

Of droughts and flooding rains

Bruce Munday has met Trevor Egel several times at field trips to Gaymore, usually to inspect lucerne variety trials. Trevor's enthusiasm for R&D is infectious, so Bruce knew that one day he would capture Trevor's story.

"To look at *Gaymore* today the casual visitor might wonder if there is really a salinity issue at all.

Like most farmers in the South East this year, our biggest and most obvious problem is the drought. But it isn't always like this. Over the years we have been more affected by flooding than by drought.

The land through here was largely cleared from about the mid-1950s up until the early '70s. Whilst there was always a bit of salt-affected land, indicated by the tea tree scrub and samphire, much of it was good grazing country supporting excellent stands of Hunter River lucerne.

A couple of things together seemed to trigger the real spread of salt. In the late '70s, the blue-green aphid devastated the lucerne which had probably been doing the job of the pre-clearance scrub in drinking up excess soil moisture.

Then in 1981 we had a very wet year, much of the country being under water for up to four months. This wiped out all the pasture on our best land across the inter-dunal flats.

When the water table finally retreated and soil moisture evaporated it left behind vast areas of salt. We then went into the 1982 drought — until now one of the driest years on record.

Case study: Trevor, Janet and Bradley Egel
Location: Mt Charles, Upper South East of SA
Property size: 1600 ha
Mean annual rainfall: 450 mm winter dominant (not this year)
Soils: Sand over clay to heavy clay on flats
Enterprises: Sheep and cattle; small seeds



Photo: G Bailey

Trevor Egel and neighbour Denis Sanders (being attacked by flies) taking soil samples at SGSL trial site

There were times in the '80s when it was tempting to call it quits. But after more than 40 years in a pretty trying environment we reckon we have learned a thing or two. We now know our land and after a lot of trial and error we think we have developed a farming system that meets most of the challenges.

It seems ironic in a year of extreme drought to say that our main natural hazard is flooding. But even though the district is named Mt Charles, most of the landscape out here is extremely flat, with low dunes dissecting the broad valley floors.

For much of this landscape the water table is about a metre below the surface in summer when salinity levels can reach that of sea water. It doesn't take a lot of rain to fill up the soil profile, and large areas can go under water very quickly. In fact this can happen without the rain even falling on our property.

The sandy rises have traditionally been our refuge from flooding, allowing us grazing when other areas are too wet. However over the years these sandy soils

have become increasingly non-wetting, less productive and more in need of protection from over grazing. Clay spreading has been a recent boon, making it much easier to get a good pasture established there.

Keeping the salt at bay

The inter-dunal flats are potentially our most productive land if we can just manage the water table. The salt is not such a problem if we can prevent it from concentrating in the root zone, so much of our effort is directed at this.

The scientists have shown there is some recharge through the dunes, but the dunes also tend to shed a lot of their surface water, whereas on the flats it has nowhere to go other than to recharge the groundwater. So much of our strategy has been to get lucerne going wherever we can so we create a soil moisture buffer that will provide the maximum protection.

The saltier land tends to be too wet for lucerne except in the driest of years like this one. There we concentrate on puccinellia which provides reasonable feed and has the added virtue of an essentially dust and seed free pasture for lambs in late spring.

In reality it is never quite as simple as this. Whilst we can fence to land class, managing dunes and the predictably wet areas separately from the productive flats, even the apparently uniform inter-dunes show a great deal of natural variation.

Across a paddock there might be variations in surface elevation of only ten or so centimetres, but this will be enough to strongly favour one pasture species over another.

Key points

- Lucerne is a great plant — if you lose it, sow it again
- If you've got salt, learn to live with it by keeping it down
- Experience helps you cope with unpredictability.

After years of trying to establish either just lucerne with barley (for forage) or just pucci with burr medic, we have learned it is far more effective to sow them all together and let each find its niche.

This also helps us deal better with the seasonal variations, so if the season is particularly wet and wipes out the lucerne, we still have the pucci to fall back on.

Productive pastures do not last long here in these harsh and unpredictable conditions, so we look to resow on average every five years. This might seem a bit extravagant, but we contain some of our costs by harvesting our own seed for both lucerne and pucci.

In the case of lucerne we have benefited from some of Geoff Auricht's trials that have pointed us towards the most suitable varieties for this country. Then when you harvest your own seed grown under extreme conditions you effectively screen out the weakest performers. So we find we

have customised a lucerne 'variety' we nickname 'Survivor' that seems to suit us better every year.

The pucci is usually still performing well when the lucerne needs resowing, and we find that we can generally sow the lucerne straight back into the pucci.

We are not directly benefiting from the Upper South East drainage scheme, but we might benefit indirectly. If ever we return to flooding conditions the drainage network should at least allow the surface water on Gaymore to keep moving, rather than stagnating. It will be interesting to see if the pucci survives better under these conditions."



Photo: G Auricht

SARDI researchers taking pasture cuts from lucerne trials at Gaymore

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The science behind the story

By Geoff Auricht

Lucerne is expected to grow in ever more diverse environments across Australia owing to its farming and environmental benefits as a productive, nutritious, perennial pasture legume. Projects funded by the CRC Salinity, ACIAR¹, GRDC² and SARDI are developing new lucernes adapted to waterlogging, salt, acid soils, drought or long spells of grazing where older cultivars are likely to fail.

Three breeding selection trials have been sown at Trevor's in recent years as part of this work, all in low-lying areas. The first survived just long enough to identify some promising lines before waterlogging and salt killed it over the first winter. The second has surprised us and persists to this day while the third has thinned dramatically following a wet spell in 2004. Related trials have been sown in WA and northern China as well as in the SARDI glasshouse. Results show that locally bred and selected cultivars provide a sound base for further

improvement and that even greater adaptation can be achieved by selecting highly tolerant plants from diverse sources for crossing and development into new cultivars.

Australian breeding programs with a long history of cultivar development, such as SARDI's, provide the locally adapted breeding lines, the seedbank, the screening and breeding facilities and the knowledge. National and State programs provide the essential funding while farmers such as Trevor provide the land, the local experience and advice, the template for the 'perfect plant' and the resilience, enthusiasm and good humour to ground the research and make a productive partnership between scientists and producers! Trevor even has a go at doing much of it himself, identifying the best cultivars from his experience or from the breeding trials (e.g. SARDI 10), and, if not using this directly, then combining it with his local mix and growing his own seed.

This can yield a local blend, well adapted to the immediate area but of uncertain performance farther away.

This partnership, between SARDI researchers and Trevor, combines the skills and experience of both to produce results, be it SARDI cultivars or 'Survivor', which allow for sustained and expanded lucerne production into ever more challenging environments.

- *Geoff Auricht, Pasture Leader with the South Australian Research and Development Institute, leads the CRC Salinity's project Improving lucerne performance for acid soils.*

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