Benefits of trees for farm productivity

Planting and protecting remnant vegetation on the farm.

Aside from enhancing the environment what is in it for you and your farm business?

This leaflet outlines the economic benefits of native vegetation on farms.

Aside from the environmental benefits of native vegetation on farms, there are many production and economic benefits, the most important of these are as follows:

- Increased shelter for stock, leading to increased stock health and birthing rates.
- Shelter for pasture and crops (resulting in increased production)
- Return of birdlife (reduction in pesticide use/costs)
- Spray drift moderation
- Increase in plant pollinators
- Increased farm value
- Reduced salinity, waterlogging, wind and water erosion problems
- Firewood and timber production
- Carbon Farming Initiative

Stock Production - Increased Shelter for Stock

Wind breaks equal healthier and more productive animals

Animals protected by windbreaks are generally healthier and more productive. Productivity of farm animals is optimal for a comfort zone of a relatively narrow temperature range. Animals experiencing excessively hot or cold conditions require more energy to maintain basic metabolism and thus have less energy available to increase body weight or to produce meat, milk or wool. In other words, more feed is required to counter environmental stresses.

Experiments with sheep and cattle have shown that strong wind and rain double the energy requirement of animals for maintenance. One Australian study from the New England Tablelands in New South Wales showed that cold stress can depress sheep liveweight gain by 6 kg, and can depress wool growth by 25%. Lynch,J.J., and Donnelly,J.B. (1980)

Shelter from the sun

Shelter trees can also provide substantial additional benefits due to the provision of shade.

During the Wimmera summer, provision of shade should be considered to reduce stock losses (particularly for calves and lambs) from heat stress. Where these benefits are likely to be substantial, shade plantings within paddocks should be considered in addition to windbreaks.

For sheep, excessive heat is detrimental to ram fertility, and in ewes can reduce ovulation rates and conception. Heat stress in sheep can also lead to death, particularly for lambs. Ewes will assist their lambs to seek shade if this is available.

Excessive heat depresses the condition of cattle by reducing feed intake. Heat stressed cows produce fewer calves and the calves produced have a lower birth weight. It is not uncommon for Calves to die of heat stress. Bird,P.R. (1984)

Protection from cold and wet conditions

Of the three factors which create exposure problems in livestock (cold, wet and wind), wind is the most practical to moderate through the provision of shelter.The greatest reductions in mortality from exposure are produced by windbreaks designed to provide significant wind reductions when conditions of extreme weather occur.

Cold, wet and windy conditions frequently combine to produce a very high wind chill factor a condition which is lethal to stock. Wind chill is the effect of increased cooling experienced because of the combined effect of wind and low temperature. This situation becomes even worse when the animal is wet, and heat losses due to evaporative cooling also occur. Animals in the open under these conditions can be extremely vulnerable.

The most widely recognised benefit of shelter to livestock in southern Australia is the prevention of the death of newborn lambs from exposure in wet, cold, windy weather. Most lamb losses occur within three days of birth. Lambing percentages can be very low in many regions in Australia because of this problem. It has been estimated that in southern Australia, on average, as many as 15% of newborn lambs die from exposure. Several Australian studies have shown that lamb mortality in cold, wet weather can be at least halved by the provision of adequate shelter. Lamb losses can be commonly reduced from 20% to 10% by the provision of adequate shelter and stock management.

In the case of sheep, the benefits of shelter have been shown to include increased feed availability, reduced lambing losses, reduced off-shears losses, and increased efficiency of conversion of feed to meat and wool. In southern Victoria it has been estimated that these factors can combine to produce an overall increase in sheep productivity of 29%. Fitzpatrick,D. (1994).

When comparing sheep in sheltered areas to those with no shelter, there is a 31% increase in wool production and 21% increase (6kg) in live-weight. Native vegetation cover of around 30% has been shown to be the optimal amount of cover in order to yield maximum income from grazing enterprises. Lockwood,M., et al., (2000).

Conclusion

The provision of adequate shelter from wind, sun, cold and rain can prevent dramatic stock losses under extremely adverse conditions. It can also provide small regular returns due to improved animal productivity. Shelter therefore produces a combination of benefits to livestock. Burke, S. (1998)

Shelter for Pasture and Crops

Windbreaks

Windbreaks have increased crop yields by up to 25%. Although trees can effect crop growth for a distance equal to about twice their own height, they shelter a much larger area, extending downwind for at least 15 times their own height. Dengate, J., (1983).

Windbreaks create a decrease in evapotranspiration, moderate cold winter and hot summer winds and protect crops and soil in extreme weather situations such as the 1982 dust storms and the flooding of 2011.

A series of trials in the Rutherglen region has reported an increase in wheat and crop yields in sheltered zones estimated between 22% and 47% (Rutherglen).Bird, P. R.,et al (1993). An increase in lupin yield by 19-22% when the area of shelterbelt was included in the net yield/ha, and an increase of 27% on the lupin crop area between the windbreaks (South-west Western Australia). Richmond, E., (1992)

Return of birdlife -
Reduction in pesticide use and costs

"Birds are technologically advanced, highly motivated, extremely efficient, and cost-effective, insect-pest controllers". Stirling, J. (2007)

The fact is that trees attract birds and other wildlife species which consume pests such as detrimental insects, rats, mice and rabbits. Studies have shown that many wildlife species consume large volumes of pest insects. Bats, ibis, parrots, robins, fairy wrens, magpies, lizards, bandicoots and sugar gliders are all known to consume a range of insect pests. Predatory birds, such as hawks, kookaburras and owls consume pests such as mice, rats and rabbits. This in turn means the landholder cost for pest control is reduced through time savings and reduced chemical usage. DPI, (2009)

By maintaining habitats suitable for beneficial mammals such as fat tailed dunnarts, sugar gliders, antechinuses and bats, farmers could save much time and money through having these mammals control insect pests for them, reducing their reliance on expensive chemicals. Not only planting and protection of existing trees will help these species, leaving fallen logs and dead hollow trees will provide much needed habitat for their survival. Crouch,C., (2005)

Bats are the hidden insect controllers, they eat a wide range of invertebrates, moths, beetles and bugs, with some species also taking spiders, mosquitoes, grasshoppers and crickets. Individuals can consume up to half their own body weight in insects a night. Bat populations rely on live and dead trees for habitat, some dead trees standing in paddocks have been found to hold up to 200 bats. Every tree in farmland has value for bats. Lumsden,L., Bennet, A. (2003)

Spray drift moderation

A vegetative barrier is usually a tree or shrub line that is located on the downwind side of a sprayed area to protect an area susceptible to spray drift. Vegetation barriers reduce spray drift by filtering the air as it flows through the porous barrier. CSIRO, (2002)

Increase in plant pollinators

Stands of native vegetation provide important habitat for colonies of plant pollinators including bees and other insects.

Pollination can have a significant impact on the animal production sector because of the importance of insect pollinated crops as fodder. Many legumes that benefit from insect pollination such as clovers, are important as a source of protein for livestock, as well as fixing nitrogen for soil improvement. Bee pollination can influence the persistence of clover in pasture, therefore affecting grazing quality. Simpson (2003).

If legumes are well pollinated and set ample seed, less seed needs to be purchased for future crops.Lupins trailed by the CSIRO were found to have significantly greater yields from plots to which bees and larger insects had access than from plots from which these insects were excluded. Bee activity on lupins also makes them important agents of cross pollination.

Research has revealed that it is highly likely that honey bees benefit canola crops, but it is difficult to categorically state to what degree. Somerville,D.(2002)

Increased farm value

Aesthetics is a benefit of native vegetation retention recognised by most landholders. Most of the aesthetic benefits were expressed in terms of visual amenity. Miles, C.A. (1998) (DSE)
Farms with good remnant vegetation cover increase in capital value. Value increases have been known to vary from between 15 to 35% Clowes, A. (1998)(DSE)

The results of areas surveyed in central NSW found a 15% increase in farm value.The best vegetated farm in the Boorowa district was assessed by the Valuer-General at $140/ha more than the average farm. In the Orange district there was a 35% premium for well-vegetated land over average values. Clowes, A., McMahon, S. (1997)

Reduced salinity, waterlogging, wind and water erosion problems

Trees on farms can have a serious effect on the reduction of salinity, waterlogging, wind and water erosion.

Salinity occurs when more water goes into a catchment than comes out, the water-table rises, bringing salt to the surface. Shallow rooted crops such as cereals in a recharge area allow a greatly increased volume of water to percolate down through the soil to create a salt effected discharge area. Planting trees into a recharge area can reduce the amount of water reaching the discharge (salt effected site) and trees planted around the discharge area can remove water through transpiration before it adds to the saline effected site. (www.plantstress.com)

A Western Australian wheat farmer, by retaining 25% of native vegetation on his farm has protected the remainder of his farm from rising water tables and associated salinity problems. The returns on his farm have been around 12% compared with the national average of 3% (Crouch,C., 2005)

Waterlogging hydrology is very similar to that of salinity the main difference is that the water is flowing into an area that does not have a high salt content. Tree planting for the treatment of waterlogging is very similar to that of treating salinity.

Wind and water erosion. The top few centimetres of soil being the most fertile are critical to crop and pasture growth. While the loss of a few millimetres of soil in a year may not seem that critical, but over a number of years can drastically affect yields, leading to an increase in fertiliser requirements.

Trees can help reduce this erosion by:

- Slowing wind and water flows
- Providing protection from wind and water
- Holding soil together; and
- Increasing infiltration

Strategically planted shelter belts and revegetation areas can greatly reduce wind and water erosion.(Unimelb, publications.)

Firewood and Timber Production

There are at least three types of wood production activities available to farms; a dedicated firewood woodlot, integrated firewood and sawlog plantation and a low intensity multi-purpose plantation.

Dedicated firewood woodlot

Specific areas set aside for growing firewood alone, the most commonly used species can have their first harvest after 6 years, they require minimal management after establishment and depending on the species can be coppiced to produce successive firewood crops. Advantages – Depending on size, but enough wood for own heating use and can be sold off farm.

Integrated firewood and sawlog plantation
Primary planting is for sawlog production, firewood will be produced during the thinning operations and at final harvest. Advantages – firewood for home use and saw-logs for commercial sale.

Low intensity multi-purpose plantation
This type of plantation usually uses local species and combines firewood production with native vegetation for shelter, wildlife habitat, land rehabilitation or other purposes. This type of plantation may be established through planted seedlings or direct seeding and good firewood species can be incorporated into the plantings. Advantages – firewood production for home heating. DPI (2009)

The added benefit of all of these types of production is that the trees can provide the benefits mentioned throughout this leaflet to a lesser or greater degree depending on the planning and management that goes into the original planting.

Carbon Farming Initiative

As well as improving productivity and land health, trees provide the added benefit of capturing and storing carbon. Trees store carbon in their wood and litter where it remains until they rot or are destroyed. All wood products are about 50% carbon. Soil as well has the ability to store carbon, the amount varies depending on factors such as soil texture, soil moisture, climate etc.

There is a lot of confusing information around regarding carbon; emissions, sequestration, credits, offsets and the big question still remains. How can I make money by storing carbon on my farm?

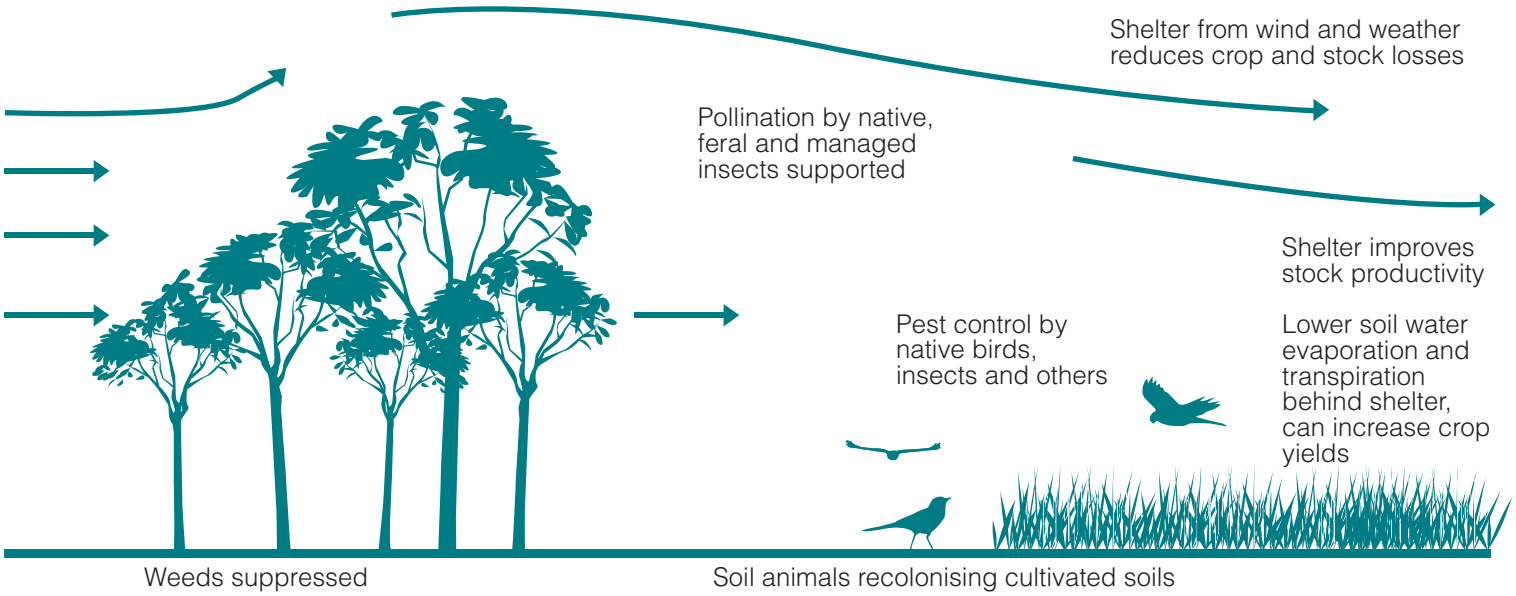
The carbon industry is still waiting for the complete commitment from parliament before this industry really takes off, but one thing for sure is that carbon storage on farms through trees and soil is going to add a new dimension to the financial farm products on offer. There are already a number of smaller voluntary markets where individuals, companies or Governments purchase carbon offsets to mitigate their own carbon emissions. There is still some development and discussion regarding the regulation of offsets DPI, (2012).

Although the initiative is still in its infancy stages, it has been clearly established that trees planted in recent years fulfilling a certain set of requirements can still be included in the Carbon Farming Initiative. For updates and details go to http://www.climatechange.gov.au Quick links - Carbon Farming Initiative.

Other benefits:

- Increase resilience of farms in times of drought.
- Improvement in water quality in dams and creeks by decreasing nutrient and sediment input, resulting in less algae and bacterial problems.
- Increasing organic carbon (matter) on farms resulting in improved natural fertility and increased ability to retain water
- Flow on effects of improving productivity through native vegetation are that farming families are able to continue operating a viable farm business for the long term.

Paddock productivity benefits



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