EFFECT OF CORN ROW SPACING ON INTERSEEDED ALFALFA ESTABLISHMENT AND YIELD

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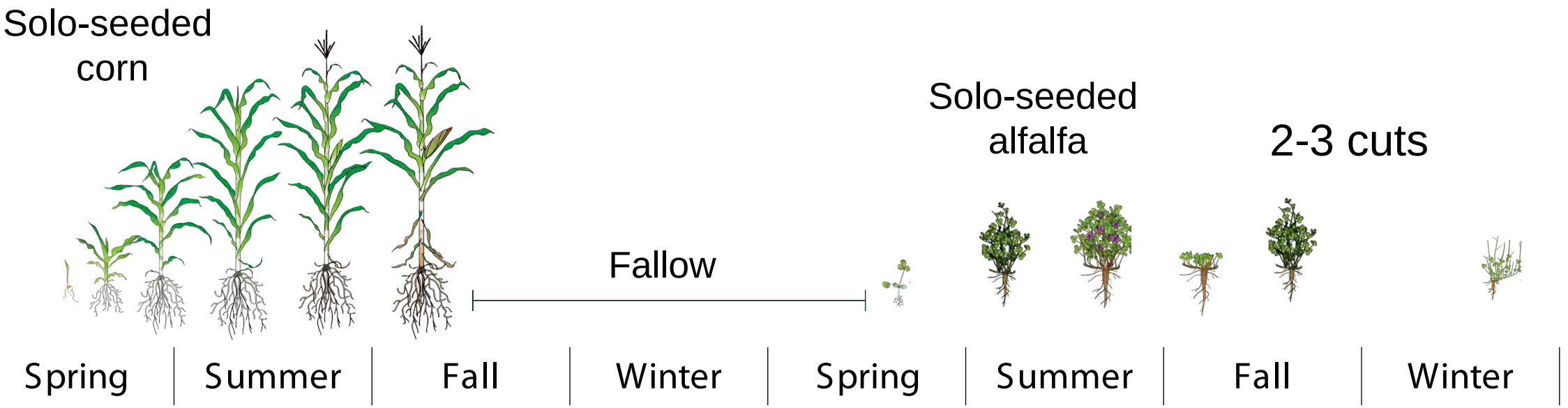
North American Alfalfa Improvement Conference | July 14-16, 2026

INTRODUCTION

Silage corn-alfalfa rotation



Establishment year, low yield

INTRODUCTION

Silage corn-alfalfa interseeding

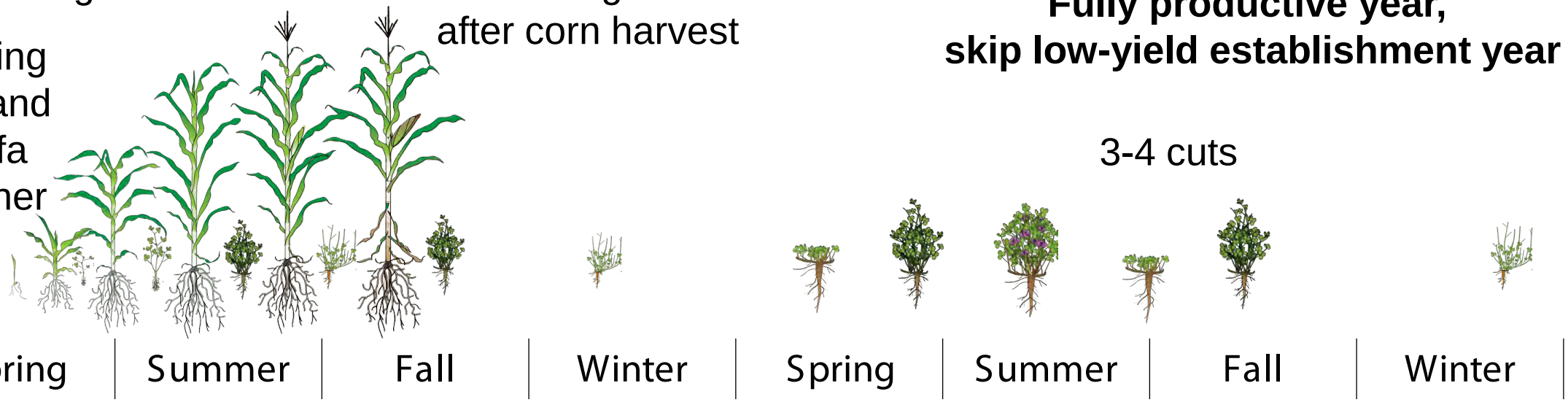
Corn dominates alfalfa during the season

Alfalfa regrowth after corn harvest

Fully productive year, skip low-yield establishment year

Seeding corn and alfalfa together

3-4 cuts



200% increase in alfalfa yield
12% increase in system yield
Weed supression, Less nutrient leaching

0-50% corn yield drag
10% on average
vs solo-seeded corn

Risk of alfalfa stand failure

INTRODUCTION

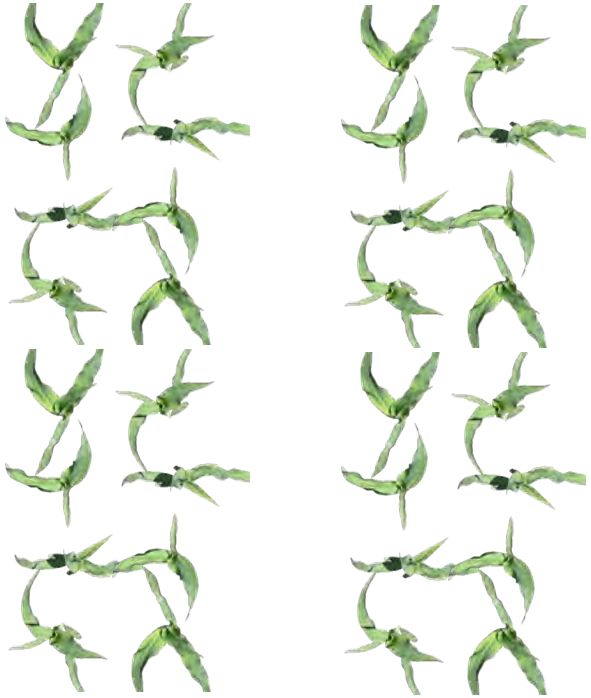
Corn Row Spacing

Standard 30 inches

Reduced row spacing

- Corn yield potential;
- Competition with interseeded crops.

Twin-row spacings



- Increase light penetration
- Reduced impact on corn yield relative to 30 in;

RESEARCH GAPS AND OBJECTIVES

Research gaps:

- Limited evaluation of **silage corn** row spacings;
- Limited understanding of **corn row spacing** effects in **alfalfa** interseeding;

Research objectives:

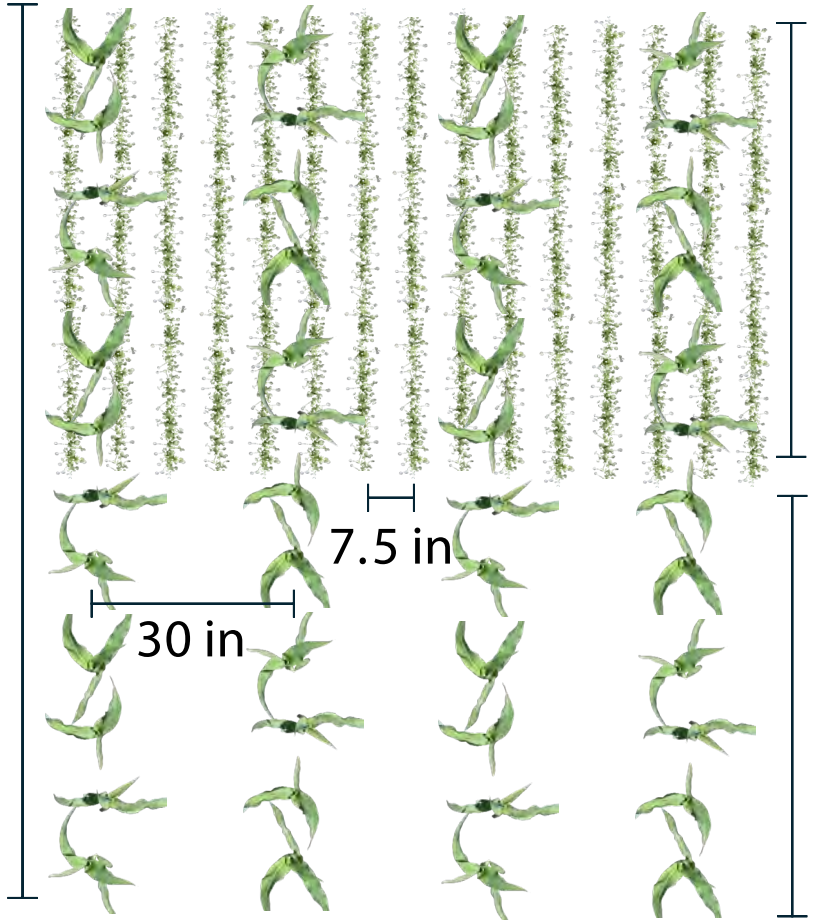
- Evaluate the effects of corn row spacing on interseeded alfalfa establishment and productivity.
- Determine the effects of corn row spacing and interseeding on corn canopy development and silage yield.

MATERIAL & METHODS

Split-plot design

Main plot effect:
5 different corn row spacings

Standard 30 in

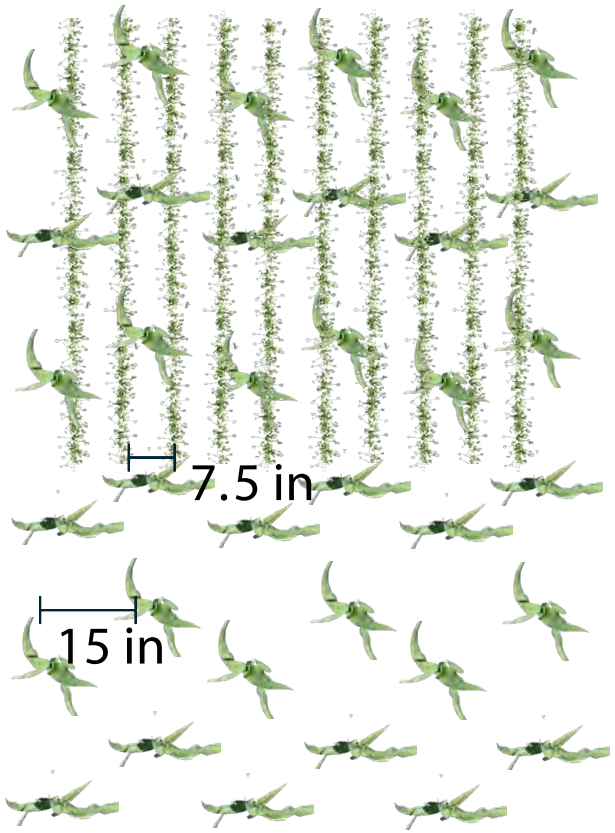


Subplot effect:
2 Cropping systems:

Corn-alfalfa interseeding

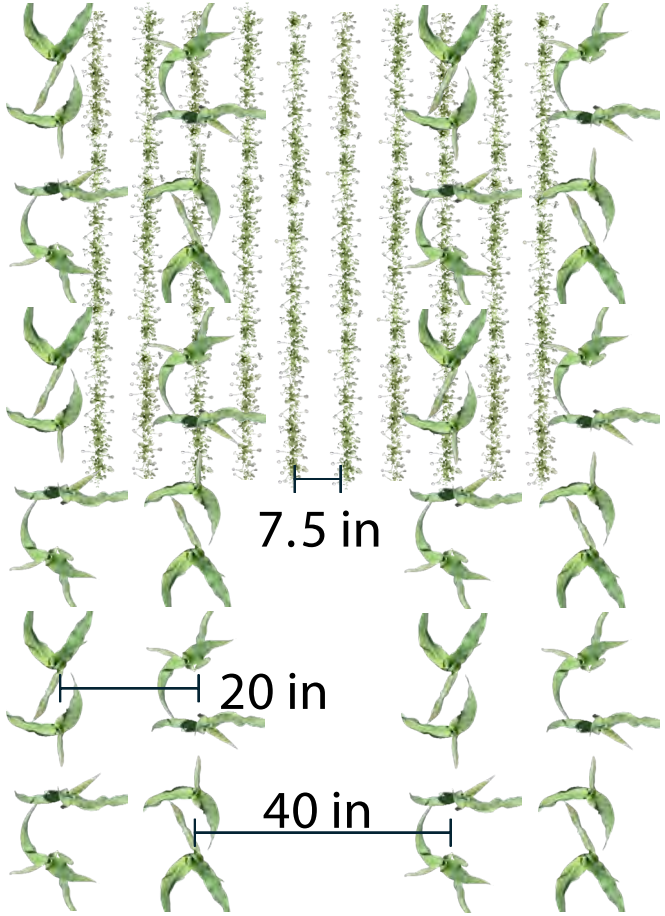
Solo-seeded corn

Narrow 15 in

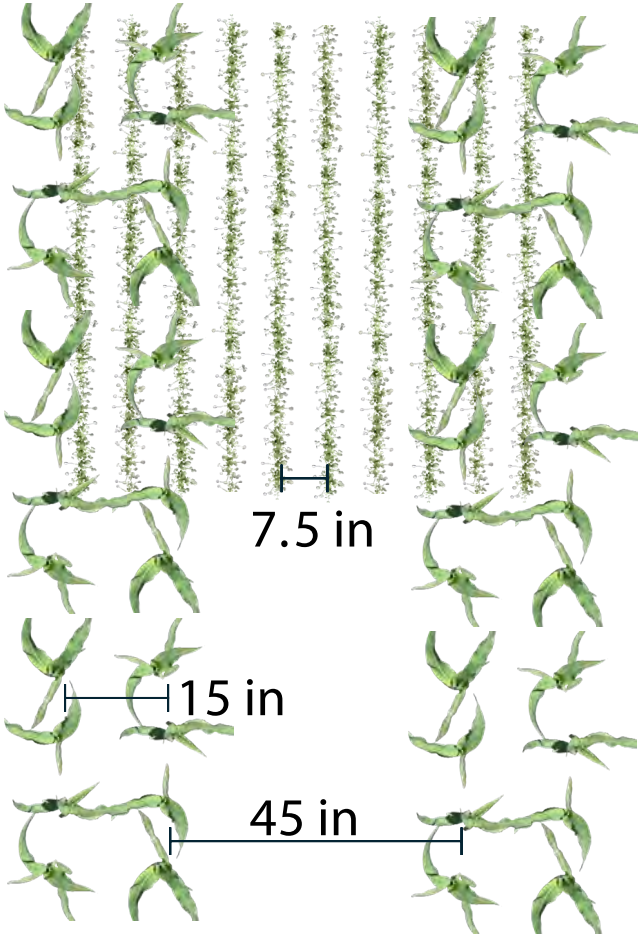


MATERIAL & METHODS

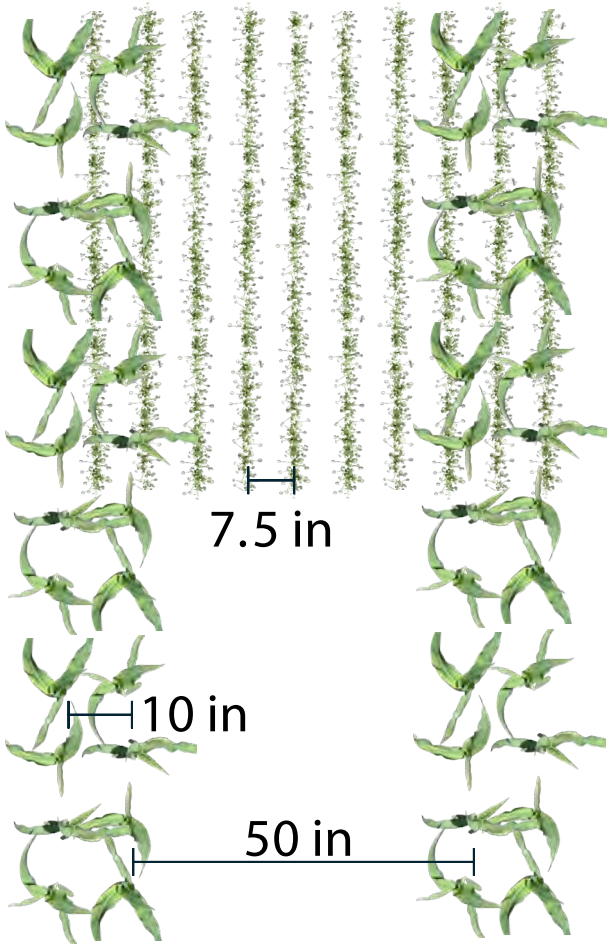
40 / 20 in twin-row



45 / 15 in twin-row



50 / 10 in twin-row



MATERIAL & METHODS

USDA Dairy Forage Research Center (Prairie du Sac, WI)

Corn + alfalfa planting: 05/15/25 | 80,000 plants ha^{-1}; 18 kg ha^{-1}

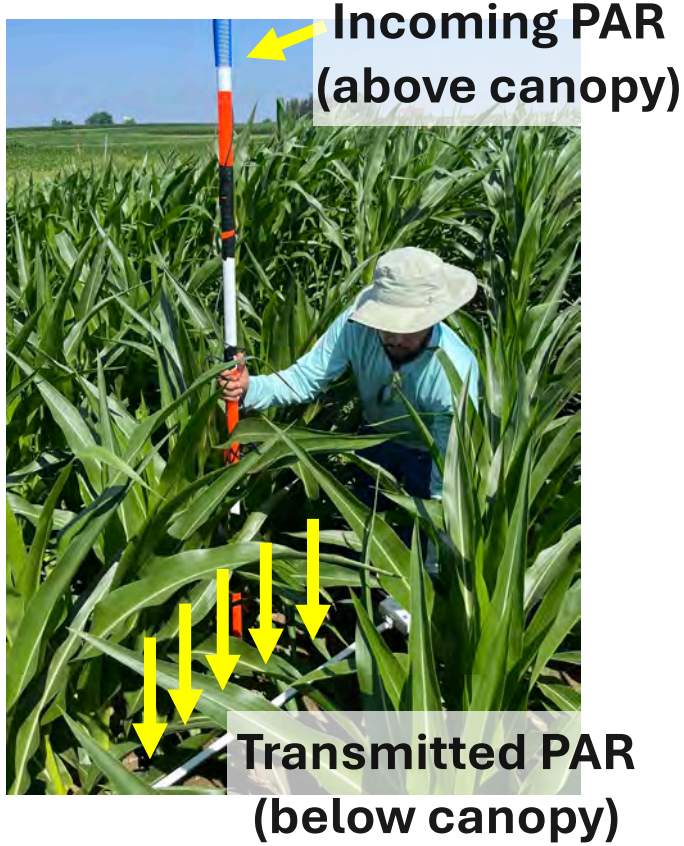
Corn harvest: 09/26/25

Measurements

Photosynthetically Active Radiation (PAR)

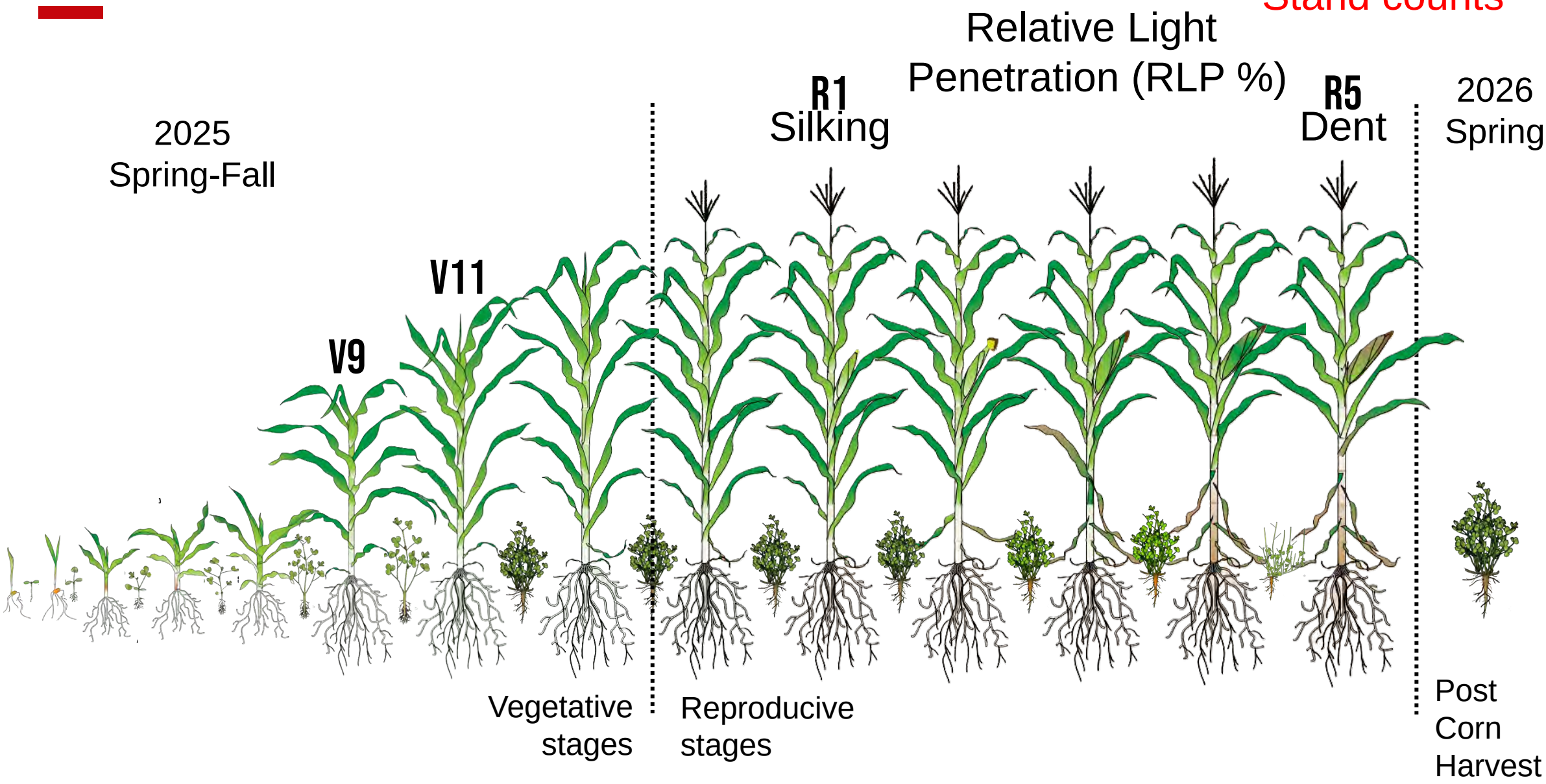
Relative Light Penetration (RLP %) = $\frac{\text{PAR reaching the understory}}{\text{Total incoming PAR}}$

- Alfalfa stand density in 0.46m² (5ft²) per plot after corn harvest
- Corn silage and alfalfa dry matter yield from center rows (~ 25 m²)
- **Nitrogen banded next to corn rows 200 kg ha^{-1}**

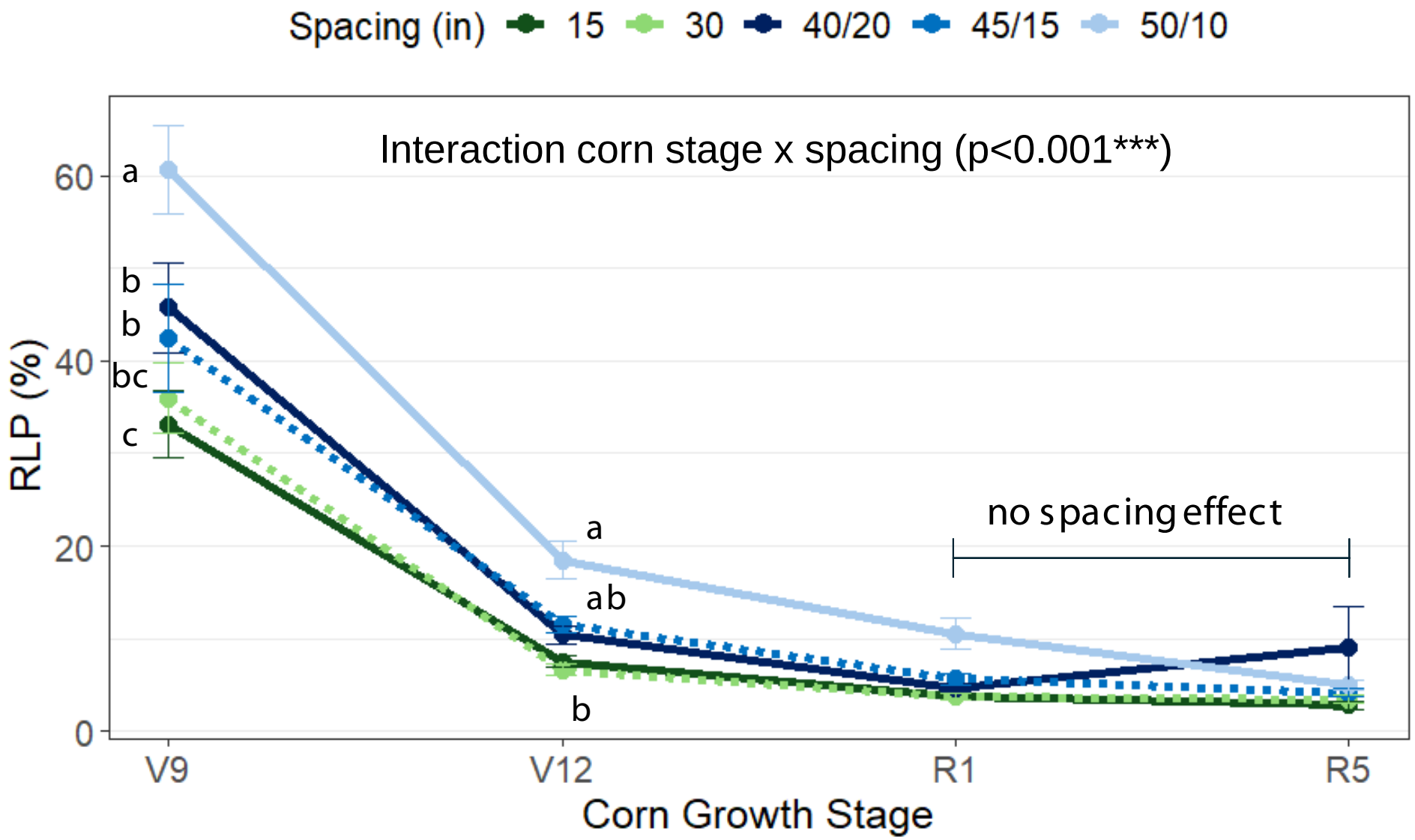


MATERIAL & METHODS

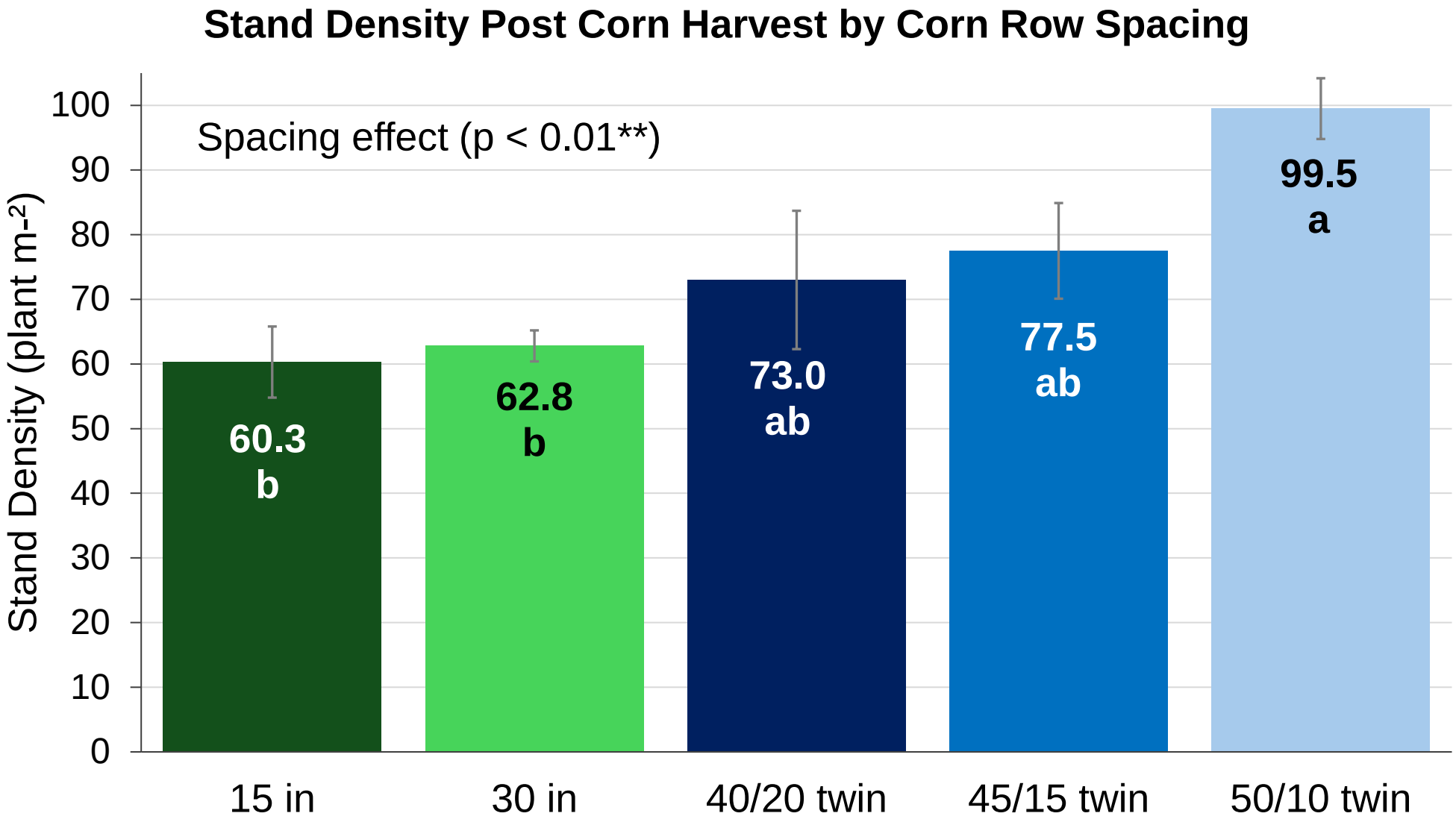
Alfalfa 1st cut yield
Stand counts



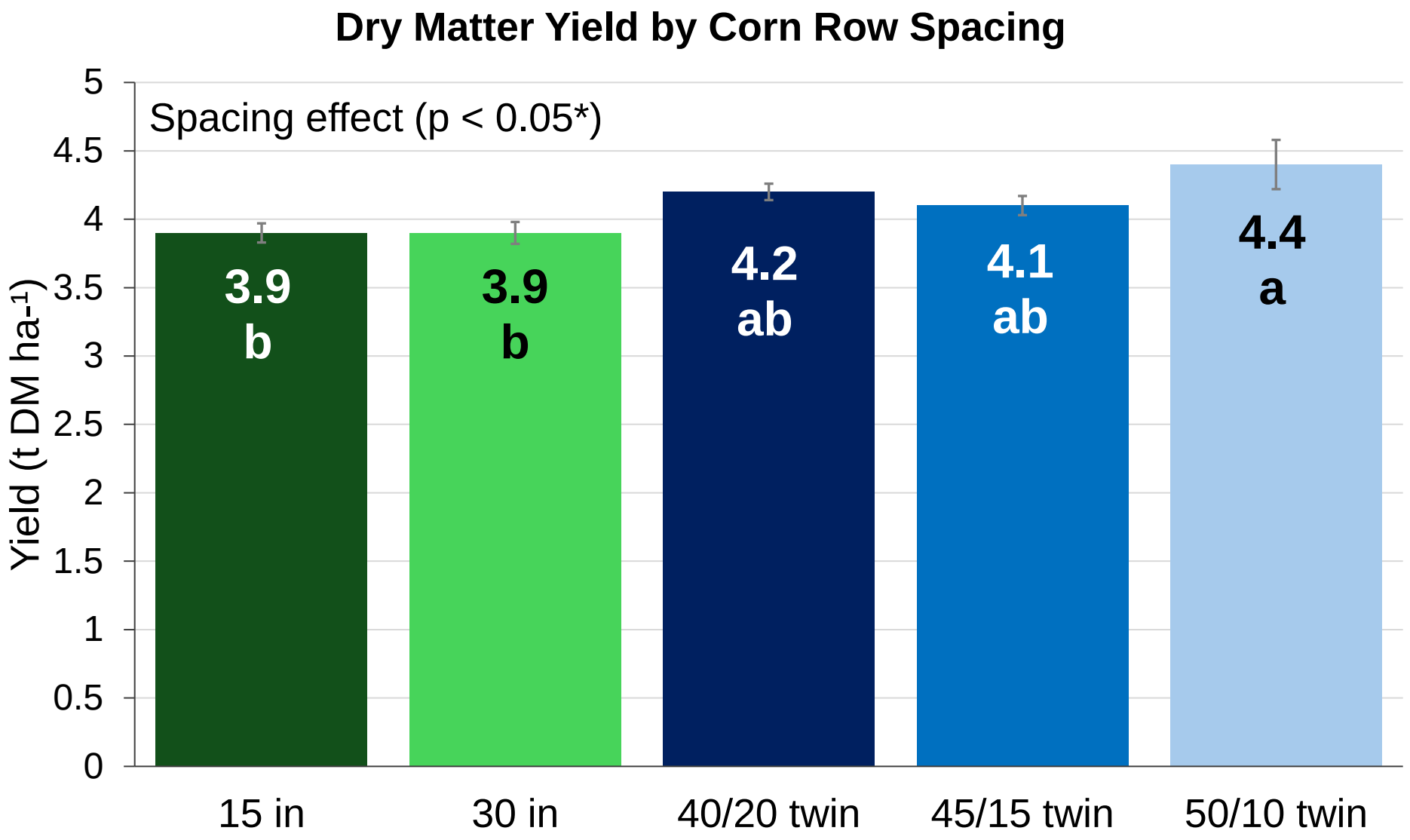
RELATIVE LIGHT PENETRATION



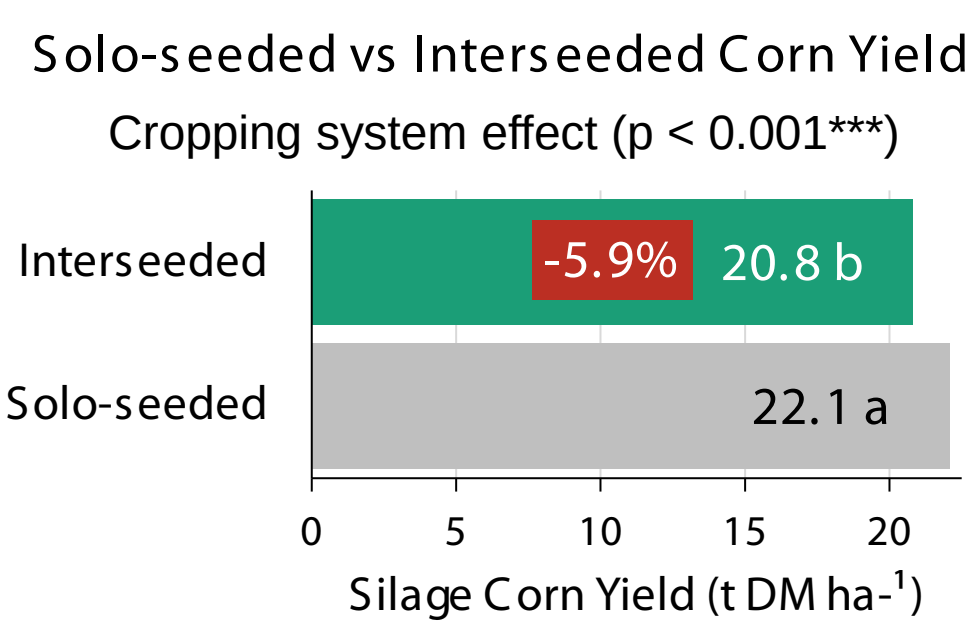
ALFALFA SURVIVAL



ALFALFA 1ST CUT YIELD

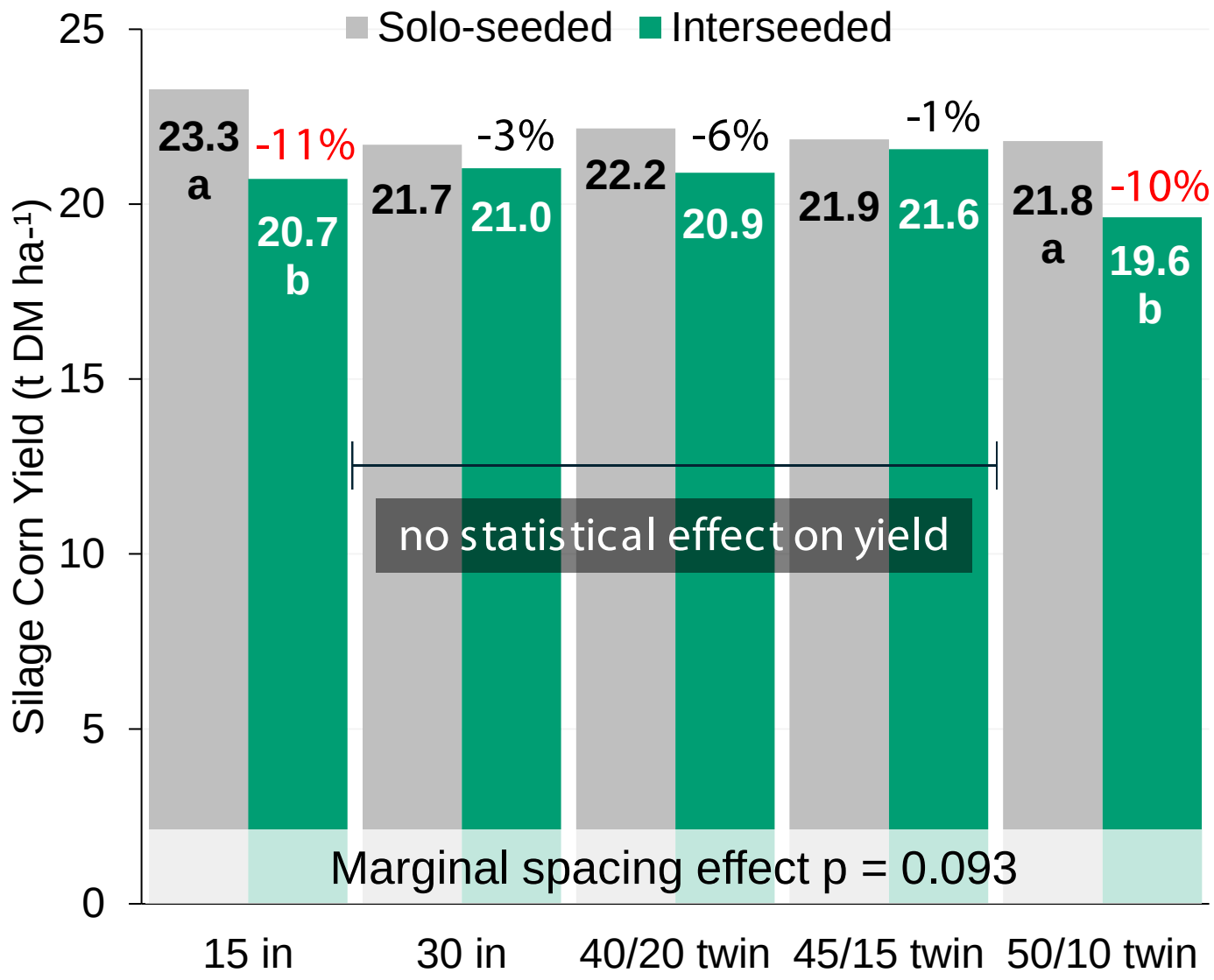


SILAGE CORN YIELD



Relatively high average silage yield (21.4 t DM ha⁻¹)

- Growing conditions
- Agronomic practices
- N banding, N rate



CONCLUSIONS

- **15 and 30-in:** Rapid canopy closure, limited alfalfa performance;
- **40/20 and 45/15-in:** Delayed canopy closure, best balance between corn yield and alfalfa performance;
- **50/10-in:** Greatest light availability; highest alfalfa establishment and yield; reduced corn yield.*

Future directions

- Validate across environments and growing seasons.
- Evaluate long-term alfalfa persistence and forage production.
- Assess milk production per hectare.

ACKOWLEDGEMENTS

Special thanks to:

- My advisor, Dr. Harkirat Kaur, and committee members Dr. John Grabber and Dr. Marta Kohmann
- The WiscBadgerCorn Lab team
- USDA tech Matt Volenec and USDA Research Station staff.
- USDA and Dairy Innovation Hub

USDA

DAIRY
INNOVATION HUB

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THANK YOU!

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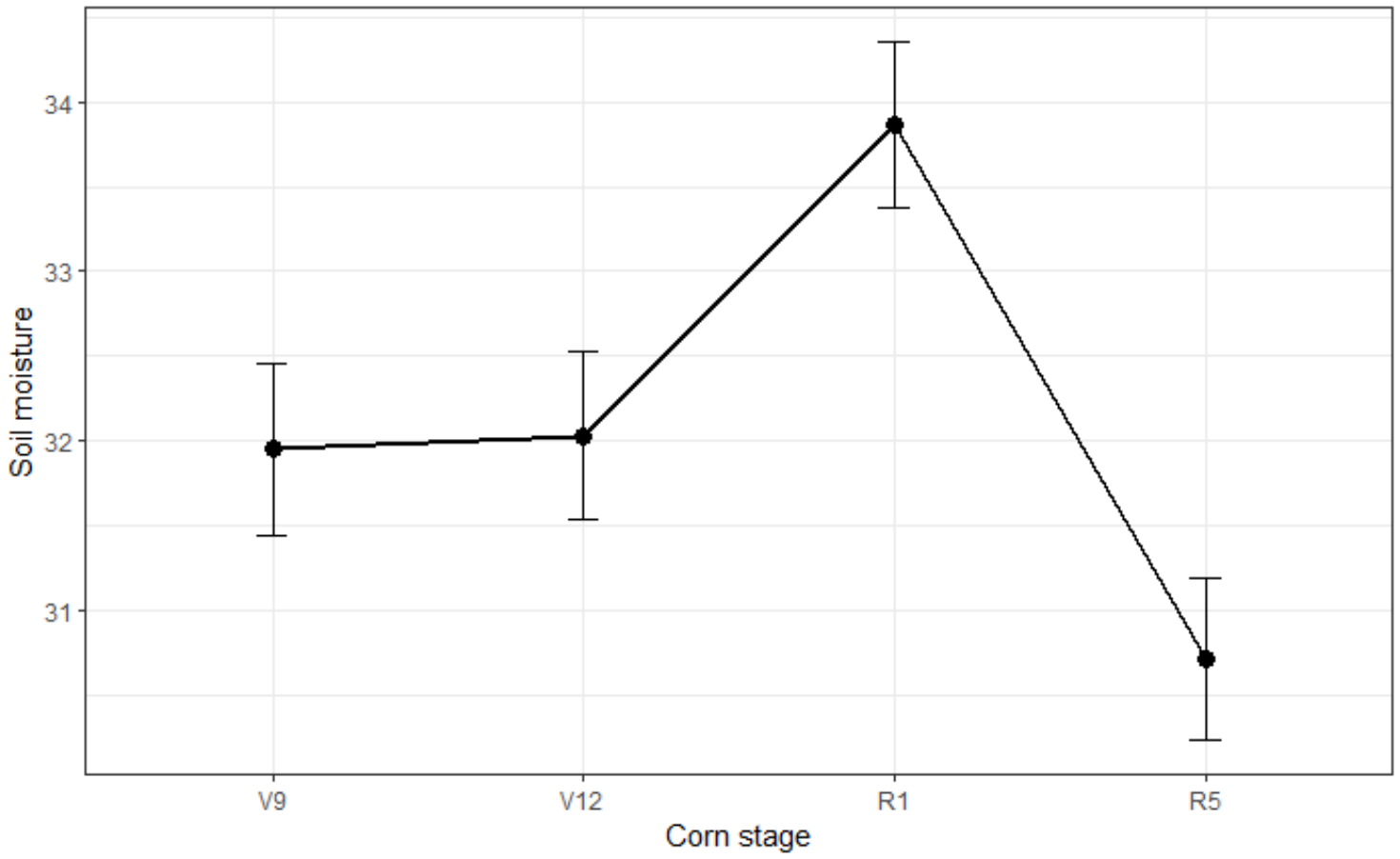
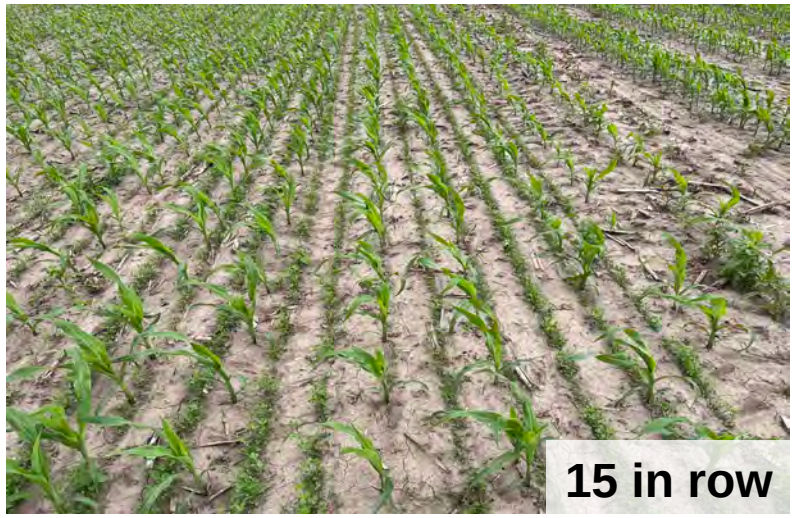
ADDITIONAL MATERIAL



MATERIAL & METHODS


15 in row


30 in row


40 / 20 in twin-row


45 / 15 in twin-row


50 / 10 in twin-row

MATERIAL & METHODS

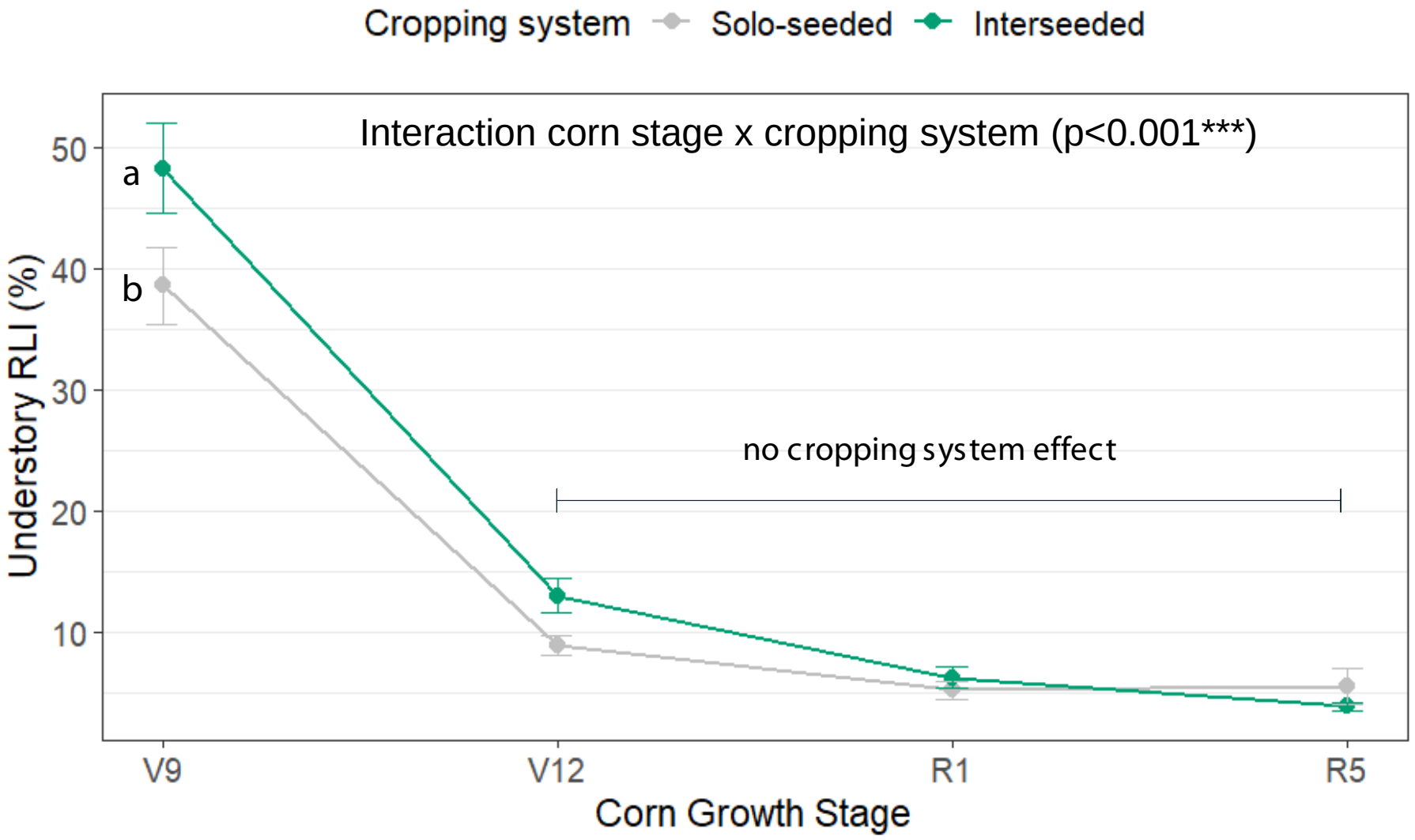
Analysis: Mixed-model ANOVA in RStudio

Fixed effects: spacing, cropping system, stage; **Random:** replication.

α = 0.05 (* indicates significant effects)

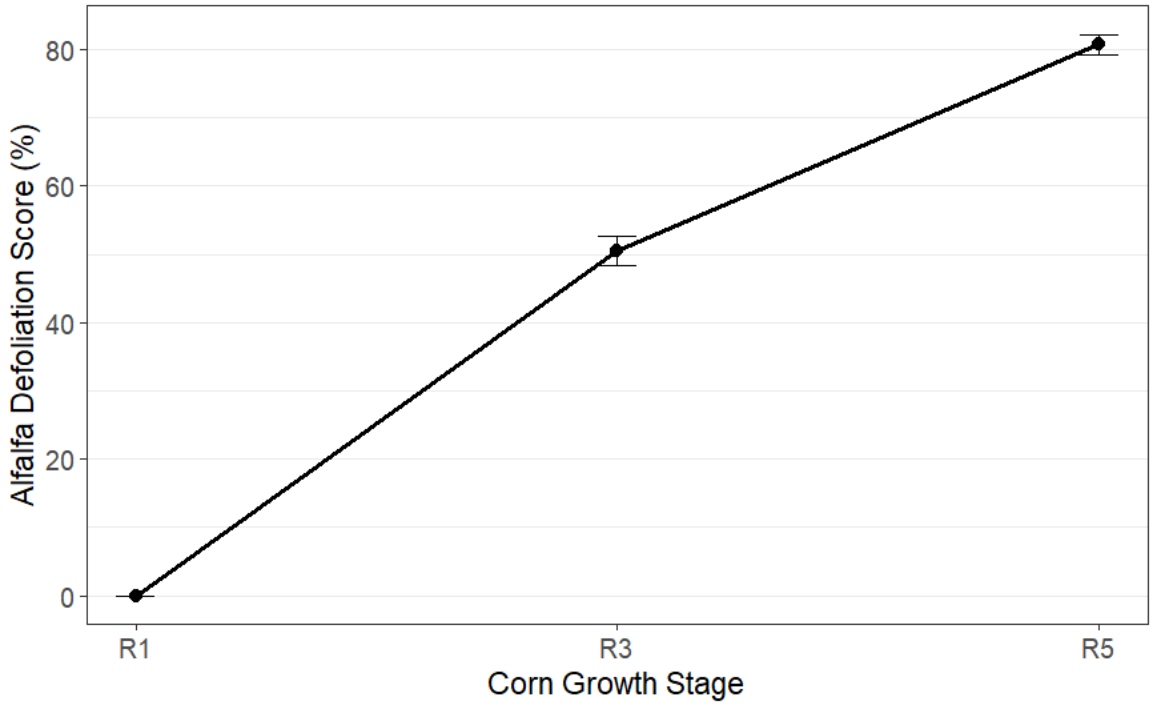
Most interseeding studies have evaluated **ultra-wide (60-in)** row spacing, leaving **other alternatives** largely unexplored.

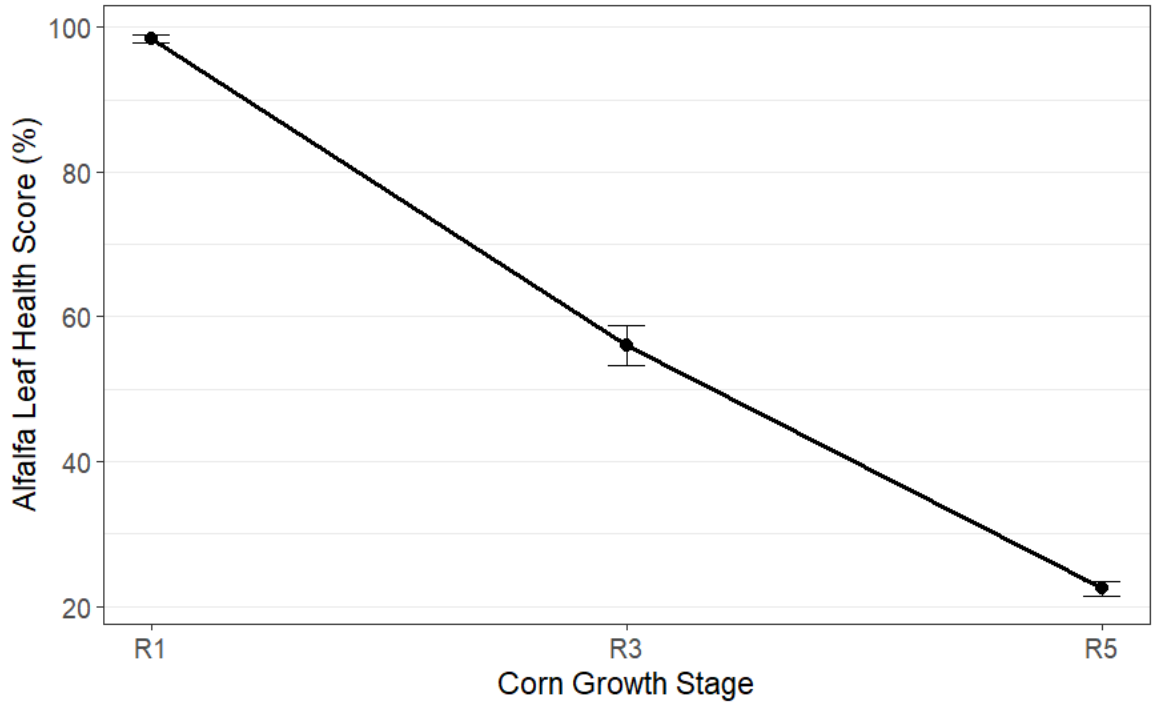
RELATIVE LIGHT PENETRATION



- Interseeding delayed corn development.
- No longer differentiation after corn V12 stage

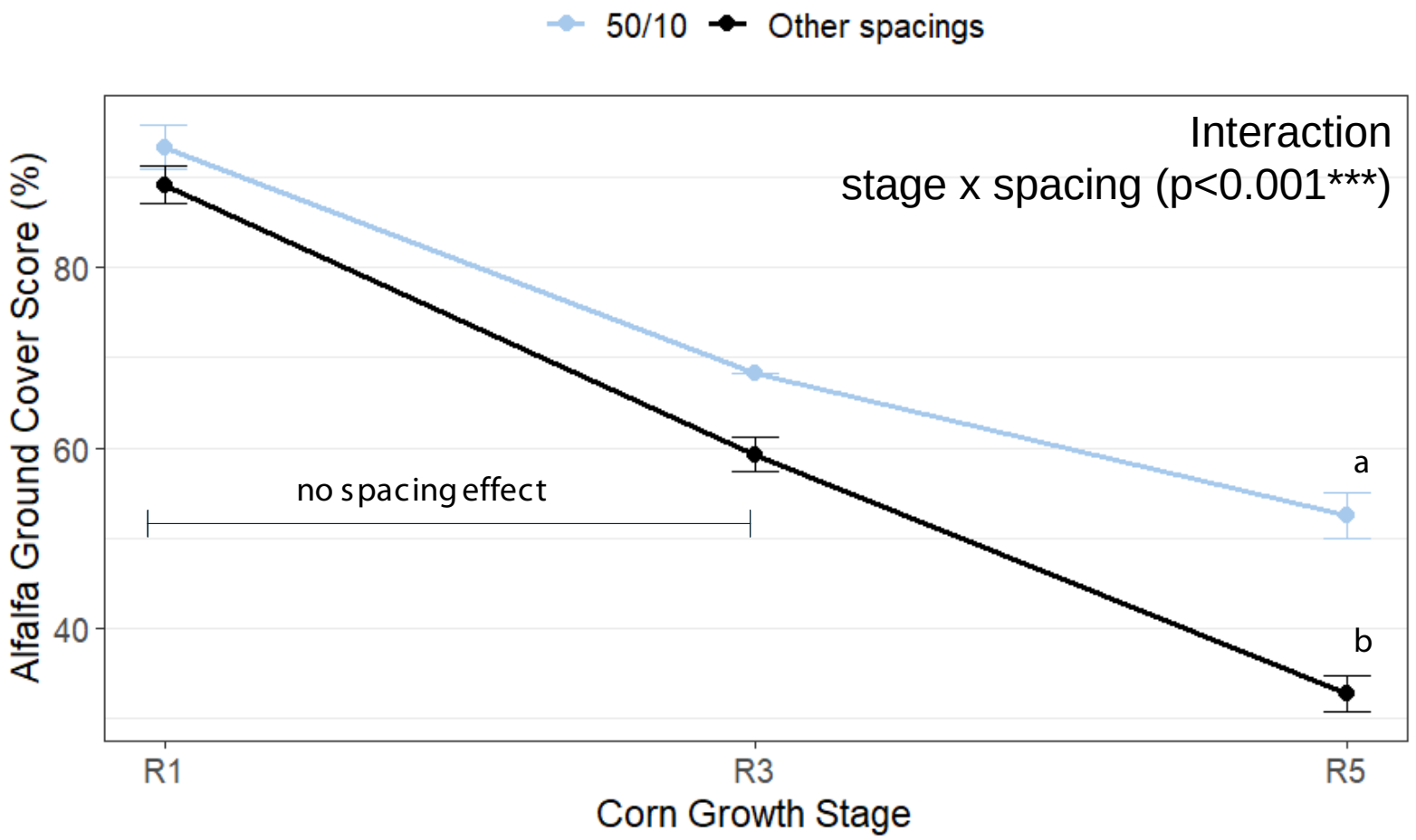
DEFOLIATION & LEAF HEALTH





Stage effect ($p<0.001$**)
No spacing effect ($p>0.05$)

GROUND COVER



CORN SILAGE YIELD

Strong cropping system effect ($p < 0.001$***)
Marginal spacing effect $p = 0.093$
Marginal interaction effect $p = 0.09$