

Resilient Cropping

Nutrient Management



Resilience is the ability to cope with adverse events. Farms handle adverse events better if the soil is healthy, water available, and infrastructure (and capital) in place.



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, the Foundation for Arable Research, LandWISE 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?”



Managing Nutrients for Resilient Cropping

Resilient nutrient use is achieved when environmental losses are minimised and the crop has a sufficient supply to reach its potential yield.

Plant nutrients come from a number of sources. Inorganic and organic fertilisers can be selected to supply a range of nutrients to the crop, but their supply rates can be very different. Crop debris and animal excreta play an important role by recycling nutrients to soil.

Nutrient availability

The availability of nutrients depends on the source, the weather, the soil characteristics and farm management practices. Soluble nutrients such as urea, may be immediately available to the plant, however under some environmental conditions there is a risk that they will be lost through volatilisation and leaching. Nutrients from organic sources and crop debris are supplied over a longer time frame.



Soil processes and management practices play an important role in the supply of nutrients to the crop.

Plants access dissolved nutrients from the soil water through their root hairs. Soil environments that are water-logged or compacted restrict root growth and the plant's ability to access nutrients is limited.

These inaccessible nutrients may then be leached in water moving through the soil profile.

Soil microbial processes continually cycle nitrogen within the soil. The microorganisms are dependent on the soil environment providing air, moisture and nutrients to support their growth. Cultivation and irrigation practices can have both positive and negative influences on this environment.

Nutrients and the environment

Society has an increasing expectation that farmers will manage the use of nutrients in ways that will minimise losses to the environment.

Nitrates and phosphates are appearing in our rivers and lakes and greenhouse gas emissions are increasing. Agriculture has a part to play in reducing these negative environmental effects.

The National Policy Statement (NPS) for Freshwater Management which came into effect on 1 July 2011 sets out the objectives and policies for freshwater management under the Resource Management Act.

Local governments will be responsible for managing the fresh water in streams, rivers and lakes in their regions. They will employ a catchment based approach, and consider all the activities within the catchment that could affect water quality.



The environmental outcome for fresh-water in a catchment will be determined by a consultative process with the community.

There are two stages in developing a fresh water management plan:

The first stage determines what the community expectations are. These environmental outcomes may include things like: retention of mauri; the ability to swim in the river in summer; or the ability to use the water for stock watering without treatment.

The second stage determines what level of water quality is needed for these outcomes to be achieved.

Regional councils are likely to set limits on nutrient losses to maintain water quality. Farmers should keep abreast of what's happening in their regions.



Good agricultural practice

Properly managed fertilisers support cropping systems that provide economic, social and environmental benefits. In contrast, poorly managed nutrient applications can decrease profitability and increase nutrient losses. These losses have the potential to degrade water and air.

The sustainable use of nutrients can be achieved by considering the 4Rs of nutrient stewardship.

These are:

- **Right fertiliser source** supplied at the
- **Right rate** at the
- **Right time** and in the
- **Right place**

4R nutrient stewardship provides a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability.

The sustainable nature of 4R stewardship encompasses economic, environmental and social aims.

Economic aims include:

- Improving net farm income
- Improving regional economic development.

Environmental aims include:

Reduce unwanted losses to the environment such as:

- erosion of nutrient containing soil particles;
- emissions of volatile ammonia (NH_3);
- nitrous oxide (N_2O) emissions from nitrification/de-nitrification.

Reduce energy use per harvested unit of farm production.

Improve recycling of crop nutrients from crop residues and livestock manures.

Social aims include:

- Production practices that are acceptable to local communities and to final product markets

Nutrient Management Plans

A nutrient management plan (NMP) is a written plan that describes how the major plant nutrients (nitrogen, phosphorus, sulphur and potassium, and any others of importance to specialist crops) will be managed.

A good nutrient management plan;

Is a valuable farm management tool that considers the land manager's personal objectives for the sustainability of the farm business.

Ensures that the nutrient management on the farm meets all legal and industry requirements.

Includes an annual nutrient budget which compares the nutrient inputs from all sources with all the nutrient outputs.

Identifies changes in soil nutrient levels to meet production and environmental aims. Develops a nutrient-application plan to achieve these changes.

Minimises the cost of supplying nutrients and avoids wasted spending on unnecessary or nutrients that won't be used.

Minimises the risk of damage to the environment.

When implemented correctly, a Nutrient Management Plan can result in an increase in production and profitability while at the same time protecting the environment.





Resources

Resilient Cropping factsheets

Drainage
Nitrogen leaching
Nitrous oxide emissions
Nutrient losses
Soil Carbon
Urease and nitrification inhibitors
Urea
Volatilisation

Available as downloads from the FAR and LandWISE websites

www.far.org.nz and www.landwise.org.nz/projects/resilience

Nutrient management tools

FAR Focus on Nutrient management plans

Code of Practice for Nutrient Management, FertResearch

www.fertresearch.co.nz

Spreadmark certified operators

www.fertqual.co.nz

AmaizeN – forecasting software for yield and N fertiliser of maize silage and grain crops

www.far.org.nz

Wheat Calculator – forecasting software for yield, N fertiliser and irrigation of wheat crops

www.far.org.nz



Resilient Cropping

Contacts for more information

Diana Mathers

Foundation for Arable Research

Phone: 06 877 9435

Mobile: 027 544 2236

Email: mathersd@far.org.nz

Dan Bloomer

LandWISE

Phone: 06 650 4531

Mobile: 021 356 801

Email: info@landwise.org.nz

Web Resources

www.far.org.nz

www.landwise.org.nz/projects/resilience



Ministry for Primary Industries
Manatū Ahu Matua

