

# Trimax Merlin 320 Mower Trial

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## Introduction

At the request of Trimax Mowing Systems NZ Ltd, NZ Sports Turf Institute have undertaken a trial to determine the mowing quality of its Merlin 320 fairway mower as it compares with a typical reel (cylinder) mower commonly used for mowing fairways on New Zealand golf courses.

The Trimax Merlin 320 is a rear mounted, tractor powered, rotary mower designed for use on golf fairways and rough areas (Figure 1). The Merlin can also be used on other larger turf areas typically where a reel mower is commonly used. The Merlin features three interconnected decks each housing three, twin bladed spindles. Each deck is able to move independently from the other and includes front and rear rollers. Anti-bounce skids can be mounted on each deck to help prevent scalping of more challenging terrain. Cut height can be varied from 10 to 100mm.

Mowing quality was assessed on the basis of cut quality (no shredding, rough cut edges, no turf die back), the overall condition of the turf and whether there are any changes in the degree of thatch build-up. The trial was run for a period of just over three half months from the last week in October 2010 to end of January 2011.

**Figure1:** Trimax Merlin 320

## Materials and Methods

### **Site details**

The trial was conducted on the 17th fairway of Manawatu Golf Club, Palmerston North. The turf on the 17th fairway consists of a mix of various cultivars of bentgrass (*Agrostis* sp.) and *Poa annua*. The 17th fairway is divided into two sections separated by an area of managed grass and two bunkers on the left and right hand sides of the fairway.

The first section of the 17th fairway, from tee to the set of bunkers was mown with Merlin 320. The second section of fairway from the managed rough to the green approach was mown with a reel mower (control). The first part of the 17th fairway contains a number of sharp undulations and small mounds, and provides a challenging surface from a mowing perspective, regardless of the design of the fairway mower (Figure 2). The second part of the fairway is more gently rolling in nature.

The cut height of the Merlin 320 was adjusted to match that of the control mower. In addition, soon after the first cut with the Merlin 320 some additional anti-bounce skids were

attached to the mower to help prevent the slight scalping that was occurring on some of the sharper mounds.



**Figure 2:** 17th fairway looking across towards the 3rd fairway, area cut by the Merlin 320

### ***Assessments***

Assessments were made at four locations per section of fairway. The assessment areas were chosen so that cut quality of each mower could be assessed across a range of contours. These included two flattish areas of fairway, a gently undulating area and a sharper mound or undulation. Each assessment area covered approximately 1m<sup>2</sup>.

### ***Overall turf and cut quality***

Assessments of overall turf quality and cut quality of each assessment area were undertaken every two to three weeks over the trial period. Turf quality assessments were made of the whole assessment area and included whether there was loss of turf cover due to mower damage or turf dieback, increased incidence of disease or visible variations in cut height. Overall turf quality was assessed on a 1 to 9 scale where 9 represents perfect turf, with no damage and complete cover.

Four assessments were made of cut quality per assessment area by closely examining multiple leaves for signs of shredding, tip dieback or other damage. Cut quality was scored on a scale of 1 to 9 where, 9 represents a perfect cut with no shredding or other damage and 1 represents severe shredding, with leaf dieback. A number of leaf samples were collected and analysed under a low power microscope and photographs taken of cut quality.

### ***Thatch depth***

Thatch depth was also assessed from three 50mm soil cores taken from each assessment area on three occasions during the trial period; soon after commencement of mowing with the Merlin 320 mower, mid-way through and at the end of the assessment period.

## Results

### Overall turf quality

Overall turf quality was assessed of each assessment area every two to three weeks. There was a general decline in turf quality over the trial period for both the Merlin 320 mown section of fairway and the control (Table 1). However, none of this decline was related to the mowing itself, but was due to the presence of 'dry patch' of both fairway areas. Figure 3 shows a series of photographs illustrating the decline in turf quality over trial period. The brownish/grey patches are due to dry patch. Dry patch regularly occurs in these areas during the hot and dry summer weather. Dry patch was confirmed as the cause of the decline in turf quality scores by taking soil cores from the dry patch affected areas visually comparing the moisture content with an unaffected area (Figure 4).

**Table 1:** Overall turf quality

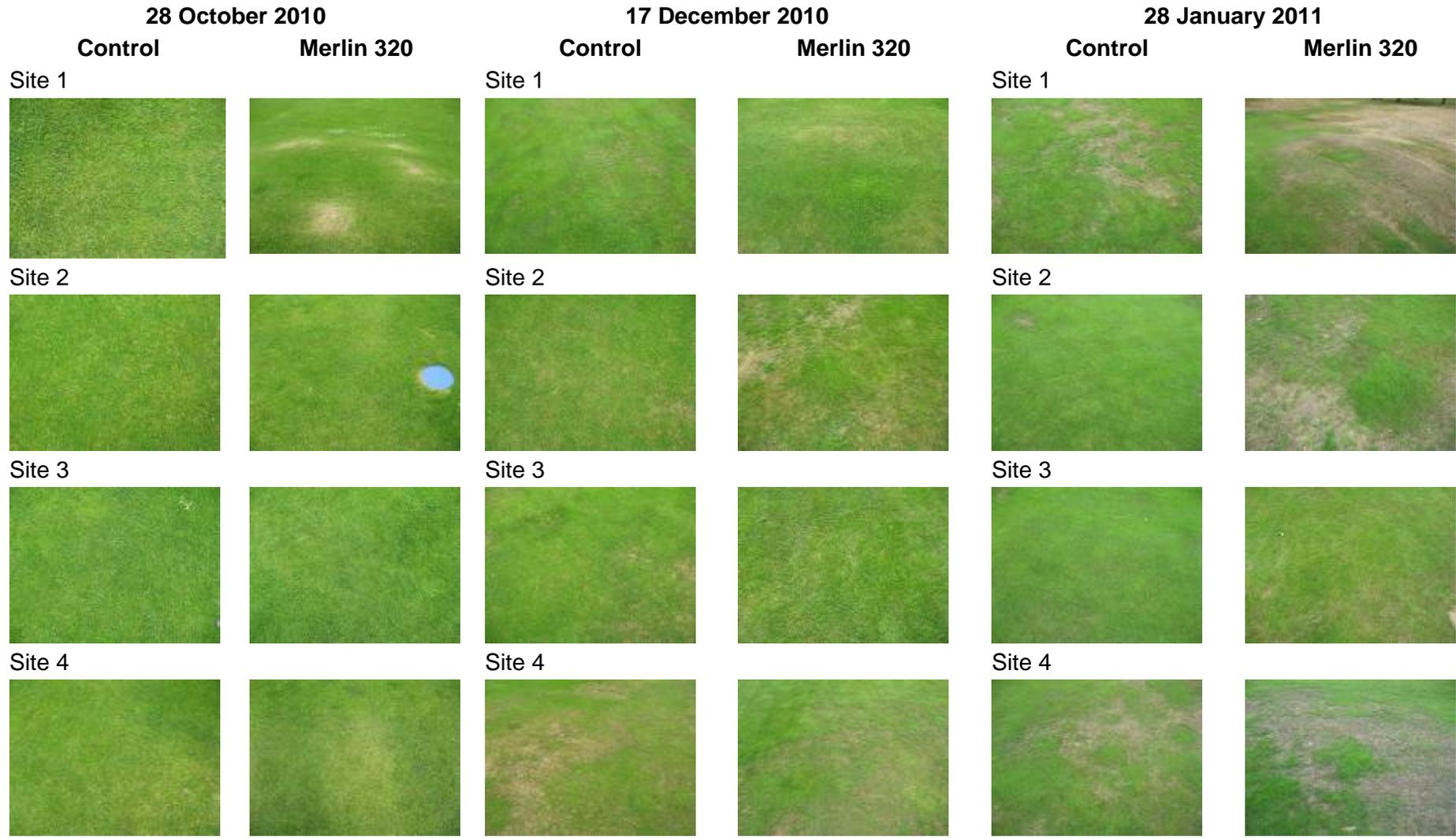
Treatment	11 Oct 2010	28 Oct 2010	8 Nov 2010	24 Nov 2010	16 Dec 2010	14 Jan 2011	28 Jan 2011
Merlin 320	9	7.5	8	7	7	5.5	5
Control	9	8.8	8.3	7.5	7.5	7.5	7.5
	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.



**Figure 4:** Moisture difference in dry patch affected turf (a) versus green healthy turf (b) unaffected by dry patch

Only immediately after the first mow with the Merlin 320 (28 October) was there any noticeable difference in turf quality that could be attributed to mowing. This took the form of some slight scalping of the turf of a very sharp mound that made up the first assessment area of the fairway being cut with the Merlin 320 mower (Figure 5). However, this scalping quickly recovered after fitting anti-bounce skids to the Merlin 320 mower. The skids

**Figure 3:** Turf quality on three assessment dates





**Figure 6:** Cut Quality on four assessments dates

**Control**

**Merlin 320**

**28 October 2010**



**24 November 2010**



**17 December 2010**



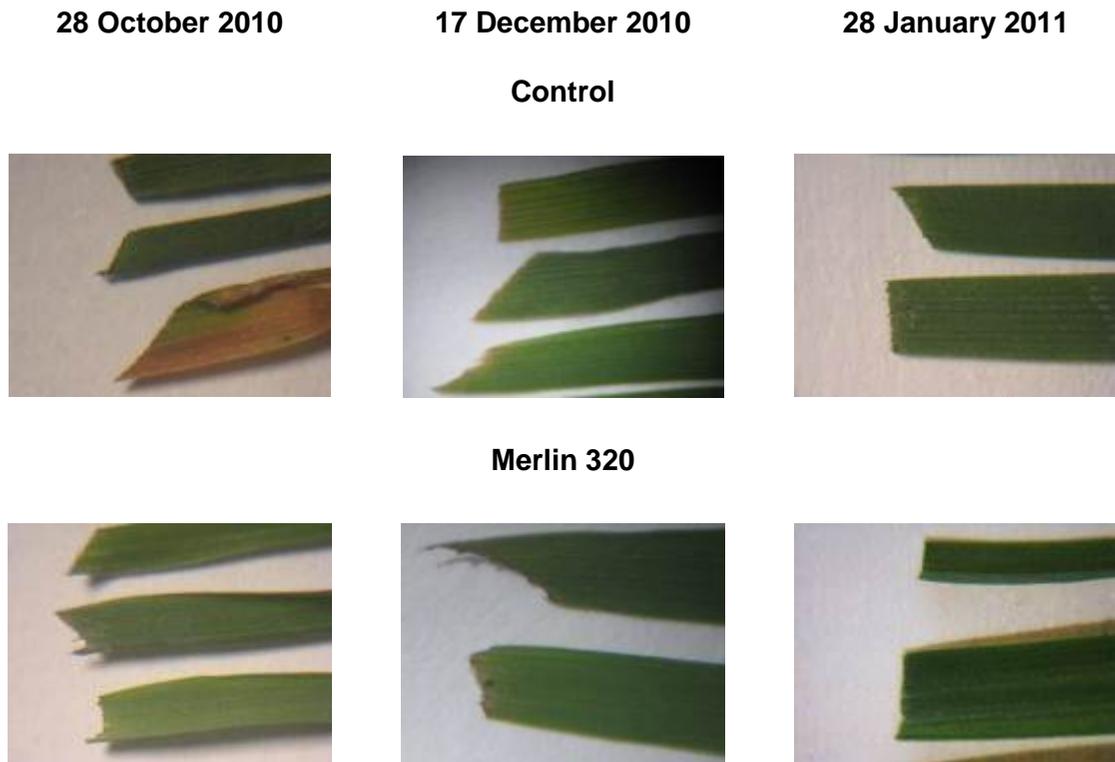
**28 January 2011**





**Figure 7:** Stalky bentgrass growth

Cut quality of individual leaves was more closely examined under a dissecting microscope to look for differences in cut quality. Photographs were taken down the microscope and those from three dates are presented in Figure 8. From these examinations and from the photographs in Figure 6, it was observed that the cleanness of cut of the Merlin 320 was very similar to that of the control mower.



**Figure 8:** Cleanness of cut as taken through a dissecting microscope

***Thatch depth***

Thatch depth was measured on three occasions during the trial. Thatch is the layer of undecomposed plant material immediately below the green grass plant (Figure 9). Thatch depths were highly variable across each fairway area with a range of 12 mm. Mean thatch

depths did not change over the period of the trial. In addition, there was also no increase in the depth of thatch due to the use of the Merlin 320 mower



**Figure 9:** Example of thatch layer under the 17th fairway

**Table 3:** Thatch depth

Treatment	Oct 2010	Dec 2010	Jan 2010
Merlin 320	15.9	15.2	16.9
Control	15.1	18.5	15.7
	n.s.	n.s.	n.s.



**Figure 10:** Anti-bounce skid damage from Merlin 320

## Other observations

During the assessment of the 17 January along narrow scuff mark was noticed near the first assessment area being cut with the Merlin 320 mower (Figure 10). This area consists of a fairly 'sharp' mound that was slightly scalped during the first mow with the Merlin 320. The course Superintendent advised that it was due to one of the skids on the Merlin 320 digging into the turf surface. The damage occurred when the mowing direction was changed and after a period of wet weather prior to Christmas. The anti-bounce skid has dug in when the tractor has moved up onto the top of the mound. This particular mound rises up from the surrounding fairway by 300-330mm over a distance of approximately 2.5m (slope of 12 – 13%).

## **Conclusion**

There were no significant differences in the cut quality in terms of shredding, rough cut edges or turf die back between the Merlin 320 rotary mower and the control (reel type) mower. Only after the first cut, of a particularly 'sharp' mound was there any damage due to mowing with the Merlin 320 mower and this consisted of only some minor scalping. Scalping did not reoccur after anti-bounce skids were added to the Merlin. Similarly, there were no significant differences in overall turf quality between the two mowers. In the three months over which the trial was conducted there were also no changes in thatch depth between the two mowers.

## **Acknowledgement**

The author would like to acknowledge the assistance of Malcolm Wells and Manu Dajee from Manawatu Golf Course for undertaking the mowing of the trial. The author would also like to thank Chris Gribben for his assistance in scoring the trial.