Hi-Grain UPDATE

Research to profit higher-rainfall temperate zone graingrowers

Research News

October 2003

RAISED BED HEADLAND MANAGEMENT

Background:

Currently there are an estimated 30,000 hectares of raised beds installed for drainage purposes in Victoria. South Western Victoria, with about 25,000 hectares has the highest concentration with the towns of Winchelsea, Lismore and Hamilton being the main centres. In North Eastern Victoria raised bed areas are centred on Nagambie and Euroa. Raised bed paddocks are a network of open drains, ranging through furrows between the beds, collector drains and vegetated waterways. Variable paddock topography experienced throughout the dryland areas can create problems with surface water remaining in depressions after a rainfall event. These areas can create problems in pugging and machinery trafficking a paddock.

Raised beds usually run down the steepest slope in a paddock. The small catchment per bed results in relatively small volumes of water in each furrow and hence a low chance of soil erosion. Also, the steeper slope helps keep excess water moving down the furrows, particularly in paddocks that have undulations.

The collector drains that usually run at right angles to the beds are placed on the flatter slopes. These drains can carry large volumes of water, and to reduce the chance of soil erosion they are usually wide, flat and vegetated.

GRDC Grains Research & Development Corporation

SOUTHERN FARMING SYSTEMS

State Government Victoria Department of Primary Industries

To further help reduce the volume of water, herringbone open relief drains can be placed across the headland leading to permanent vegetated waterways on the fence-line.

These wide, flat collector drains and headlands can become very wet and trafficking these areas can become very difficult in paddocks with little slope. To help solve these problems, Southern Farming Systems with funding from the GRDC have a headland management project established on a concept farm at Winchelsea.

A wet, flat headland that was not well enough shaped to remove all surface water was chosen to develop a better management system. The problem faced was to remove the remaining puddles after the surface flow from the beds and collector drains. It is these puddles that cause vehicles to "bog up" the collect drains and headlands.

Poorly drained collector drain

Flat, poorly drained headland

Headland Management

In the first year of the project (2002) the headland in one of the concept farm paddocks was redesigned. A road grader was engaged to widen (25m) and heighten (650mm) the existing rather flat and wet headland. The next task was to try some techniques on the collector drains to help remove puddles and other surface water. At the same time culverts were placed under the headland at the lowest point in the paddock to help make the paddock totally trafficable.

With the road grader, a slope of 1% (same slope as paddock) was placed on the apron between the end of the beds and the collector drain. To help water easily find the lowest point the collector drain was 'V' shaped and not flat, as normally recommended. Flat drains are normally used to reduce the likelihood of soil erosion. However, flat drains normally accumulate puddles.

Culverts at lowest point in paddock

Three treatments were chosen to improve the collector drains.

1. Collector drains filled with 40mm-200mm crushed rock.
2. Underground slotted plastic pipe (100mm) placed 400mm deep and back filled with 40mm-50mm clean gravel.
3. Control ('V' shaped).

These three treatments were replicated twice down the headland. Water from each treatment was removed by an underground drain across the headland.

One of the finished large crushed rock treatments.

A backhoe digs a trench about 400mm deep ready to install the underground pipe for our second treatment. Although we used a 300mm wide bucket, probably only a 100mm wide trench would be required.

The 100mm slotted agricultural drainage pipe laid in the trench.

To relieve the drainage water from each treatment, a drainage pipe was taken across the headland to the fence line.

One of the finished underground drainage sections backfilled with 40mm clean gravel.

Using a dumpy level we determined the falls we had to play with and engaged a road grader to widen (25m) and heighten (650mm) the existing wide raised bed headland. With the road grader we placed a slope (1%) on the apron between the ends of the beds and the main drain. For our purposes, the main drain is "V" shaped and not flat as normally recommended.

The road grader deepening the "V" drain by about 300mm ready to backfill with large crushed rock.

The 2002 season in Winchelsea gave average rainfall (570mm) and the treatments were well tested throughout the season. The following photos summarise the results.

At sowing time conditions were moist and the collector drains on the control treatment instantly showed the effects of tractor and airseeder weight.

The underground treatment removed water very well and remained dry and withstood the tractor weight very easily.

The underground treatment in late winter. Note the slightly wet areas between the gravel and the beds in the foreground. This apron had a slope of approximately 1%.

The large crushed rock treatment took the weight of the machine but the rocks squashed into the mud. The tractor driver said he needed to slow down to cross the collector drains. He was also worried about potential damage to the tractor tyres.

During the winter it became very apparent that the underground drainage treatment was far superior. This photo shows the control (foreground) compared to the underground treatment (background).

New Project 2003

In (2003) we installed a full 350-metre headland with the underground system. The headland has been reshaped and second hand 100mm slotted plastic pipe installed.

The backhoe digging the 450mm deep and 300mm wide trench. Note the spoil was removed while the backhoe was working and a gravel base added to the trench.

Pipe was fed off a reel directly into the trench. Note we have not used a fitter sock over the pipe. We will have to wait and see if that was a good idea. A small length of pipe with sock was installed to compare the difference over time.

Note how the collector drain has been returned to 'flat' using the gravel. Of course it is too early to offer sound advice about the techniques employed even if these treatments work. The cost of approximately $10/metre needed to reconstruct the headland and place the underground pipes in place may be will be too expensive for some farmers. For a 25 hectare square paddock, the headland is 500m long. The total cost is therefore around $5,000 to establish this system.

For further details contact the Project Supervisor at Southern Farming Systems:

Colin Hacking on (03) 5229 0566

or Regional Agronomist, **Bruce Wightman,** Dept. of Primary Industries, Victoria on (03) 5226 4715, bruce.wightman@dpi.vic.gov.au

This season we became mechanised. Here the farmer's grain truck was used to add the gravel base.

Gravel 40-50mm was placed over the pipe again using the grain truck. However this time a much larger chute had to be constructed for the truck to handle the larger diameter and angular gravel. Our photo shows Southern Farming Systems Soil Scientist, Renick Peries admiring the finished job.

This is the same collector drain shown on page 2, again after approximately 50mm of rain.