

FACT SHEET

EUROPEAN CANOLA MARKET



GRDC
GRAINS RESEARCH
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Understanding the European biofuel market for Australian canola

Australian canola growers sell into the European biofuel market by certifying their canola as sustainable. Research has helped maintain access to this significant market.

Key points

- Almost half of Australia's canola production (49 per cent) has entered the European Union (EU) biofuel market over the past five years.
- From January 2018, canola is accepted for this market only if the biofuels made from it meet a new, higher greenhouse gas emissions savings requirement of 50 to 60 per cent, up from 35 per cent.
- CSIRO research has helped the industry retain market access by providing evidence that biofuel made from Australian grown canola can achieve the new requirement.
- Growers supplying this market sign a self-declaration form confirming they meet other sustainability requirements of the EU Renewable Energy Directive and are willing to be audited.
- Growers should ensure they understand the requirements for participation in the market.
- Growers may be audited and will require specific farm records.



PHOTO: GUY ROTH, THE UNIVERSITY OF SYDNEY

THE SUSTAINABLE CANOLA MARKET AND 2018 CHANGES

Canola can earn a premium when certified as sustainable and sold into the European Union (EU) biofuel market. This is a significant market for Australia. In 2016, 57 per cent of Australian canola production, and 91 per cent of canola exports, were sold into the EU certified sustainable canola market.

Driven by the EU's commitment to reduce greenhouse gas (carbon dioxide, methane, nitrous oxide) emissions and to improve energy efficiency, the [European Union \(EU\) Renewable Energy Directive](#)¹ created market demand for biofuel by mandating that the EU will achieve a 20 per cent improvement in energy efficiency by 2020 with at least 10 per cent of all fuels used in the transport sector sourced from renewable energy.

Biofuels made from biomass crops such as canola can be accepted for this market only if they provide sufficient savings in greenhouse gas emissions relative to the fossil fuels they

replace and also meet other sustainability requirements. The required savings in emissions are calculated up to the point where fuel is pumped into a vehicle.

Previously canola crops only had to meet a 35 per cent saving in emission to be acceptable to the EU biofuel market.

From January 2018 the EU Renewable Energy Directive requires biofuels to provide a minimum 50 per cent saving in emissions relative to fossil fuels, or a minimum 60 per cent saving where the biofuel is produced in a new plant commissioned since October 2015.

Research has provided evidence that biofuels made from Australian canola can meet this new, increased emissions saving requirement. This has been critical for retaining market access. Most Australian canola growers can continue to access this market provided that they declare their canola system meets the EU's other sustainability requirements.

DOES AUSTRALIAN CANOLA MEET THE NEW REQUIREMENTS?

Canola-based biofuels were previously accepted into this market using a worldwide default emissions saving value of 38 per cent, which exceeded the initial 35 per cent emissions savings requirement. This default value does not meet the new 50 to 60 per cent emissions savings requirement.

EU policy allows for locally determined emissions values to be approved for use in place of the default figures when calculating biofuel emissions savings. These locally derived emissions values were needed for the Australian canola industry to continue to access this market.

Australian canola emissions values

The Australian Oilseeds Federation (AOF) and Australian Export Grains Innovation Centre (AEGIC) commissioned CSIRO to conduct research to prepare locally specific emissions values for the on-farm production phase of the canola biofuel supply chain under Australian conditions.

CSIRO's research defines the greenhouse gas emissions values for canola production specifically for each Australian canola growing state (Table 1). These figures were incorporated

into an Australian Country Report, which has been approved by the European Commission.

It provides evidence that allows Australian canola to be purchased to produce biofuels for the EU renewable energy market. Without this research Australian canola could not be sold into this market.

Grain marketers and accumulators can now calculate the total biofuel emissions savings achieved up to the fuel pump by using these new, approved Australian farm production emissions values together with values for the post-farm emissions (transport, processing, and so on).

OTHER REQUIREMENTS OF THIS MARKET

The EU policy has additional sustainability requirements designed to ensure that production of biomass for the renewable energy market does not cause indirect environmental damage such as the clearing of high conservation value land to grow crops for biofuel production or biofuels displacing food production, jeopardising EU food security. Until now, these certified sustainable canola requirements have not changed from those that growers have previously met to access the market.

WILL BIOFUELS MADE FROM AUSTRALIAN CANOLA MEET THE NEW REQUIREMENTS?

Determining the emissions released in production of a biofuel takes into account all steps up to where the fuel is pumped into a vehicle:

- Biomass production, such as growing of canola crops, including:
 - Emissions released from the growing cycle, fertiliser, decaying and burnt crop residues, the manufacture of fertiliser and pesticide inputs and fuel used in machinery operations, harvest and transport; and
 - Greenhouse gases captured in soil carbon accumulation from agricultural practices, carbon capture and replacement, geological storage and electricity cogeneration;
- Biofuel processing; and
- Transport.

Emissions are calculated along the biofuel production supply chain as the grams of carbon dioxide (CO₂) equivalent* greenhouse gases emitted per unit of energy (MJ FAME = megajoules of fatty acid methyl ester).

Buyers must calculate the emissions produced from the full biofuel supply chain to determine if the new emissions savings requirements can be met. The CSIRO research established that canola growing in New South Wales, South Australia, Victoria and Western Australia has comparatively low greenhouse gas emissions profiles that can produce biofuels that readily meet the EU's January 2018 emissions savings requirements.

BIOFUEL SUPPLY CHAIN EMISSIONS

For a biofuel to achieve a 50 per cent savings in emissions it must release no more than half of the 83.8g CO₂-e/MJ FAME emissions released from fossil fuels. That is, the combined emissions from canola growing (including manufacture and transport of crop inputs like fertiliser), post-farm processing and transport must be less than 41.9g CO₂-e/MJ FAME.

Emissions released in the post-farm phase of biofuel processing and transport can be assessed using a default emissions value of

23g CO₂-e/MJ FAME. Default values are conservative and tend to be a worst-case scenario. Many biofuel processing systems have lower emissions. Biofuel producers can obtain approval for an emissions value specific to their system, just as the CSIRO report has done for the canola production phase in Australia.

Buyers can now combine the approved on-farm emissions values from Victoria and SA with the default post-farm (biofuel processing and transport) emissions value of 23g CO₂-e/MJ FAME to achieve a total biofuel production emissions value of less than 41.9g CO₂-e/MJ FAME. This meets the 50 per cent emissions savings mandate required to maintain access to the market after January 2018.

Emissions savings calculation example:

18	+	23	=	41
CO ₂ -e/MJ FAME		CO ₂ -e/MJ FAME		CO ₂ -e/MJ FAME
Emissions from Victorian grown canola		Default post-farm biofuel production emissions		Total emissions are less than 41.9 = achieves the 50 per cent savings

Biofuels using canola from NSW and WA will meet the emissions requirements if they are processed in a biofuel facility that has an approved emissions value of 21.9 g CO₂-e/MJ FAME or less for the post-farm processing and transport component.

Emissions values calculated for canola production in Tasmania and Queensland are at the upper end of the requirements. If biofuels were made from canola grown in these states it would require a post-farm biofuel processing and transport system with a low, approved emissions value. As little, if any, canola from these states enters the EU Biofuel market this is expected to have little impact on canola trade from Australia.

Full details of CSIRO's findings are available from: www.australianoilseeds.com/Technical_Info/industry_reports.

CO₂ equivalent is a value for all greenhouse gases that adjusts for the higher impact of nitrous oxide and methane relative to carbon dioxide.

Biomass for the EU renewable energy market:

- Cannot be grown on land that, prior to January 2008, was:
 - primary forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed;
 - conservation areas for the protection of rare, threatened or endangered species, such as national parks;
 - high biodiversity grasslands; or
 - lands that have high carbon stocks such as wetlands, peat lands or continuously forested areas.
- Must be produced with good practice in areas such as soil management, water use, chemical use and storage, fuel storage and safety, and have the records to support this.
- Must account for no more than 7 per cent of the energy used in transport coming from crops grown on agricultural land. (This limits the overall scale of the renewable energy biofuel market but is unlikely to impact on demand for Australian canola.)

Genetically modified canola

The use of genetically modified (GM) canola is not an issue for the biodiesel production market itself. However, some markets for canola meal and other by-products of oil production may be more sensitive to the use of GM crops. For this reason, non-GM status plays into the price premium for canola grain destined for Europe.

HOW CAN GROWERS ACCESS THIS MARKET?

Australian grain marketers and accumulators gain access to the EU biodiesel market by participating in a voluntary sustainable biomass certification scheme that demonstrates compliance with the EU Renewable Energy Directive.

Two voluntary certification schemes are available:

- International Sustainability and Carbon Certification (ISCC)
- Biomass Biofuels Sustainability Voluntary Scheme (2BSvs)

Both schemes require the 'certificate holder' (for example, the grain marketer or accumulator) to be re-certified annually.

Growers sell into this sustainable canola market by supplying a certified grain marketer or accumulator and declaring that their operations meet the sustainability requirements of the EU Renewable Energy Directive.

Self declaration

When choosing to contract canola as sustainable, growers sign a self-declaration that:

- Identifies the grower and property used for growing canola;
- States that the grower meets the sustainability requirements of the Renewable Energy Directive;
- Assures that legal requirements have been met, such as the right to use land, training and payment of staff, storage, handling and use of chemicals; and
- Gives consent to be audited for verification that the information provided on the self-declaration form.

False declarations at the farm level affect the integrity of the voluntary scheme and could leave a grower open to accusations of misrepresentation and legal action to cancel the contract and recover damages. Any grower making a false declaration or refusing an audit may be prevented from participating in the scheme again.

Auditing and records

Certificate holders (for example, grain marketers and accumulators) are audited annually. A small sample of the farms supplying each certificate holder will be selected each year for an independent audit. Not all growers are audited every year, and most would not expect a second audit within 10 years.

Australian farmers already keep many of the required records to meet local regulations and for farm business and risk management purposes, as detailed in *Growing Australian Grain: Safely managing risks with crop inputs and grain on farm*ⁱⁱⁱ.

If audited, growers may need farm plans with aerial photographs to assure the auditor that canola was not grown on land cleared of forest since 2008.

There are some differences between the two auditing schemes in the information required.

ISCC certification

The checklist provided in this factsheet provides an example of the records growers require for an audit under the ISCC certification scheme.

The ISCC's document *ISCC202 Sustainability Requirements for the Production of Biomass*^{iv} details the requirements for participating farms, including lists of some of the records required.

Under the ISCC scheme, any breach of Principle 1 (high-conservation-value land) will result in that farm being excluded from ISCC certification.

If the farm has breached some other requirements, corrective measures may be offered. These require satisfactory implementation within 40 days to achieve certification.

If one or more farms in a sample audit group do not meet the requirements, a second, larger sample of farms will be audited.

2BSvs certification

Under the 2BSvs scheme, the grain marketer or accumulator as the "First gathering entity" develops its own system to demonstrate that the biomass it provides meets the sustainability requirements of the EU Directive and it provides relevant information and training for biomass producers.

This information and training includes the data, documents and records that its suppliers need to retain to demonstrate compliance.

For this reason, the records that growers need to keep may differ between different grain buyers using the 2BSvs scheme.

The 2BSvs document *Requirements for the verification of biomass production*^v sets out the criteria, indicators and principles that grain marketers and accumulators must work within.

CALCULATING EMISSIONS VALUES FOR AUSTRALIAN CANOLA

The CSIRO research reportⁱⁱ provides a specific greenhouse gas emissions value for each Australian canola growing state (Table 1). It has been formally accepted by the EU, allowing these Australian figures to be used for calculating emissions values for biofuels made from canola grown in each state.

CSIRO's detailed analysis and modelling determined the emissions from soils, crop residues, fertiliser inputs, fertiliser and pesticide manufacturing, fuel use, lime and seed used for canola growing in each Australian state (Figure 1). The calculations took into account regional differences in climatic conditions, soil types and management practices and irrigated versus dryland systems.

The research found that variations in nitrogen fertiliser inputs and the associated fertiliser manufacture, soil biological processes of crop residue decomposition and yield had the most impact on

greenhouse gas emissions (Figure 1). Emissions from fuel use and indirect nitrous oxide emissions were the next most significant. Changes in stubble management, the area subject to leaching, pesticide and lime use and direct nitrous oxide emissions had a minor impact on the final emissions value.

Figure 1 illustrates variations in emissions from each element of the canola system caused by differences in the farming system, soil type and climatic conditions in each state.

For example, canola systems in Queensland were measured by CSIRO to have similar emissions to those in other states with the exception of emissions from fuel usage, which was four times higher than other states.

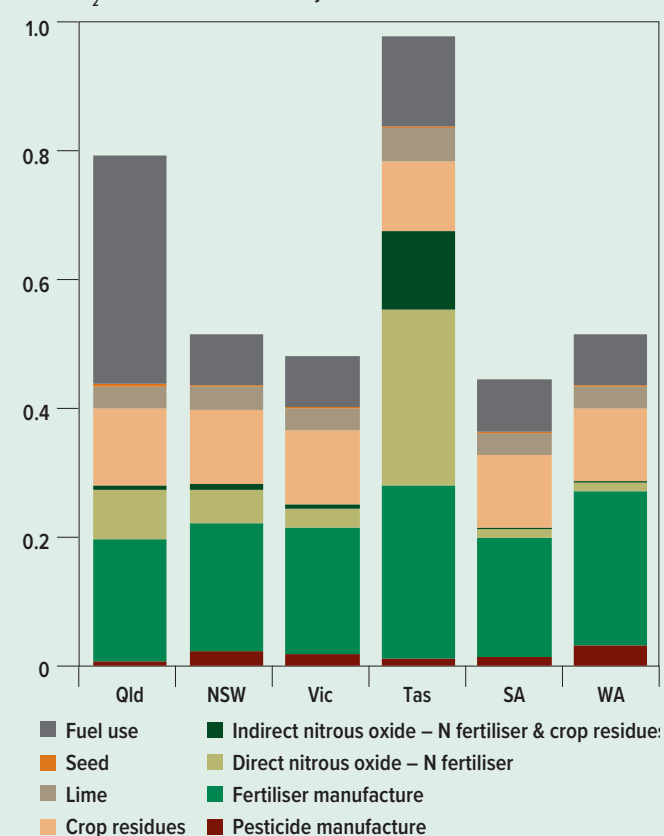
The higher total emissions value reported for Tasmanian canola relative to other Australian states is attributed to higher levels of nitrogen fertiliser applied and higher leaching loss.

TABLE 1 Greenhouse gas emissions from canola cultivation in Australian states

Total canola production emissions g CO ₂ -e/MJ FAME	
Queensland	30
NSW	20
Victoria	18
Tasmania	37
South Australia	17
Western Australia	20

FIGURE 1 Greenhouse gas emissions from the components of Australian canola production in each state.

Tonne CO₂-e/tonne canola seed on dry matter basis



Source: CSIRO research commissioned by the Australian Oilseeds Federation (AOF) and Australian Export Grains Innovation Centre (AEGIC) with GRDC investment on behalf of industry.

FURTHER INFORMATION (FOOTNOTES):

- i EU Renewable Energy Directive www.ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive
- ii Australian Country Report for Canola www.australianoilseeds.com/Technical_Info/industry_reports
- iii Growing Australian Grain: Safely managing risks with crop inputs and grain on farm <http://grainsguide.grainproducers.com.au>
- iv ISCC202 Sustainability Requirements for the Production of Biomass www.iscc-system.org/wp-content/uploads/2017/02/ISCC_PLUS_202_Sustainability-Requirements.pdf
- v 2BSvs Requirements for the verification of biomass production www.2bsvs.org/scheme-requirements-and-documents.html
- vi ISCC Audit-Ready Guide <http://www.australianoilseeds.com>
- vii Nash D, Anderson G, Dowling C, Fullerton G, Grace P, Kraak J, Sounness C, Wallace A, (2014): Understanding nitrous oxide emissions from agriculture and principles for mitigation. www.n2o.net.au/resources/publications
- viii National Agricultural Nitrous Oxide Research Program: Nitrous oxide emissions in the Grains Industry www.n2o.net.au/wp-content/uploads/NANORP_Grains_Fact_Sheet.pdf

FARM RECORDS AUDIT CHECKLIST

The AOF has prepared a [guide for growers](#)^{vi} detailing the documents they would need for an ISCC audit, based on the ISCC Principles. Audited growers will need to demonstrate compliance with all the 'major musts' (marked (M) below) and 60 per cent of the other criteria under each principle.

LEGAL

- ☐ Trading name/landowner name and full contact details. (M)
- ☐ Land titles and/or lease agreements whole farm and cropped land with coordinates. (M)
- ☐ History of tenure and land rights complied with/secured. (M)
- ☐ We comply with all applicable regional/national laws and international treaties. (M)

BIODIVERSITY & CARBON

- ☐ Farm maps – pre 1 January 2008 and current showing vegetation and land use. (M)
- ☐ Post January 2008 clearing permits (if applicable). (M)
- ☐ Farm Plan (Crop Rotations, Vegetation + Soil & Water Conservation).
- ☐ Crop rotation maps and paddock records (electronic and paper). (M)
- ☐ Subcontractors comply with the ISCC requirements. (M)

ENVIRONMENTAL IMPACT & RIPARIAN VEGETATION

- ☐ New building & drain plans and approvals showing environmental considerations. (M)
- ☐ Riparian vegetation maintained or re-established.

SOIL CONSERVATION, ORGANIC MATTER & STRUCTURE

- ☐ Soil conservation plan/strategies documented and collated including evidence of good soil management practices, conservation cultivation technique(s) to reduce erosion, increase organic matter and maintain soil structure. (M)
- ☐ Burning permits (if applicable). (M)
- ☐ Use of agricultural byproducts is appropriate. (M)

GROUND WATER

- ☐ An irrigation water management plan (if applicable).
- ☐ Mineral oil product storage is such that it reduces risk of environmental contamination. (M)
- ☐ Water use is efficient, respects existing water rights, provides for access for human consumption, is sustainable, non polluting, and waste discharge is available. (M)

FERTILISERS

- ☐ Records of fertiliser applications (paddock, date, full description, rate). (M)
- ☐ Records (soil tests) to show input/output balance of fertilisers/nutrients. (M)
- ☐ Nitrogen fertilisers do not contaminate ground or surface water and are not applied to flooded, water logged or frozen soils. (M)
- ☐ Application machinery calibrated annually and is well maintained. (M)
- ☐ Fertiliser storage facilities are dry, clean and have no leakage. (M)

PEST MANAGEMENT

- ☐ Advice or training has been received in integrated pest management.
- ☐ Evidence of prevention, monitoring and intervention for pest control.

CHEMICALS

- ☐ Chemical handling certification(s) for all staff deciding on chemicals. (M)
- ☐ Record of chemical, paddock, date, operator, rate, target species. (M)
- ☐ Invoices for registered plant protection product purchases.
- ☐ Up-to-date Product Storage Inventory.
- ☐ Plan/facilities to prevent potential ground water contamination and address accidental spillage are in place. (M)
- ☐ Farm waste management and recycling plan (designated waste storage areas).
- ☐ There is regular calibration of application equipment. (M)
- ☐ All product label instructions and local restrictions followed. (M)
- ☐ A non contaminating disposal method for surpluses, rinsates and flushings followed. (M)
- ☐ The chemical store is robust, fire resistant, has a sealed floor, locked, well ventilated & lit, and is independent of other materials. It meets local regulations. (M)
- ☐ Chemicals are only stored in original containers. (M)
- ☐ Liquids are not stored above granules or powders.
- ☐ Measuring and mixing facilities are available. (M)
- ☐ Empty containers not reused except for identical product.
- ☐ Container disposal avoids harm to humans and the environment, uses official collection and disposal (for example, drumMuster®) and follows local regulations.

OCCUPATIONAL HEALTH & SAFETY (OH&S) PLAN

- ☐ An OH&S Plan that addresses identified risks.
- ☐ Employee training records showing adequate instruction in health and safety, hazardous substances and complex equipment they use on the farm. (M)
- ☐ All staff and contractors are equipped with approved, clean personal protective clothing. (M)
- ☐ First aid kits are present at all permanent sites and accessible in the field.
- ☐ Potential hazards have warning signs.
- ☐ Worker facilities are hygienic and living quarters habitable (if provided).
- ☐ Accident prevention procedures are evident within 10 metres of product or store.
- ☐ Accidental contamination procedures, first aid kit and facilities are on hand.

EMPLOYEES

- ☐ Employees and subcontractor records – full name, date of birth, date of entry, wage/rate and period of employment.
- ☐ Signed self declaration of good practice agreed with employees.
- ☐ Employment conditions meet International Labour Organisation (ILO) core standards 29, 105, 138, 182, 87, 98, 100, 111 [Australia is a member of the ILO]. (M)

Source: Australian Oilseeds Federation ISCC audit ready guide (www.australianoilseeds.com)

WHY IS ALL CANOLA NOT THE SAME?

Differences in greenhouse gas emissions between regions are due to variations in fertilisers, soils, moisture, fuel usage, management and other elements. Crop yield has a large influence on the emissions value where emissions are assessed per unit of crop product or energy (as they are for the EU renewable energy market) rather than per hectare.

Individual growers do not need to demonstrate the emissions from their canola production to access the EU biofuel market. The emissions figures for each state can be used to determine the supply chain emissions value. Reducing emissions will help to improve the efficiency of fertiliser and fuel use on farm.

Strategies to reduce fertiliser loss and greenhouse gas emissions include matching fertiliser application to crop demand, timing and placement of nitrogen application to match the soil type, crop and weather conditions, selection of fertiliser product, legume cropping to build organic nitrogen stores and reducing waterlogging.

NITROUS OXIDE AND CROPPING

Nitrous oxide is considered the most potent of the greenhouse gases in influencing climate with long-term effects on the atmosphere. Nitrous oxide is released naturally from nitrification and denitrification by microbes in soils; the rate of emissions has increased under modern agricultural systems. About 80 per cent of nitrous oxide emissions in Australia come from agriculture. The loss of nitrogen fertiliser as nitrous oxide is one of the leading sources of greenhouse gas emissions.

Nitrous oxide emissions from Australian cropping system are low compared with the high-input systems of the northern hemisphere. However, losses up to 70 per cent of nitrogen fertiliser as nitrous oxide and di-nitrogen have been measured.

Under cropping systems:

- Nitrous oxide is released from applied N fertiliser, crop decomposition, burning of crop residues and biological nitrogen fixation.
- N fertilisers and animal manures can increase mineral nitrogen in the soil, increasing the rate of nitrous oxide emissions.
- Climatic conditions, soil type and management affect the rate of emissions.
- Wet conditions increase denitrification, even if the soil is not noticeably waterlogged, particularly if the soil's nitrate and organic matter levels are high.
- Nitrous oxide emissions can increase when soils with high levels of organic carbon are changed from pasture to cropping with added N fertiliser.

NITROUS OXIDE RESEARCH

The National Agricultural Nitrous Oxide Research Program (NANORP) gathered detailed information about nitrogen losses and strategies to minimise nitrous oxide emissions in Australian grain, horticulture, cotton, dairy and sugarcane farming systems. The program was funded by the

Australian Government from 2012–2016 and managed by the GRDC.

Research needs to be considered in its regional context as there are major differences around Australia in fertiliser timing, application and crop management to suit local soil types and rainfall. Regional research findings in grain systems included:

WESTERN AUSTRALIA:

- On sandy cropping soils in the state's low-rainfall area only 0.08 to 0.12 per cent of applied nitrogen fertiliser was lost as nitrous oxide. Losses there were highest in wet, post-harvest summer conditions.

QUEENSLAND AND NORTHERN NSW:

- Dryland summer sorghum crops had low levels of nitrous oxide emissions (typically 1 to 2kg/ha or less than 1 per cent of N fertiliser). Losses of nitrogen as other gases were much higher (up to 80kg/ha or 40 per cent of annual nitrogen applications). This is believed to be due to the low carbon levels of the clay soils typically used for cropping in the northern region.
- Double cropping on these soils can increase the labile carbon content, resulting in high gaseous nitrogen losses early in the growing season (if the soils are waterlogged and coincide with high fertiliser rates).
- Growing legumes after the sorghum crop to build organic nitrogen stores may reduce nitrous oxide emissions from these systems.

SOUTHERN NSW

- There was no influence of tillage on emissions when compared with a no-till cropping system at Wagga Wagga.

VICTORIA

- In the high-rainfall zone (more than 650mm rainfall annually) in south-west Victoria, emission losses up to 60g nitrous oxide per hectare per day were measured on cropping soils prone to waterlogging and with high mineral N content.
- In the medium-rainfall area around Horsham, 20 to 40 per cent of applied N was not taken up by crop.
- In the Wimmera region, nitrous oxide emissions were low on soils with low labile carbon and nitrate content. Emissions increased when the high-clay content soils were waterlogged.
- Research at Hamilton measured a total loss of 80 to 90 per cent of applied nitrogen where nitrogen had been applied as urea, deep banded at a depth of 10cm below the seed at sowing, followed by saturated or waterlogged conditions.
- Up to 45 per cent of applied nitrogen was lost from the system after a single large storm event in one trial.
- Canola and legumes used most of the mineral nitrogen available during the growing season, with most emissions occurring in the summer fallow after harvest from N mineralised from crop residues.

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