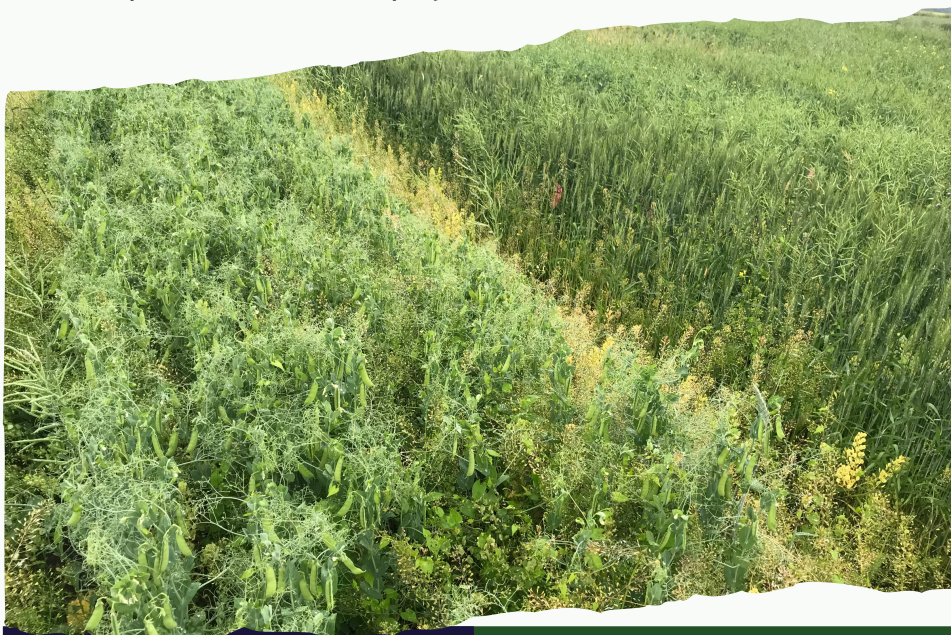


PEACE REGION LIVING LAB

Optimizing Intercrops for the Peace Region

This study aims to report significant findings in yellow pea, wheat and canola yield, test weight, protein content in wheat as well as oil content in canola seed obtained from intercrop systems fed under various percentages of N fertilizer rates in comparison to monocrop yields of these cash crops fed at 100% of N fertilizer rate. Moreover, weed cover is also evaluated in order to observe if more weeds are found under intercrop compared to monocrop systems and how this can be affected under different N rates.



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Key Points:

- Monocrops suppress weed growth more than intercrops
- Monocrops have greater protein and oil content
- Optimal N fertilizer rate for intercropping wheat or canola with peas is 50% of recommended N

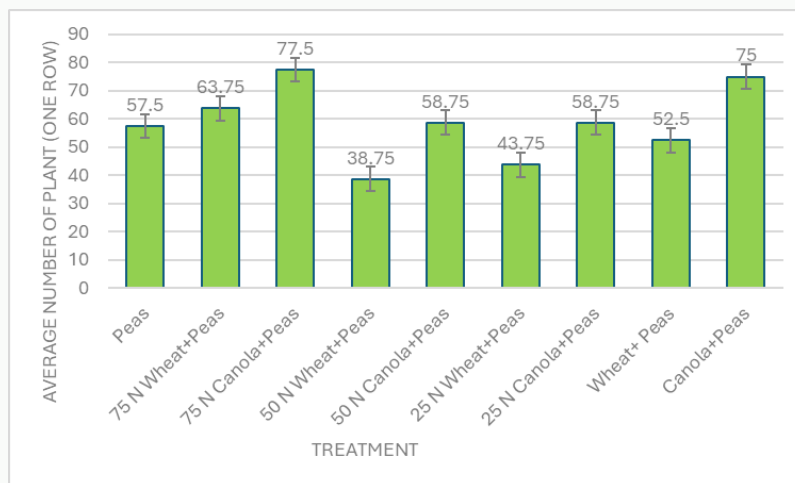
Task	Timeline	Details
Seeding	May 28	Canola 1.6-3.2 lb/ac Wheat 58-116 lb/ac Peas 151-201 lb/ac 0.75" depth
Maintenance	May 20-31	Urea 0-158 lb/ac S15 80 lb/ac Glyphosate (pre-seed) 1 L/ac
Harvest	Aug. 30 - Oct. 3	Straight-cut

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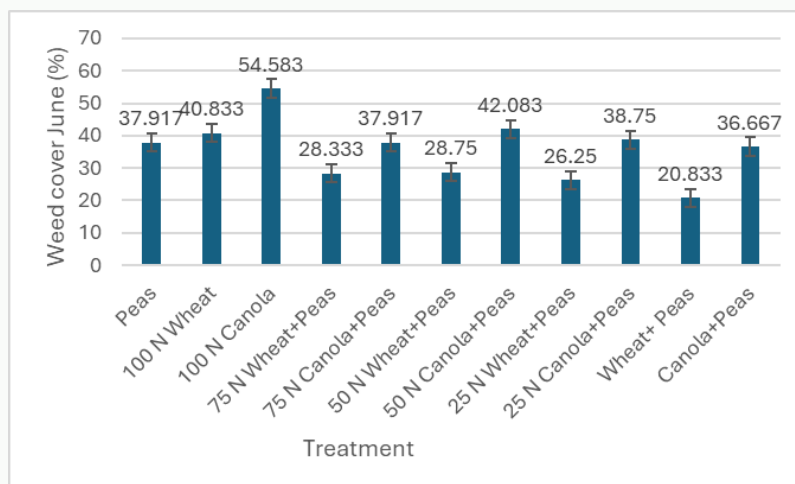
Optimizing Intercrops for the Peace Region

No statistically significant effect was observed for wheat emergence in intercrop systems fed under various percentages of N fertilizer rates ($p = 0.09$). This suggests that fertilizer rates and treatment combinations did not have a strong effect on plant emergence. However, from descriptive statistics, there is a slight variation in their median ranging from 80 plants per row for 25 N Wheat+ Peas to 95 plants per row for 100 N Wheat.

No statistically significant effect was observed for canola emergence in intercrop systems fed under various percentages of N fertilizer rates ($p = 0.2$). This suggests that fertilizer rates and treatment combinations did not have a strong effect on plant emergence. However, from descriptive statistics, 100 N Canola had the highest median emergence (42 plants per row) and highest maximum (70 plants per row), making it the most effective compared to the other treatments.



Weed cover (%) in July



Weed cover (%) in August

No significant effect for pea emergence in intercrop systems fed under various percentages of N fertilizer rates was observed ($p = 0.2$). However, from descriptive statistics the treatment Wheat+Peas 50 N shows the lowest median emergence at (40 plants per row) while the highest medians are seen Wheat+Peas 75 N and Canola+Peas 75 N treatments.

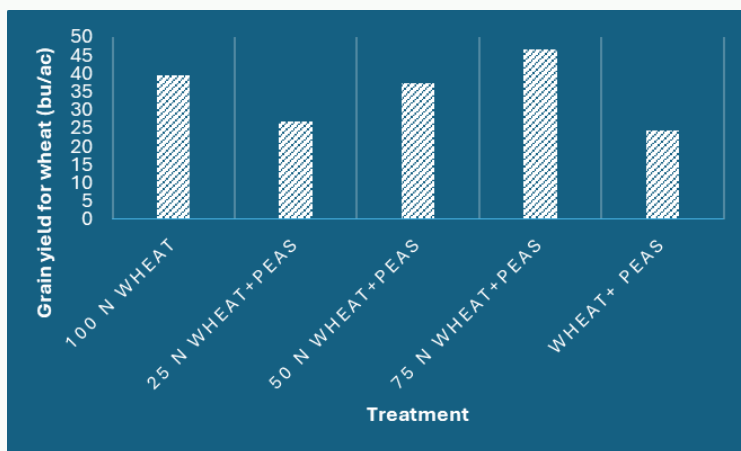
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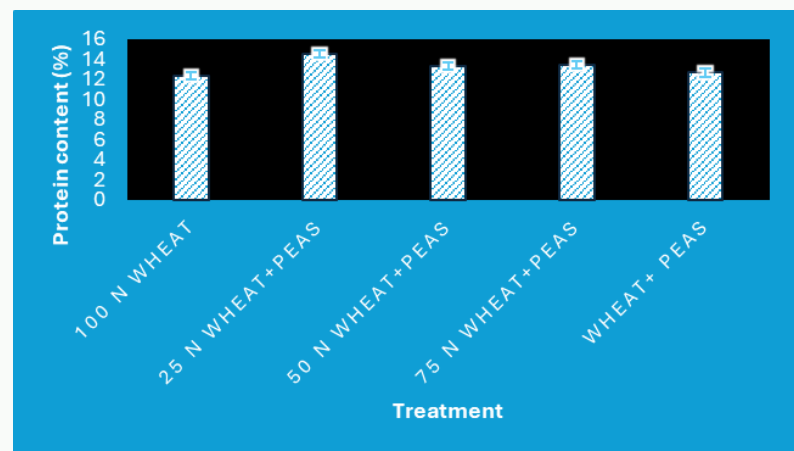
The ANOVA result at p-value of 0.002, is significant in weed cover in June across different intercrop systems with varying Nitrogen fertilizer rates compared to monocrop systems at 100% N fertilizer rate. A post hoc test was carried out to examine which specific treatment pairs differ significantly. The largest significant difference ($p = 0.007$) was observed between Canola (monocrop with 100% Nitrogen) and Canola+Peas (intercrop with 75% recommended nitrogen), compared to 75 N Canola Pea vs 50 N Wheat Peas at $p = 0.045$) which also performed well. 75 N Canola Pea vs. 25 N Canola Pea also performed well ($p = 0.025$). Therefore, monocrop systems with 100% N fertilizer controlled weeds more effectively than most intercrop treatments. The 75 N canola-pea intercrop had significantly higher weed cover in June.

There is an effect observed in weed cover in July across different intercrop systems with varying nitrogen fertilizer rates compared to monocrop systems at 100% N fertilizer rate.

A post hoc test was carried out to examine which specific treatment pairs differ significantly. Monocrop of canola at $p = 0.01$ shows lower weed cover compared to all intercrop treatments. The 50 N canola-pea treatment also had lower weed cover compared to other treatments, though its differences were not always statistically significant, but had better weed suppression than some of the wheat-based intercrops, making it a strong option. A sustainable approach to reducing nitrogen fertilizer input while still maintaining good weed suppression is 50 N canola + peas.



Wheat yield (bu/ac) of wheat-pea intercrops

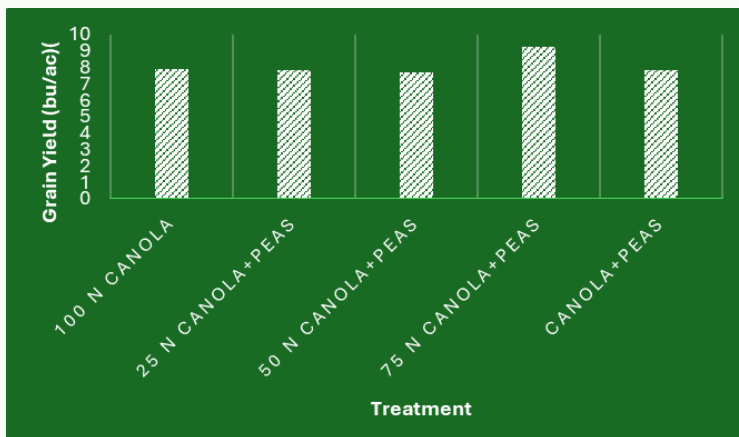


Protein content (%) of wheat-pea intercrops

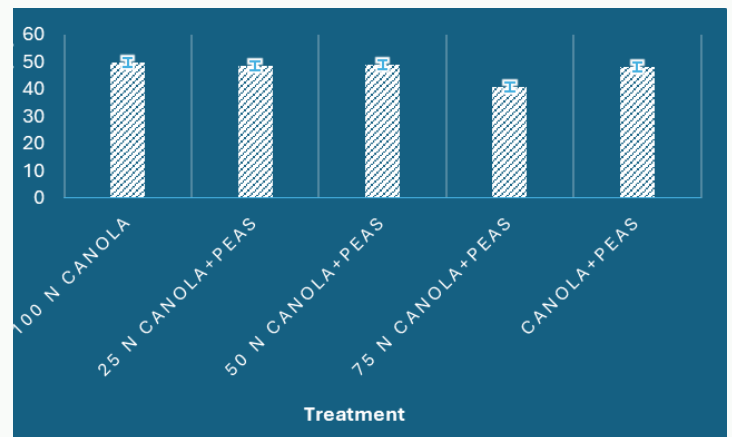
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Wheat yield was not significant across treatments compared to control ($P=0.16$). However, there was a variation with 25 N Wheat + Peas having relatively lower yields (24 bu/ac) with 75 N Wheat + Peas treatment being the highest (46 bu/ac) compared to control. 50 N Wheat + Peas could be a preferable option. Protein content in wheat shows significant differences at $p = 0.002$. Tukey post hoc test identifies that monocrop wheat had significantly higher protein content than 25 N Wheat + Peas ($p = 0.001$) compared to other treatments. This means higher nitrogen application increases protein content. 25 N Wheat + Peas also had significantly higher protein than Wheat + Peas at $p = 0.007$ compared to other treatments. Thus, even a small amount of nitrogen (25 N) increases protein content compared to the Wheat + Peas treatment without additional nitrogen.



Canola yield (bu/ac) of canola-pea intercrops



Oil content (%) of canola-pea intercrops

Yield for Canola was significant across treatments compared to control ($P=0.019$). Tukey post hoc test identifies a significant difference between 25 N Canola + Peas and 75 N Canola + Peas ($p = 0.038$) compared to other treatment. Best-performing treatments in terms of yield were Canola + Peas and lower nitrogen (25 N and 50 N) combined with peas, while 75 N Canola + Peas underperformed. Oil content in canola show significant differences at $p = 0.001$. Tukey post hoc test did comparisons indicating that 75 N Canola+Peas shows a significant decrease in oil content compared to 50 N Canola+Peas, (p -value < 0.001). It also has significantly lower oil content when compared to both monocrop canola and 50 N Canola+Peas, with $p = 0.001$. The highest oil content is observed in the canola monocrop and 50 N Canola+Pea intercrop, with statistically significant higher values compared to 75 N Canola+Peas.