The Economic Benefits of Native Shelter Belts Report 01/14

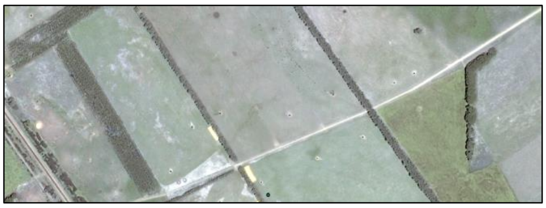
SUMMARY

Typical shelterbelt utilising existing fence lines.
Source: DPI Victoria (2009).

The protection of existing native vegetation and the planting of shelterbelts may provide a multitude of productivity and biodiversity benefits for farming industries. The value of shelterbelts in raising agricultural productivity has been demonstrated in many countries suggesting potential improvements in crop yields (25%), pasture yields (20-30%), and dairy milk production (10-20%).[1]

The following information is based on references and previous research, providing examples of existing 'facts and figures' when considering the economic benefits of implementing shelterbelts. Productivity increases relate to all agricultural industry sectors, including the dairy, wool, meat, cropping, and horticultural industries.

Farmers can use this information to more effectively utilise the landscape to potentially increase productivity, while conserving and enhancing critical resources such as soil health, water quality, and protection from environmental stressors (wind, heat & cold impacts).



Multiple configurations of shelterbelts at Curdievale (SW Victoria), providing stock and pasture protection from various wind directions. Source: Quickbird USA (2008).

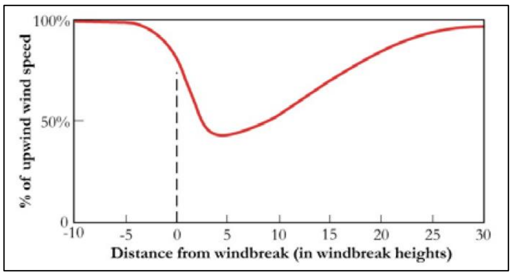
Shelterbelts with strategic placement and well-defined objectives have numerous potential benefits to farm productivity such as:

- Protect crops and pastures from drying winds
- Protect livestock from cold or hot winds
- Provision of shade to protect stock from the effects of heat stress in summer as 'extreme' heat years increase[2]
- Provide habitat for wildlife and natural biological control agents
- Help prevent salinity and soil erosion
- Boundary shelter/windbreaks can reduce bio-security hazards to stock from neighbouring land[3] (eg. prevent nose-to-nose contact, weed movement control)
- Provide posts, firewood, timber, fodder, honey, bushfoods, nuts, cork and various other products
- Protect and enhance living and working areas
- Acts as a firebreak
- Increase medium to long-term land values[4]

HOW SHELTERBELTS WORK

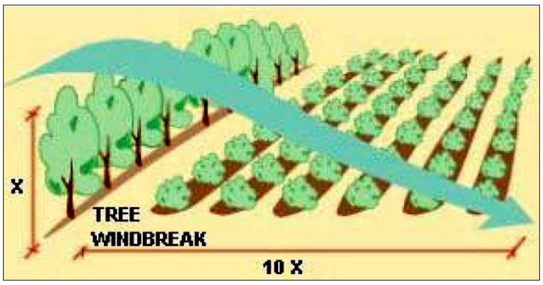
Permeable shelterbelts of trees and shrubs work by filtering and breaking the force of the wind, allowing slight air movement through the shelterbelt. However recent research has shown dense windbreaks (<30% porosity) provide increased protection downwind of a well-designed windbreak or shelterbelt.

The differences in air pressure on the windward and leeward sides of the shelterbelt provides the protection,[5] forming a 'cushion' of slow moving air on either side of the shelterbelt.[6]



Impact of wind speed reductions and distance from windbreak.
Source: Rowan Reid (University of Melbourne) (2013).

- The shelterbelt/windbreak height determines the size of sheltered area, with taller trees protecting a greater area. The tallest tree species should form the backbone if shelter is the primary objective.
- Wind deflected around the ends of windbreaks increases turbulence and reduces shelter effect, therefore windbreaks/shelterbelts should be long and continuous, to minimise end-effects.[7]
- A grid of shelterbelts offers best protection from all winds.



Protection zone principles.
Source: Goolwa/Wellington LAP SA (2012).

Multi-layered windbreak to reduce wind tunnelling effects.
Source: Agriculture WA (2012).

ADAPTING TO A CHANGING CLIMATE

Even though continually disputed, the evidence is clear of an increasing warming climate trend [8] and increases in extreme weather events. The analysis[9] shows that the extent and frequency of exceptionally hot years have been increasing rapidly over recent decades, and that trend is expected to continue.

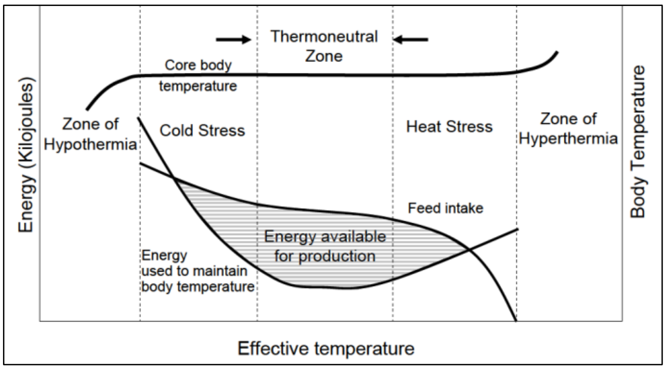
This research suggests further that on average, exceptionally high temperatures are likely to occur every one to two years, or for the last 100 years, the hottest five years are what we can expect every one to two years (2010-2030). Effective farm shelter can assist in protecting farm animals, paddocks, plants and soils from such increasing extreme events.

PRODUCTIVITY BENEFITS

General

Please note: the following research findings relate to specific sites and therefore cannot be expected across all farm sites with varied climate and soil fertility zones. The findings relate to trials in a particular location at a particular time.

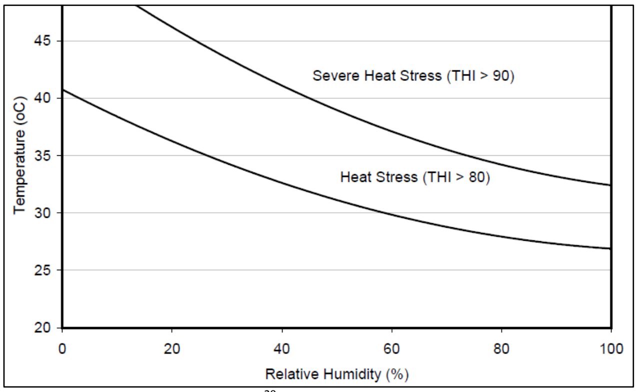
- Shelter reduces animal stress (heat/cold) and animal maintenance energy needs, providing more energy for production.[10]
- Increased shelter for stock, pasture and crops increasing productivity.[11]
- If 10% of the farm is dedicated to shelterbelts; the potential reductions in wind speed can amount to between 33-50%.[12]
- Greater livestock gains result from increased pasture supply and reduced environmental stress; such gains have potential to offset the loss of land occupied by trees.[13]
- Moderation of spray-drift.
- Less reliance on introduced pollinators.
- Reduced pesticide usage via natural biological control.
- Increased land values and landscape amenity.
- Increased ecologically sustainable property values, legacy for future generations, and diversifying future family income.
- Effective shelter placement can be used to dry out laneways, provide fire-breaks, stabilise roadways, utilise less arable areas.



Thermal neutral zone – The effect of temperature on animal production.
(Source: Ames 1980)

Livestock – Dairy

- Sheltered areas have up to 17% estimated increase in dairy milk production.[14]
- On a 27 degree (Celsius) day, unsheltered cows have 26% less milk production than shaded stock.[15]
- Milk yields are depressed by cold at a rate of up to 1.34kg per day (4% fat-corrected milk).[16]
- Over (approx.40-60 years) the lifetime of fencing and shelterbelt; total dairy production will increase by 30% (20% improved pasture growth, 10% improved milk production), and $150/ha of sheltered pasture.[17]
- Heat stress can markedly reduce stock fertility, milk production and increase mortality of calves.[18]
- The use of trees can reduce heat load (summer) in cows by 50%[19] and heat loss in winter, and is more cost-effective than using electricity-driven sprinklers and fans while absorbing carbon dioxide.

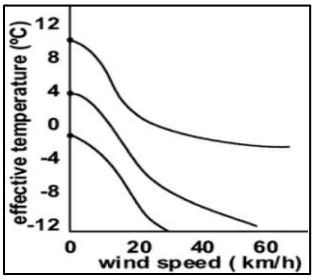


Heat stress in dairy cows[20] (normal body heat range 38.2-39° C).
(Note: THI – Temperature humidity index)

-THI > 72 = dry matter intake decline, reproductive performance decline
-THI > 75 = significant decline dry matter intake
-THI > 78 = significant decline in milk yield

Livestock - Sheep

- Fewer stock losses specifically lambs and shorn sheep; shelter reduces livestock losses of new-born lambs with trials in SE Australia suggesting effective shelter reduces these losses by 50%.[21]
- Sheltered sheep show a 31% increase in wool production and a 21% increase in live-weight (5 year trial).[22]
- In shorn sheep, shelter that reduces wind speed by 50% can reduce energy losses by 20%, [23]increase live-weight by 30%.
- Cold stress reduces live-weight gain by 6kg in sheep and depresses wool growth by 25%, while heat stress reduces wool growth by reducing feed intake.[24]
- Sheltered lambs exhibit a 50% reduction in losses (SW Victoria) and 28% increase in survival rates.[25]
- Winter lamb mortality (birth to 48 hrs) reduced by 10% in sheltered areas.[26]

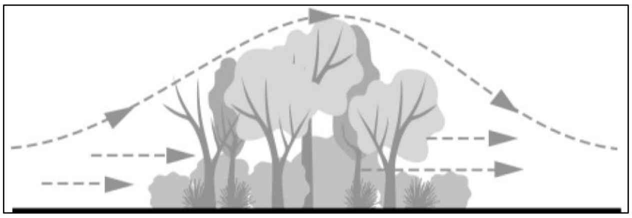


Impact of wind-chill and wetness on sheep[27]

- Sheltered off-shear wethers require only 1/3 the supplementary feed as unsheltered stock.[28]
- Heat-load reduction on ewes at joining and lambing results in 10-16% more lambs present at marking.[29]
- Heat stress is detrimental to ram fertility, ovulation rate and conception in ewes, and foetal development.[30]
- The use of hedgerows using native shrubs/grasses is an emerging trend for specifically providing shelter in lambing paddocks[31]

Location	Date	Loss	Windspeed (km/h)	Mean Temp. (C)	Rainfall (mm)
SW WA	Jan 82	100,000	7-11	16-24	100-250
SW Vic.	Dec. 82	50,000	32	10.8	21
SW Vic.	Mar. 83	100,000	32	16.0	42
SW Vic.	Dec. 87	50,000	20	10.2	48

Impact to off-shears sheep of climatic extremes (Source: Rowan Reid 2013).


Permeable shelterbelts planted with a variety of local native species provide habitat for native wildlife without creating turbulence.[32]

Livestock - Cattle

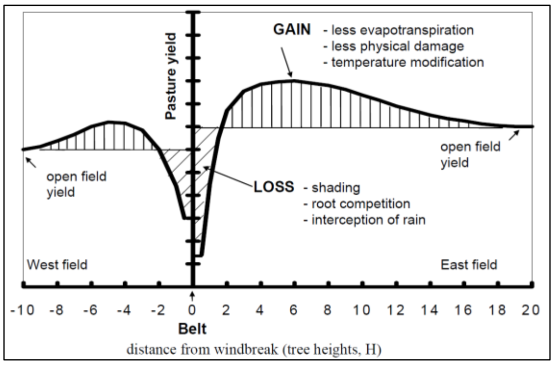
- In cattle – efficiency of production (live-weight gain or milk output per unit of feed) is improved by shelter; shading and protection from high-humidity alleviates stress, and improves milk production and weight gain.[33]
- Protected areas of farms have a 20% to 30% higher yield than unprotected areas, with annual benefits of $38-$66 per hectare.[34]
- Cold stress reduces live-weight gain in cattle by 31% over several weeks.[35]
- Heat stress reduces stock fertility, weight gain, and increased mortality of calves and sheep, and may cause abortion and under-sized calves.[36]
- Shorthorn cows show reductions in cud-chewing in unsheltered areas and increased rumination, reducing productivity.[37]

Effective Temperature (°C)	Extra Energy Required (%)	Extra Hay or Grain Required: extra hay (kg/cow/day)	extra grain[1] (kg/cow/day)
-1	0%	0	0
-12	20%	1.6–1.8	0.9–1.0
-23	40%	3.2–3.6	1.8–2.3

Effective temperature and additional feed required to meet the cow's energy requirements[38]

Pasture production

- Shelter improves plant growth and increased pasture and crop production, by reducing moisture loss from soils and transpiration in crops and pastures; shelter reduced the loss of water from soil in late spring by 10-12mm.[39]
- On one farm protected areas had a 20% increase in average annual growth pasture growth.[40]
- Major gains in decreased animal stress and greater pasture production in winter can support an extra 1-3 sheep/ha.[41]
- Shelter can increase agricultural production such as increased wool production, increased pasture growth (10-60%) therefore increase stocking rates.[42]
- There is growing evidence that soils around trees contain elevated amounts of organic material and a higher nutrient status, thereby promoting pasture growth.[43]



Shelter effects on plant growth and factors that influence losses in the competitive zone and gains in the shelter zone[44]

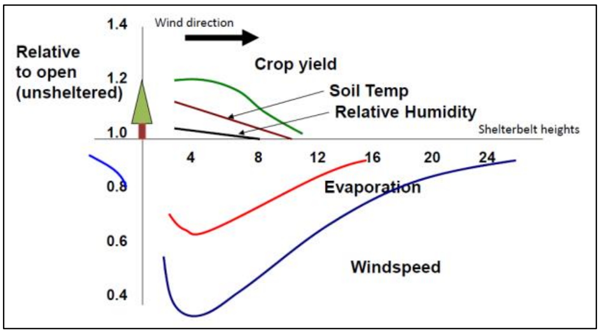
Cropping

- Shelterbelts increase crop yields, even allowing for cropping land lost from paddock and near-shelter competition.[45]

- Shelterbelts can potentially be affective for a distance 12-15 times the height of the tallest tree, with protection of some crops observed at up to 25 times the height.[46]

- Increases in crop yields in Australian studies include: 22% for oats, 47% for wheat[47] in areas of above 600mm annual rainfall.

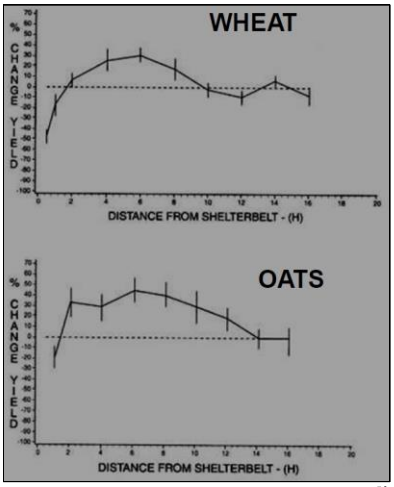
- Sand-blasting at seedling stage of cereal crops leads to reduced plant growth, due to moisture stress and physical damage.[48]



The microclimate behind shelterbelts.[49]

- An increased net cereal yield of 15% per annum was attributed to shelterbelts;[50] in Rutherglen, Victoria, an increase in wheat and crop yields in sheltered zones estimated between 22% and 47%.[51]

- Although trees may impact the crop for a distance equal to twice their height, they shelter a much larger area, extending downwind for at least 15 times their own height.[52]



Crop productivity and distance from shelterbelts.[53]

Biosecurity benefits – all industries

- Increase in pest insect predators by increasing habitat.
- Decrease in chemical spray drift by reducing wind speeds.
- Providing a natural barrier to fungal spores carried by wind and in dust.
- Reducing soil particle movement by reducing wind speeds during cultivation, harvesting etc.
- Facilitate healthier stock/crops and greater resilience to pests and diseases.
- Restrict unwanted stock movements, prevent stray movement.
- Disease control advantage (preventing nose-to-nose contact, which can spread diseases like *strangles* or *pestivirus*).
- Weed control advantage (trees and bushes can stop the spread of serrated tussock).
- Managerial advantages (in keeping various groups of animals separate and creating usable laneways for moving stock and vehicles)[54].

Landscape values

- Long-term development of 30% of total farm contributes to a more environmentally sustainable land use, reducing salinity and erosion, with the remaining land better managed and fertilised as productivity increases.

- Land protection benefits; control of groundwater recharge and salinity; deeply-rooted trees provide necessary recharge control.

- Shelterbelts reduce topsoil loss via reducing wind scour and rapid drying of soils; removal of clay and silt particles by wind contain much precious nutrients; reducing paddock wind speed by half, will reduce wind erosion to one-eighth (1/8).[55]

- Shelterbelts placed above and as buffers along watercourses, reduce stream sedimentation and eutrophication, improve water quality, and reduce soil and nutrient run-off from paddocks. Interception of nutrients before entering water storages improves water quality for stock.

- Stabilise soil surface; reduce waterlogging, also useful in non-arable areas such as those impacted by gully erosion.

- Improved landscape amenity and aesthetics.

- Potential fire protection; as localised wind speeds can be reduced.[56]

Land values

- Farms with some shelterbelts and remnant vegetation increase capital value by 15%.[57]
- *NSW Valuer General* valued the best vegetated farm at $140ha more than the district average value; in more fertile areas there was a 35% premium over average values.[58]
- Add aesthetic value to the landscape by screening undesirable sights and increasing property value[59]

Limitations of shelterbelts

- The need to understand the limitations of shelterbelts if designing for positive impacts.
- Cost of establishment, maintenance, land lost to production, and may harbour pest species.
- Fire risks are an issue if incorrectly sited – some consideration should be given to the use of some exotic and deciduous species to reduce flammability and provide increased light in winter[60].
- Potential "rain shadow" effect in the lee of shelter belts.
- Increased competition to adjoining pastures in areas of low rainfall and soil fertility – this is reduced by using less competitive species.
- Reductions in growth and pasture quality during winter when shaded by east-west shelter belts

BIODIVERSITY BENEFITS

The *CSIRO* names key ecosystem services provided by well-designed shelterbelts:[61] biological control, climate regulation, erosion control and sediment retention, soil formation, water regulation, nutrient cycling, pollination, raw materials, food production, catchment management and biodiversity conservation.

- Reduction of pesticide use; biological control of insect pests of pasture where a diverse array of trees and shrubs is maintained; biological control is performed by birds, parasitic wasps and other animals; flowering plants species such as Sweet Bursaria (*Bursaria spinosa*) and Silver Banksia (*Banksia marginata*) provide habitat for pasture-grub parasitising wasps (Scolid and Thynid).[62]
- Mixed-species in older shelterbelts with fallen logs provide habitat for robberflies, lacewings, ladybirds, hoverflies, mantids and bee-flies which all parasitise pasture grubs and wingless grasshoppers.[63]
- Sugar gliders utilise Acacia gums (Black wattle – *A.mearnsii*) and Eucalypt sap in spring/summer, and feed on insects including moths and pasture scarabs, and consume up to 18,000 scarab beetles per hectare per season, and 3.25kg of insects per year.[64]

Utilise wide and mixed species shelterbelts to increase biodiversity.
Source: Mallee Futures (2012).

- Birds and Bats are insectivorous and require mixed species plantings and the development of hollows; the diet of insectivorous bats such as the Southern Freetail Bat comprises 80% Rutherglen Bug.[65]
- 100 *Straw-necked Ibis* consume up to 25,000 insects per day (locust & grasshoppers); natural insect control on an adjoining 100,000ha of crop land was worth an estimated $675,000 per year (Barmah Forest area).[66]
- Lizards (Skinks & Geckos) feed heavily on insects and also depend on ground rock, fallen timber, and dead trees for refuge.
- Provide potential wildlife corridors for animal and genetic transfer across the landscape.
- Tree and shrub species diversity reflects wildlife diversity; size of shelterbelts and remnants, proximity to water, proximity to corridor linkages, age structure of vegetation, diversity of flora and therefore fauna.[67]
- Increased sediment filtration and therefore increases in water quality in local waterways.
- Lowering of water tables to reduce salt loads in local streams.
- Return of bird and other wildlife species.

SHELTERBELT DESIGN

The value of whole-farm planning

A well-considered whole-farm plan ensures objectives including landscape integrity, biodiversity, agriculture and forestry activities are provided for.

Farm planning allows evaluation of the efficiency and impact of current land-use, and agricultural operations.

Whole-farm planning is critical to locating shelterbelts for multiple benefits.
Source: DEPI Victoria (2013).

The location of a shelterbelt is influenced by considering all site features such as: property infrastructure, prevailing and seasonally problem winds, soil types, problem areas of erosion and salinity, remnant vegetation, use of non-arable areas, and other on-site specific features. It is therefore important to specifically design the shelterbelt to suit the required purposes/benefits.

Design general information

- Plant shelterbelts and windbreaks perpendicular to the direction wind protection is required; these are not always the prevailing winds.
- Cornered and right-angled windbreaks provide protection from a range of wind directions.
- Site shelterbelts and windbreaks where there is maximum benefit to stock, crops, pasture and wildlife.
- Assess the site prior as part of planning to understand site limitations (topography, drainage, erosion, shallow soil) and useful native plant associations to use.
- Investigate what other benefits can be gained by linking remnants, protecting riparian zones, preventing salinity.
- Crops are most affected by hot-drying winds from the north.
- Livestock are at risk from cold winds and rain from the south-south west, and summer heat and wind from the north.
- During summer, shelterbelts protect crops and pasture from severe evapotranspiration and wind and soil erosion; such situations benefit from a grid of shelterbelts using north-south and east-west orientations.[68]
- This configuration provides shade for stock at different times of day and protection from winds from all directions and prevents permanent shading of pasture and crops as they receive sun at different times of the day.
- Generally speaking the extent of protected area equals the length of the belt x height of shelterbelt x 10, while the minimum length should be 10 times the height (tallest layer); therefore if 25m height, the shelterbelt should be 250m long. Networks of belts or finishing belts in low areas is preferred as with having shelterbelts wrap-around at the ends[69]
- Effective locations are high in the landscape (ridge-line) produces the greatest area of protection.[70]
- Planting on contour lines should be avoided as localised frosts can result.[71]

How wide?

- Shelterbelts incorporating trees and shrubs in 3-6 rows (12-24m wide) are effective for most situations.
- Wider and strategically-placed shelterbelts promote increased biodiversity habitat and reduced ‘edge-effects, increasing the ‘core’ area, and reducing species predation.[72]
- Many references suggest shelterbelts of 2-4 rows (or direct seed equivalent) with 2m between the outer rows and fence.
- Single-row belts should only be used on land of highest value, and where space is limiting, and must include species with uniform ‘ground-to-top’ foliage cover.
- 1-2 row shelterbelts are cost-effective options but require a uniform and high survival rate.
- Smaller trees and shrubs are placed on the outside of central tall trees to prevent shading out.
- An average shelterbelt (3 rows/12m wide) can promote 12 species of woodland bird; if widened to 25m (7 rows) the number rises to 17.[73]
- If shelterbelts are wide enough they can incorporate limited stock grazing and provide protection in severe weather situations.
- To minimise cost, utilise existing fence-lines for shelterbelt establishment.

Spacing and Density

- Density of shelterbelt depends on purpose; if providing additional habitat for native fauna use multiple rows including dense shrubs, which also reduces wind funnelling under the shelterbelt.
- A denser windbreak offers higher protection over short distances, while a less-dense windbreak provides less protection but over a greater distance.[74]
- As density is reduced, turbulence is also reduced and downwind protection increases; a medium density of 40-60% is recommended.[75]
- Density is modified by the structure of the shelterbelt and influenced by: height, density, number of rows, width, species used, foliage texture, spacing, length and continuity of shelterbelt.
- To reduce the potential of wind-tunnelling under Eucalypt canopies, multiple rows should be used and the role of non-local species and exotic species could be considered.

Row design

- Row-planting provides easier access for maintenance but not necessarily most effective shelterbelt.
- Close-plantings produce a faster result, utilising the fastest growing, local-provenance species in the centre row.
- Using local fast-growing trees as the central species supports slower growing species.[76]
- For row-plantings in general, larger trees are planted 3-4m apart, with larger shrubs 2.5-4m apart; lower shrubs are placed 1.5-2.5m apart.
- The number of plants to use per hectare varies by site and localised climatic and soil variables, with a guide as 1000 plants/ha (1km long x 10m wide @ 3m plant spacing).

Direct seeding options

- Direct seeding utilises locally-collected seed of suitable tree, shrub, grass, and ground cover species in various proportions (to mimic mixed native vegetation).
- If established within and prior to average and above average rainfall, direct seeding produces a more diverse, 'natural' and self-maintaining shelterbelt over time.
- Initial weed and pest animal control is critical in the first 2-5 years for successful establishment.
- Seed requirements for direct seeding based on 0.5kg / ha.
- Seed ratios should be based on 1/3 trees and 2/3 shrubs.
- DPI and local consultants can provide detailed information on direct seeding projects and species suitable.

Species selection

- Provenance - source seed for planting and direct seeding if possible from the closest remnants (within 20km) of the same soil type, and drainage position in the landscape (species most adapted to site climatic and physical characteristics).
- Local provenance species have a higher establishment and survival rate as reported in numerous studies.[77]
- Species selection is based on the objectives of the shelterbelt and influenced by height, growth rate, and density characteristics.
- Fodder, honey and timber species can be incorporated to provide periodic or long-term resources.

Establishment and Maintenance


Source: Landcare (2010)

Establishment of seedling or direct-seeded shelterbelts is detailed in many other accessible references on the internet but include: weed control (6-12 months prior to planting), fencing, deep-ripping and planting/direct- seeding; steps that should be well planned prior to commencement. The quality of site preparation directly relates to shelterbelt success and therefore the potential biodiversity and productivity benefits.

Management after planting includes: control of browsing animals (rabbits, hares, wallabies, kangaroos, livestock, snails), and grass and broad-leaved weeds. Selective sprays used in late spring after planting may continue for the first 5 years of establishment. Gaps from death of plants must be replenished with replacement seedlings.


Source: DPI VIC (2009)

CONCLUSION

Well-designed, established and maintained shelterbelts, support ecologically sustainable agriculture, which benefit from increased productivity, sustainability, biodiversity, and property and landscape values.

Sustainable whole-farm planning incorporating shelterbelts and biodiversity values can also potentially increase the 'environmental credentials' of a farm, supporting best-practice and increased market share.

Shelterbelts are not a short term panacea but a mid to long-term proposition that requires a flexible approach and site-specific solutions. More than this they contribute to equity for future generations, position farmers for a 'low-carbon' future, and adaptation to a changing climate.


Source: DPI VIC (2011)

USEFUL RESOURCES, LINKS

See DEPI (Victoria) Landcare Notes:

http://www.depi.vic.gov.au/environment-and-wildlife/community-programs/landcare/victorian-landcare-gateway

LC0137: Shelterbelts for Livestock Protection
LC0138: Shelterbelt Management
LC0139: Shelterbelts and Wildlife
LC0104: Tree planting and aftercare
LC0133: The benefits of using indigenous plants

Cost/benefit calculation

http://www.evergraze.com.au/library-content/shelter-investment-tool/http://www.evergraze.com.au/
http://www.teara.govt.nz/en/shelter-on-farms/page-5

Livestock – Dairy

http://www.thedairysite.com/articles/837/cold-stress-in-cows
http://www.dairyingfortomorrow.com/index.php?id=96
http://www.dairyingfortomorrow.com/uploads/documents/file/Case%20studies/trees%20benefit%20sale%20dairy%20farm.pdf
http://www.dairyingfortomorrow.com/index.php?id=52
http://www.nzffa.org.nz/farm-forestry-model/resource-centre/tree-grower-articles/tree-grower-november-2008/natives-and-those-problematical-pivots/
http://www.coolcows.com.au/Infrastructure/Paddocks%20and%20laneways/trees-for-shade.htm
http://milkmaidmarian.com/2011/12/28/our-green-investment-already-begins-to-grow/
http://bioprotection.org.nz/news/story/shelterbelt-research-gets-funding-dairynz

Shelterbelt design

http://www.gwlap.org.au/docs/Windbreaks&Shelterbelts_single%20page%20style.pdf
http://www.southernwoods.co.nz/documents/Info2-DairyFarmPlanting2.pdf
http://www.farmforestline.com.au/pages/2.2.1_shade.html
http://live.greeningaustralia.org.au/nativevegetation/pages/pdf/Authors%20C/9_Cleugh.pdf
http://www.nzjf.org/free_issues/NZJF27_2_1982/D0B5A0A6-04FE-44BD-9A86-D6DE1F802941.pdf
http://www.dairysa.com.au/LinkClick.aspx?fileticket=ZoHXJj8RA24%3D&tabid=76&mid=421
http://www.heytesburylandcare.org.au/attachments/DAPFS5_Shelterbelts.pdf
http://www.dpi.vic.gov.au/forestry/innovation-research/technical-reports/private-forestry-research-database
http://www.strathewenlandcare.org.au/page/landholder_grants_and_projects.html#Shelterbelts
http://www.landcaretas.org.au/wp-content/uploads/2012/09/NSW_PWS_Factsheet7NativeShelterbelts.pdf
http://www.palservices.com.au/pages/belts_shelterbelts.html
http://www.tagsforpots.com.au/index_files/Revegetation%20Planner%20guide.pdf
http://www.nativegrasses.com.au/field_days/Rowan_Reid.pdf
http://www.teara.govt.nz/en/diagram/15600/shelter-belts-effect-on-wind
http://www.dpi.vic.gov.au/agriculture/farming-management/business-management/property-management-systems/core-components-for-farm-planning-services
http://live.greeningaustralia.org.au/nativevegetation/pages/pdf/Authors%20B/8b_Bird_SWVT.pdf

Livestock - Sheep

EverGraze Phone Seminar – Turning reproductive performance into reality.
EverGraze Exchange – Improving the survival of lambs
EverGraze Action – Perennial grass hedges for lamb survival
EverGraze Case Study – Currie's: Sheltering their lamb income
EverGraze Supporting Site – Curries, Casterton
Broster JC, Rathbone DP, Robertson SM, King BJ, Friend MA (2012a) Ewe movement and ewe-lamb contact levels in shelter are greater at higher stocking rates. Animal Production Science 52, 502-506.
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Allocasuarina are useful species to provide porosity and filter weed seed.
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This report was created in response to landholder confusion about the benefits of planting native shelter belts on their properties in South West Victoria. To address a gap in the provision of a compilation of recent research about the topic – The Basalt to Bay Landcare Network asked Peter Austin to compile that evidence. This draft was then circulated within the agriculture industry, researchers, universities, and government providers in Victoria and interstate – to provide feedback and additional input so that the final report would reflect an across the board agreement that there are economic benefits to landholders from the planting of native shelter belts. This activity is at the core of what our not-for-profit group does – facilitating across tenure the increase of native vegetation to support businesses, communities, and biodiversity. From this report we plan to increase funding in our Network Region for supporting landholders to action these benefits on a local and regional scale. We undertake to update the report biannually.

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Australian Wool Innovation- Gus Manatsa
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ORGANISATION DETAILS

The Basalt to Bay Landcare Network Incorporated is a not-for-profit Landcare Group based in Koroit, Victoria. Our Network Region covers the Council areas of Moyne and Warrnambool. This represents almost 4% of the land area of Victoria.
We have been a group since 2007 and have a part time Landcare Facilitator position funded by the Victorian State Government Local Landcare Facilitator Initiative. For information about our current and past projects please visit www.basalttobay.org.au