



- Fertilisers and soil ameliorants such as animal manures, gypsum and lime should only be applied and incorporated into beds when they are established or re-formed.
- Consider the application of pre-drilled, deep banded urea to reduce the need for topdressed urea fertiliser. Contact your regional agronomist for further information.
- Fertilisers such as superphosphate, DAP and MAP should be sown with the seed into the bed. Ideally no fertiliser should be sown with the seed in the filter furrows between the beds.
- **Top-dressed fertiliser should only be directed to the top of the beds.** SFS has developed an air fertiliser spreader (see pictures on pages 1 & 3) for regular top-dressing raised bed crops with low rates of nitrogen fertiliser.
- **Apply top-dressed nitrogen fertiliser when the soil is moist** and use four to seven day weather forecasts to avoid application immediately before a major rainfall event.
- Take care to avoid spillage of fertiliser and chemicals close to drainage lines and dams.

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### Where to go for more information

#### Department of Primary Industries

W: [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au)

E: [customer.service@dpi.vic.gov.au](mailto:customer.service@dpi.vic.gov.au)

T: 136 186

DPI have major offices throughout Victoria. They also have a number of smaller offices in local regional areas.

#### Southern Farming Systems

W: [www.sfs.org.au](http://www.sfs.org.au)

E: [sfso@pipeline.com.au](mailto:sfso@pipeline.com.au)

T: (03) 5229 0566

#### Catchment Management Authorities:

##### Corangamite CMA

W: [www.ccma.vic.gov.au](http://www.ccma.vic.gov.au)

E: [info@ccma.vic.gov.au](mailto:info@ccma.vic.gov.au)

T: (03) 5232 9100

##### Glenelg Hopkins CMA

W: [www.glenelg-hopkins.vic.gov.au](http://www.glenelg-hopkins.vic.gov.au)

E: [ghcma@ghcma.vic.gov.au](mailto:ghcma@ghcma.vic.gov.au)

T: (03) 5571 2526

For your local Country Fire Authority Area Headquarters contact:

#### CFA State Headquarters

W: [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au)

E: [feedback@cfa.vic.gov.au](mailto:feedback@cfa.vic.gov.au)

T: (03) 9262 8444

Original version (1999) prepared by: G.Anderson, M. McKenzie & B.Wightman (NRE, Geelong).

Revised edition (2005) prepared by: T.Johnston & M.McKenzie (DPI, Geelong).

# Hi-Grain

## UPDATE

Research to profit  
higher-rainfall  
temperate zone  
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### BEST PRACTICE FOR RAISED BED - CONTROLLED TRAFFIC CROPPING

Raised bed technology, developed by Southern Farming Systems (SFS), a partnership between farmers, Department of Primary Industries (DPI) and agribusiness, is an established method of overcoming waterlogging and improving soil structure. The system uses controlled traffic, with vehicle wheels only travelling along the furrows between the beds. Raised beds have allowed large scale, productive cropping systems to be adopted in the high rainfall zones of southern Australia.

In Southwest Victoria, the SFS partners including DPI and the Corangamite and Glenelg Hopkins Catchment Management Authorities are all working with rural communities to help ensure the use of raised bed controlled traffic cropping is well planned.

This brochure outlines the key environmental issues that must be considered with raised bed controlled traffic cropping.

*'Everyone benefits from best practice whereas poor management can potentially give the industry a bad name'.*



SFS air fertiliser spreader.

#### Research News

March 2005



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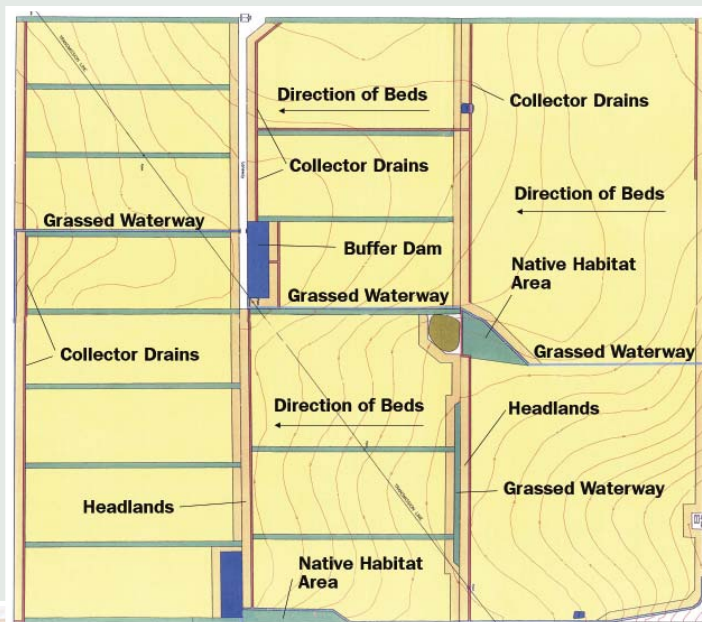
# Whole farm planning

Careful planning is essential when starting a raised bed controlled traffic cropping system. The first critical step is to develop a whole farm plan. This gives a comprehensive overview of the development and ensures all aspects of the project are considered and planned.

An accurate 10cm contour survey is essential for any raised bed development over 10ha.

The whole farm plan needs to include:

- Soils, slopes and appropriate alignment of the raised beds.
- Surface water movement, headlands, collector drains, grassed waterways, buffer dams.



Consultation with neighbours and experts is essential before installing raised beds.

- Ease of machinery access and movement.
- The location and arrangement of native shelterbelts or farm forestry plantings.
- Protection and management of native vegetation and wetlands.
- Access tracks for fire management vehicles.

Contact DPI for further information on whole farm planning.

# Best practice design elements

It is important to adopt best practice when establishing and running raised bed cropping. Everyone benefits from best practice whereas poor management can potentially give the industry a bad name.

The following information is considered to be the best practice for farmers developing raised bed enterprises. The guidelines should be tailored to suit your local conditions and experience. If in doubt, seek expert advice from the relevant authorities and departments in your region.

**Bed arrangement:** Raised beds need to be aligned according to the soil type and slope to avoid erosion of topsoil and subsoil. **Raised beds are not recommended for slopes greater than 1.5%.** Soils which are unstable, dispersive or vulnerable to erosion should only be developed for raised beds with extreme caution.

As a guide the following maximum slopes for raised beds are recommended:

<b>Heavy textured topsoils</b> (eg. Heavy Clays):	<b>1.5%</b>
<b>Medium textured topsoils</b> (eg. Clay Loams):	<b>1.0%</b>
<b>Light textured topsoils</b> (eg. Silty or Sandy Clay Loams):	<b>0.5%</b>

**Length of runs:** The length of the beds influences the amount of water flowing down the furrows. The furrows act as drains and tracks between beds and can only handle small water flows. Increasing the length of the beds increases the volume of water flowing along the furrows and lifts the risk of erosion. **The bed length on an average 1% slope should never exceed 400 metres.** The bed length should be reduced if the slope is greater than 1%.



**Sow crop in the furrows:** Furrows should be sown with crop to prevent soil and nutrient movement and to stop weed growth (which occurs in unsown furrows). Ideally, no fertiliser should be sown with the seed in the furrows to minimise nutrient loss. Crop or pasture should be sown in the collector drains and headlands at the end of the beds to filter water running out of the furrows.



**Permanent grassed waterways:** Permanent grassed waterways are another key element in raised bed cropping to minimise erosion. Grassed waterways are essential for carrying water from upslope areas through or around a bedded paddock. Water from each paddock should flow into a permanent grassed waterway system that can carry water flows at safe grades. **Grassed waterways should have a slope of 1.5% or less.** Expert advice is available to help design waterway systems.

**Drill row grooves on top of beds:** When sowing, the use of press wheels for improved control of sowing depth ensures the development of grooves in the drill rows. These grooves are useful in harvesting moisture and reducing runoff in dry periods, particularly in hardsetting surface and hydrophobic soils.



Moisture collected in drillrows.

**Headland and collector drain management:** Carefully designed headlands and collector drains are key elements in raised bed cropping. Well designed systems reduce potential erosion and increase traffic access in wet periods. Headlands need to incorporate collector drains at the end of the beds to capture runoff from the furrows and direct water to the permanent grassed waterways. Main collector drains need to be flat, wide (about 2m), on a gentle slope (ideally <1 %) and fully



Grassed waterways safely carry water between paddocks.

vegetated. Current research is investigating the use of sub-surface drainage under the collector drains to further alleviate wet soil problems - see Hi-Grain Update 'Headland management'.

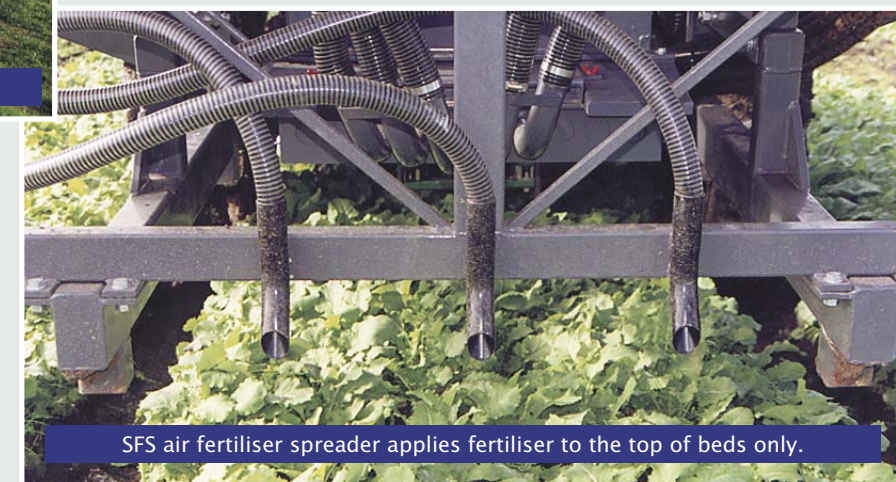
**Access tracks for fire management:** Raised beds can significantly hamper access to fire fronts and to water points. Access by fire trucks needs to be taken into consideration when developing your whole farm plan and fire plan. Contact your local Country Fire Authority (CFA) Area headquarters for further information.

**Water harvesting and storage:** There is potential to harvest water running off bedded paddocks and store it on-farm. Current research is investigating the potential water yield from bedded paddocks. The harvested water can be used to grow intensive horticultural crops - see Hi-Grain Update 'Do you need to obtain approval for your raised bed works?'.

Well-designed dams can help in flood mitigation (buffer dams), in managing nutrient runoff and in creating wildlife habitat. It is important dams do not stop flows further down the catchment.

**Nutrient management:** Nutrient losses in runoff water can be minimised and production maximised by the following recommendations:

- Undertake soil testing at the start of the season and plant tissue testing during the season to ensure that crop nutrient requirements are not exceeded.
- Base fertiliser requirements on crop yield goals and set goals that are achievable in most years.



SFS air fertiliser spreader applies fertiliser to the top of beds only.