparation during the season to be easier and quicker.

The two objectives of pre-season rolling are:

- To consolidate the surface of the block after the autumn renovation and winter to create a smooth, firm surface.
- To consolidate the soil at depth (below 50mm).

Rollers

Having the luxury of choosing a roller may be unlikely. But assuming you do have a choice, what are some of the key issues in respect to the effect of the roller on your pitch?

Weight

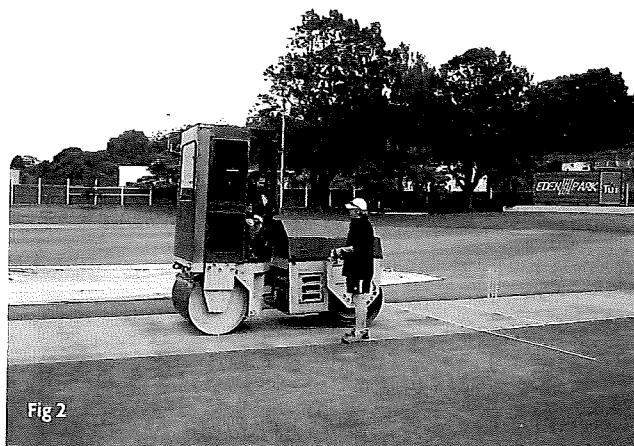
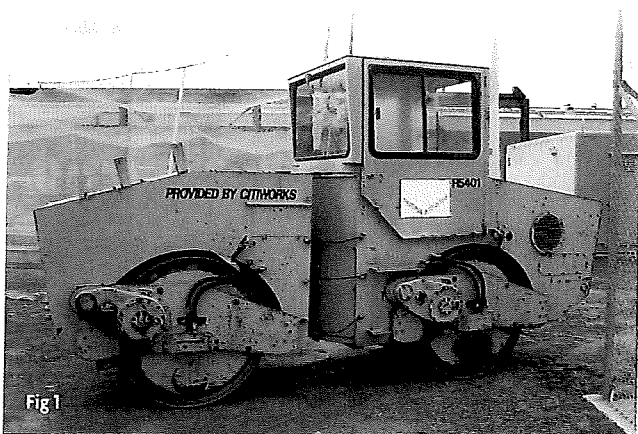
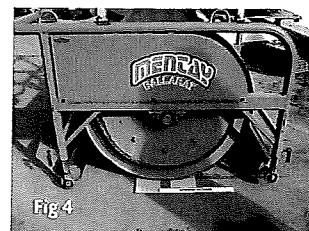
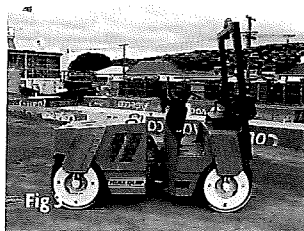
The terms heavy and light roller are a little meaningless. The weight of the roller is easily measured, but that indicates very little about the compressive effect of the roller as it passes over the soil. The crucial factor is the contact pressure of any roller – essentially this is the force applied by the roller (its weight) divided by the contact area (its footprint). You may have a heavy roller, but if that weight is spread over a large area its contact pressure might actually be less than a much lighter roller with a smaller contact area. Look at it this way, would you prefer a 16 stone bloke in boots to tread on your foot or an 8 stone woman in stilettos?

tri-roller and the number of drums). The next bit is tricky and will require being on hands and knees, as you need a measure of the width of the drum in direct contact with the floor. For this, use two pieces of thin cardboard.

Place the cardboard on either side of the drum and measure the gap between the two pieces. This accurately shows you how much of the drum is in contact with the ground. Use this measurement in your calculations (contact width).

(Figure 3) A tandem cricket pitch roller.

(Figure 4) Measuring the contact area of the roller.



(Figures 1 & 2) Notice the different diameter of the drums. The first roller is a lot heavier than the second, but their compressive effect on the soil may be similar due to the smaller footprint of the second roller.

Measuring the effectiveness of your roller

Calculating the roller footprint

To make comparisons between rollers it is recommended to measure the ground contact area on a hard surface. In practice, the roller sinks more at the start of preparation and less towards the end when the surface is harder and drier – hence, the roller ground pressure varies through preparation. Measure the length of the drum in contact with the ground (consider if you have a tandem or

AN EXAMPLE (FOR A TANDEM ROLLER)

FRONT DRUM:		
Length	1.5 m	(1500mm)
Contact width	0.08 m	(80mm)
REAR DRUM:		
Length	1.5 m	(1500mm)
Contact width	0.08 m	(80mm)

To calculate the footprint area, multiply the length of the roller by the contact width and multiply this by how ever many drums there are on the roller. For Figure 3, the footprint area is 1.5m x 0.08m = 0.12m², therefore for the roller as a whole, the footprint area is 0.24m² (2 x 0.12m²).

Contact Pressure

In the case of this example, the weight of the roller is spread over 0.24m². To turn this into a contact pressure we need to know the force exerted by the roller (measured in kilo-Newtons – kN).

Physics states that: **Force = Mass x Acceleration**

In the previous example, if the roller's mass is 1600kg, then the force is mass x acceleration due to gravity (9.81m/s²), so:

$$\begin{aligned}\text{Force} &= \text{Mass} \times \text{Acceleration} \\ &= 1600\text{kg} \times 9.81\text{m/s}^2 \\ &= 15696 \text{ N} \\ &= 15.7\text{N}\end{aligned}$$

Remember $\text{Pressure} = \frac{\text{Force}}{\text{Area}}$

So, then the contact pressure for this roller is:

$$\begin{aligned}&= \frac{15.7\text{kN}}{0.24\text{m}^2} \\ &= 65.4\text{kN/m}^2\end{aligned}$$

This equation gives you a figure against which you can make a meaningful comparison between different rollers. The contact area of the roller is key here and the larger the diameter of the drum, the greater the contact area. So next time you order the heavy roller, just remember biggest isn't always best!

How to go about pre-season rolling

Surface consolidation

After a spell of several days dry weather in late winter or spring, a light roller can be used over the block to consolidate the surface. Roll when the surface soil is moderately dry or firm and stop when moisture is brought to the surface. The aim should be to protect the grass plant from damage, so avoid over-rolling. Light rolling can continue again once the surface has dried out. This is particularly useful if the top 10-15mm of the profile has been de-compacted during the autumn renovation. A hand roller, or even a reel mower, could be used for this purpose.

Pre-season deep consolidation

Pre-season deep consolidation is distinctly different from pitch preparation rolling. Pre-season rolling with a heavy roller is intended to consolidate the soil in the profile at the 60-100mm depth. In most cases pitch preparation rolling only consolidates the 0-50mm region of the soil profile and has minimal effect at depth. Pre-season rolling targets the area deeper in the soil profile which is thought to help provide more consistent bounce in the pitch.

Other issues in respect to effectiveness of the pre-season rolling will be minimum travelling speed – the slower the speed the greater the contact time and the more effective in terms of compression each pass will be. It is likely, albeit unproven at present, that a slower speed is less likely to cause problems with fracturing of soils by the pressure wave ahead of the roller as it moves. Ideally, the front roller should be driven by the power unit to help minimise formation of a bow wave. Towed units are not recommended for pre-season rolling.

Timing of pre-season rolling

The best time to schedule pre-season rolling is in the early spring and it should always be carried out prior to the spring renovation. This avoids the heavy roller damaging any newly sown grass. Time the rolling after a few days to a week (depending on your

location and climate) of dry weather in late winter or spring when the surface of the pitch has become relatively firm and dry, but the soil at 50-100mm depth is still moist. The deeper soil layers compact as the grass roots remove moisture with steady drying. The frequency of rolling needs to match the drying rate.

For those who carry out soil moisture monitoring of core samples, soil at 50-100mm depth should be at around 80-85% pore saturation, while the soil above it could be a little drier. At around 80-85% pore saturation most soils used in cricket pitches throughout the country will be a firm cheesy consistency and moist in appearance. Cores are easily compressed by finger pressure. At 70% pore saturation soils are stiffer and have a more brittle consistency. Cores are very hard and cannot be broken by finger pressure.

In reality, if the soil moisture conditions are favourable, pre-season type rolling (deep consolidation) can be carried out at any time of the year, summer or winter. In some areas, often because of rain, conditions are unfavourable for pre-season rolling until after the start of the cricket season.

Pitches should not be rolled in saturated soil conditions. Rolling with a heavy roller when the soil moisture is high in the top 30-40mm can compact and seal the surface causing problems when preparing pitches later in the season. In addition, rolling an overly wet soil creates a stretching and shearing effect, breaking grass roots and creating horizontal cleavage layers that can be very damaging to pitch performance. Rolling should never be used as a substitute for proper scarifying and levelling with soil.

Duration of pre-season rolling

The duration of pre-season rolling is the key to consolidating a new pitch. Between one and three weeks of regular rolling, in moderate drying conditions, is needed to consolidate a pitch, while at the same time maintaining the grass in good condition. Over rolling that crushes the grass foliage should be avoided. Pitches in regular use may only require a few passes with a heavy roller.

The best way to gauge the amount of rolling required is by visually assessing cores taken from the profile. Regular inspection of core samples during the pre-season rolling process will tell you when you've done enough.

During early winter, take cores to examine the density of your cricket block at depth. Many established cricket blocks may not require any pre-season rolling to consolidate the soil below 50mm because over many years of preparation this has been achieved and maintained.



(Above left and right)

No pre-season rolling required on the left pitch profile, compared with a lot of consolidation required for the right pitch profile.

The uncompacted soil is easy to identify by the obvious feathering in the core samples (refer to core sample photos).

During the process, once moisture is brought to the surface, pre-season rolling should cease until the surface has dried again. Each rolling pass on the cricket block should be at a different angle and not in the direction of play to minimise any corrugations or creases forming. To perk the grass up after the heavy rolling, a light sprinkle with the hand held hose is worthwhile.

If pitches have a problem of inconsistent bounce, or other problems thought to be caused by a lack of soil density at depth (check by taking core samples), then one or more pre-season type rollings should be scheduled during the playing season.

Settled weather following a good soaking of rain during the playing season provides the ideal conditions for pre-season type rolling, providing the block does not dry out too quickly.

Maintaining base density

With a non-swelling soil type such as Patumahoe, once base density has been achieved it is quite difficult to actually lose it without a major deep autumn renovation. With a swelling soil such as the Waikari or Kakanui, to maintain the density it is important to maintain the soil at a cheesy consistency and not let the soil dry out below 70-75% pore saturation, otherwise the soil will shrink, crack and lose density.

Allowing swelling soils to go through wetting and drying cycles can result in the whole soil profile crumbling and losing all cohesion and density. All the hard work of consolidating your pitch profile over the years can be lost in one season.

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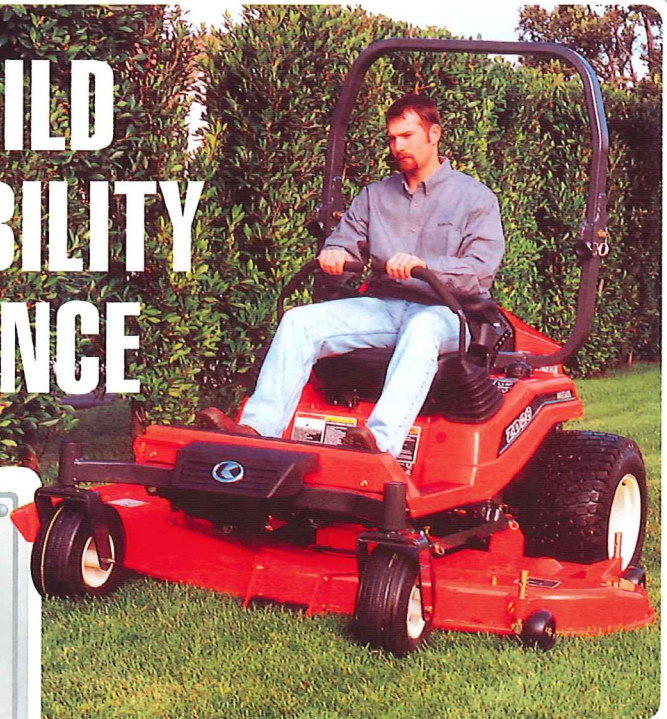


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