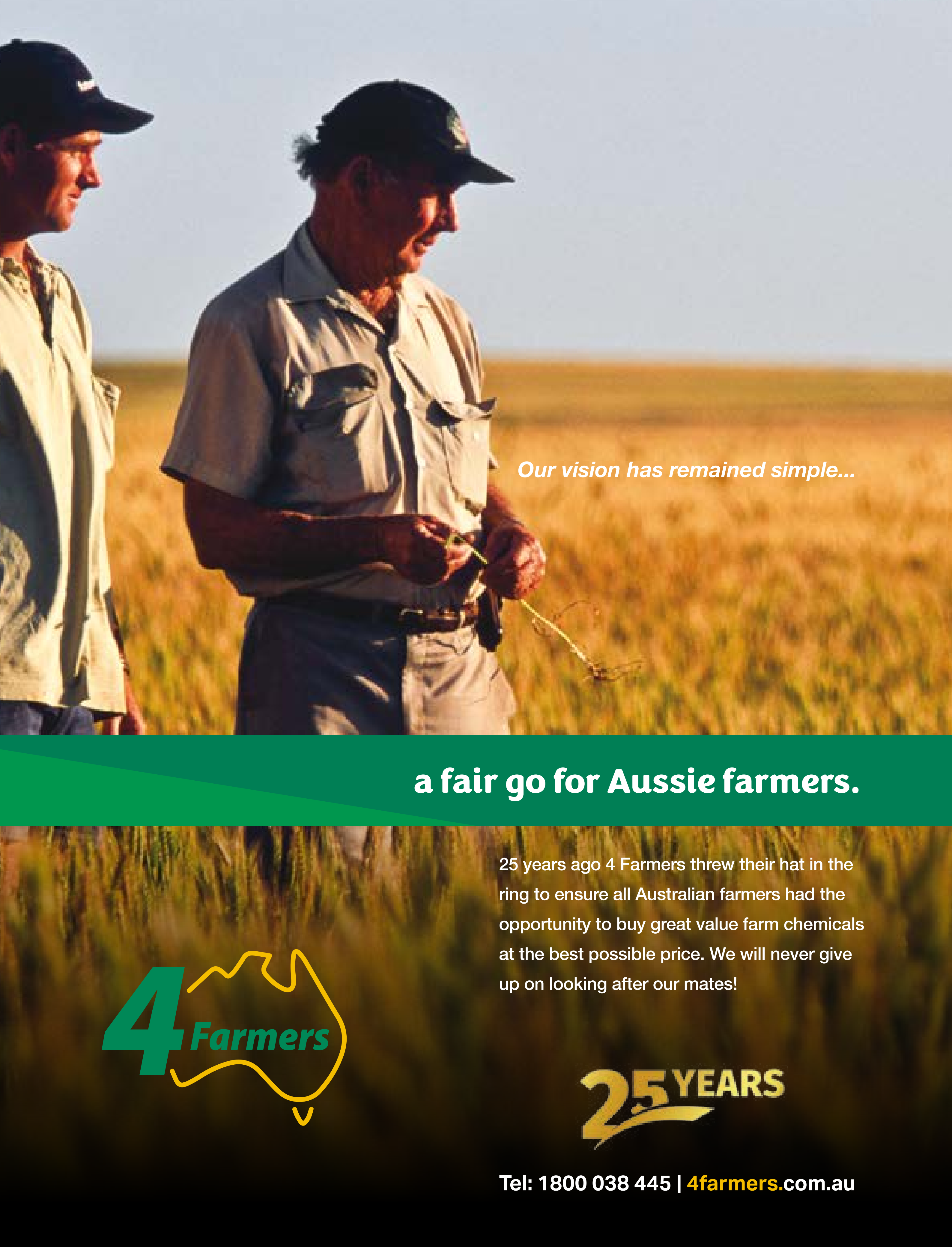
Our vision has remained simple...
a fair go for Aussie farmers.
25 years ago 4 Farmers threw their hat in the ring to ensure all Australian farmers had the opportunity to buy great value farm chemicals at the best possible price. We will never give up on looking after our mates!
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Photo 3: This photo shows the improved establishment of wheat following a millet cover crop (lower picture) compared to a no cover crop (top picture).

In contrast, biomass declined significantly over the longer summer fallow in the grain systems. Biomass dropped to below 500 kg per hectare and cover dropped below the critical level of 30 per cent at wheat planting for the multi-species (with tillage radish), the legume (lablab) and the early spray-out cereal (millet) treatments.

Longer fallows should therefore include cereal species and use later spray-out times for stronger stem development and cover that is more resilient.

Cover crops can recover more water than they use

The 'water cost' of growing the cover crops, relative to the Control treatment in the early stages of the fallow was about 40–50 mm for the early-termination, about 40–70 mm for the mid-termination and about 60–120 mm for the late-termination treatments. The variations will be different each year, depending on the timing of rainfall before and after the cover crops are terminated (sprayed-out) each year.

The low-cover 'Control' treatments stored an extra 56 mm in the shorter back-to-back cotton system and 42 mm in the long fallow following skip-row sorghum. In both cases, the best cover crop treatments recovered the water they used to grow, and ultimately stored more soil water across the whole fallow than the Control (low-cover treatment) which was maintained with herbicides (Table 1).

The best treatment in the short fallow between cotton crops was the early spray-out cereal, which finished with an extra 14 mm of water. It used less water to grow and maintained 40 per cent cover over the life of the short fallow. By planting, the mid-spray-out treatment recovered to match the Control and went on to increase infiltration and store more irrigation water in the early growth of the cotton crop.

On the longer fallow following skip-row sorghum, several cover crop treatments were ahead – the best being the late spray-out (+19 mm), the multi-species (+21 mm) and the late spray-out with rolling (+36 mm). These cover crops more than recovered their lost water with the extra cover they provided.

Crop performance

The cover crops cost around $70 per hectare to establish and then spray-out with herbicides. They recouped some of this cost by saving three fallow sprays that were otherwise needed in the cotton system (about $60) and two fallow sprays in the grain system (about $40). But each treatment was more profitable than the low cover fallows, with improved yields of the subsequent cotton and wheat crops measured for all cover crop treatments (Table 1).

The wheat yield increases were largest following the cereal cover crops, especially the late spray-out treatments with their more resilient stubble. The water differences at the end of the fallow explains only some of the observed yield differences. But the establishment of the wheat crop was also dramatically better with cover crops, especially where cereals were used (Photo 3).

The expected yield increases from the higher fallow water storage alone would typically be about 200 kg of grain in wheat (assuming 15 kg grain per mm water) for the mid-terminated millet (worth about $50 per hectare), about 280 kg of grain for the late millet (worth $75 per hectare) and about 540 kg of grain for the late + rolled millet (worth $150 per hectare).

These gains would represent net returns of $20, $45 and $120 per hectare respectively. But the measured yield gains for these same three treatments were 950 kg per hectare, 1461 kg per hectare and 1129 kg per hectare respectively, representing increased returns of between $250 and $380 per hectare.

Similarly, the remarkable gains in cotton yields for all treatments compared to the Control fallow represent large returns for the investment in cover crops. The reasons for these big yield increases are not clear. The irrigation schedule for the trial was based on the grower's own crop in the rest of the paddock (wheat grown through to harvest), which was similar to treatment 6 and explains why the treatment overcame its large water deficit at planting.

Continued better infiltration of overhead irrigation with cover crops in the early stages of the cotton crop, and apparent better extraction of soil water in the later stages of the crop may help explain at least some of the results.

These 'initial' results from both trials show that cover crops can increase net water storage across fallows when groundcover levels are low (less than 30 per cent). How often these soil water results will occur across different seasons will be explored with further experiments and simulation modelling. Furthermore, the impacts on the subsequent wheat and cotton yields are dramatic and provide big dollar returns – far beyond expectations from the increases in soil water alone. Improved establishment of the wheat crop at Bungunya and better water extraction by the cotton at Yelarbon are likely contributors to the results.

But its likely that there are other factors that remain to be studied in future research. ■

Sprayable biodegradable polymer shows promise

CSIRO is developing a sprayable biodegradable polymer membrane technology for use in agricultural crop production systems to minimise soil evaporation, suppress weeds and improve crop water productivity in order to increase crop yields, farm income and farm profitability.

This patented technology is undergoing pre-commercial trials.

The sprayable technology has been demonstrated in laboratory pot experiments and in irrigated field plot trials using melons, sorghum and cotton. These trials have confirmed increases in crop water productivity in excess of 30 per cent compared with bare soil treatments.

Around 3,500,000 tonnes of plastic mulch film is produced worldwide every year for the Plasticulture market, representing a significant opportunity for market disruption via a new technology. The Plasticulture market enjoys an average annual growth rate of about five per cent, and research firm Markets and Markets, projects the global agricultural films market to reach a value of US$11,744 million by 2020.

"The problem is that plastics don't biodegrade, they fragment," says researcher Keith Bristow. "In the process they produce toxins and heavy metals which remain in the soil. China uses large amounts of plastic mulch and already has huge problems with large areas no longer able to be farmed due to the build up of plastic waste in soils.

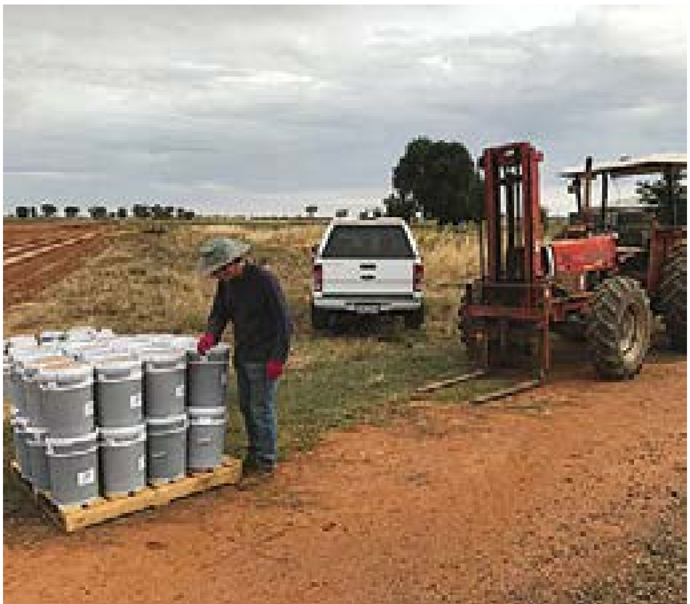
Same problem in Australia

"We also have the same problem in Australia with many councils saying they won't accept the waste in landfills any more. The only options for disposal are landfill/burning which can produce nasty toxins such as dioxins or stockpiling/burying the waste – neither option is acceptable," says Keith.

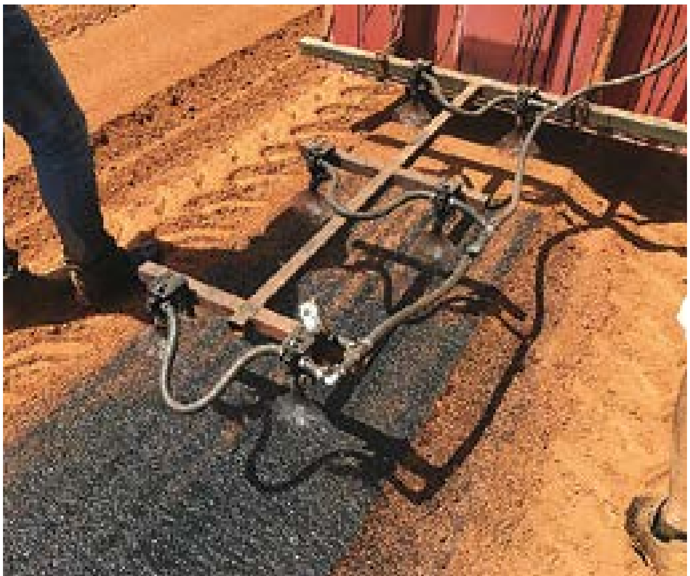
When film fragments it can disrupt the soil pores and you don't get good aeration and water relations. And toxins can disturb soil microbiology and it can find its way to waterways and the water table.

Results to date show significant gains have been made in

Sprayable polymer membrane offers farmers flexibility, helps reduce production costs, and eliminates soil and water pollution (field demonstration of the non-pigmented polymer formulation).



Commercial scale up of polymer was successful with the first set of pallets delivered to the melon field trial site.



Using multiple spray nozzles to improve uniformity of application (black pigmented polymer formulation that maintains in-field colouration).