

Exchange

Shrub belt hedges for shelter and recharge control

In nature, woody vegetation, or shrubs, often grow in bands or strips across the slope. This growth pattern is the most effective way of harvesting water flowing down slope and occurs in semi arid environments in Australia and Africa. The most obvious benefit of belts of shrubs is to shelter stock from cold and wet weather that can cause livestock deaths, especially of new born lambs. But there are many other benefits, such as fodder, biodiversity and other environmental gains, including reducing salinity and erosion.



EverGraze Proof Site at Wagga with shelter belt experiment growing Acacia spp [inset]

Benefits of shrub belts

Research has found that mortality rates of Merino twin lambs born in shelter areas was half that of twins born in exposed paddocks. About 30% of Merino ewes bear twins. Maternity wards with shelter help to improve twin lamb survival.

The belts of tall woody shrubs cannot prevent wet and cold weather but they can significantly reduce the speed of wind and the wind chill factor. Very strong winds can decrease the apparent temperature by up to 20°C.

In another EverGraze experiment when ewes have good shelter, the lambs spend a greater amount of time with the ewes forming a greater bond and preventing mis-mothering.

Salinity has been one of the most environmentally damaging consequences of changing landuse following European settlement of Australia. Increasing the amount of water that plants can use is the key to managing salinity.

Establishing shrub belts is the most efficient way of using more water while allowing farming to continue in between the belts. Shrubs planted across the slope can help to intercept surface runoff after rain which can also reduce erosion.

Shrubs provide biodiversity in the landscape. Shrub belts offer refuge for many fauna that fail to thrive in agricultural monocultures. Not only do the belts provide habitat in their own right, they can also connect remnants of native vegetation providing corridors for wildlife to move around the landscape.

Exchange summary

- ▶ Shrubs have been used to reduce water loss below the rootzone reducing recharge as well as offering shelter for lambs.
- ▶ Belts of Acacia shrubs grew quickly at Wagga reaching a height of 3 – 4 m in exceptionally dry years and provided complete shelter within 2.5 years.
- ▶ Pasture growth surrounding the shrub belts was not affected.



Acacia podalyriiflora

Carbon sequestration is an emerging issue for rural landholders. Shrubs and trees are the most effective way to tie up carbon in agricultural landscapes. If this vegetation is not harvested, carbon is locked up for a considerable time.

Disadvantages

There are direct costs and consequences of growing belts of shrubs within pasture paddocks. The most obvious disadvantage, after the cost of establishment, is the loss of some area of productive pasture and the possible fragmentation of the farming enterprise. These must be balanced with the benefits to the farming enterprise and the environment.

Experimental shrub belts at Wagga

Experimental shrub belts were established into lucerne and phalaris/annual pastures on a commercial grazing property, 20km east of Wagga Wagga. Figure 1 below shows the experiment layout.

The site chosen for the shrub experiment has a 10% slope which is at right angles to the prevailing wind at 9:00 and 15:00 hrs. At the top of the slope the soil is shallow and overlies fractured shale. Plant roots explore cracks in the shale for water.

The soil at the bottom of the slope the soil is much deeper and provides more balanced and plentiful resources for plant growth.

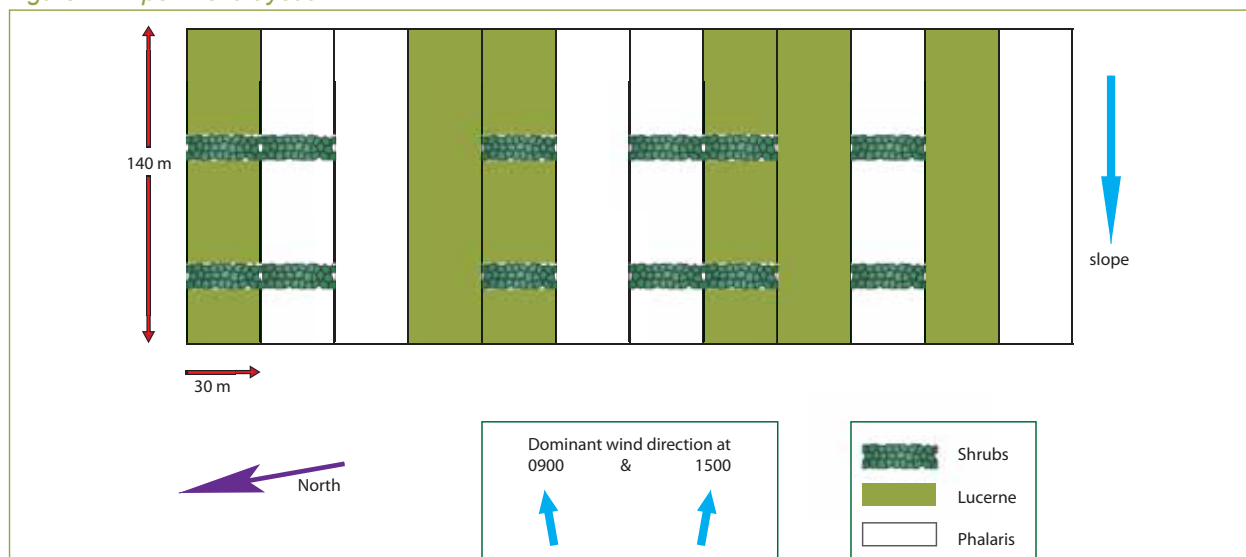
Two shrub belts were planted 30 m apart at right angles to the slope. Each belt is 10 m deep and contains three rows of shrubs. Taller Deans Wattle (*Acacia deanei*) or Black Wattle or Green Wattle (*A. decurrens*) were planted in the middle rows to provide wind protection for the greatest distance possible from the shrub belt. To provide a dense impermeable windbreak the outer rows were planted with short 'stocky' shrubs such as Port Lincoln Wattle or Flinders Ranges Wattle (*A. iteaphylla*) and Western Silver Wattle or Showy Wattle (*A. decora*).

The experiment was designed to ensure the right plant was planted in the right place for the right purpose.

The right plant

Wattles (*Acacia* spp) were selected for the shrub belts since they are native and relatively fast growing so they quickly form a belt that will sustain itself through self seeding. There are a number of types of *Acacia* throughout southern Australia with different heights and branch architecture enabling a stepped wind break to be assembled. They are also aesthetically pleasing and are frost, drought and fire tolerant. In addition, *Acacias* have a larger leaf area than eucalypts and so have the potential to transpire more water. The species selected for the experiment were suited to the environment of the NSW South West Slopes. Other areas would have similar species suited to their area.

Figure 1. Experiment layout





Shrubs increase biodiversity such as this Bird dropping spider

The right place

When determining placement of shrub belts, consideration needs to be given to soil types, slope and prevailing winds.

The extent shrubs can dry the soil will depend on where they are planted on the farm. High on the slope, where the soil was shallow, the shrub belts dried the soil more than the surrounding lucerne and annual/phalaris pasture pasture. Low on the slope the shrub belts provided a dry buffer in annual/phalaris pasture but not in lucerne.

The hedges also need to be placed at right angles to the wind expected during lambing. This is to provide the maximum shelter benefit for lamb survival.

The right purpose

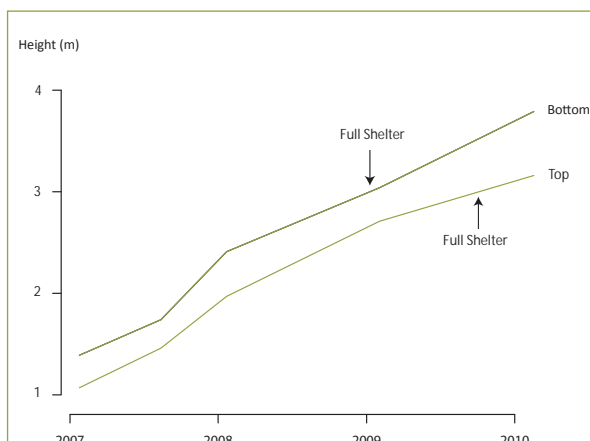
The purpose of the shrub placement was to try and intercept as much water as possible from flowing down the slope, whilst providing shelter for lambing ewes. The slope, prevailing wind direction and soil type helped determine shrub row placement as shown in Figure 1.

Observations

The belts of Acacia shrubs grew quickly at Wagga reaching a height of 3 – 4 m in exceptionally dry years. The shrubs have not only survived, but grew very well despite receiving only 56% of the long term annual rainfall in 2006 (Figure 2).

There has been very little competition between the shrubs and pastures.

Figure 2. Shrub growth to achieve full shelter



Pasture growth was still vigorous and did not appear to be affected by the shrub growth.

The lower shrub belts successfully created a dry soil buffer in annual pasture and phalaris mix. Lucerne dried the soil to similar levels as the shrubs so adding shrub belts to lucerne pastures would have no hydrologic effect (Figure 3).

While we have not specifically studied changes in the biodiversity of the land due to adding shrub belts we have noticed many species of spiders and birds using the shrub belts.

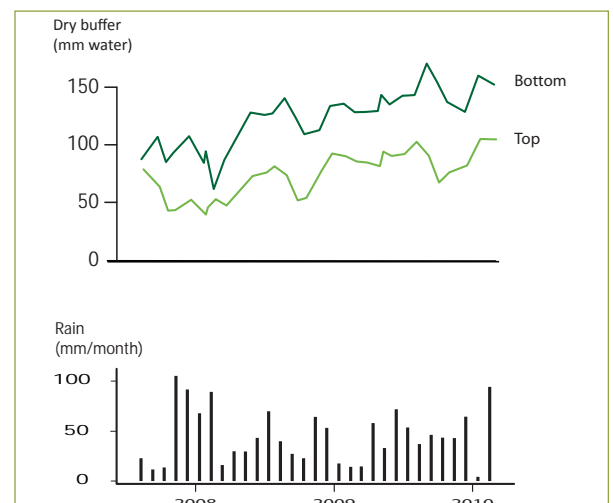
Conclusions

Rules of thumb that predict shelter from shrub height show the belts would have almost completely protected the pasture area from damaging winds two and a half years after establishment.

Infiltration of water into the shrub belts should be as high as possible, therefore, they need to be managed to maintain ground cover in order to prevent the soil setting hard and to slow surface runoff. This is probably best done by excluding livestock. This means that the belts will require relatively expensive permanent fencing and there will be loss of grazing from the area of the belts.

Twin lamb survival rate is greater when they have shelter. Maternity wards can be established using shrub rows. The shelter reduces the wind chill factor thus increasing lamb survival and profits.

Figure 3 The drying effect of the bottom and top shrub belts in an annual/phalaris pasture stand.





*Sheep grazing at Wagga Wagga
Proof Site 2009*

Establishing shrub hedges on your farm

When establishing shrub rows on your farm, it is important to consider the following;

- ▶ Determine the prevailing winds for your area, soil type and slope.
- ▶ Consider planting shrub rows in some kind of gentle curve to avoid 'wind runs' down alleys.
- ▶ Consider undertaking a whole farm plan to ensure you are planting the right plant in the right place for the right purpose.
- ▶ After selecting your site, double rip rows where shrub planting will occur.
- ▶ Fence off the site to prevent stock access when plants establishing. Consider installing a gate for crash grazing to control weed growth or to provide access for forage grazing of established plants and lambing.
- ▶ Plant shrubs when they are likely to receive ongoing rainfall (Spring or Autumn).

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Further information

EverGraze Exchange - *Improving survival of lambs.*

EverGraze Action – *Perennial grass hedges provide shelter at lambing*

Both publications are available at
www.evergraze.com.au

Perennial forage shrubs providing profitable and sustainable grazing. Key practical findings from the Enrich project.

http://www.futurefarmonline.com.au/literature_85754/Enrich_Booklet

EverGraze on line: www.evergraze.com.au

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