

# • CLIMATE • ACTION • FARMING •

## - Carbon Farming Information -



## - PERENNIALS & CARBON -

### HOW TO CREATE A LIVING CARBON SINK ON YOUR FARM

**W**ith an increasingly unpredictable and variable climate, we need to consider simple management options to mitigate its impact on production.

Perennials in your system can buffer your farm from the effects of climate change and can provide flexibility in your management options and potentially maximise profits.

Carbon farming is the process of managing soil, vegetation, water and animals to increase carbon storage and reduce greenhouse gas (GHG) emissions.

GHGs are released through normal farming practices

such as farm machinery use, the production and use of fertiliser as well as being created through enteric fermentation from animals.

There is a wealth of information on the benefits of soil carbon on soil health and production. Soil carbon increases cation exchange, improves water holding capacity, holds the majority of nutrients and trace elements (important for plant growth) and contributes to the structural integrity of clay soils by forming aggregations.

Soil carbon also prevents nutrient leaching, buffers large changes in soil pH and makes minerals more readily available to plants.

## PERENNIAL PLANTS & CARBON STORAGE ●●●

A perennial is a plant which lives for more than two years. While the term is most widely used when referring to herbaceous or grassy plant species, perennial also applies to woody plants such as trees and shrubs.

Carbon is stored within plants, particularly woody species which hold larger amounts. Perennials also increase soil organic carbon, which was found to decrease significantly after introduced farming removed native vegetation (*Sanderman et al, 2009*).

A search on the internet will reveal a wealth of useful information, or refer to the Department of Food and Agriculture WA's carbon farming fact sheet; *Permanent Environmental Plantings To Earn Carbon Credits* available from [www.climateactionfarming.com.au](http://www.climateactionfarming.com.au) or see the South Coast NRM *Stories From the Land* fact sheet, *Soil Organic Carbon – A Reward For Good Land Stewardship*.



*Old man saltbush is a native perennial offering farmers great potential as a fodder shrub.*

## THE BENEFITS OF PERENNIALS ●●●

A myriad of benefits can be reaped by establishing a woody or a herbaceous perennial system to complement your farming enterprise.

Perennials fit easily into any farming system, are simple to establish and maintain and can have the following benefits:

- Build soil organic carbon (SOC).
- Store carbon.
- Provide potential new income source & enterprise diversity.
- Encourage healthier soil biology.
- Provide an excellent contingency food source or ground protection.
- Utilise excess water and nutrients.
- Increase soil water carrying capacity.
- Improve water infiltration and drainage.
- Reduce the feed gap in autumn.
- Provide green cover to prevent erosion.
- Provide protection by reducing exposure for stock.
- Provide habitat for native animals.

## MATCHING PERENNIALS WITH CLIMATE & SOILS ●●●

For the best chance of successful establishment, the type of perennial species should be matched with the local growing environment.

This includes rainfall, temperature, length of growing seasons, soil type and potential pests and diseases.

Again, much of this information can be obtained by searching the internet or consulting with neighbours, technical experts or an agronomist.

Establishment can be enhanced by applying appropriate fertilisers, liming, pest control and appropriate grazing management. The best

species/pasture will depend on the ease of incorporating it into your current system and what you want to achieve with your farming enterprise.

Perennials can be permanent (woody perennials) or temporary (herbaceous species used between crops) and be used to address common farming issues (waterlogging, salinity and erosion) or as a management tool with paddock rotations.

Thinking long-term will assist you to decide what's best for you, as will consulting with technical experts, an agronomist or neighbour who has established perennials into their system.

*The websites below offer a wealth of useful information to help you decide what species to use and how to establish and maintain a perennial system.*

**HERBACEOUS PERENNIALS ●**  
[www.agric.wa.gov.au/crops/pastures](http://www.agric.wa.gov.au/crops/pastures)  
[www.evergraze.com.au](http://www.evergraze.com.au)  
[www.futurefarmonline.com.au/index.htm](http://www.futurefarmonline.com.au/index.htm)  
[www.evergreen.asn.au](http://www.evergreen.asn.au)

**WOODY PERENNIALS ●**  
[www.afg.asn.au](http://www.afg.asn.au)  
[www.sandalwood.org.au](http://www.sandalwood.org.au)  
[www.fpc.wa.gov.au](http://www.fpc.wa.gov.au)  
[www.oilmallee.org.au](http://www.oilmallee.org.au)

## ESTABLISHING HERBACEOUS PERENNIAL PASTURES ●●●

Along with the recognised benefits of establishing perennial pastures into your farming enterprise, species such as kikuyu are also known to sequester carbon.

Minimal disturbance of the pasture's soil means SOC levels are maintained as the decomposition of its matter is reduced. Annual pasture species can still contribute to SOC but are marginally less than perennial pasture species. Establishing perennial pasture can be an expensive process so it's essential to establish them successfully the first time round by following a few simple effective steps.

Herbaceous perennial pastures are considered standard practice on the South Coast and as such there is a wealth of local expertise and many online and printed resources available to help you through this process. Species choice is very much dependant on soil type, soil condition, climate and desired land use.

- Follow these steps to successfully establish and maintain your herbaceous perennial pasture.

### PLAN AHEAD ●●●

Allow at least 12 months before your preferred sowing date and consider future land use - what livestock type or crop rotations will be planned?

Test your soils and ensure they're in a suitable condition to support the selected species. Communicate with other farmers, catchment officer or an agricultural advisor about what they may have tried, what worked and what didn't. Also, consider temperature and rainfall.

### WEED & PEST CONTROL, BEFORE, DURING & AFTER ESTABLISHMENT ●●●

Weed and pest control should start in the previous spring for an autumn/winter sowing - this will help prevent an annual weed seed set from occurring. Use a method suited to your weed burden, farm practices and land capability. Besides the obvious sprays, you can use other weed treatments such as spray graze or fallow, spring fodder crops and pasture topping. After establishment, check your pasture every 14 days for pests or emerging weeds and use appropriate control measures if required.

### ENSURE SOIL MOISTURE IS ADEQUATE ●●●

A moist and firm bed with close seed contact gives the best chance of successful germination. Sow subtropical species in late spring to early autumn and temperate species in autumn to spring. Sowing in dry conditions decreases the chance of good germination. Use selective herbicides or insecticides immediately after detection.

### ACCURATE SEED PLACEMENT ●●●

Ensure seed isn't placed too deep or too exposed and be aware some species have specific sowing needs. Consider sowing rates and talk to other farmers or agronomic advisors to see what they did and assess their results. Ensure legume species are inoculated with the appropriate strain of rhizobia. Consider incorporating insecticides or fungicides along with your seed if appropriate.

### INITIAL & SUBSEQUENT GRAZING ●●●

Always allow your new pasture to set seed in the first year. Don't make hay from grassy species in the first year and allow the roots to develop before first graze. Some species will have enhanced tillering and root development if lightly grazed once the grasses reach 15 cm (get advice before you do this). Never graze newly established pastures in dry conditions and resist the urge to overgraze new pastures.

## ESTABLISHING WOODY PERENNIALS ●●●



Woody perennials remove CO<sub>2</sub> from the atmosphere during photosynthesis and store carbon within their leaves, stems, roots and bark. Approximately half of an average tree consists of carbon, the amount stored is dependent on climate, species, age and density. Unless you're familiar with establishing woody perennials, seek advice before you start from an appropriate person such as a forester or catchment officer.

Establishing woody species can be expensive and time consuming, so the more you prepare and learn, the easier the process. Before commencing, ask yourself a number of questions about what you want from the woody species, including:

- Where should I plant?
- What proportion of my land should I plant?
- Would I like to get an income from this?
- What are my long term plans for the farm?

If you're planning on reverting previously cleared land back to native vegetation, contact your local landcare or NRM group as they may be able to provide subsidies to decrease cost or access to equipment.

- Follow these steps to successfully establish and maintain a woody perennial pasture.

**PLAN AHEAD** ●●●

Allow at least 12 months before your chosen planting or sowing date and check your local government's planning approval requirements policy for agroforestry and/or plantation establishment. Decide to use seedlings, seed or seedlings and seed and order them early (about October the year before). Ask a professional for advice on appropriate species and consider future land use and desired outcome.

Consider using marginal lands whilst ensuring conditions remain adequate for the species you have selected. Design rows for commercial crops and more random S patterns or circular patterns for native species. Appraise your soil type, existing vegetation, stem density, time, cost and method of planting (seedling versus seed versus seedling and seed).

Species selection depends on your long term goals. Options to consider include future harvesting for additional income or reverting the area to native bushland and habitat. What native animals or pest animals are on your property – and protect seedlings from grazing for at least the first year.

**WEED & PEST MANAGEMENT BEFORE, DURING & AFTER ESTABLISHMENT** ●●●

Weed and pest control should start in the previous spring for an autumn/winter planting/sowing and will help prevent annual weed seed set from occurring. Use a method suited to your weed burden, farm practices and land capability. Besides the obvious sprays, use other weed treatments such as grazing or scalping. Once established, check plants regularly for pests, predation or emerging weeds

**ESTABLISHMENT** ●●●

Try to plant on cool overcast days to minimise plant exposure and establish trees in winter after adequate rainfall. Large areas can be expensive and time consuming to water-in so avoid if possible. Consult a professional to establish a commercial crops' stem density (depends on rainfall/species/soil type/end use). If reverting to native vegetation, plant 900 - 1,200 seedling stems per ha or 12,000 - 15,000 per ha if direct seeding (5 star planting). If conditions are wet try mounding to provide a suitable growing environment.

If soil is compact and dry use deep ripping to provide a suitable growing environment. For small areas or where terrain makes it difficult to operate machinery, plant by hand; an average person can plant between 500 - 1,000 seedlings a day. Tree planting machines can plant up to 5,000 seedlings a day, so use for planting in large areas.. Direct seeding is often cheaper, quicker and easier.

**MAINTENANCE** ●●●

Consider fencing trees to limit stock access; this is critical when first establishing your plants. Ensure you manage feral animals, particularly rabbits. Plan for infill and replace plants which don't survive. Monitor and control weeds and pests, especially second year weeds which can make the difference between success and failure, especially on dry land or where the weed burden was high before planting. Install a fire break and provide fertiliser if appropriate.

**REFERENCES** ●●●

Sanderman J, Farquharson R and Baldock J. *Soil Carbon Sequestration Potential: A review for Australian agriculture. Report prepared for the Dept of Climate Change and Energy Efficiency, Sustainable Agriculture Flagship, CSIRO, 2009.*

**ABOUT THE EMISSIONS REDUCTION FUND (ERF)** ●●●

The Emission Reduction Fund (ERF) is an Australian Government program allowing individuals or entities to access Australian Carbon Credit Units (ACCUs) by conducting approved projects that either sequester carbon or reduce the emission of greenhouse gases. For a detailed explanation of the ERF, visit:

[www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/Pages/default.aspx](http://www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/Pages/default.aspx). Fact sheets produced by the WA Government's Royalties for Regions program and DAFWA analyse and capture current and emerging carbon farming information related policy, legislation and science to identify carbon farming opportunities and its associated risks.

**SOUTH COAST NRM CONTACTS** ●●●

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