

PEACE REGION LIVING LAB

Relay Cropping of Winter Cereals into Annual Cereals in the Peace Region

Relay cropping is when a cash crop is sown early in the growing season and within a month or so, a second crop is then seeded. This is conducted by taking advantage of the fact that the first crop planted has not grown tall enough to be ruined by machinery while placing the second crop into the ground. Possible benefits include the reduction of soil erosion from air and water after the end of the growing season and the maintenance of a living root system during the cold months of the year.



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Task	Timeline	Details
Seeding	May 10 - June 19, 2023	Spring Wheat 66-132 lb/ac Winter Wheat 20-40 lb/ac Fall Rye 6-12 lb/ac Winter Triticale 12-25 lb/ac Italian Ryegrass 4-8 lb/ac 1" depth
Maintenance	May 24-27, 2024	Urea 100 lb/ac S15 80 lb/ac Glyphosate (pre-seed) 1 L/ac
Harvest	Aug. 30, 2024	Straight-cut

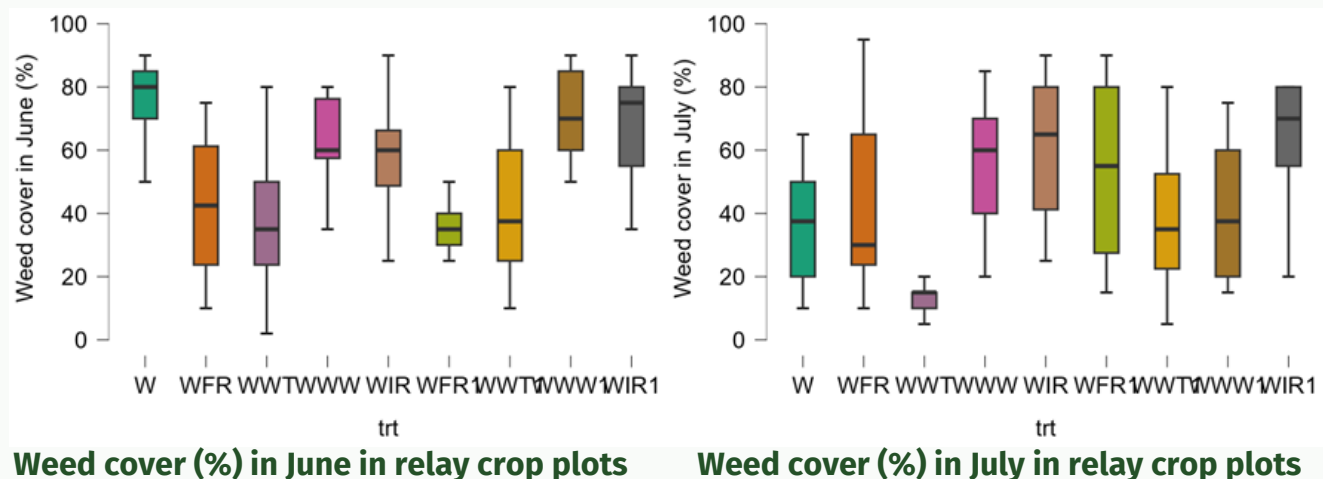
Key Points:

- Winter Triticale and Fall Rye are the most effective relay crops for weed suppression in spring wheat stands
- Winter Wheat is the highest yielding winter cereal crop in the second year of the trial

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Legend: W=100% Spring Wheat (Check), WFR=50% Spring Wheat + 25% Fall Rye, WWT= 50% Spring Wheat + 25% Winter Triticale; WWW= 50% Spring Wheat + 25% Winter Wheat; WIR=50% Spring Wheat + 25% Italian Ryegrass; WFR1= Spring Wheat + 12.5% Fall Rye; WWT1 = 50% Spring; WWW1=50% Spring Wheat + 12.5% Winter Wheat; WIR1= 50% Spring Wheat + 12.5% Italian Ryegrass



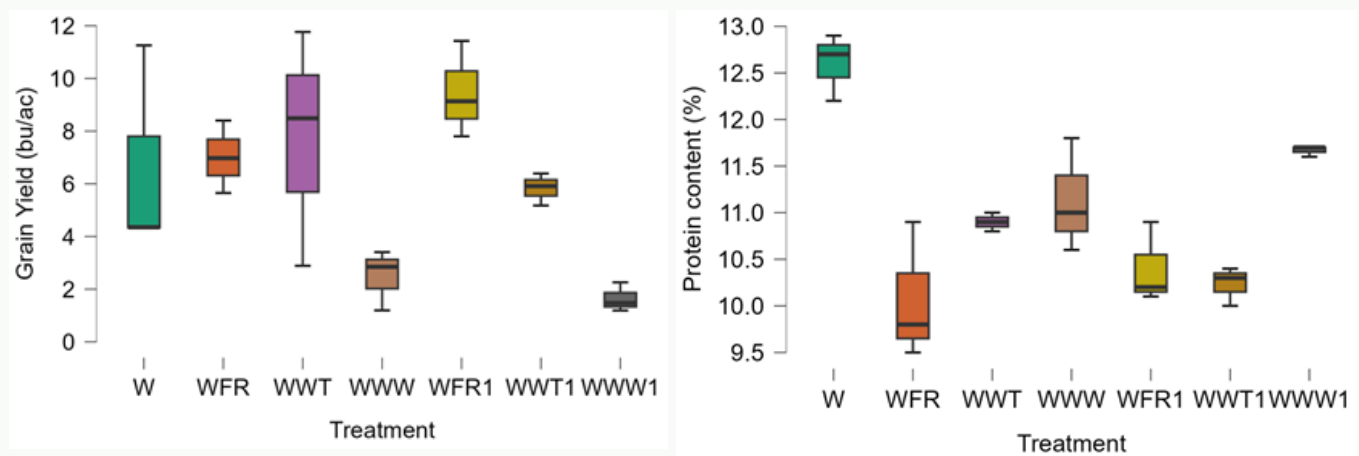
Weed cover results in June were statistically significant at ($p = <0.001$). Post Hoc Test reveals that the most effective treatments for reducing weed cover in June are 50 Wheat + 25 Winter Triticale and 50 Wheat + 12.5 Fall Rye, as indicated by their placement in the "a" letter group compared to the control (100 Wheat). In summary, 50 Wheat + 25 Winter Triticale appears to be the most effective treatment, with 50 Wheat + 25 Fall Rye and 50 Wheat 12.5 Winter Triticale also strong options for minimizing weed cover in June among winter cereal varieties.

Weed cover results in July were also statistically significant with ($p = 0.001$). 50 Wheat + 25 Winter Triticale has lower weed cover compared to 50 Wheat + 25 Winter Wheat, 50 Wheat + 25 Italian Ryegrass, and 50 Wheat + 12.5 Italian Ryegrass. This suggests that 50 Wheat + 25 Winter Triticale could be one of the most effective options for reducing weed cover.

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Yield (bu/ac) of wheat and relay crops

Protein content (%) of wheat and relay crops

Grain yield ranged from 2.5 to 9.5 bu/ac and is statistically significant ($p = 0.002$). Post Hoc Test for Letter-Based Grouping indicates that 50 Wheat + 12.5 Winter Wheat (a) and 50 Wheat + 25 Winter Wheat (a) belong to the "a" group, have the highest yields and are significantly better than treatments in group "b". 50 Wheat + 25 Fall Rye (b) is the only treatment in group "b," indicating it has the lowest yield and is significantly worse than the top-performing treatments in group "a". 50 Wheat + 12.5 Winter Wheat and 50 Wheat + 25 Winter Wheat are the best treatments for maximizing yields.

The ANOVA for protein content (%) of winter cereals shows a significant overall effect ($p < 0.001$), indicating that different treatment combinations impact protein content. Post hoc test reveals specific significant differences: 100 % Wheat has significantly higher protein content compared to: 50 Wheat + 25 Fall Rye ($p = 0.002$), 50 Wheat + 25 Winter Triticale ($p < 0.001$), 50 Wheat + 12.5 Fall Rye ($p < 0.001$), 50 Wheat + 12.5 Winter Triticale ($p = 0.018$), 50 Wheat + 12.5 Winter Wheat ($p = 0.049$). These significant differences suggest that relay cropping with Fall Rye or Winter Triticale at both 12.5% and 25% levels reduces the protein content in comparison to pure Wheat. In conclusion, 100% Wheat is optimal for protein content, while 50 Wheat + 25 Winter Wheat provides a viable relay cropping option.