

How can I start implementing a new fertiliser regime?

What is fertiliser and how does it work?

Fertiliser provides the nutrients to grow and nourish pastures and crops. Plants require 17 essential nutrients to thrive so fertiliser supports plant growth and replenishes these nutrients. For a plant to grow and thrive, it needs a number of different chemical elements and the most important are:

- Carbon, hydrogen and oxygen – available from air and water and therefore in plentiful supply.
- Nitrogen, phosphorus, potassium (a.k.a. potash) – the three macronutrients and the three elements you find in most packaged fertilisers.
- Sulfur, calcium and magnesium which are secondary nutrients.
- Boron, cobalt, copper, iron, manganese, molybdenum and zinc which are micronutrients.

The most important of these (the ones that are needed in the largest quantity by a plant) are nitrogen, phosphorus and potassium because they are necessary for these basic building blocks:

- Every amino acid contains nitrogen.
- Every molecule making up every cell's membrane contains phosphorus (the membrane molecules are called phospholipids), and so does every molecule of ATP (the main energy source of all cells).
- Potassium makes up 1–2% of the weight of any plant and, as an ion in cells, is essential to metabolism.

Without nitrogen, phosphorus and potassium, the plant simply cannot grow because it cannot make the pieces it needs. If any of the macronutrients are missing or hard to obtain from the soil, this will limit the growth rate for the plant. In nature nitrogen, phosphorus and potassium often come from the decay of plants that have died. In the case of nitrogen, the recycling of nitrogen from dead to living plants is often the only source of nitrogen in the soil.

The goal of fertiliser is to make plants grow faster by supplying the elements that the plants need in readily available forms. Most fertilisers supply just nitrogen, phosphorus and potassium because the other chemicals are needed in much lower quantities and are generally available in most soils. Ultimately, plant growth is limited by the most limiting resource, be that macro-nutrients, micronutrients, oxygen, water or sunlight.

Many things must be considered when deciding what kind of fertiliser to apply to crops. Plants will need certain amounts of nutrients at different times in their life cycle to maximize their growth. A common method to determine what is needed is completing soil and plant tissue tests.

There are various fertiliser application methods that a producer should consider. The four main types of application methods are:

- **Broadcasting:** uniformly distributing fertiliser over an entire field (see photo below).
- **Foliar:** apply liquid fertiliser in a spray so that it settles on leaves of plants.
- **Placement or banding:** apply the fertiliser near plant rows within a field and in WA generally only occurs during the seeding process.
- **Fertigation:** adding fertiliser to irrigation water and applied through drip, furrow and sprinkler irrigation systems.



Applying fertiliser through the broadcasting application method.

Types of fertiliser

Fertilisers are mainly classified into two main types:

1. Synthetic (Inorganic)

Chemical or synthetic fertilisers generated by chemical techniques that contain nutrients for crop growth are known as inorganic fertilisers.

2. Natural (Organic)

Natural fertilisers derived from plants and animals and contain organic matter are known as organic fertilisers. By adding organic matter along with nutrients necessary for plant growth, it enriches the soil. It is worth noting that not all natural fertilisers are certified organic.

The most commonly used fertilisers in WA are synthetic fertilisers which are applied through either broadcasting (spreader), placement (seeding) or foliar (spraying).

Natural fertilisers include agricultural waste, livestock manure, industrial waste, animal and plant byproducts and biomineral or rock-based blended fertilisers. Organic fertilisers are generally required to be used at far higher volumes, are more variable in nutrient content and less plant available in the short term. Synthetic fertilisers are used at lower volumes have consistent nutrient content and are immediately plant available.

Implementing a new fertiliser regime

While synthetic fertilisers remain the most common type of fertiliser there is a shifting demand among some producers with a growing interest in organic type fertilisers linked to increasing input costs, a growing interest in production practices that are perceived to be more natural and the perceived consumer sentiment that aligns with this.

Organic fertilisers provide nutrients to promote plant growth (fertiliser), whilst also adding organic matter to the soil, with benefits for soil condition.

The shift from synthetic fertilisers to natural fertilisers is currently the most common practice change for producers to implement a new fertiliser regime. Before implementing a new fertiliser regime, it is important to clearly understand the desired outcomes from the change.

As part of the process of understanding an overall fertiliser strategy it may be a good idea to go back a step further and better understand your business. It is important to define or understand the desired farms outcomes which may include:

- Targeted production levels
- Economic ambitions
- Preferred environmental objectives.
- Nutrition of fertiliser requirements

As part of this initial process soil testing will be important to ensure an accurate understanding of soil types and nutritional requirements to meet production levels. Soils tests provide valuable information on soil nutrient levels and soil conditions that could be limiting production.

Information from soil tests can be used to develop custom management strategies and determine appropriate inputs and ameliorants to help optimise productivity, profitability and sustainability. Visiting the [MLA Soils Hub](#) is an important first step as a source of information and available resources around soil testing.

Targeted Nutrition – apply what is needed

Soil testing will help to develop a custom nutrition strategy which is a key component of an operations management strategy and will help in reducing the over application of certain nutrients which can occur when fertilisers are applied year in year out as part of the annual farms operations.

This importance of targeted nutrition has been made clear in the outcomes of the uPtake project ([uPtake - Healthy Estuaries \(dwer.wa.gov.au\)](http://uPtake - Healthy Estuaries (dwer.wa.gov.au))) a partnership project designed to improve nutrient use efficiency on grazing farms in South West Western Australia by improving farmer and industry knowledge, confidence and uptake of the science supporting fertiliser recommendations.

The outcomes from the project, outlined below, demonstrate the importance of soil testing and how the results can be used to help in applying the right nutrition:

1. Results from trials to date show that the national critical values for P used to inform P fertiliser recommendations are relevant to South West WA. You can therefore have confidence in that P fertiliser recommendations based on critical values from BFDP.
2. If your soil test shows that your soil contains excess P for your target production levels, (i.e your fertility index greater than 1) adding more P will not increase productivity. Adding more P will unnecessarily increase costs and may escalate P movement into waterways, contributing to algal blooms. If your P soil test shows a fertility index of 1 at the start of the season, then it contains sufficient P for seasonal pasture growth. Soil testing should guide subsequent pasture P requirements.
3. Addressing limiting nutrients in your soil (e.g. nitrogen, sulphur, potassium, micro nutrients) and correcting low pH can dramatically increase production and minimise unnecessary losses of nutrients to the environment.
4. Soil testing and comparison with critical values is essential to determine the nutrient requirements of your soil to meet your production targets. (DWER, 2022).

The following list outline areas to consider before implementing any new fertiliser regime.

1) Research the new fertilisers

Spend time researching and understanding how any new fertiliser regime will function within your farming system. Clearly understanding how the fertiliser supplies the required nutrients to the plants/crops you are growing will be important to achieve you can achieve you intended production outcomes. Supply, cost, logistics and application methods are all very important to understand before starting any change.

2) Have a clear strategy

It is important to have a clear strategy when implementing a new fertiliser regime in relation to plant life cycle is critical to production. Know when and how the new fertiliser will be applied.

For example, is nutrient availability driven by environmental factors or is time of year and stage of plant growth a key factor for nutrient requirements? Consider how differences in seasons may impact how and when to apply. In the event of a good season or a drought what changes need to be put in place?

3) Understand how the fertiliser will work within the biology of the production system

Non synthetic fertilisers encourage the improvement in soil biology, soil health and soil condition. These types of fertilisers contain plant nutrients in low concentrations that must be converted into inorganic forms by soil bacteria and fungi before plants can use them. Therefore, they are typically slowly released, especially during cold weather when soil microbes are not as active.

Promoting improved soil biology/health/condition and in turn converting this improvement into crop or pasture production is complex. Therefore, it is important to understand how any fertiliser applied is going to promote and improve the soil biology and generate the desired production.

4) Seek advice

Seeking advice will be important in the journey of implementing a new fertiliser regime. There is a wealth of knowledge held within the agricultural industry from the fertiliser suppliers, agronomists and consultants.

Changing fertiliser regimes is a significant decision for any farming business and can have considerable impacts on production and profitability. It is therefore important to source a broad range of advice from trusted sources to determine the best fertilizer strategy for your business.

5) Account for nutrient carry over of past fertiliser applications

During the changeover period from a synthetic based fertiliser regime to natural fertilisers there will be a nutrient carry over in the soil from synthetic fertilisers and mineralization of soil organic matter. How long this carry over is in the soil will depend on soil type, rainfall, production and seasonal conditions.

6) Any change in fertiliser regime will take time

It will take time for the true effects of a new fertiliser regime to be seen without influence from past practices. It is important to account for this when monitoring and evaluating the outcomes of the new fertiliser regime. The full impact of any new fertiliser regime may take several years to unfold.

References

DWER, 08/2022, "2", 2 March 2023, < [2021-Trial-summary_FINAL-APPROVED.pdf \(dwer.wa.gov.au\)](#)>

Acknowledgement

This Project is funded by the MLA Donor Company and Pedaga Investments.

