

Managing soil erosion with diverse cover crops

ALEX MILNER-SMYTH

Using cover crops to solve their soil erosion problem has led to additional benefits for Marlyn and Patrick Richter.

Managing highly erodible soils was a constant focus for Marlyn and Patrick Richter, brothers who farm 1,050 ha just outside Menoken, in North Dakota.

The property has a history of wind erosion due to a combination of fragile sandy and sandy-loam soils and conventional farming practices.

Windbreaks, established during the 1950s and 1960s, did little to address the issue but a move to no-till in 2001 was a significant step towards preventing soil loss. During their first nine years of no-tilling, soil organic matter levels increased from an average of 1.25% to 2.2%.

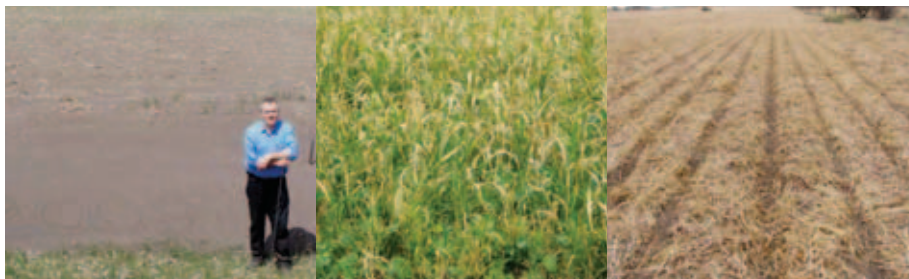
However, sparse soil residue resulting from hay/silage production and grazing cattle meant soil loss through wind erosion wasn't completely eliminated.

As well as soil erosion and low soil organic matter levels, nitrates frequently leached lower into the soil profile after big rain events, requiring additional fertiliser applications to treat yellowing crops.

The Richters considered integrating diverse cover crops in their system to mitigate some of these issues, but were



MAINTAINING AN 'ARMOUR' OF VEGETATION ON THEIR SOILS IS PAYING OFF FOR THE RICHTERS THROUGH INCREASED PROFIT, LESS EROSION AND IMPROVED SOIL CONDITIONS, AS EVIDENCED BY HIGHER EARTHWORM POPULATIONS IN THE AREA.



THIS COMPOSITE IMAGE ILLUSTRATES THE RICHTER BROTHERS' COVER CROP STORY, WITH DIVERSE COVER CROPS (CENTRE) THE DIFFERENCE BETWEEN THE BARE, ERODED, LOW-NUTRIENT SOIL ON THE LEFT AND THE WELL-PROTECTED, CARBON AND NUTRIENT-RICH, PRODUCTIVE SOIL ON THE RIGHT.

concerned that water use by cover crops would have a detrimental effect on following cash crops.

In 2007 they started an on-farm trial to assess the risks and benefits of cover cropping, dividing a paddock into three sections to assess different approaches.

Paddock 1 Cover cropped, grazed, no manure added (29 ha)
Paddock 2 No cover crop, not grazed, manure added (6 ha)
Paddock 3 No cover, not grazed, no manure (13 ha)

FIGURE 1. Paddock layout for the 2007 cover crop trial.

They grew a mixture of oats and peas that was cut for silage in June 2007, then applied glyphosate for weed control prior to the cover crop mixture being sown in July. The mix comprised millet, cowpea, soybeans, turnip, oilseed radish, sunflower and sweet clover.

By October the stand had grown to waist height and 141 pairs of cow-calf pairs were put into the paddock to graze. They were removed after 17 days, when they had used about half the forage, based on the cover-cropping 'rule of thumb' to use 50% of the ground cover for stock and retain 50% to provide 'soil armour'.

The following May the Richters planted all three paddocks with corn, despite some of the driest conditions they'd ever seen. During the growing season the corn received 380 mm of rain and the crop was harvested at the end of October 2008.

A visual inspection in the spring of 2008 showed no soil erosion and significantly fewer weeds where the cover had been planted. In the other two trial paddocks, where there had been no cover crop, there were still visible soil erosion and high weed populations.

	Paddock 1	Paddock 2	Paddock 3
Total expenses	\$562.22	\$632.52	\$601.38
Gross income	\$716.08	\$755.00	\$635.66
Nett income	\$153.86	\$122.48	\$34.28

FIGURE 2. NETT CORN INCOME PER HECTARE.



CORN GROWN AFTER A COVER CROP HAD A SIGNIFICANTLY HIGHER GROSS MARGIN THAN CORN SOWN INTO SOIL THAT HAD BEEN FALLOWED SINCE THE PREVIOUS SUMMER.

And earthworm populations in the area with cover crop were three times higher than in the other sections.

More notably, comparisons of plant-available soil water showed no significant difference between the cover cropped paddock and those without sown cover.

The corn yield following the cover crop was 5.2 t/ha. Paddock 2, where manure was added yielded slightly more (5.5 t/ha) than the cover crop paddock, while Paddock 3 yielded 4.6 t/ha.

While the corn yields from Paddock 1 and Paddock 2 were similar, gross margin calculations revealed that the cover cropped area was well ahead financially.

In addition to the other benefits, the cover on Paddock 1 provided enough weed suppression to make a herbicide application unnecessary. The other two paddocks needed to be sprayed for weeds.

Grazing the cover and corn stubble provided additional financial benefits. Based on the beef value at the time, the weight gains of the cattle turned onto the mixed cover crop in October 2007 equated to \$US7,992, or \$US274/ha grazed.

Cover cropping has met the Richters' initial objectives of managing soil erosion, increasing soil organic matter and top-level nutrient cycling and has proved to be more profitable than their previous rotations.

In addition, being able to graze cropping paddocks sown to cover crops also gives long-term perennial pasture paddocks a chance to regenerate.

Interested in learning more? Download a presentation by Marlyn Richter at <http://www.bcscd.com/image/cache/Managing-Soil-Moisture-with-Cover-Crops-Livestock.pdf>



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