



# CarbonKids Case Study



**Science For A Better Life**  
CarbonKids is a CSIRO education program  
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## No-Till Agriculture in Western Australia

Bill Crabtree is a farmer and farm consultant working in Western Australia. Below, Bill explains the challenges farmers face in today's changing climate and how he realised at a young age that farming practices had to change. Bill has spent all his life promoting the concept of No-Till Agriculture. This technique uses a range of modern technologies to grow crops in a more sustainable way. Bill has received several awards for his work, including the McKell Medal from the Australian Minister of Agriculture.

### What is your background?

I am the second youngest of 10 children. I grew up on the south coast of Western Australia and went to the local Jerramungup Junior High School for 10 years. I experienced first-hand clearing the land from virgin bush. I spent many months converting native scrub to crop land. This involved pulling down the scrub with tractors and chain, ripping out mallee roots, raking and ploughing the soil and then seeding crops.

### Where is your land located and what is the environment like?

The farm I grew up on is 45 km south of Jerramungup and has very sandy soil and is very windy. Summers are hot and dry and in late autumn the temperature cools and the rains begin. This is the important time when the agricultural season begins— it is commonly termed the “break” of the season. Near this time, around May, the soils were usually cultivated, making them loose and prone to soil erosion.

Interestingly, this area of Australia has the most consistent high winds of any region. The reason is that high pressure systems sit in the Great Australian Bight. The Australian continent helps to hold these systems stable and resistant to moving. Given that air systems move from west to east, this creates a wedge or bottle neck where the frontal systems push up against the high pressure systems. It just so happens that the south coast of Western Australia is the exact location of the pressure point. The result is persistent high winds.

### How and when did you come to realise that farming practices needed to change to protect the land and cope with the current changing/dry climate?

When I was about 13 years old I remember thinking that farming methods have to change. I saw that soil was regularly blowing across the road and the paddocks and crops were swept bare with the consistent winds. In wet years the winds were not a problem as the wet soil would be resistant to movement from erosive winds.

However, when the seasons were dry, erosion occurred. In some years the results were horrific – landscapes became wind-swept and dust storms were common.

### What changes are needed in the way we think, act and make decisions on the land in a changing climate?

We need to embrace new technologies that assist in managing problems. In this case it was a willingness to adopt herbicides in broadacre and dryland agriculture. Such a change creates questions and concerns and these issues needed addressing and resolving. In a climate as dry as Australia, we need to optimise water use – make the most of every drop of water. This has become more important over the last 40 years as there has been a strong drying trend for the South West of Western Australia.



Bill Crabtree - A long term advocate of No-Till Agriculture



Conventional tillage and dry years can lead to dust storms (Photo courtesy T Moroney).



No-Till Seed Drills can accurately plant seeds through heavy stubble.



Retained stubble preserves moisture and protects the newly emerging crop.

## What's unique about the minimum tillage land management practices being implemented to address climate change?

Minimum or no-tillage farming allows farmers to maximise every bit of soil water. Rainfall is captured more efficiently as no-tillage creates furrows which channel the water to where the seed and fertiliser are placed. Less water evaporates from no-tillage as the stubble is generally retained and this reduces wind speed. In contrast, inverting soil with conventional tillage brings wet soil to the surface where the moisture readily evaporates.

Stubble is also a form of carbon and since it is retained there is less lost to the atmosphere where it would contribute to greenhouse gases. Over time, carbon levels build up in the soil.

Finally, no-till means many less passes over the ground with tractors that burn high levels of fossil fuels. Less fossil fuel burning means less carbon dioxide emissions.

## What are the key elements of the system?

Farming efficiently and profitably is challenging. However, simply put, farmers need to be able to plant crop seeds into both wet and dry and soft and hard soil with good seed and fertiliser placement. No-tillage seeders are capable of doing this efficiently.

The longer farmers practice no-till the softer their soils become – and they become more biologically active. Softer soils make farmers want to adopt controlled traffic where they use the same wheel tracks for as many operations as possible. Spongy soils create a good environment for strong root growth. They also improve water infiltration. On hillsides with full stubble and a history of no-till, farmers are able to have water penetrate to depth rather than run off and cause bogging in the low lying areas. This more even water capture and use has profound whole-farm crop yield benefits – the high land has more water at depth for finishing crops in dry finishes and the low-land avoids water-logging and weed management challenges.

It is also important that farmers do not let weeds over-run their crops. So rotating herbicides is critical and rotating crop types greatly helps facilitate this herbicide rotation. Delaying sowing after the first week in May generally gives a one percent per day yield decline. Perhaps this is the biggest benefit of no-till – improved whole farm time of sowing.

So in summary, some of the key elements include;

- Retaining stubble when harvesting to protect the soil.
- Controlling weeds during the summer and early in the planting season with high-quality, low-impact herbicides.
- Rotating herbicides classes.
- Rotating crop types to make weed and disease control easier.
- Using specialised no-till machinery that can accurately plant seeds through the trash of the last crops. This may include high-tech. GPS technology to accurately sow the crop between the rows of last crop.

## What are the benefits of the system?

The main benefits include more efficient use of fuel, fertilisers, labour, machinery and water. These lead to more resilient crops that grow on constantly improving soils. The proliferation of free-living, nitrogen-fixing bacteria in these long-term no-till farming systems will become increasingly appreciated as a cheap source of nitrogen fertiliser.

Some people have said that no-tillage has drought-proofed our farming systems, and this is nearly true. In only the worst of droughts is no-tillage not able to return at least what has been invested.

## How did you go about raising awareness and convincing people?

My role has been to do some experiments, learn from others and then do what I know works and share this knowledge with others. It has been a great privilege to be involved with such a sound idea that has profoundly changed the face of farming in Australia. No-till was generally a farmer-driven idea and I was pleased to be in the thick of it – helping to improve the system at every stage.



No-till agriculture can lead to more reliable yields in drier years.