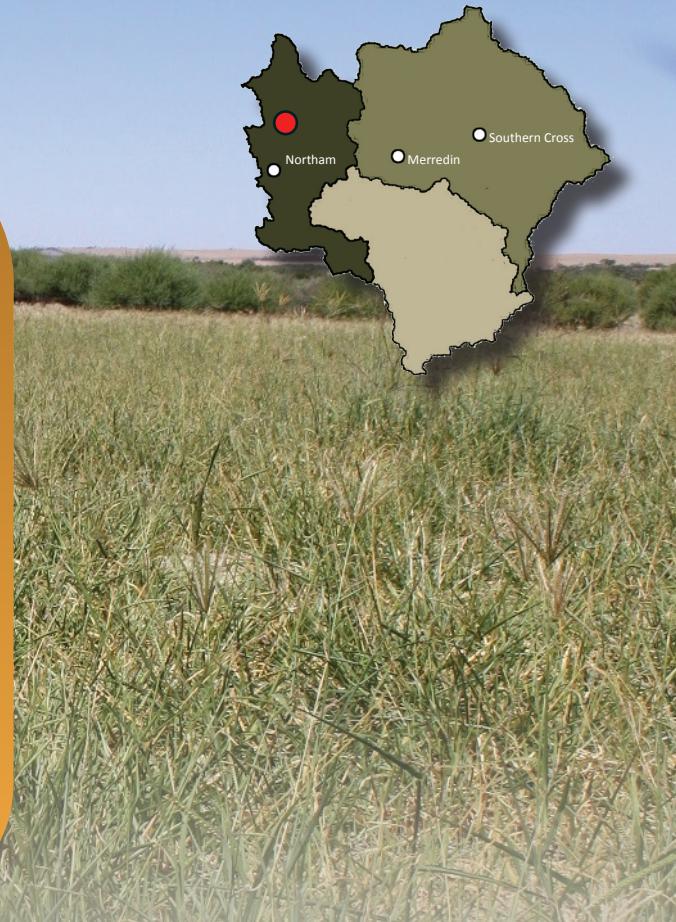


By Elise Bowen & Natalie Hogg

Department of Agriculture and Food, Western Australia

Names	Peter, Kathy and Michael Sadler
Farm name	Leahurst
Location	Wongan Hills
Catchment group	Gabby Quoi Quoi
Rainfall	325mm
Farm size	2766 hectares
Enterprise mix	85% crop, 15% sheep
Soil types	Loamy sand over gravel
Species sown	Rhodes grass Gatton panic Siratro Heritage Seeds Evergreen Northern Mix: (60% Gatton panic, 10% Callide Rhodes, 10% Katambara Rhodes and 20% Bore signal grass)



Above: Evergreen Northern Mix with seed heads of Gatton panic (back) and Rhodes grass (fore).

Key Messages

- **Sub-tropical perennial pastures showed good establishment on sandy soils, on which subterranean clover and serradella failed, and show potential for use in a pasture cropping system**
- **The sub-tropical perennial pastures provide summer/autumn ground cover, protecting the soil from wind erosion and increasing the grazing potential from unproductive paddocks**
- **It is critical to consider pasture variety, seeding method, weed control and ground cover when establishing sub-tropical perennial pastures**

Background of perennial pasture systems

Sub tropical perennials have been trialled as part of the Evergreen project in the Northern Agricultural Region, which promotes the uses of perennial pastures in production systems. Two grasses, Rhodes and Gatton panic, and one legume, Siratro, have proven to establish and persist in deep sandy soils, even in years of severe drought.

Perennials have several potential benefits to farming systems on unproductive, sandy soils and provide year round ground cover, protecting the fragile soils from wind erosion events. They are able to utilise out-of-season rainfall, increasing livestock carrying capacity during summer and autumn. Even during winter and spring, they persist and grow better than annual species in these sandy soils.

An emerging farming system in the Northern Agricultural Region of WA is pasture cropping, which involves sowing an annual crop into a summer active perennial pasture base; this is a more widespread practice in the Eastern States. Early trials in northern broad acre areas of WA have demonstrated good perennial establishment in our soils and climate, and comparable annual crops yields in pasture cropped paddocks compared to in conventionally cropped paddocks with no pasture base.

Sadler's Story

The Sadler's have areas of unproductive sandy soil which is prone to wind erosion, due to light soil type and low ground cover. "Planting perennials is an option to increase year-round ground cover, both for the management of wind erosion, and to provide a pasture base for the future application of pasture cropping", said Michael. In addition, the Sadler's have adopted a biological farming approach, and believe perennials will play an important role in increasing soil fertility through greater biological activity, soil aeration, increased soil carbon and increased soil water holding capacity. All of these factors will contribute to increasing the productivity and sustainability of the Sadler's farming system.

"We tried unsuccessfully for two years to establish Serradella on some of our lighter, sandy country

where clover wouldn't grow", explained Kathy. The trial paddock is unproductive with annual pastures, and is at a high risk of wind erosion, due to low ground cover. After seeing Rhodes grass successfully established in sandy soils in the Northern Agricultural Region, it took the Sadlers 1-2 years to decide in 2010 to sow a perennial pasture mix into a 36 ha paddock that had been pasture previously. "The pasture mix established well, and with little grazing over summer the ground cover seemed to greatly increase", said Peter.

The Sadlers were concerned about the erosion risk of a bare paddock in spring between seeding the perennials and the pasture being well establishment. "We tried seeding some barley seed with the pasture mix to provide quick ground cover. However the barley provided too much competition with the germinating pasture for water, particularly in a drier spring", said Peter. It was decided that ground cover was necessary during pasture establishment to protect the soil, but this was best provided by sowing the pastures into previous crop stubble.

In 2011 the Sadler's set up the Wheatbelt NRM funded trial to compare the mix of perennial pastures with monocultures of Rhodes grass, Gatton panic and Siratro, with the ultimate aim of over sowing the established perennial pastures with wheat in 2012 to trial pasture cropping. Each of the four pastures were sown in 22 ha plots on September 1, using a DBS/Nichols bar narrow point airseeder with 12 inch spacings; this results in deep ripping to aerate the soil while disturbing a minimal amount of topsoil.

Perception of adopting sub-tropical perennial pastures

The Rhodes grass, Gatton panic and the mix all established well, however the Siratro had a disappointing germination with the resulting plants being few and far between. "The Siratro seed may have been sown too shallow," Peter suggests.

Two knockdowns were applied pre-sowing (late winter) to control annual ryegrass; however the soil disturbance from seeding resulted in a large spring germination, which would compete with the

perennials during germination and establishment. After seedling emergence, an across-plot strip was sprayed to target melons. "The herbicides successfully killed the ryegrass, and knocked back the perennials; however the perennials recovered", said Peter.

Due to the large ryegrass burden, the Sadler's have decided to wait until 2013 to sow wheat into the perennial pastures. This will allow them to minimise the ryegrass problem, and reduce the competition of wheat with ryegrass for soil moisture and nutrients.

Prediction for the future value of sub tropical perennials

"In the immediate future, we plan to trial pasture cropping by sowing wheat into the existing perennial pastures in 2013, following ryegrass control in 2012", mentioned Peter. Longer-term, they aim to increase the area of their farm sown to perennials to 300-400 hectares, and if pasture cropping works in their system, cover crop most of this area with cereals, lupins or canola.

The perennial pastures will provide for an increased stock carrying capacity, a higher pasture nutritive value and year-round grazing options. To maximise the utilisation and benefit from the perennial pastures, the Sadler's intend to build up their sheep numbers. "This will allow us to more effectively graze the perennials before seeding in annual crops, as at the moment we don't have enough sheep to do this", said Peter.

Major changes to the farming enterprise

The Sadler's currently run a crop-dominant system, with continuous cropping over the whole property. Their cropping rotation has historically been wheat-wheat-lupins, though other rotations have included wheat-barley-lupins, wheat-canola-lupins and continuous wheat. Currently only one paddock is in a pasture phase, and this is solely for ryegrass control. The Sadlers use a minimum till approach to cropping, as this creates less soil disturbance, and results in less germination of weeds. Though sheep graze the stubbles, they retain stubble to protect the soil from wind erosion.



Siratro plants demonstrating an early (top) and late (bottom) germination.



Michael Sadler in the Evergreen Northern Mix



The bordering plots of Rhodes grass (left) and Gatton panic (right)

In the first summer since the establishment of the perennial pastures, the Sadlers have had no problems with wind erosion in these paddocks. The Siratro plot had a very low germination rate, and was at the most risk; however above average late spring rainfall of 60mm has brought up enough summer weeds to provide some ground cover. "In mid-February 2012, there were lots of smaller Siratro plants evident among the weeds and larger Siratro, so they may have had a second germination later in spring".

One of the key attributes of a biological farming system is the use of mineral-based fertilisers instead of traditional acid-based fertilisers. This maximises microbial activity in the soil, and the mineral-based fertilisers provide longer-term nutrient availability to plants. Peter commented that "nitrogen fertiliser rates have been reduced by about 50% over the farm, with the same crop yields achieved".

Costs associated

The main costs for establishing this system include:

- **Pasture seed** - the Sadler's already had the Evergreen Northern Mix on hand, valued at \$14.50/kg; the Rhodes grass, Gatton panic and Siratro were purchased for respective costs of \$8.90, \$13.40 and \$20/kg. This equated to a range in seed costs from \$53.40/ha for the Rhodes grass, sown at 6kg/ha, to \$116/ha for the Evergreen Northern Mix, sown at 8kg/ha. The Gatton panic and Siratro were both sown at a rate of 4kg/ha. For future pasture sowing, the Sadlers do not intend to harvest their own seed, but purchase more.
- **Fertiliser** - the Western Minerals fertiliser used is alkaline-based, which is a biological alternative to contemporary acid-based fertilisers. The total fertiliser cost was approximately \$40/ha.
- **Herbicides** – a double knockdown of 1.5 L/ha Glyphosate and 1L/ha Gramoxone was applied pre-sowing, at an approximate cost of \$14/ha. The post-emergent application of Garlon, Gramoxone and Ester 680 was only used on a trial strip, so this cost is not included.

Dos and don'ts when planting sub tropical perennials

The Sadlers outlined several key things to know before growing a sub tropical perennial pasture:

- Get the most appropriate pasture variety for the area
- Optimal time of sowing to benefit from soil moisture availability
- The expected weed burden of the paddock and chemical choices for pre-seeding and post-emergent weed control
- Pasture variety-specific information such as seeding depth and insect control

Seeding depth is a critical factor for optimising germination and survival of sub tropical perennials. "If sown too deep, the soil is not aerated enough; and if sown too shallow, the soil dries out too quickly around the seed", explained Peter. Michael stated "to maximise seedling germination and establishment, we targeted an ultimate seeding depth of 12.5mm". This was based on their previous experience with sowing sub tropical pastures, and advice given about recommended seeding depth. Before seeding, Michael mixed the seed in with the alkaline-based fertiliser on the floor of the shed using a front-end-loader bucket. "Having the seed mixed in with the fertiliser encouraged an even feed of the seed through the seeder", he said.

Peter firmly believes that sub tropical pastures should not be sown into bare paddocks, and preferably sown into stubble. "Having adequate ground cover protects the soil from wind erosion; this is particularly important if the perennials have poor establishment and there are large gaps in the pasture during summer and autumn", he said. Peter suggests selecting a small paddock for the initial trial of the pasture species as an important strategy to minimise the risk and cost of a potential pasture establishment failure.



CARING
FOR
OUR
COUNTRY



wheatbelt
natural resource
management



Department of Agriculture and Food

