06

FARMLINK RESEARCH REPORT 2021

INTERCROPPING CANOLA AND VETCH – IS THERE POTENTIAL?

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TRIAL SITE LOCATION Temora Agricultural Innovation Centre

INTRODUCTION

At the beginning of 2021 FarmLink received funding from the Department of Agriculture, Water and Environment for our Weather or Not project. Weather or Not is a FarmLink produced magazine that tracks 8 farmer paddocks across the FarmLink region, utilizing crop sensors and the crop modelling tool Yield Prophet to make better nitrogen decisions. However, in 2021 we introduced an intercropping trial to the project to look at alternative nitrogen sources and strategies across our cropping rotations.

What is intercropping?

Intercropping is the farming practice of growing two or more crops together for grain. This practice is more widely done overseas and is relatively new to Australian farming systems. The benefits are varied and may include, overyielding, improved N economy, more efficient resource use (water, nutrients and sunlight), reduced diseases and soil health improvements. Much of these perceived benefits are either anecdotal or attributed to overseas research and more work needs to be done to evaluate intercropping's potential in our region.

In 2019, FarmLink members and staff went on an intercropping study tour to Canada to investigate its potential. On this tour we saw large commercial farms successfully growing two grain crops together. Harvesting and separating different grain types was their biggest challenge but most of the farms we saw had increased their total intercropped area over the past 10 years. We saw that Intercropping had increased their farming system diversity and contributed to more sustainable and profitable farm businesses.

In 2021 FarmLink established a vetch/canola intercropping trial. The aim was to identify the potential of intercropping in our farming systems and quantify some of the anecdotal benefits of intercropping.

PROJECT PARTNER FarmLink

FUNDING PARTNER Australian Government | National Landcare Programme

Aim

To evaluate the potential of growing canola and vetch together as an intercrop mix.

Method

Location: Temora Agricultural Innovation Centre

Growing season rainfall (April to October):

Sowing date: 10 May 2021

Seeding equipment: Knife point press wheel

Pre-emergents: 750g/ha Terbyne Xtreme (Terbuthylazine) + 1L Rustler (Propyzamide)

Post emergents:

- 2L/ha Mancozeb sprayed on intercrop and vetch monoculture treatments on 10 August 2021.
- 1L/ha Veritas sprayed across all treatments (intercrop, canola monoculture and vetch monoculture) on 31 August 2021.
- 1L/ha Veritas sprayed on vetch monoculture treatments only on 15 October 2021

Fertiliser: 80kg/ha MAP at sowing across all treatments and three different nitrogen rates, spread with urea on 13 July 2021. The three nitrogen rates were high (126kg N/ha), low (38kg N/ha) and zero nitrogen.

Trial design: Randomised complete block trial design with 4 replicates

Treatments

1.	Canola monoculture (Trident) + high nitrogen rate (126kg N/ha)
2.	Canola monoculture (Trident) + low nitrogen rate (38kg N/ha)
3.	Canola/vetch intercrop (Trident and Timok) + high nitrogen rate (126kg N/ha)
4.	Canola/vetch intercrop (Trident and Timok) + low nitrogen rate (38kg N/ha)
5.	Vetch monoculture (Timok) + zero nitrogen rate

*Note: all treatments received starter fertiliser at sowing (80kg/ha MAP)

The crop was sown on 8 May 2020 using a double disc plot seeder and 60kg/ha MAP was applied with the seed. The vetch was inoculated with TagTeam rhizobia. In-crop spraying included pre-sowing (Terbyne Xtreme + Rustler + Talstar) and in-crop (Select + Uptake). There were no fungicide sprays applied.

Results

Yield results

The intercrop treatments out-yielded the canola monoculture under both fertiliser regimes (high and low N). These results show that there is potential for an intercrop to be commercially viable and potentially provide a lower risk crop option in the broadleaf phase of a crop rotation. For example, the low N intercrop treatment, which had only 38kg/ha N applied, yielded more than the high N canola, which is the commercial practice treatment of 126kg/ha N or 273kg/ha urea applied.

Post-harvest the grain samples of the intercrop were separated into each grain type. The results showed that the ratio of canola:vetch was influenced by the nitrogen applied. The high N treatment resulted in more canola and less vetch grain. In comparison, the low N treatment resulted in less canola and more vetch grain. The reasoning for this is likely due to vetch fixing its own N and when applied N is low, the vetch will out-compete the nitrogen deficient canola plants and therefore a greater ratio of vetch to canola in the final harvest sample.

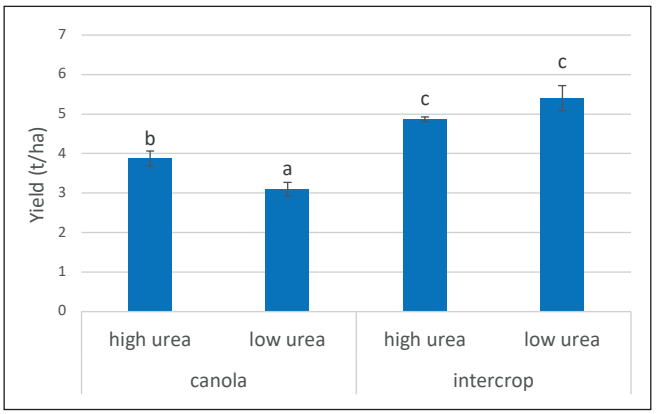

Figure 1. Yield response from applying high or low nitrogen rates on monoculture canola or vetch/canola intercrop (P<0.05, LSD = 0.567). Different letters indicate statistically significant difference and error bars indicate the standard error.

Soil N results

The soil N results did not show any statistically significant difference between the intercrop vs monoculture canola treatments. After year 1, all treatments resulted in 60-80kg/ha N remaining in the soil, with the exception of monoculture vetch, which had almost 100kg/ha N remaining.

These results show that with large grain removal there is not going to be a huge residual N benefit. Also, that the N benefit of an intercrop is likely still going to be less than a pulse monoculture.

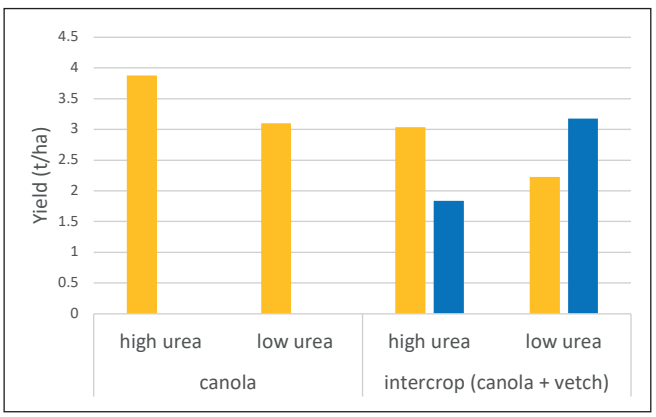

Figure 2. Separated harvested grain into canola and vetch grain types.

Disease pressure

There were differences in disease pressure between the intercrop and the vetch monoculture. Botrytis grey mould (BGM) was first observed at very low levels on the 10 August, in both intercrop and vetch monoculture vetch treatments. 2L/ha mancozeb was sprayed across both these treatments on 10 August.

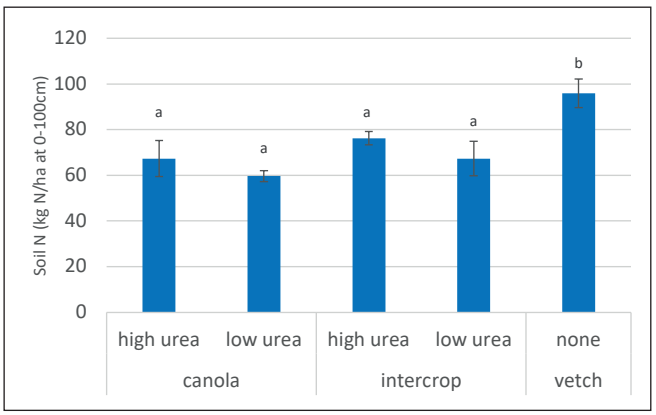

Figure 3. Residual soil N remaining after year 1 crop type and nitrogen rate treatments. Different letters indicate statistically significant difference and error bars indicate the standard error.

The second spray was 1L/ha Veritas on 31 August. This was sprayed across all treatments, targeting BGM in vetch and sclerotinia in canola. The spray was timed at the 20-30% bloom stage in the canola. This was the last fungicide application in the intercrop treatments. BGM was still present in the intercrop after this second spray, but it was low pressure and did not warrant a third fungicide spray.

In comparison, the vetch monoculture treatments had high BGM pressure later in the season. A third fungicide spray (1L/ha Veritas) was sprayed on the vetch monoculture treatments only. The differences in vetch plant architecture between the monoculture and intercrop treatments are the likely reason for differing later season BGM pressure. In the intercrop the vetch grew up to the top of the canola canopy (1.7m high) and this likely created better air flow through the canopy and lower humidity within the canopy. Compared to the monoculture vetch, that lodged on the ground and suffered high BGM pressure.

Discussion

The trial results showed that the "overyielding" benefit of an intercrop is real, compared to the monoculture alternatives. In this trial the vetch/canola intercrop significantly outyielded a high input canola crop. This is an impressive result but it should be noted that this may not always be the case across all seasons and in different geographic locations.

Canola is often a high input and high cost crop to grow. Each farm business has different risk profiles and growing an intercrop could provide a lower risk alternative to monoculture canola. If the seasonal outlook at sowing is not great, or if you are farming in a more marginal area, for example, then possibly an intercrop could be a lower risk option that could also provide legacy benefits for following crops.

The nitrogen benefit of an intercrop was not as great. The residual nitrogen differences between an intercrop and a canola monoculture crop were not statistically significant. There is likely more residual nitrogen remaining after an intercrop compared to after a low N canola crop but again the results were not significant. A vetch monoculture crop resulted in significantly more residual nitrogen compared to all other treatments.

These results show that the vetch component of an intercrop does provide residual fixed N for following crops but this benefit is probably not as high as is sometimes anecdotally reported.

This trial confirms that there is potential for intercrops to form a part of our cropping rotations. Their role might best fit into farming systems wanting to reduce nitrogen inputs and de-risk their cropping enterprise.