

COVER CROPS IN THE WIDE BAY BURNETT



National Vegetable
Extension Network

WIDE BAY BURNETT

The Australian vegetable industry depends on healthy soils to maintain farm profitability and sustainability. Aggressive cultivation, short-term crops and tight rotations can take a toll on soils. Cover crops are one of the best tools for improving soil structure and health, controlling soil-borne disease and weeds, reducing erosion and nutrient loss and adding nitrogen to the soil (soil wealth).

When starting in cover crops, there are two major questions:

- What is the aim of having a cover crop aim?
- What are your management options?

With harsh climatic conditions and generally low organic matter in the region, keeping your paddocks covered and avoiding fallow periods can reduce the detrimental impact of weather events leading to long-term profitability of your soil.

Cover crop species selection

Species selection is one of the most important aspects for effective cover cropping. When choosing a cover crop species, it is important to consider several factors:

- Current soil condition
- Current season and expected climate
- Subsequent cash crop
- Cover crop aim
- Management and termination options
- Time/ window of opportunity
- Pest and disease issues



Sunn hemp, millet and tillage radish cover crop.

What is the aim of having a cover crop?

- To cover and protect the soil and thereby reduce erosion
- Maintain/ build organic matter
- Soil structure improvement – root architecture
- Add nitrogen – such as legumes
- Insect control – break/ trap crop
- Weed suppression
- Soilborne disease control
 - Biofumigation
 - Enhanced soil

What are your management options?

- What window? Time, water and temperature
- What cover crop – main objective, next cash crop
- Cost – direct and indirect
- Termination of cover crop
- Cover-crop residue management
- Nutrient management
- Potential negatives – weeds, host pest & diseases

Perhaps the most important consideration is understanding the pest and disease host range for that species. If you are trying to control and manage your nematode population in the Wide Bay region, it is not conducive to plant a cover crop that hosts nematodes, as this will tend to exacerbate the situation.



Buckwheat cover crop. Photo by Boris Rayeni.

Cover crop species with potential benefit in the region

Functional group	Cover Crop	Comments
Brassica	Tillage radish Nemat Caliente 199	Biofumigation Deep rooted Weed suppression Soilborne disease and nematode management Nutrient cycling
Legume	Sunn hemp Lablab Cowpeas Soybean Field peas	Use a rhizobium inoculate Legumes won't fix much nitrogen if soil nitrate levels are above 100 kgN/ha. Expect legumes to fix between 100 and 200 kgN/ha — the bigger the crop, the more N fixed.
Grasses	Millet Sorghum Sudan grass Maize Sorghum x Sudangrass Rye grass	Recycle nutrients High biomass Improves soil structure
Cereals	Rye Wheat Barley Oats Triticale	Disease suppression Improve soil structure High carbon
Broadleaf	Buckwheat	Weed suppression Quick growth and breakdown Attracts beneficial insects

Disclaimer: Always consult an advisor before trying new species, especially if nematodes are an issue.

Biofumigants

Biofumigation is the practice of utilising the crops natural ability to produce soil-borne disease-suppressing chemicals. The chemicals are known as glucosinolates and are generally found in plants of the *Brassica* species (QDAF).

When the plant material is macerated (usually with a mulcher) the glucosinolates release chemicals called isothiocyanates (ITC's). These ITCs are a similar chemical to metham sodium and when managed correctly can naturally suppress pests and soil-borne diseases (Serve-Ag).

Management is key to successful biofumigation. Brassicas may need irrigation and fertiliser application. At incorporation, brassica crops need to be finely mulched to release the chemicals and then incorporated into the soil as quickly as possible. Adequate soil moisture is also needed at incorporation stage.



Tillage radish 51DAP. Photo by Marc Hinderager.

Recent trials in the region suggest a promising biofumigant crop for the region is Nemat (*Eruca sativa*). Nemat is excellent for nematode control as its roots produce exudates that attracts pest nematodes to its root zone, traps them and stops them from reproducing, allowing for good nematode control in cropping soil (Serve-Ag)



Biofumigant crop being mulched and then incorporated immediately. Photo by Darren Long.

Tillage radish also presents many benefits as a cover crop. It has been bred to produce an enormous tap root as well as above ground biomass. It is excellent for weed suppression, ground cover, soil structure, breaking through compaction and cycling nutrients (AGF Seeds).

Termination/ incorporation

Successfully managing the physical transition from cover to cash crop will determine the effectiveness of this management system for your farming enterprise.



Photo- Ryecorn cover crop being roller-crimped and direct seeded with soybean.

Roller crimping

This method utilises a roller crimper implement to flatten the cover crop to the ground creating a mat on the surface which maintains soil moisture, reduces weed pressure and provides effective soil cover all of which lead to enhanced soil benefits. When roller-crimping it is important the plants are ‘crimped’ below the first node to ensure effective termination. Herbicide can be used prior to rolling to guarantee an effective kill. After a cover crop has been roller crimped, it is possible to direct-drill some cash crops into the residue or use strip tillage for planting.

Strip Tillage

Strip-till is a system that cultivates strips of soil where the crop will be planted or sown, leaving the remaining soil area undisturbed. This method has the potential to reduce establishment costs and presents timing efficiencies while improving soil health. Strip tillage machinery can usually, in a single pass, rake aside crop residue, till the soil and accurately place fertiliser and seed/transplant. This can drastically reduce the number of passes and intensity of tillage.

There are several soil health benefits of strip-till including reduced erosion, increased water retention, reduced fuel and labour costs, reduced compaction, less weed pressure and increased soil health/ organic matter.

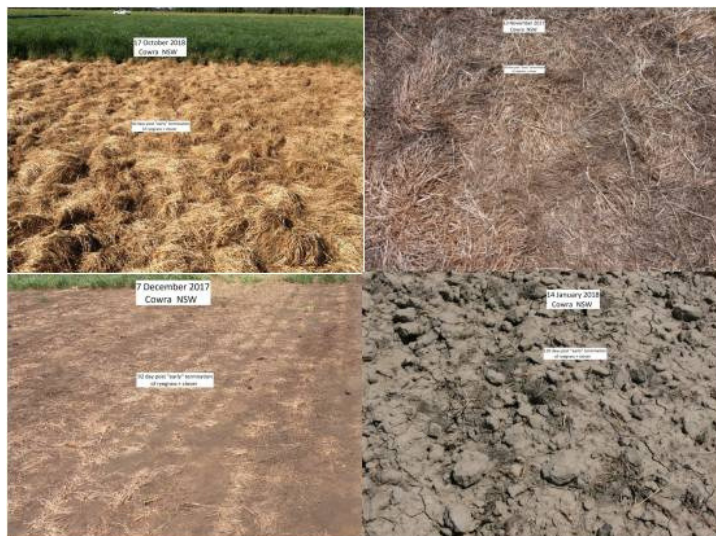


Strip tilled paddock after a cover crop. Credit Joe Cook.



Cucumbers following control (left) and a rolled, strip-tilled rye corn cover crop (right). Photo by Marc Hinderager and Ed Fagan.

Another option in water-limited situations is terminating cover crops early with herbicide. Cover crops with high C:N ratio, such as rye grass and cereals, can be sprayed out once ground cover is achieved as this provides weed suppression and captures any rainfall that is received.



Early termination of ryegrass led to good weed suppression, increased soil moisture and increase in cash crop yield. Photo by Marc Hinderager.

This then leads to reduced erosion and increased soil moisture. Recent reports have also found that the cover crop roots are, just as, if not more, important than above-ground biomass. “Key findings indicate that the species-richness effect of soil health is predominately related to root biomass production, which stimulates growth and diversity in microbial communities within the soil, balances the bacteria to fungi ratio, and generally creates synergy between all soil elements and processes to promote a healthy soil ecosystem.” (Alexander Nixon, Nuffield Scholar Report on multi-species cover crops).



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Written by Adam Harber, VegNET Industry Development Officer, Bundaberg Fruit & Vegetable Growers (BFVG).

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In text references

Soil wealth - <https://www.soilwealth.com.au/>

Serve-Ag - <http://www.serve-ag.com.au/biofumigation-seed/>

QDAF - EHP Resilient Rivers Project: Biofumigation Trial Results

AGF seeds - <https://agfseeds.com.au/cover-crops#tillage-radish>

Nuffield Scholar Report, Alex Nixon- <https://nuffield.com.au/scholar-profile-alex-nixon/>