



- BUILT for this COUNTRY -  
CROPPING into KIKUYU MAINTAINS SOIL CARBON

FARMER  
PROFILE

NAME: Ken and Jan Reddington, Paul and Alice Reddington  
LOCATION: Bremer Bay, WA  
AVERAGE ANNUAL RAINFALL: 520 mm  
ENTERPRISE: 80 per cent livestock, 20 per cent cropping  
PROPERTY SIZE: 2,000 ha  
SOIL TYPE: Sandy duplex, non-wetting, South Coast sandplain



NUTS &  
BOLTS

Perennial pastures increase soil carbon because:

- They have deep-rooted fibrous systems.
- They utilise summer rainfall to extend the green feed season and stabilise top soil to reduce erosion.

Cropping into kikuyu pasture allows diversification of income by providing a profitable cash crop which:

- Maintains soil carbon storage.
- Improves pasture productively by reinvigorating kikuyu.
- Provides additional grazing opportunity of stubble.
- Allows farmers to be opportunistic and make farming systems more robust against future climate variability.

**K**en and Jan Reddington obtained a condition purchase block at Bremer Bay in the early 1970s.

Over the past 40 years they have developed the property into a highly productive farm called Malamerup which they operate with their son Paul and his wife Alice.

The family focus mainly on grazing, running sheep for prime lamb production and super fine merino wool, as well as cattle for beef. As they began developing the farm, the Reddingtons realised the region's regular strong winds were causing significant soil erosion on the property.

## THE IMPORTANCE of GROUNDCOVER on the SOUTH COAST ●●●

Approximately 25 per cent of the South Coast region is at high to extreme risk of wind erosion (*D. van Gool et al. 2008*). Furthermore, a recent study analysing wind erosion data from the 1980s estimates that wind erosion can lead to the loss of approximately three per cent of soil carbon stock in the top 1m of soil each year (*Harper et al. 2009*).

To prevent wind erosion, farms should aim for 50 per cent groundcover all year round by non-erodible material (gravel, stubble or pasture residue) (*EverGraze, 2013*). This prompted the Reddingtons to look at various options to stabilise the top soil. Options available included adopting no-till practice, land use change, use of tree belts or planting a hardy deep-rooted perennial pasture. Eventually a solution was discovered that not only stopped wind erosion, but had a production benefit as well.

"On the South Coast we get out of season rain events," Ken Reddington said. "Probably 25 to 30 per cent of our rain is in summer. We get strong wind events too and found that sheep would camp in one area and water in another all leading to "a perfect storm condition; if a paddock could blow, it did blow," he said.

"We looked at different options to stabilise the top soil. The perennial pasture kikuyu was the one we chose because it was virtually bullet proof. It stabilised the soil and responded to those summer rain events, we got good quality green feed off it and ended the problem of blow."



*Wind blown paddock before planted to kikuyu and (below) the same paddock after planted to kikuyu.*



## THE BENEFITS of KIKUYU PASTURE ●●●



*After summer rain, kikuyu comes back "electric green".*

The suitability and benefits of kikuyu have resulted in many positives for the Reddington's livestock production and the sustainability of their land.

"Now we have kikuyu planted, the late summer-autumn period is not as stressful as it used to be," Ken said.

"I would be on tenterhooks wondering when the break of the season was coming and would we lose top cover and feed before the break arrived, so I would have vulnerable paddocks and have to lock the stock up and feed-lot



*Kikuyu regrowth in harvested canola crop.*

them. At the moment, we know we've got cover on the paddocks and we can push them pretty hard without risking wind blow.

"In late summer and autumn you wouldn't have anything else. I love kikuyu then, especially the way it responds to summer rain. If we get a thunderstorm it becomes electric green, it really bounces out of the ground and you'll have an inch of it virtually overnight. It's amazing how it responds to summer rain. It's built for this country or this country's built for it."

## THE BENEFITS of PERIODICALLY CROPPING into KIKUYU ●●●

Although kikuyu proved a great benefit to the farming system, some management issues were discovered which needed addressing, particularly after the kikuyu had been established for around 20 years.

The kikuyu had done an excellent job at stabilising the Reddingtons' paddocks and taking advantage of summer rainfall when it occurred. However, in the older paddocks it was growing with less vigour and becoming more of a proposition for sheep than cattle.

"The kikuyu had become dominant and began to choke out certain annual species, especially when they had false breaks the clover would really struggle," Paul Reddington said. Ken and Paul began to notice everywhere they had worked or

"tickled up" the kikuyu it responded well. Paul then had the idea of cropping canola into the kikuyu for one to two years. "Canola has a large tap root, so when cropping it, the root aerates the soil and the canola knocks the kikuyu back. It's also provided the ability to get a cash flow off it while simultaneously controlling the kikuyu," Paul said.

"Since cropping into kikuyu we've noticed it comes back healthier, more invigorated and with increased production. Incorporating it into our farm has been a lifesaver," he said. Growing kikuyu has given the Reddingtons a reliable source of livestock feed; they can utilise out of season rainfall; have the ability to grow a cash crop if conditions are favourable and have confidence their paddocks will remain stable throughout the year.

## PERENNIAL PASTURES & SOIL CARBON ●●●

Perennial pastures are generally expected to store more soil carbon than annual pasture due to their extensive root system which persists all year round.

Soil carbon plays a pivotal role in contributing to the physical, chemical and biological processes of soils and is essential for having a healthy soil. The Reddingtons were interested to see if the soil carbon had increased in the paddocks planted with kikuyu and also if cropping into it affected soil carbon stores. South Coast NRM in conjunction with the University of WA conducted research on the Reddingtons' farm to discover more. Below is a summary of the soil research trial undertaken at Malamerup.

### OUR AIM WAS ●

To investigate:

- How soil carbon stores under kikuyu grazing systems in comparison to an annual grazing system
- How cropping into a kikuyu pasture affects soil carbon

### WHAT WE DID ●

We compared total soil carbon under three different farming systems within the same farm:

- Annual grazing system
- Kikuyu grazing system (15 years)
- Crop converted from kikuyu paddock (15 years)

### HOW WE DID IT ●

Through soil testing that was consistent with the CSIRO's Soil Carbon Research Program methodology, randomly distributed 25 x 25m quadrats were used to sample the soil profile from 0-30 cm to measure total soil carbon.

### WHAT WE FOUND ●

- Total soil carbon is higher in a kikuyu grazing system compared to annual grazing systems
- Cropping for up to two years into a kikuyu grazing system does not change the total soil carbon - see figure 1.

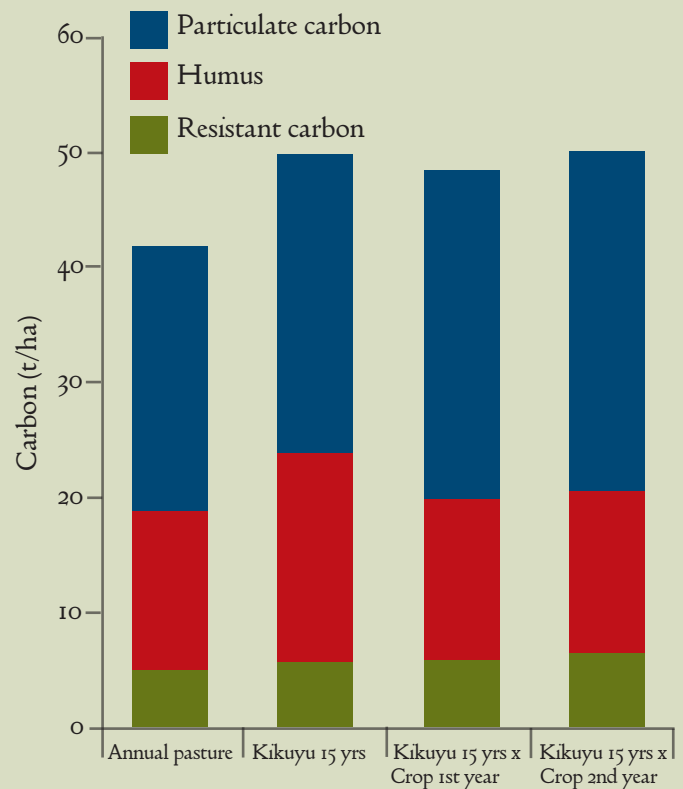


FIGURE 1. Mean of total carbon (0-30 cm) in different farming systems relating to the different types of carbon.

### SOIL CARBON FAST FACTS

- Soil carbon provides energy for nutrient cycling biological processes.
- It enhances water holding capacity.
- It improves soil structure and stability by binding soil particles into aggregates.
- Soil carbon has three factions:
  - Particulate carbon comes from initial decomposed organic matter, including plant and root residue.
  - Humus comes from decomposed particulate carbon. It is the final product of the decaying process.
  - Resistant carbon is stable, long lived in the soil. It can not be affected by management practices.

"Since we've cropped into kikuyu, we've noticed it returns healthier, more invigorated and with increased production.. Incorporating it into our enterprise has been a lifesaver."  
- Paul Reddington, Bremer Bay, WA, 2014 -



**PLEASE NOTE:** Although it hasn't been an issue on the Reddingtons' farm, in some circumstances, kikuyu can overwhelm native plants, particularly around creek lines.

Care should be taken to manage kikuyu in these circumstances to maintain the environmental and production benefits that these habitats provide.

### ACKNOWLEDGEMENTS

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### REFERENCES

- D. van Gool, L. Vernon and W. Runge (2008) Land Resources in the South-West Agricultural Region, Resource Management Technical Report 330, Department of Agriculture and Food, Government of Western Australia, Perth.
- RJ Harper, RJ Gilkes, MJ Hill and DJ Carter (2009) Wind Erosion and Soil Carbon Dynamics in South-Western Australia, Aeolian Research 1,(2010) 129-141.
- Manage Wind Erosion – South Coast Sandplain WA (2013), EverGraze project, <http://www.evergraze.com.au/library-content/manage-wind-erosion>.

### CONTACTS

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### FURTHER INFORMATION

For more information about this and other Climate Action Farming projects please visit: [www.climateactionfarming.com.au](http://www.climateactionfarming.com.au).

For further information on agricultural trials in WA go to: [www.agtrialsites.com](http://www.agtrialsites.com). A series of short Climate Action Farming films can be viewed on the South Coast NRM YouTube channel.

Other STORIES FROM THE LAND case studies include:

- The Magic Number
- Perennial Survey
- Cropping into Kikuyu, Herbicide use & Regrowth of Pastures.
- Soil Organic Carbon - A Reward for Good Land Stewardship.
- Farmer to Farmer Program.
- Healthy Soils Produce Happy Vines.

### PHOTOGRAPHY & DESIGN

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