How do I improve my subtropical grass based pastures?

The issue:	Subtropical perennial grass-based pastures are productive in southern WA, particularly kikuyu, but maintaining productivity and legume content can be challenging.
The impact:	Producers are missing an opportunity to improve their feedbase by only growing subtropical grass.
The opportunity:	Annual legumes are compatible with subtropical grasses and provide low-cost nitrogen. They increase red meat production by providing nutritious feed during the colder months and filling the autumn/summer feed gap.

Subtropical perennial grasses make a valuable contribution to forage production on the south coast of WA. They are useful for filling the feed gap in summer/autumn, resulting in increased stocking rates and reduced reliance on supplementary feeding.

Research has established there are annual legumes which can boost subtropical grass-based pastures by:

- increasing the overall dry matter production, particularly in winter and spring
- lifting the nutritive value of subtropical grass-based pastures during the growing season
- increasing soil N fertility through nitrogen fixation.

And the gain? MLA-funded research found a quality legume-based component in subtropical grass pastures in WA led to increases in gross margins (GM) by an average of $40/ha.

Improving the legume content

Sub-clover is the most commonly found legume in kikuyu pastures on the south coast of WA. However, sub-clover density can decline when kikuyu outcompetes it, particularly for soil moisture at the break of season.

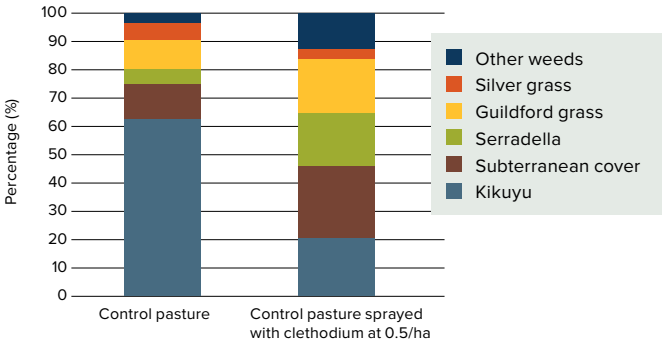
Predation by redlegged earth mite or an excess of kikuyu biomass preventing light and moisture from reaching the soil surface can also reduce sub-clover production. Soil fertility and subsoil acidity also needs to be managed for sub-clover to ensure adequate soil nutrients and soil pH.

This situation can be managed by incorporating the following techniques:

Good grazing practices – applying sufficient grazing pressure before the break of season provides space for annual legumes to establish successfully provided there is sufficient soil moisture, adequate pest control and a sufficient legume seed bank. The residual biomass should be 800–1,000kg dry matter/ha or roughly the height of half a gold ball.

Grass suppression – using a grass-selective herbicide after the break of season can suppress the subtropical grass, thereby reducing competition for resources and allowing legumes to establish and become a substantial component of the pasture, assuming there is an adequate legume seed bank. (Figure 1). Glyphosate can also be used to reduce kikuyu density, however, the timing of application needs to be carefully considered to avoid any impact on germinating sub-clover.

Figure 1: Botanical composition (%) of a kikuyu-based pasture sprayed with clethodim (0.5L/ha) following the break of season in May, compared to untreated pasture in August 2014 in Esperance



Sowing – if the legume seed bank is poor, kikuyu can be suppressed and the legume seed drilled into the pasture.

Species selection – while sub-clover is the best companion legume for kikuyu, serradella is a good option in deep sands and can be sown as a pod in summer or a seed in winter.

How do I increase production of my subtropical pastures?

1. Address soil constraints

Aspects of the soil including acidity, nutrient constraints, non-wetting, wind erosion and waterlogging all impact pasture productivity, and managing these should be the first step in increasing production.

When beginning, soils should be managed for the sub-clover rather than the kikuyu component of the sward as the sub-clover is more sensitive to both pH and phosphorous. After assessing paddock history and the soil type, soil and tissue testing is a good way to understand the soil limitations. Most legumes are sensitive to pH, which can lead to poor legume content on acid soils. Address soil acidity before tackling soil fertility.

Sub-clover is highly responsive to soil phosphorus availability and both potash and sulphur are essential for sub-clover growth.

2. Control weeds

When suppressing kikuyu to allow legume production to increase, weeds, particularly silver grass, can increase and become a problem. Silver grass germinates early in the growing season and sets seed early in spring. It can be dominant over autumn and winter. Producers need to be aware of the limited silver grass control options within pastures and the need to manage effective applications in terms of timing and rainfall. This is particularly important for control options like simazine.

In challenging situations, spraying the kikuyu out with a knockdown and oversowing the pasture with a crop can help short-term weed control.

3. Getting the mix right

MLA-funded research attempted to identify legumes that could equal annual ryegrass in increasing the production of a kikuyu pasture. While woolly pod vetch was found to produce a lot of winter dry matter, it was not found to be consistent across trial sites and seasons.

Research indicates sub-clover or annual ryegrass significantly increase winter production of kikuyu pastures. Producers who wish to try something different could trial woolly pod vetch. (Warning: woolly pod vetch seed is toxic to livestock and can cause death. Grazing is only recommended from the 10-node stage to podding. It can be cut for hay or silage.)

Serradella is also an option on deep, sandy soils. Serradella will tolerate a soil pH similar to kikuyu and has a fairly deep root system, enabling it to compete for soil moisture effectively. It should, however, only be considered where sub-clover has failed.

4. Use of nitrogen

The strategic use of nitrogen (N) can be an effective strategy for increasing kikuyu production. The application of up to 25 units of N when the kikuyu is in an active growth phase can lift yield, however, it can be an expensive tactic and should only be used when feed availability is low. Urea, sulphate of ammonia or any other N source can be used, however, sulphate of ammonia is a good option if rainfall is not expected immediately as it generally has lower rates of volatilisation.

How do I ensure maximum productivity from subtropical grass or legume-based pastures?

There is no single grazing method to meet the desired outcome for all livestock and pasture requirements and seasonal conditions. Optimising pasture production depends on controlling two variables: the residual feed on offer following grazing, and the length of time between grazings.

It is generally recognised that rotational grazing increases pasture dry matter and allows higher stocking rates. Yet, set stocking allows animals to select a high quality diet, increasing the weight gain per head in the short-term.

The combination of set stocking and high stocking rates can lead to an increase in sub-clover content, which can also improve performance per head. In contrast, rotational grazing usually leads to an increase in the grass component, which increases production per hectare.

Response of subterranean clover to increasing rates of P (0–100% of estimated P required for maximum growth)

Making the most of kikuyu

While kikuyu can be continuously grazed, rotational grazing at high stocking rates in summer and autumn when plant growth rates are low may be beneficial to maximise dry matter production.

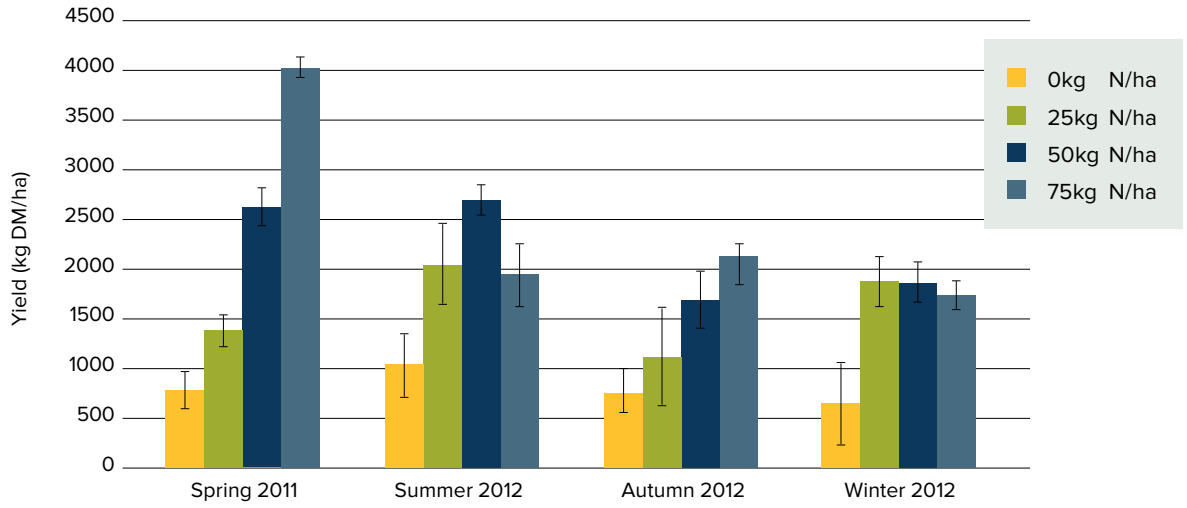
Tips for grazing kikuyu:

- Newly sown pastures can be grazed once runners are 20cm or longer and have strong roots.
- Graze new pastures for short periods with high stocking rates.
- Before the break of season, established kikuyu needs to be grazed hard (down to 800–1,000kg DM/ha) to open up the sward and allow space for annual legumes to establish.
- After the autumn break, maintain kikuyu pastures at 800–1,400kg DM/ha.
- In winter, maintain pastures at 1,400–3,000kg DM/ha (from 5cm).
- In spring, maintain pastures at 1,000–1,400kg DM/ha (2–5cm).
- In summer, use high stock densities to graze to 800kg DM/ha (around 1cm or less).
- After summer rain, increase grazing intensity to keep pasture below 3,000kg DM/ha.

If managing kikuyu/sub-clover pastures with rotational grazing, research suggests an optimum rotation is:

- pre-grazing feed on offer (FOO) of 2,600kg DM/ha in winter and 3,800kg DM/ha in spring
- residual FOO at the end of the grazing of at least 1,400kg DM/ha
- rest periods between grazing varying from 60 days in winter to 30 days in spring.

Figure 2: Seasonal yield response (kg DM/ha) of kikuyu pasture to applied N at three different rates applied as urea at Cranbrook. Periods over which yield was measured: spring 2011 – 9 Sep to 30 Nov; summer 2012 – 1 Dec to 18 Apr; autumn 2012 – 19 Apr to 6 Jul; and winter 2012 – 7 Jul to 12 Sep. Rainfall received was 209mm in spring 2011, 86mm in summer 2012, 133mm in autumn 2012 and 112mm in winter 2012



How do I manage nutrients?

The basic guideline for a subtropical grass/legume pasture is that the legume, through successful root nodulation, will deliver enough nitrogen (N) to support productive and nutritious grasses, but the legume has higher requirements for phosphorus, potassium and sulphur. However, there are opportunities to increase productivity further with tactical applications of N.

Applying N at rates of 25kg/ha provides the most efficient conversion of N to biomass. MLA-funded research found that while spring responses to N were high, it was not economic unless feed was being conserved.

The research also found applying phosphorus to meet the needs of sub-clover will also meet the needs of kikuyu, however, kikuyu will only respond when Colwell P levels are critically low (Figure 2).

Before sowing sub-clover, or any legume, seek high quality seed which has been inoculated with rhizobium to help fix N. Monitor the development of root nodulation to ensure adequate N fixation is occurring once the plants are established.

Can pasture cropping boost subtropical pastures?

This involves sowing winter cereal or oilseed crops into established perennial pastures. The keys to success are managing the grass before and during the growing season and good growing-season rainfall. Suppression of the kikuyu pre-break of season will often be required with a knockdown.

It is possible for kikuyu to recover after one or two years of cropping, but the longer the suppression, the longer the recovery time.

Pasture cropping offers advantages including:

- growing crops in marginal soils, particularly poorer sandplain soils
- increasing profitability and productivity
- controlling summer weeds
- producing feed grain for use on-farm
- increasing paddock flexibility
- stabilising erosion-prone cropping paddocks.

More information

Download WA Department of Primary Industries and Regional Development's pasture species manuals:

Improving subtropical grass pastures on the south coast of Western Australia

Companion legume options for sub-tropical grasses in southern Western Australia

Highly productive sub-tropical grass–serradella pastures in southern Western Australia

Rhodes grass in southern Western Australia

Panic grass in southern Western Australia

MLA's: *Five Easy Steps* phosphorus tool

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