The Lee family, of Kukerin, have been pleasantly surprised by the impressive establishment of saltbush on land they had dismissed as too saline to be productive.

Since 2007, Andrew and Natalie Lee and parents Kay and Jean, have participated in an on-farm trial funded through a South West Catchment Council (SWCC) ‘Caring for our Country’ project, inspired by the Sustainable Grazing on Saline Lands (SGSL) initiative.

The trial has seen the establishment of rows of old man and Eyres Green saltbushes planted as seedlings, and tested the suitability of a range of annual legumes between the rows.

“The trial has taught us never to give up on an area,” Andrew Lee said.

“The trial has taught us never to give up on an area… whatever the salinity.”

The Lee family’s farming enterprise, located in a 375mm rainfall zone, comprises 70 per cent crops, including wheat, barley, canola, hay, field peas and lupins, and 30 per cent merino sheep.

They participated in the trial hoping to find out how they could achieve low cost establishment of suitable pastures on salt-affected areas.

The 20ha trial site is located in a 200ha paddock, of which 100ha of arable land was fenced off before the trial.

Trial work took place within the remaining land, which includes 40ha of arable land, and 60ha of saline land.
As well as the 20ha trial site, the Lees planted 40ha of the paddock themselves to old man and river saltbush, and wattles.

The 200ha paddock was cleared of its mallee, gimlet, salmon gum and broombush vegetation in 1956 and 1959.

“Surface salinity first appeared in 1965 after a very wet winter in 1964, and expanded significantly in 1975 following a very wet winter in 1974,” Kay Lee said.

“Since then, the saline area has increased slowly and has been fairly stable since 1985.”

The arable area of the paddock was cropped usually one in every three years.

“The balance continued to deteriorate because sheep were running over the whole area, keeping it bare and allowing wind erosion,” Andrew Lee said.

When the trial started, paddock cover on the 20ha site comprised patchy barley grass and salt scald.

The depth of the water table on the 20ha trial site ranged from 0.92m to 1.05m below the surface.

The salinity of water in the water table was equivalent to sea water at 600 millisiemens per metre (mS/m), while the root zone salinity 0.5m below the surface ranged from 50 mS/m in fresher areas, to 550 mS/m in the areas of bare salt scald.

Soil types ranged from sandy loams on the lower slopes, to clay on the valley floor.

In July, 2007, the trial site was sprayed with glyphosate and ripped with an agroplough.

Mr Lee said in hindsight it would have been better to scarify the soil first, as the agroplough created lumps of clay, making hand-planting difficult.

In August, 2007, 20,000 old man saltbush seedlings were planted on the 20ha site using a tractor-drawn tree-planter on the better areas and hand-planters on the clay soils.

Each 6-8m wide alley had four rows of saltbush, with a 16m inter-row between the alleys.

Department of Agriculture and Food research officer John Paul Collins said the initial strike rate of saltbushes in early 2008 was about 70 per cent, with most casualties being on the highly saline clay soil type.

“Some of the gaps in the better areas were filled in with replacement seedlings in August, 2008,” he said.

In August, 2008, the saltbush alleys were sprayed with 100ml/ha of Fusilade to control grass weeds.

In fresher areas of the trial site, single strips of annuals were sown on June 19, 2008, at 10kg/ha using a DBS bar with 60kg/ha MAP fertiliser drilled below the seed.

The annuals included balansa clover, persian clover, Prima gland clover, snail medic, strand medic, Santiago burr medic and the Ball SalinA mix (containing clover, medic and ryegrasses).

“The burr medic and snail medic appear to have been the most successful of all the species and are worth pursuing as an annual legume on mildly saline ground in the future,” Mr Collins said.

In addition to the annual species, kikuyu, tall wheat grass, puccinellia, rhodes grass and Bambatsi panic grass were direct sown in August, 2008 on mildly saline country.

But germination of the perennials was poor due to a dry August/September period.

Surface salinity first appeared in 1965 after a very wet winter in 1964, and expanded significantly in 1975 following a very wet winter in 1974.
There was also no germination of old man saltbush direct-seeded in 2008 with a cone seeder, also due to the dry August/September period.

“The burr medic and snail medic appear to have been the most successful of all the species.”

Phil Nichols, of the Department of Agriculture and Food, was involved with all the direct seeding trials on the Lee family’s trial site in 2008.

He said trials in WA where saltbush had been direct seeded indicated there were genotypic differences between sources of old man saltbush seed.

“Different seed sources may have different capabilities of establishing from seed,” Dr Nichols said.

Researchers also needed to get a better understanding of the ideal seasonal and soil conditions for direct seeding saltbush.

Dr Nichols said the burr medic species were the best annual legumes currently available for environments comparable to the Lee site.

“They are the most salt tolerant of the annual legumes, but only where there is not prolonged waterlogging,” he said.

The Lee family plans to establish further areas of saltland pastures after their participation in the trial.

“We will try to stop areas getting to the point of bare salt scald, where it is hard to do anything productive,” Mr Lee said.

“Initially we will plant more saltbush,” he said.

“We will use these areas of saltland pastures as living haystacks to be grazed in summer in conjunction with the stubbles.

“The arable areas of the paddocks that contain the saltland pastures will be continuously cropped because sheep do so much damage to fragile, non-arable areas.”

The family also intend to plant medics, and possibly other annuals, beneath new areas of saltbush in a bid to maximise the productivity of the saltland pastures.

Mr Lee said he might not bother about hand planting saltbush in future.

“The hand planting was superior but you might wear the higher establishment cost and do it easier by machine planting,” he said.
Both research and farmer trial and error have given us a much better understanding on ways to make saline land more productive.

Saltbush has long been recognised as an important out-of-season feed source and shelter for animals.

However, its value as a water pump to help lower the shallow water table that often accompanies salinity and provide a more favourable environment for more nutritious legumes and grasses has only recently become appreciated.

While transplanting seedlings is a more reliable means of establishing saltbush than direct seeding, it is considerably more expensive.

More reliable means of establishing saltbush from seed, by means of various seed treatments, are being investigated.

Considerable success with old man saltbush has been achieved on sites at Meckering and Morawa. However, the trial on Andrew Lee’s property demonstrates that adequate soil moisture is critical for successful establishment.

Work is continuing to refine these techniques to improve reliability and to identify old man saltbush types that can be direct seeded more reliably.

The success of burr medics, and to a lesser extent snail medics, at Andrew Lees is consistent with the findings on other mildly saline sites that do not get waterlogged.

Balansa and persian clovers have been promoted in the past for saline sites, and while they have excellent waterlogging tolerance, they do not have the salt tolerance of burr medics.

Research is proceeding on selecting new annual legume species that combine salt and waterlogging tolerance.

Of the perennial grasses, tall wheat grass and puccinellia are the best options for saline land, with puccinellia also having high waterlogging tolerance.

The challenge remains on the best ways to integrate and manage the components of saltland pastures to maximise animal productivity and pasture persistence.

Phil Nichols is a Senior Research Officer with the Department of Agriculture and Food and specialises in pasture breeding, ecology and agronomy.

The Lee site is an on-farm, farmer driven trial that was previously established through South West Catchment Council (SWCC) IP2 federal government funding. It has been inspired by a prior industry funded project – Sustainable Grazing on Saline Lands (SGSL) which established a legacy of assisting farmers in carrying out their own trials with substantial support from the Department of Agriculture and Food WA.

Transitional year funding through the federal government ‘Caring for our Country’ (CfoC) project has enabled further assistance to be provided to the Lee site, with valuable ongoing support from the Department of Agriculture and Food WA, Dumbleyung Landcare Zone and the Saltland Pastures Association.

Further information or products in this series available at sgsl.agric.wa.gov.au

Contact
Andrew and Natalie Lee
08 9864 2034
araluenfarmingco@bigpond.com

John Paul Collins
Department of Agriculture & Food
08 9821 3333
john.collins@agric.wa.gov.au

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