

How much nitrogen can we grow during summer on the South Coast?

Dan Fay, R&D Co-ordinator, SCF

SCF have recently implemented a trial with GRDC investment to explore the use of legume cover crops grown over summer, in replacement of the traditional chemical fallow. Nitrogen fixing opportunities were rated as the second highest R&D priority by SCF members in 2022, and This project will investigate the viability of legume crops sown post-harvest after a significant rainfall event or where ample soil water is available, solely to produce nitrogen for the following winter crop. This differs from other summer cropping investments which have explored summer grain production and/or grazing opportunities.

Cover crops are essentially grown to either preserve soil moisture, through the continuation of ground cover, or to produce a crop that will provide a nutritional benefit to the following crop (or both). This project focusses on the latter and finding a viable legume that could be grown over our summer (when moisture is available) could be a game changer for the region. The need to get legumes into crop rotations is becoming increasingly evident given the skyrocketing commodity prices. Since January 2021, the price of urea has increased from \$256/t up to \$1,026 and has since dropped back to a still high price of approximately \$750/t (Australian Trade and Investment Commission, 2022). This has been driven by rising global energy prices and by Russia and China imposing fertiliser export

restrictions in 2021 and constraining global supply. It has been predicted that urea prices will continue to remain high with continued conflict between Russia and Ukraine. The limited marketability and price volatility of faba beans and lupins restrict a farmer from taking advantage of the nitrogen they can fix. Could a summer legume cover crop provide this nitrogen growing opportunity, particularly on the South Coast and in the Lower Great Southern?

HOW IT WORKS

The key is to select a crop type that will have good heat tolerance, produce a large amount of biomass, and have a high biomass to fixed nitrogen ratio. It should be noted that a suitable soil pH is necessary to encourage both crop growth and nodulation. The crop is seeded and then grown until peak biomass production, and terminated prior to pod set. This is important for two reasons; once the pods are formed, nitrogen will be accumulated in the burgeoning seed and will not be readily available for the following crop, and two, if a viable seed is formed, volunteer plants will be very difficult to control in the following winter crop.

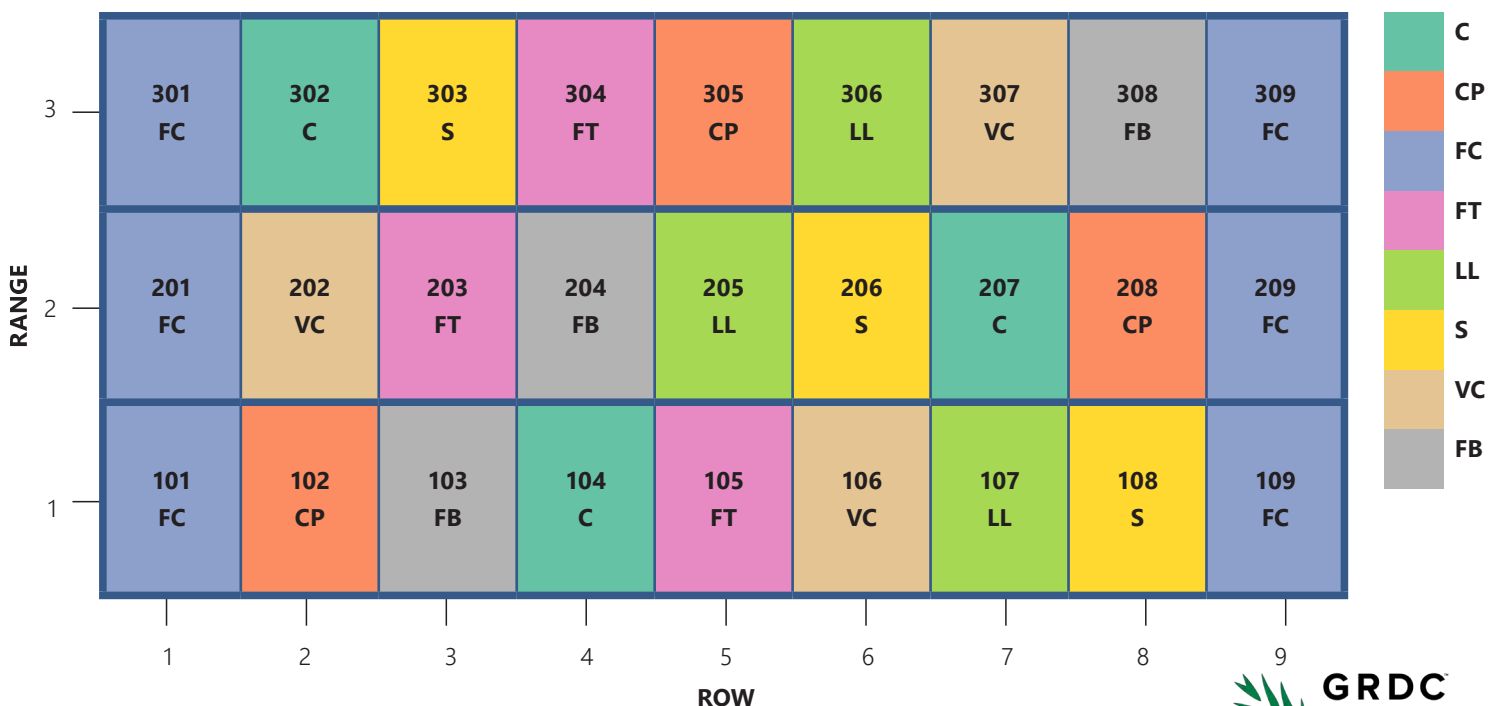


Figure 1: 2023 Legume cover crop small plot trial design





THE TRIAL

The SCF small plot trial is located at the Adams' property in Woogenellup. The trial contains six legume species; common vetch, soybean, lablab, cowpea, chickpea and faba bean, as well as two control treatments- a chemical fallow and a cultivated control. Each crop species will produce differing levels of biomass and will fix different amounts of nitrogen. This trial aims to assess the most effective and efficient species for fixing nitrogen within the summer fallow period. The trial is triple replicated and was irrigated initially with the equivalent of 25mm, to replicate the conditions of a summer rainfall event. We did try and wait for a summer storm, but with no luck! Deep soil cores have been taken to 80cm to establish the level of nitrogen currently in the soil, and to act as a baseline figure. Throughout the trial, additional deep soil core samples will be taken and analysed to form an account of the nitrogen as it moves through the system.

The cover crops will be terminated as they begin to set pods, or at autumn knockdown (whichever comes first), before the paddock is then seeded to spring wheat. At this time cover crop plant biomass will be assessed to determine the total nitrogen contribution to the system. The plots will then be incorporated into the soil to encourage a rapid breakdown of the plant residue. The winter crop and soil nitrogen will be monitored to effectively establish the impact each legume species has had on nitrogen availability and winter crop production.

The trial was seeded on February 2, and despite the subsequent hot conditions each treatment has had a good germination and is well established. This is critical to the plants surviving the summer and building biomass. SCF will continue to report on this novel trial over the next couple of months. Stay tuned for updates!



Figure 2: Trial site as of February 13 2023.



Figure 3: Soybean nodulation at 28 days after seeding.