

PEACE REGION LIVING LAB

Companion Cropping Annual Clovers with the Main Rotational Crops in the Peace Region

Companion cropping is the practice of growing a forage crop alongside a grain crop to optimize land-use efficiency so that a field can be used for hay or as a pasture after the main crop is harvested. Using small plots on a research farm in North Star, AB, this trial aims to determine which of three species of annual clover (White Clover, Crimson Clover, or Subterranean Clover) grown alongside a field crop (CWRS wheat or canola). The clovers are either sown by a disc drill or broadcast over the plot, therefore revealing which seeding method will yield better results for companion cropping.



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Key Points:

- Clover establishment is better with drill seeding
- Subterranean clover suppressed weeds the most in wheat stands, while crimson clover and white clover managed weeds in canola
- Canola stand count is higher with crimson or subterranean clover as a companion crop

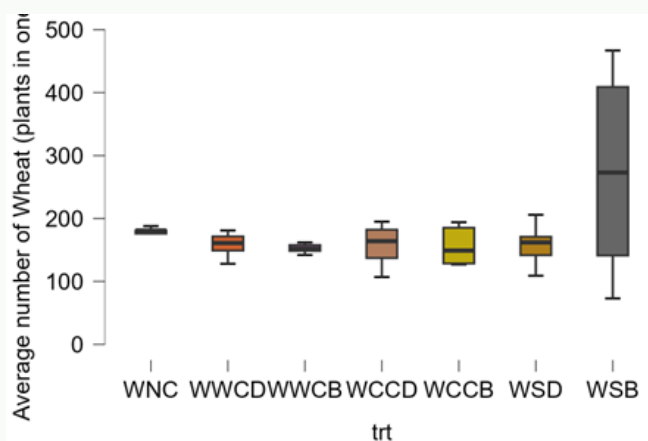
Task	Timeline	Details
Seeding	May 27-28	Canola 4.3 lb/ac Wheat 132 lb/ac Crimson Clover 3 lb/ac White Clover 3 lb/ac Subterranean Clover 20 lb/ac 0.25-1" depth
Maintenance	May 20-27	Urea 100 lb/ac S15 80 lb/ac Glyphosate (pre-seed) 1 L/ac
Harvest	Sept. 6 - Oct. 3	Straight-cut



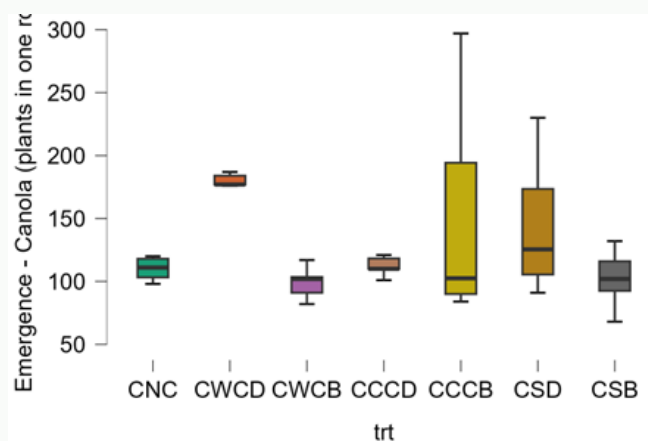
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There was a significant main emergence for spring wheat in July at $p = 0.03$. A Post Hoc test comparison for emergence of wheat was carried out with the following results: Plots with "Wheat; subterranean; broadcast" treatment shows significantly higher emergence compared to "treatments Wheat; no clover, Wheat; white clover; drilled, Wheat; white clover; broadcast, Wheat; crimson clover; drilled, Wheat; crimson clover; broadcast and Wheat; subterranean; drilled, with moderate emergence which are similar to one another.



Legend: WNC = Wheat; no clover, WWCD = Wheat; white clover; drilled, WWCB = Wheat; white clover; broadcast, WCCD = Wheat; crimson clover; drilled, WCCB = Wheat; crimson clover; broadcast, WSD = Wheat; subterranean; drilled, WSB = Wheat; subterranean; broadcast



Legend: CNC = Canola; no clover, CWCD = Canola; white clover; drilled, CWCB = Canola; white clover; broadcast, CCRD = Canola; crimson clover; drilled, CCCB = Canola; crimson clover; broadcast, CSD = Canola; subterranean; drilled, CSB = Canola; subterranean; broadcast

ANOVA analysis result of $p = 0.01$ indicates that there are statistically significant differences in canola emergence in July based on different clover options and seeding methods. The Post Hoc analysis reveals that white clover; drilled, under canola is associated with significantly better canola emergence in July compared to others. While the ANOVA identified differences across treatments, the Tukey test showed that only one specific pair (drilled white clover vs. broadcast subterranean clover) demonstrated a meaningful difference in canola emergence. This highlights the importance of seeding method choice, with a recommendation to utilize broadcasting methods, especially when using subterranean clover to optimize canola establishment.

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The drilled seeding method yields significantly higher clover emergence for both wheat and canola, suggesting better seed-soil contact and possibly more uniform seed distribution compared to broadcast seeding. Crop type (wheat vs. canola) did have minor influence on clover emergence with drilled seeding, but more noticeable variability is observed with broadcast seeding. Treatments Wheat; subterranean; drilled, Canola; subterranean; drilled, and Canola; white clover; drilled have relatively higher counts ranging from 100 to 200 plants per row compared to other treatments. Among these, "Wheat; subterranean; drilled exhibits the highest emergence.



Among the wheat treatments, "subterranean clover; drilled" consistently showed reduced weed cover compared to several Canola treatments. This indicates a potential weed suppression advantage when using subterranean clover with a drilled method in wheat systems. Compared to the most effective wheat treatments, many Canola treatments, especially those with crimson clover; drilled and white clover; drilled methods showed higher performance for weed cover. This could imply that Canola may not be as effective as wheat in minimizing weed presence under similar management conditions. For both Wheat and Canola, switching between clover types (white, crimson, subterranean) and seeding methods (drilled) did produce significant changes in weed cover. Using Wheat with Subterranean Clover (Drilled) for Effective Weed Control: This combination appears to offer a significant reduction in weed cover, making it a recommended strategy for minimizing weed presence.

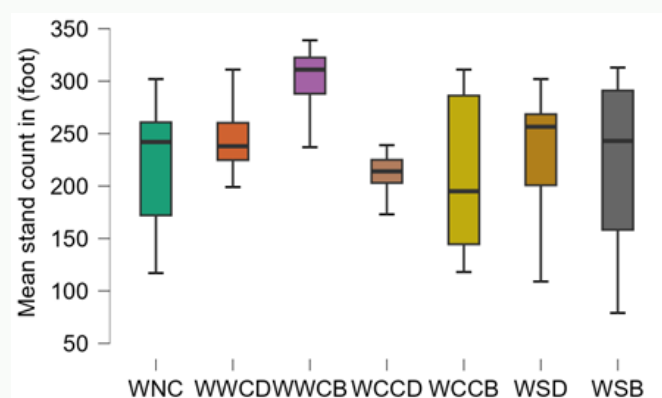
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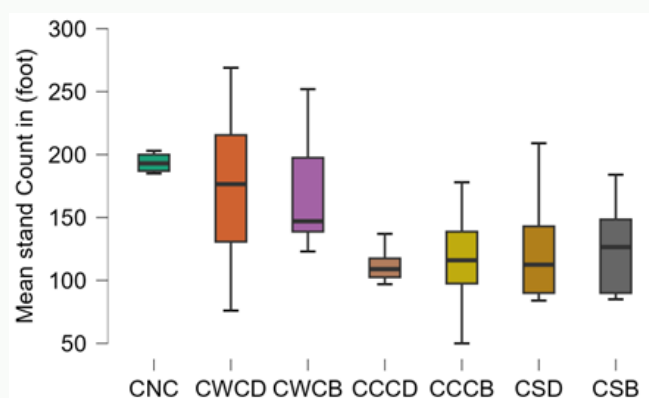
There is no statistically significant differences between the different clover treatments and seeding methods for wheat in terms of stand count at maturity ($p = 0.12$). However, interpreting the descriptive trends from the boxplot indicates Wheat; white clover; broadcast has the highest median (~300) and widest variability, followed by Wheat with white clover broadcast (~275). Although no statistical significance was detected, the descriptive statistics suggest that these treatments, may result in higher stand counts but come with increased variability.

Canola stand count at maturity in August indicates that there is a statistically significant difference between the different clover treatments and seeding methods ($p = 0.002$).

There is a significant increase in stand count when Canola is sown with crimson clover (drilled) compared to no clover ($p = 0.016$). The broadcast seeding of crimson clover also leads to a significantly higher stand count compared to no clover. Drilled subterranean clover significantly increases the stand count compared to no clover ($p = 0.047$). Canola; subterranean clover; broadcast: $p = 0.053$. Although the p-value is slightly above the 0.05 threshold, it is close, indicating a trend towards significance when subterranean clover is broadcast. Canola: white clover (drilled or broadcast) vs. other treatments did not show any significant impact on stand count.



Legend: WNC = Wheat; no clover, WWCD = Wheat; white clover; drilled, WWCB = Wheat; white clover; broadcast, WCCD = Wheat; crimson clover; drilled, WCCB = Wheat; crimson clover; broadcast, WSD = Wheat; subterranean; drilled, WSB = Wheat; subterranean; broadcast



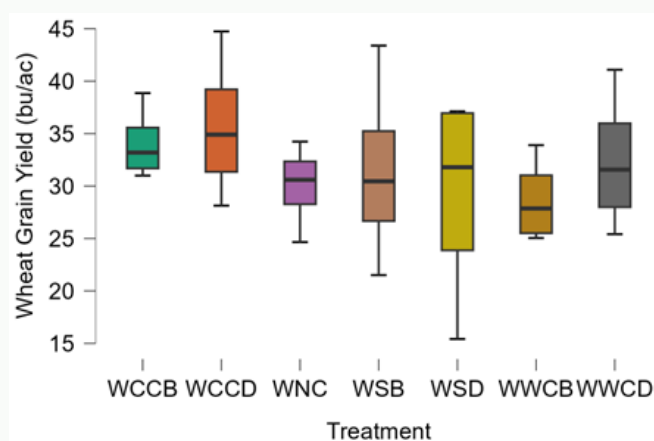
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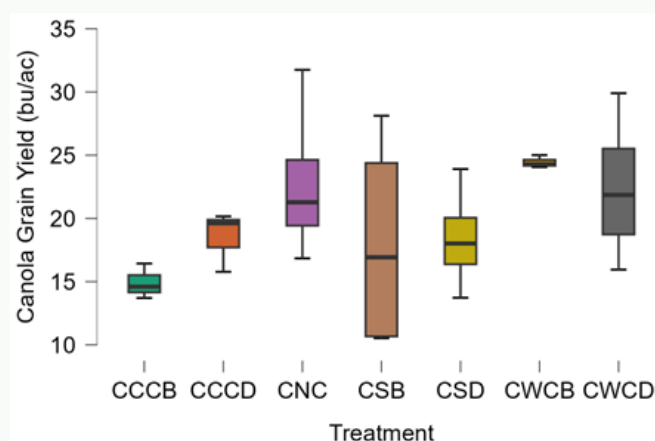
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The ANOVA results indicates no significant difference in yield for spring wheat treatments (with or without clovers) and seeding method ($p = 0.74$). This suggests that using white, crimson, or subterranean clovers, regardless of seeding method, did not significantly impact spring wheat yields compared to the control (no clover). However, interpreting the descriptive trends from the boxplot, there was a range with Wheat with white clover broadcast having the lowest median (~28 bu/ac) to the highest for Wheat with white clover drilled (~37 bu/ac). Although no statistical significance was detected, the descriptive statistics suggest that treatments involving crimson clover drilled or crimson clover broadcast appear to provide higher and more consistent wheat grain yields. These may be suitable options for maximizing productivity. Within wheat treatments, there were no significant differences in protein content.

Similarly, the ANOVA results indicate no significant yield difference for canola treatments (with or without clovers) and seeding methods ($p = 0.74$). This suggests that using white, crimson, or subterranean clovers, regardless of seeding method, did not significantly impact Canola yields compared to the control (no clover). The ANOVA results indicate no statistically significant differences ($p = 0.9$) in oil content.



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