

Big benefits from 'fine tuning' inoculation practices

GRAEME JENNINGS

Effective inoculation of legumes with *Rhizobia* can deliver substantial nitrogen (N) inputs even when it has little or no impact on yield, Maarten Ryder told the recent GRDC Update in Adelaide.

However, inoculation can provide a significant yield benefit too, said Dr Ryder, an extension officer with the University of Adelaide School of Agriculture, Food and Wine.

"In one trial in south-western Victoria, inoculation of faba bean boosted N inputs from 32 to 196 kg N/ha, almost doubled crop dry matter and lifted yield by 1 t/ha compared with beans that weren't inoculated. In the same trial, inoculation of lupin substantially increased N fixation but had little effect on the lupin yield.

An inoculant may be needed annually in acid soils unless the legume is lupin.

"Nitrogen fixation in legume crops is directly related to the biomass of the crop, so maximising the biomass of well-nodulated crops will maximise N benefits.

"In a trial at Culcairn, in the NSW Riverina, legumes fixed approximately 18 kg/ha for every tonne of dry matter produced. Trials across many years and locations show that, on average, pulse crops will fix around 110 kg/ha of nitrogen.

There is a high chance of a response from inoculating seed where it is the first year of a legume crop or pasture in the paddock, where the soil is acid or soil nitrate levels at sowing are low, Dr Ryder said.

For crops such as chickpea, which has very specific rhizobia requirements, inoculation is essential when the crop is grown in a paddock for the first time.

A response to inoculation is less likely where soil nitrate levels are high or there is a good population of the correct rhizobium for the legume being grown.

"N fixation is greater where soil nitrate levels are less than 50 kg/ha and virtually ceases at 200 kg/ha."



A HEALTHY CHICKPEA PLANT WITH AN AGGREGATION OF NODULES CONTAINING NITROGEN-FIXING RHIZOBIA.

Some crops might not need inoculation to achieve effective nodulation and consequent nitrogen fixation, he said, but in other circumstances effective inoculation with the right rhizobium for the crop could produce significant longer-term benefits.

"Soil type and paddock history can be good indicators of the need for rhizobial inoculation but the only way to check whether a legume crop is fixing nitrogen is to dig up some plants two or three months after sowing, wash the roots and check the number, position and colour

of nodules.

"If there are no nodules the crop is not fixing nitrogen. That can't be remedied in the current crop, he said, but indicated a need to use an inoculant the next time that paddock was sown to a legume."

Dr Ryder suggests growers adopt a strategic approach to rhizobial inoculation.

"Targeted strategic use is the best way to ensure maximum N inputs from legumes," he said.

"It is good practice to inoculate at least

every four years, but where acid-sensitive crops such as peas and beans are sown into acid soils it is prudent to inoculate every time a crop is sown because rhizobial populations tend to diminish quickly under acid soil conditions.

“An inoculant may be needed annually in acid soils unless the legume is lupin. Lupin and its rhizobial strain are well adapted to acid soils.”

Rhizobia would usually not be present if the crop has not been grown in the paddock previously and rhizobia levels are likely to be low if the previous legume crop was poorly nodulated or did not grow well, he said.

“Rhizobia populations decline under sustained high soil temperatures in summer and survival of rhizobia can be compromised by dry sowing, acid soils and mixing with fertilisers and pesticides.

“Inoculants should not be mixed with acid fertilisers or heavy metals and it is not advisable to mix them with untested products.

“It is also important to make sure tanks and lines are cleaned thoroughly before they are used for rhizobium.”



MAARTEN RYDER IN FIELD DAY MODE EXPLAINING THE BENEFITS OF LEGUMES IN A CROP ROTATION AND THE VITAL ROLE OF RHIZOBIA IN MAXIMISING THOSE BENEFITS.

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