

Climate Change

ACTION ON THE GROUND

Using nitrification inhibitors to reduce greenhouse gas emissions in horticulture.

The use of nitrogen fertilisers in agriculture can result in emissions of a potent greenhouse gas called nitrous oxide (N_2O). This gas has a greenhouse effect about 300 times stronger than carbon dioxide. As a result, it is important to understand ways in which the emissions of N_2O from fruit and vegetable production can be minimised.

How is nitrous oxide produced?

Nitrous oxide is produced by biochemical reactions in the soil. Nitrogen occurs in several forms within the soil (figure 1) and the way it moves between these forms in the atmosphere, soil and vegetation is very complex. Within this cycle, there are several processes that result in the generation of nitrous oxide gas that is then lost to the atmosphere. As a general rule, the greatest emissions of nitrous oxide result from a combination of:

- excess nitrates in the soil from the application of nitrogen fertilisers (for example, applying too much, at the wrong time, in the wrong place, or using inefficient methods).
- anaerobic conditions, such as waterlogged or compacted soils.

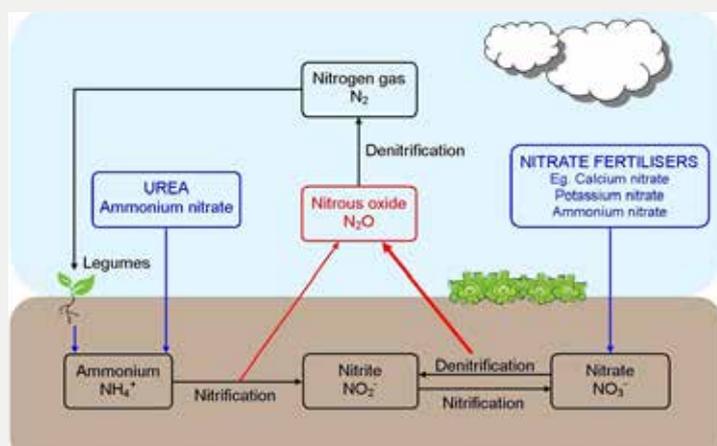


Figure 1. The basics of the nitrogen cycle in soil.

In short, nitrous oxide emissions represent wasted fertiliser and reducing these emissions will improve the economic and

production efficiency of your farm. Steps to reduce these emissions involve improving the efficiency of fertiliser use and employing practices that reduce anaerobic soil conditions.

Nitrification inhibitors.

Nitrification inhibitors are a type of chemical that can be added to nitrogen fertilisers. They act to reduce the production of N_2O by interfering with the biochemical reactions in the soil. The result is that these chemicals can reduce the production of greenhouse gases without reducing the amount of nitrogen that is available to the crop. Many large fertiliser manufacturers have developed products that contain some type of nitrification inhibitors.

A demonstration project.

A new project is designed to demonstrate just how effective nitrification inhibitors can be in reducing emissions of greenhouse gases while increasing production efficiency in horticulture farms.

A number of trial sites have been established on six farms in south east Queensland and one in Victoria. These farms were selected to represent a variety of crops and systems to provide a range of real-world examples of emission reduction practices in action.

The farms are located in the Granite Belt, Fassifern Valley, Locker Valley and Great Dividing Range in Queensland, and at Clyde in Victoria. The crops include apples, avocados, green beans, broccoli, Chinese cabbage and cos lettuce.

At each of these farms, the grower's current standard fertiliser practice will be used alongside a new regime that uses nitrification inhibitors with the same total nitrogen content. The project will measure the emissions of the three main agricultural greenhouse gases (nitrous oxide, carbon dioxide and methane), soil nitrogen levels, marketable yield, and a range of other data. The economic costs and benefits of the new practice will also be analysed.



Figure 2. Gas sampling chambers in the field on a commercial farm in the Lockyer Valley.

These trials will provide realistic demonstrations of the relative benefits of nitrification inhibitors under commercial production conditions on a range of different farm types. The results will be presented in a series of case studies, the Growcom website, and on-farm field days.

More information

More information, including case studies and information on upcoming field days, will be available on the Growcom website (www.growcom.com.au).