

# Resilient Cropping

## Irrigation



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Ministry for Primary Industries  
Manatū Ahu Matua



# About Resilient Cropping

Resilience is the ability to cope with adverse events.

When we are generally happy and healthy we can handle most things nature (or life) throws at us. If we are run down, tired and sick, the slightest thing seems to knock us for six.

Farms are very much the same. They handle adverse events better if the soil is healthy, water available, and infrastructure (and capital) in place. And the reverse is true too. Beaten up soils, lack of water, inadequate or poorly maintained infrastructure and high gearing leaves a farm (and its people) at higher risk when bad things happen.

The “Resilient Cropping” initiative aims to build resilience into crop farming. It is a joint venture between LandWISE, the Foundation for Arable Research, Horticulture NZ and Tahuri Whenua the Maori Vegetable Growers Collective. The work is funded by the Ministry for Primary Industries.

## Events

The main focus of “Resilient Cropping” is preparing for adversity such as extreme weather events, fuel cost spikes and restricted access to irrigation water.

In-field workshops across the country allow local growers to share experience and ideas and propose local solutions for local conditions. Among the topics are soil quality, irrigation efficiency, nutrient management and energy use.

A common question is, “How can we best prepare for uncertainty?”

An alternative is, “How should we farm knowing with certainty that adverse events will happen, and possibly more often?”

# Irrigation for Resilient Cropping

Irrigation increases certainty of crop yields. That allows confidence that contracts can be met, and that other resources such as land, labour, energy, agrichemicals and fertiliser will be used most efficiently.

## Need for excellence in irrigation

Good irrigation has significant benefits for the wider community and for individual irrigators. Competition for water increases the attention the community and potential irrigators place on existing irrigation practice.

Irrigation adds value to cropping, at a cost. The cost has environmental and financial aspects. Both must be minimised.

## Environmental costs

Environmental costs relate to removing the water from its source, and potentially losing nutrients to surface or ground water.

Much resource management activity, including consenting, is to minimise adverse effects of take. It seeks to maintain ecosystem functions and avoid conflict between users.

The National Policy Statement for Fresh Water Quality puts more attention on “receiving waters”, the surface or ground water that receives leached nutrients from runoff or drainage.

When irrigation enables intensified land use, the risk of leaching can increase. Excellent management is the key to avoiding such risks.



**The environmental impacts of irrigation must be managed to minimise effects**

## Financial costs

Irrigation is expensive. Careful consideration of costs and returns is needed before investing in an irrigation system, and for each irrigation event. The cost of irrigating may not be covered by better yield or quality.

When irrigation is restricted, carefully assess which crop to irrigate first. Tools such as AquaTRAC provide financial analysis for alternative crops.

Financial costs include:

- capital outlay of the irrigation system and its associated infrastructure (bores, pumps and pipes)
- running costs (energy, labour and maintenance)
- depreciation
- cost of obtaining and retaining a resource consent or water share
- resource management charges for investigations
- increased land price
- and more . . . .

## Input Use Efficiency

Input use efficiency measures the amount of production for each unit of input. If yield is halved, the diesel use efficiency relating to cultivation is halved. The same is true for labour and chemicals.

A full-yield crop will use the nutrients provided while a drought stressed crop cannot. As well as reducing nutrient use efficiency, it increases the risk of nutrient loss to ground water or surface water.

Drought risk is significant across New Zealand, and particularly in eastern regions. Every season is different, both in timing and intensity of drought experienced. Some climate modelling predictions indicate an increasing risk of drought especially in the already drier regions.

## Good agricultural practice

Good agricultural practice makes sure a suitable irrigation system is designed and installed, that it is correctly managed, and records demonstrate compliance.

Irrigation New Zealand has a range of resources to support excellence in irrigation. Guidelines, Codes of Practice and Standards cover:

- System Specification
- System Design
- System Installation
- System Commissioning
- Irrigation Management
- Irrigation Operation
- Irrigation Evaluation
- Irrigation Scheme Environmental Management Systems



[www.irrigationnz.co.nz](http://www.irrigationnz.co.nz)

These and other resources are available via the Irrigation New Zealand website [www.irrigationnz.co.nz](http://www.irrigationnz.co.nz) and [www.everythingirrigation.co.nz](http://www.everythingirrigation.co.nz).

## Components of Good Practice

Good practice includes:

- planning ahead to avoid stress and minimise impact of restrictions
- maintaining the system to avoid leaks and energy waste
- applying the right depth of water at the right time
- ensuring suitable application intensity and good uniformity
- monitoring system performance
- demonstrating that good practice has been applied

Achieving these requires good management, maintenance and operation.

## Actions

On-farm actions can:

- moderate adverse climate impacts
- reduce negative impact on crops
- minimise costs and
- avoid environmental impacts.

## Developing or upgrading irrigation

Ensure a complete irrigation specification process has been completed.

That involves:

- soil and climate assessments
- enterprise intentions
- full farm plan consideration and
- water supply availability

Use a qualified designer and an accredited design company. They will follow the Code of Practice and Standards for Irrigation Design and Installation.

## Managing Irrigation

Ensure a system Operation Manual is prepared, available and followed. It will include how to maintain and operate the system. Ensure all staff follow the right procedures

Use a formal irrigation scheduling system, including soil moisture monitoring and soil water budgeting. Use both. Tools such as AquaTRAC provide assistance.

Monitor system performance regularly, including event flow, pressure and visual checks and completing a seasonal system calibration.

Use an Irrigation Log to record applications, operation monitoring and maintenance.

## Further information

Excellent irrigation is an important aspect of many profitable and sustainable cropping systems.

## Other resources

### Resilient Cropping

Available as downloads [www.landwise.org.nz/projects/resilience](http://www.landwise.org.nz/projects/resilience)

- Resilient Cropping Fact Sheets
- LandWISE Fact Sheets
  - Controlling runoff with furrow dyking
  - Crop loss from ponding
  - Arriving at optimal water use through precision irrigation by Stephen Raine

### IrrigationNZ

- Resources available for download via [www.irrigationnz.co.nz](http://www.irrigationnz.co.nz)
  - Specification Checklist and Guidelines
- Everything irrigation [www.everythingirrigation.co.nz](http://www.everythingirrigation.co.nz)
  - Weather information
  - Soil and soil water maps and information
  - Electronic tools

### Page Bloomer

Downloads from [www.pagebloomer.co.nz](http://www.pagebloomer.co.nz)

- Irrigation Calibration Guidelines
  - Centre pivot/Linear move
  - Traveller/Boom
  - Sprayline
- Energy efficiency in irrigation
  - Pumping efficiency



# Resilient Cropping

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### Web Resources

[www.landwise.org.nz/projects/resilience](http://www.landwise.org.nz/projects/resilience)



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