Table 1. Crop husbandry in study locations

Parameters	Florence (2022)	Clemson (2023)
Plot size	20 feet x 20 feet	20 feet x 18 feet
Corn variety	Little Mill H117 SC	Albert Lea Organic Viking/Blue River Corn, O82-14GS-P
Corn planting date	26 April 2022	12 May 2023
Corn row spacing	30 inches	30 inches
Corn plant population	30,000 plants/acre	36,000 plants/acre
Fertilizer materials	Chicken litter	Nature Safe 10-2-8 fertilizer composed of natural feather meal, meat and bone meal, blood meal, and sulfate of potash.
Fertilizer application rate (as per soil test)	140-80-160 lbs/acre N-P-K	120-0-40 lbs/acre N-P-K
Irrigation	~ 0.10 inch/hour/per acre applied almost daily through drip irrigation from V4 stage to physiological maturity	Rainfed

Table 2. Cover crop seeding rates

Crop species		Seeding rate (kg ha^{-1})		
		Low	Standard	High
White clover		2.6	3.9	5.9
Buckwheat		44.8	67.3	100.9
Pigeonpea		9.7	14.6	21.9
Mixture	White clover	0.9	1.3	2.0
	Buckwheat	14.9	22.4	33.6
	Pigeonpea	3.2	4.9	7.3

Table 3. Estimated materials costs used for different cover crops inter-seeding under different tillage systems in 2022 and 2023.

2022 ($/acre)		2023 ($/acre)	
Seeds	$105	Seeds	$126
Irrigation labor, energy	$54		
Lube, filters	$3.51	Lube, filters	$4
Fuel	$23.40	Fuel	$23.40

Fertilizer costs	$393.50	Fertilizer costs	270.72
Operating costs			
Tillage costs	$108.95	Tillage costs	$108.95
Pre-harvestor	$20.75	Pre-harvestor	$20.75
Harvestor	$29.46	Harvestor	$29.46
Irrigation system	$287.01		
Custom hire	$83.50	Custom hire	$53.75
Machine labor	$6.08	Machine labor	$6.08
Total costs	**$1115.16**	**Total costs**	**$643.11**

Table 4. Estimated costs for cover crops with different seeding rates.

	Seeding rate		
Cover crop Cost	**High**	**Low**	**Standard**
Buckwheat	$247.72	$110.10	$165.15
PigeonPea	$482.62	$215.32	$321.75
White clover	$154.50	$67.05	$102.03
Mix	$295.93	$131.68	$196.48

Table 5. Partial budgeting/ economic analysis of cover crop interseeding in corn production under different tillage systems in Florence, 2022

Tillage	Focused treatment	Comparable Treatment	Added costs	Reduced Returns	Total negative effects	Reduced costs	Added returns	Total positive effects	Total effects of cover crops relative to no cover crops & fertilizers
Conventional	Ctl1	Conv, Ctl2	$393.50	$0.00	$393.50	$0.00	$173.48	$173.48	-$220.02
	BW, high	Conv, Ctl2	$641.22	$0.00	$641.22	$0.00	$129.41	$129.41	-$511.81
	BW,low	Conv, Ctl2	$503.60	$0.00	$503.60	$0.00	$203.81	$203.81	-$299.79
	BW,std	Conv, Ctl2	$558.65	$38.66	$597.31	$0.00	$0.00	$0.00	-$597.31
	PP,high	Conv, Ctl2	$876.12	$13.50	$889.62	$0.00	$0.00	$0.00	-$889.62
	PP,low	Conv, Ctl2	$608.82	$0.00	$608.82	$0.00	$299.52	$299.52	-$309.30
	PP,std	Conv, Ctl2	$715.25	$0.00	$715.25	$0.00	$204.28	$204.28	-$510.97
	WC,high	Conv, Ctl2	$548.00	$86.63	$634.62	$0.00	$0.00	$0.00	-$634.62

	WC,low	Conv, Ctl2	$460.55	$142.56	$603.10	$0.00	$0.00	$0.00	-$603.10
	WC,std	Conv, Ctl2	$495.53	$6.88	$502.40	$0.00	$0.00	$0.00	-$502.40
	Mix,high	Conv, Ctl2	$689.43	$185.52	$874.95	$0.00	$0.00	$0.00	-$874.95
	Mix,low	Conv, Ctl2	$525.18	$0.00	$525.18	$0.00	$354.74	$354.74	-$170.44
	Mix,std	Conv, Ctl2	$589.96	$0.00	$589.96	$0.00	$213.28	$213.28	-$376.68
Reduced	Ctl1	Red, Ctl2	$393.50	$0.40	$393.90	$0.00	$0.00	$0.00	-$393.90
	BW, high	Red, Ctl2	$641.22	$39.33	$680.55	$0.00	$0.00	$0.00	-$680.55
	BW,low	Red, Ctl2	$503.60	$0.00	$503.60	$0.00	$358.34	$358.34	-$145.26
	BW,std	Red, Ctl2	$558.65	$0.00	$558.65	$0.00	$171.66	$171.66	-$386.99
	PP,high	Red, Ctl2	$876.12	$0.00	$876.12	$0.00	$152.86	$152.86	-$723.26
	PP,low	Red, Ctl2	$608.82	$0.00	$608.82	$0.00	$346.98	$346.98	-$261.84
	PP,std	Red, Ctl2	$715.25	$0.00	$715.25	$0.00	$20.98	$20.98	-$694.27
	WC,high	Red, Ctl2	$548.00	$0.00	$548.00	$0.00	$328.43	$328.43	-$219.57
	WC,low	Red, Ctl2	$460.55	$0.00	$460.55	$0.00	$286.23	$286.23	-$174.32
	WC,std	Red, Ctl2	$495.53	$0.00	$495.53	$0.00	$29.21	$29.21	-$466.32
	Mix,high	Red, Ctl2	$689.43	$0.00	$689.43	$0.00	$145.59	$145.59	-$543.84
	Mix,low	Red, Ctl2	$525.18	$0.00	$525.18	$0.00	$5.34	$5.34	-$519.84
	Mix,std	Red, Ctl2	$589.96	$0.00	$589.96	$0.00	$138.51	$138.51	-$451.45

Table 6. Partial budgeting/ economic analysis of cover crop interseeding in corn production under different tillage systems in Clemson, 2023.

Tillage	Focused treatment	Comparable Treatment	Added costs	Reduced Returns	Total negative effects	Reduced costs	Added returns	Total positive effects	Total effects of cover crops relative to no cover crops & fertilizers
	Ctl1	Conv, Ctl2	$270.72	$0.00	$270.72	$0.00	$173.48	$173.48	-$97.24
	BW, high	Conv, Ctl2	$518.44	$0.00	$518.44	$0.00	$129.41	$129.41	-$389.03
	BW,low	Conv, Ctl2	$380.82	$0.00	$380.82	$0.00	$203.81	$203.81	-$177.01
	BW,std	Conv, Ctl2	$435.87	$38.66	$474.53	$0.00	$0.00	$0.00	-$474.53
	PP,high	Conv, Ctl2	$753.34	$13.50	$766.84	$0.00	$0.00	$0.00	-$766.84
	PP,low	Conv, Ctl2	$486.04	$0.00	$486.04	$0.00	$299.52	$299.52	-$186.52
	PP,std	Conv, Ctl2	$592.47	$0.00	$592.47	$0.00	$204.28	$204.28	-$388.19
	WC,high	Conv, Ctl2	$425.22	$86.63	$511.84	$0.00	$0.00	$0.00	-$511.84
	WC,low	Conv, Ctl2	$337.77	$142.56	$480.32	$0.00	$0.00	$0.00	-$480.32
	WC,std	Conv, Ctl2	$372.75	$6.88	$379.62	$0.00	$0.00	$0.00	-$379.62
	Mix,high	Conv, Ctl2	$566.65	$185.52	$752.17	$0.00	$0.00	$0.00	-$752.17
	Mix,low	Conv, Ctl2	$402.40	$0.00	$402.40	$0.00	$354.74	$354.74	-$47.66
Conventional	Mix,std	Conv, Ctl2	$467.18	$0.00	$467.18	$0.00	$213.28	$213.28	-$253.90
	Ctl1	Red, Ctl2	$270.72	$0.00	$270.72	$0.00	$194.31	$194.31	-$76.41
	BW, high	Red, Ctl2	$518.44	$0.00	$518.44	$0.00	$30.64	$30.64	-$487.80
	BW,low	Red, Ctl2	$380.82	$0.00	$380.82	$0.00	$216.19	$216.19	-$164.63
	BW,std	Red, Ctl2	$435.87	$0.00	$435.87	$0.00	$263.51	$263.51	-$172.36
	PP,high	Red, Ctl2	$753.34	$0.00	$753.34	$0.00	$154.63	$154.63	-$598.71
Reduced	PP,low	Red, Ctl2	$486.04	$0.00	$486.04	$0.00	$57.65	$57.65	-$428.39

	PP,std	Red, Ctl2	$592.47	$237.12	$829.59	$0.00	$0.00	$0.00	-$829.59
	WC,high	Red, Ctl2	$425.22	$0.00	$425.22	$0.00	$108.18	$108.18	-$317.04
	WC,low	Red, Ctl2	$337.77	$0.00	$337.77	$0.00	$191.44	$191.44	-$146.32
	WC,std	Red, Ctl2	$372.75	$0.00	$372.75	$0.00	$33.68	$33.68	-$339.06
	Mix,high	Red, Ctl2	$566.65	$0.00	$566.65	$0.00	$81.78	$81.78	-$484.87
	Mix,low	Red, Ctl2	$402.40	$0.00	$402.40	$0.00	$158.45	$158.45	-$243.95
	Mix,std	Red, Ctl2	$467.18	$0.00	$467.18	$0.00	$143.43	$143.43	-$323.75

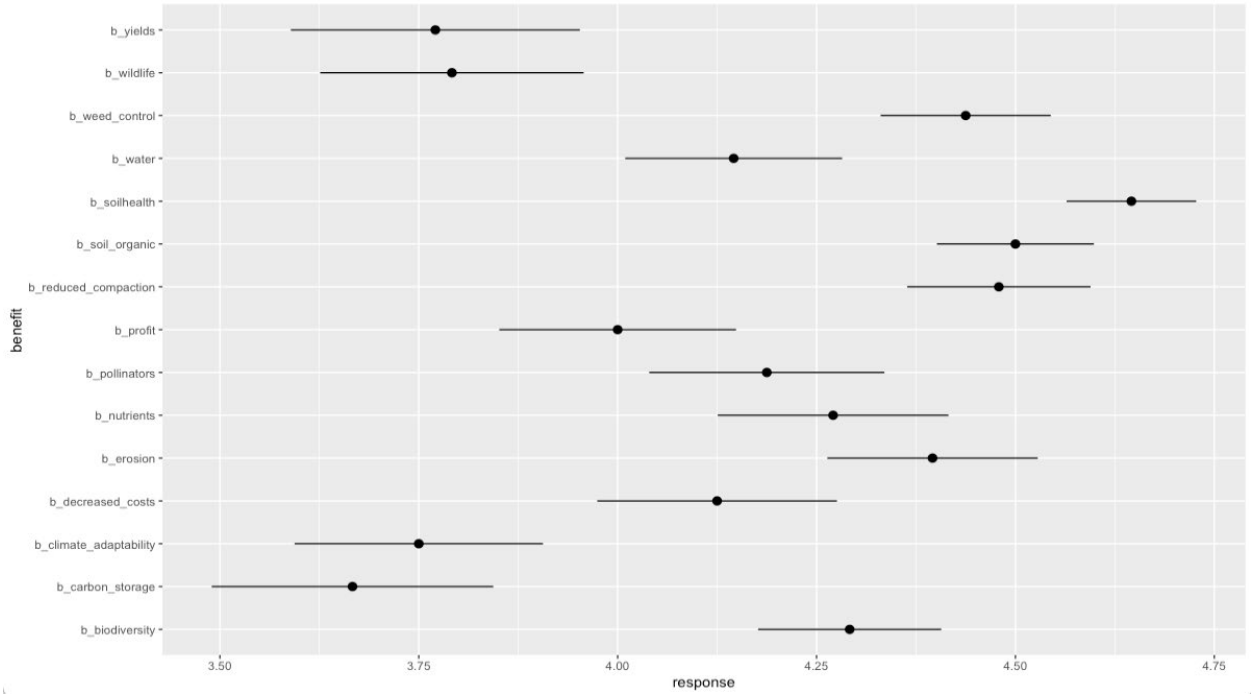

Figure 1: Responses on a 5-point scale (1= “not at all important” to 5= “extremely important”) about the various benefits of cover crops.

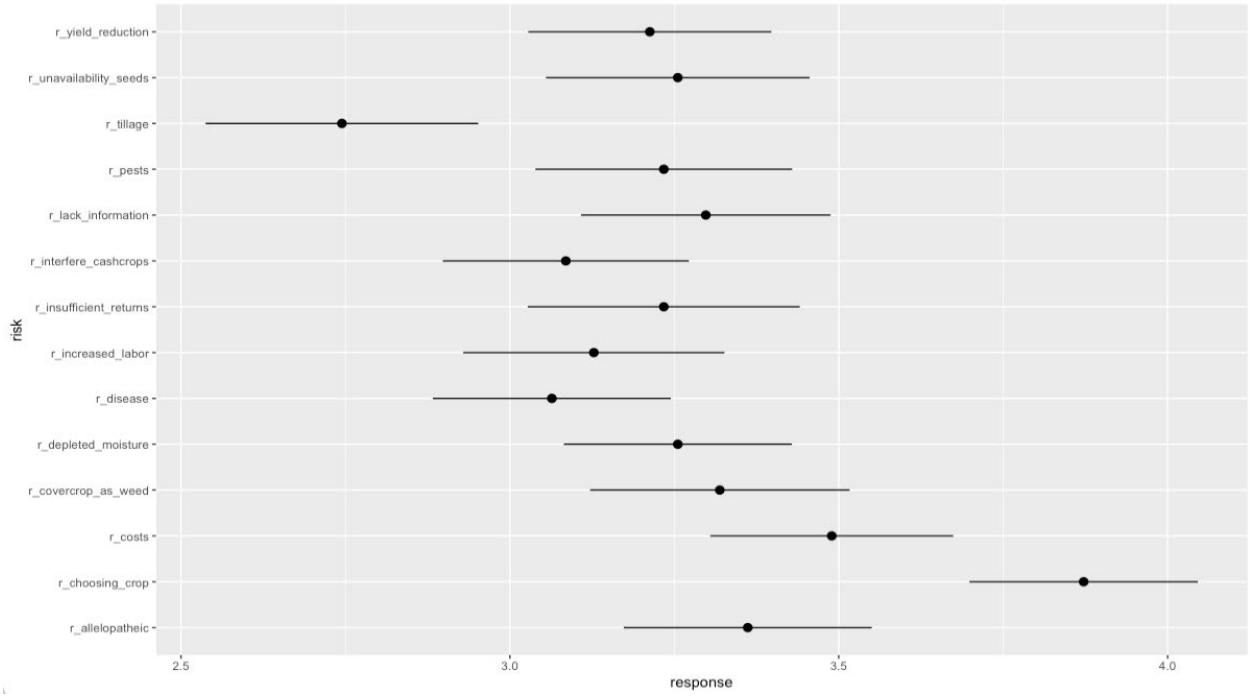

Figure 2: Responses on a 5-point scale (1= "not at all important" to 5= "extremely important") about the various risks of cover crops.

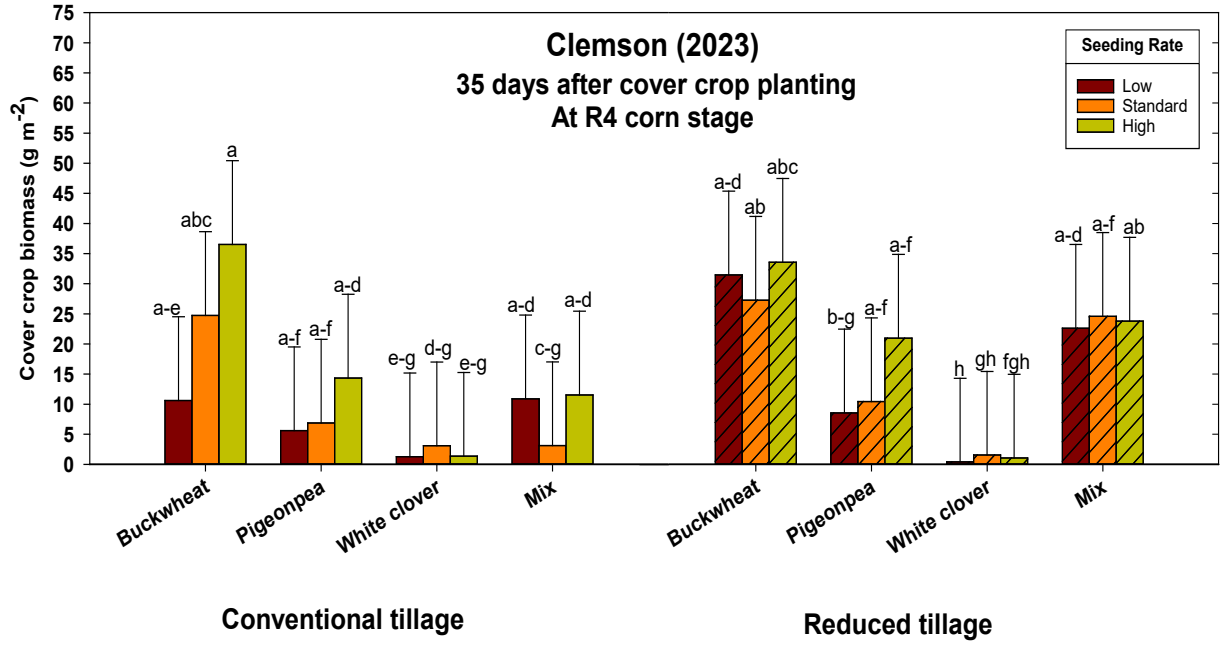

Figure 3. Biomass production of interseeded cover crops under conventional tillage and reduced tillage conditions at Clemson, SC in 2023. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates.

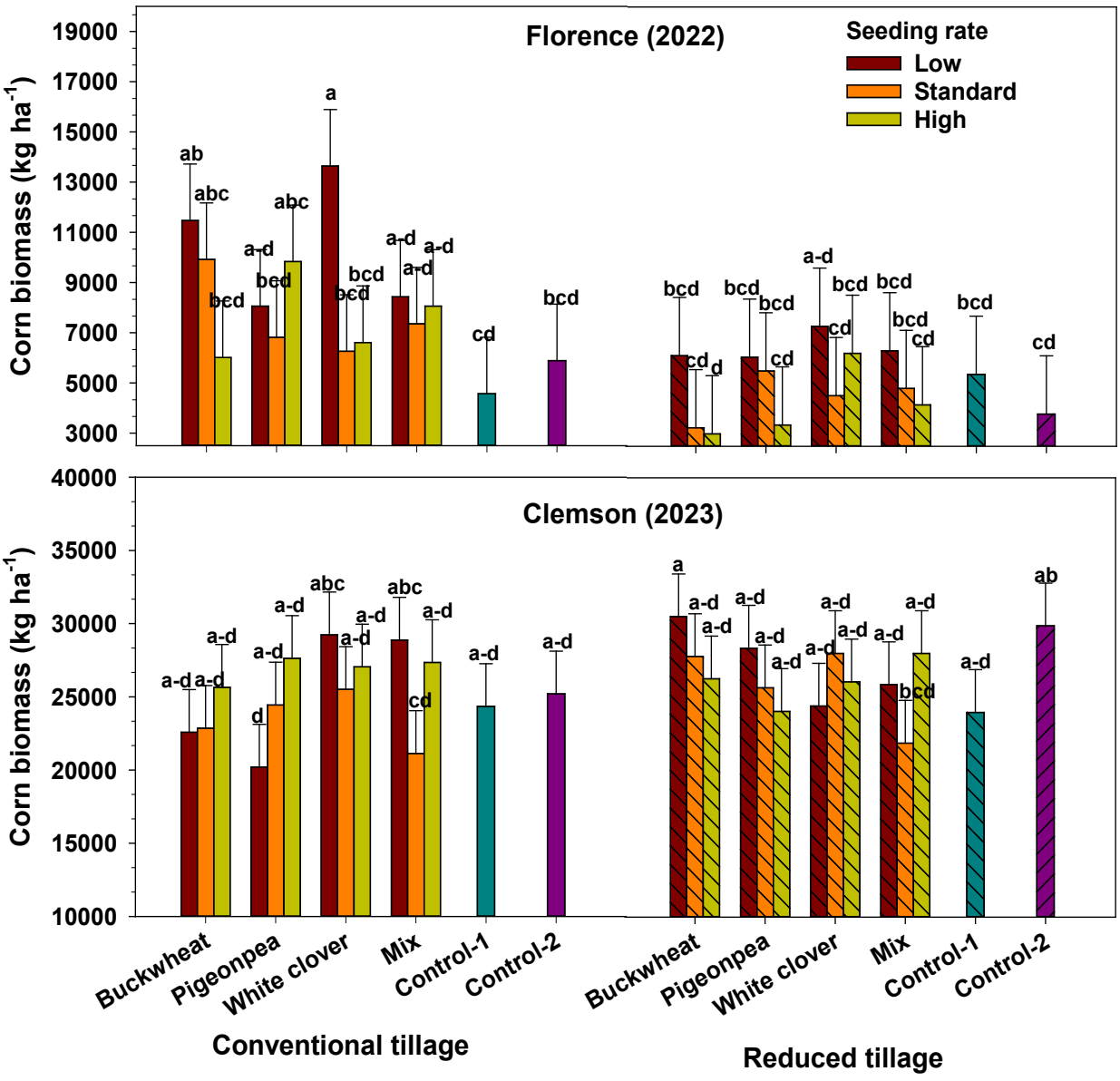

Figure 4. Effect of interseeded cover crops on corn biomass under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer.

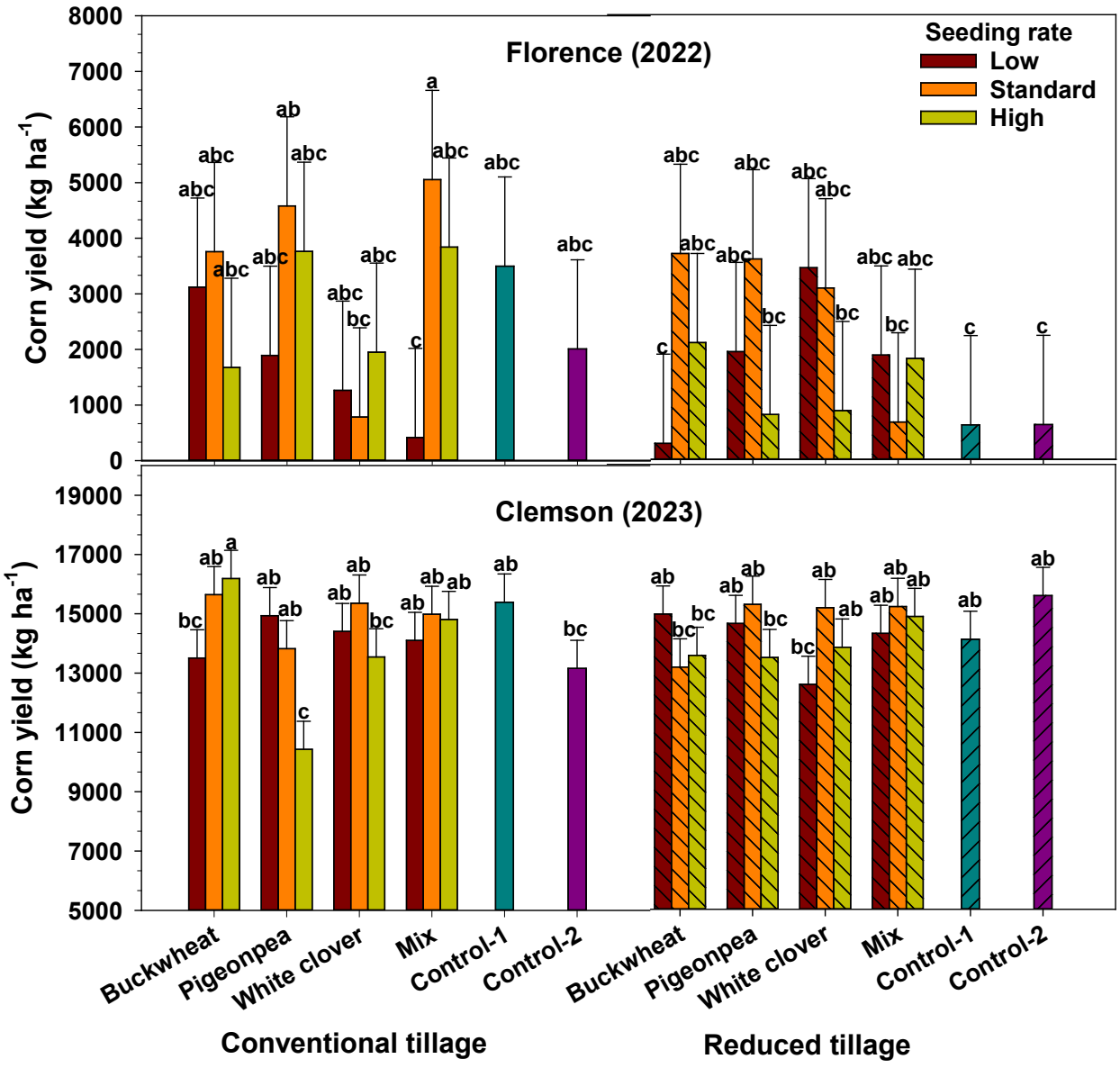

Figure 5. Effect of interseeded cover crops on corn grain yield under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer.

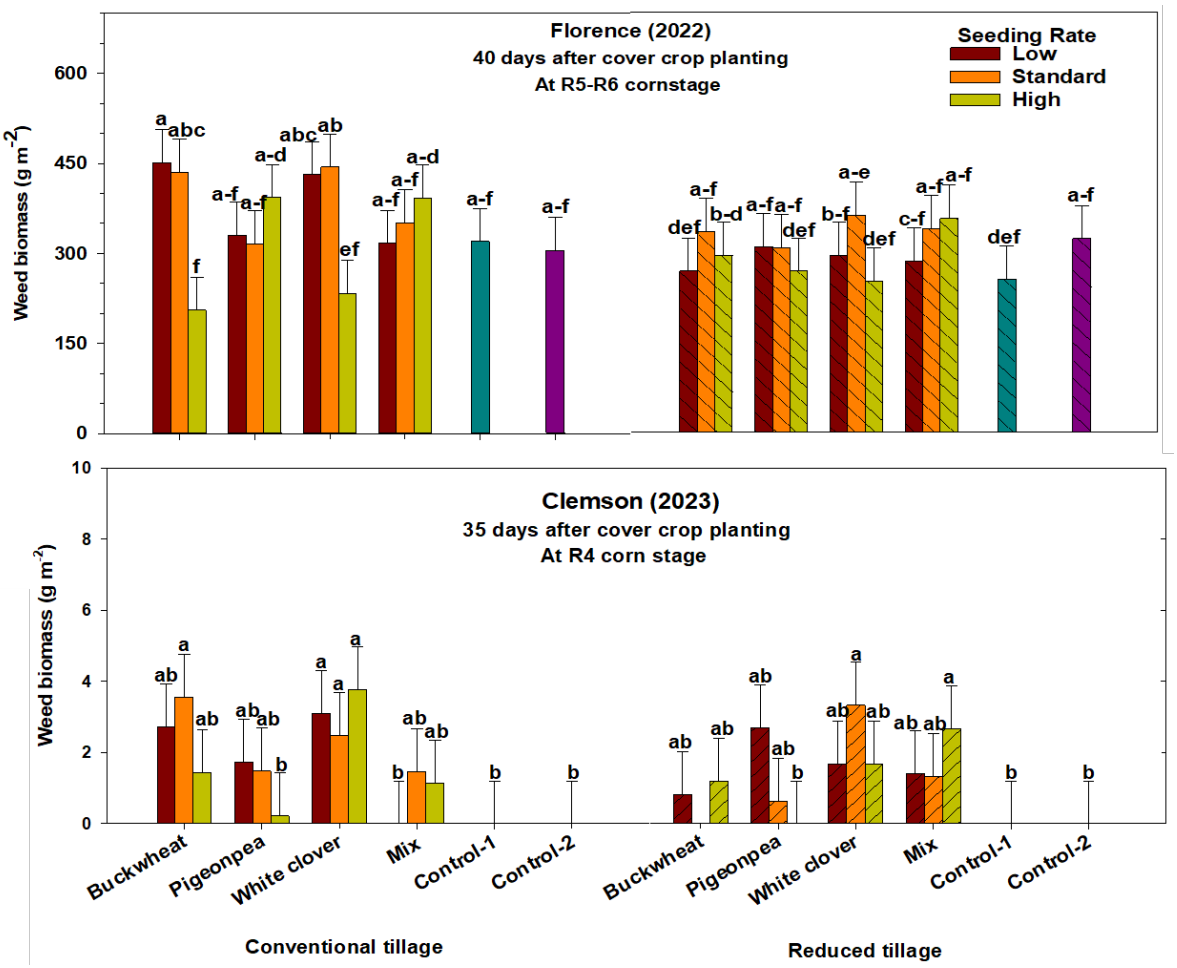

Figure 6. Effect of interseeded cover crops on weed presence under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer.

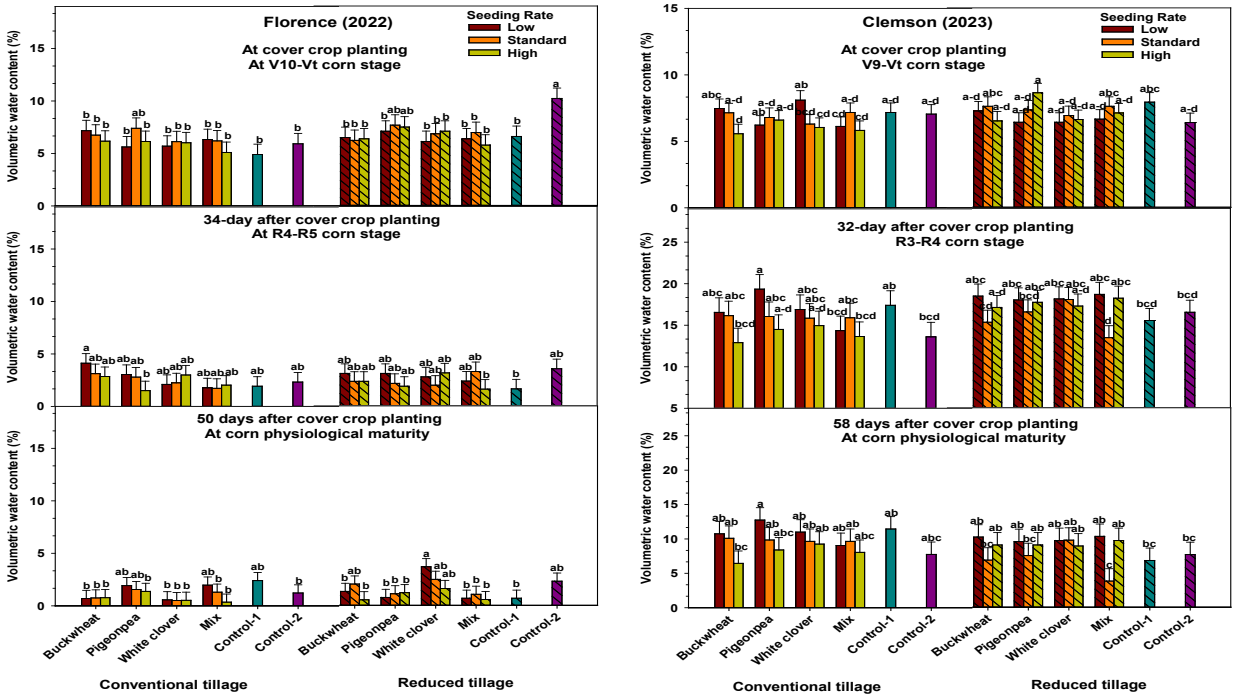

Figure 7. Effect of interseeded cover crops on volumetric soil water content under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer.

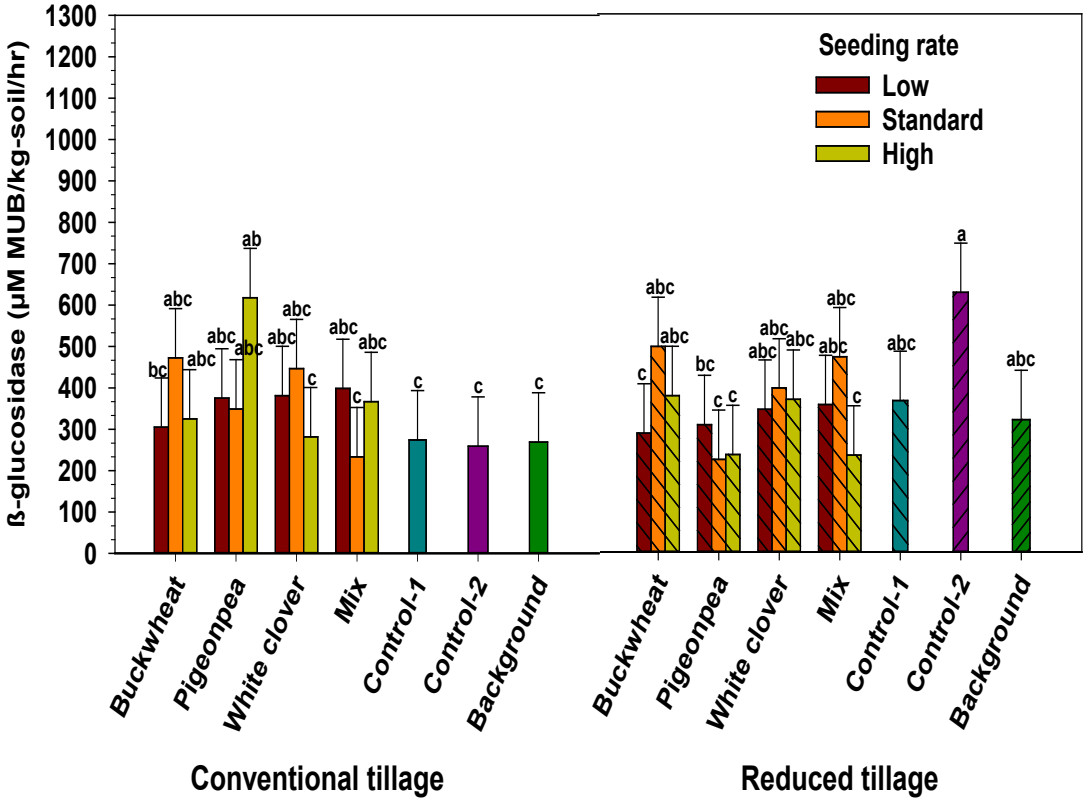

Figure 8. Effect of interseeded cover crops on β-glucosidase enzyme activity under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer. Background was soil samples collected before corn planting.

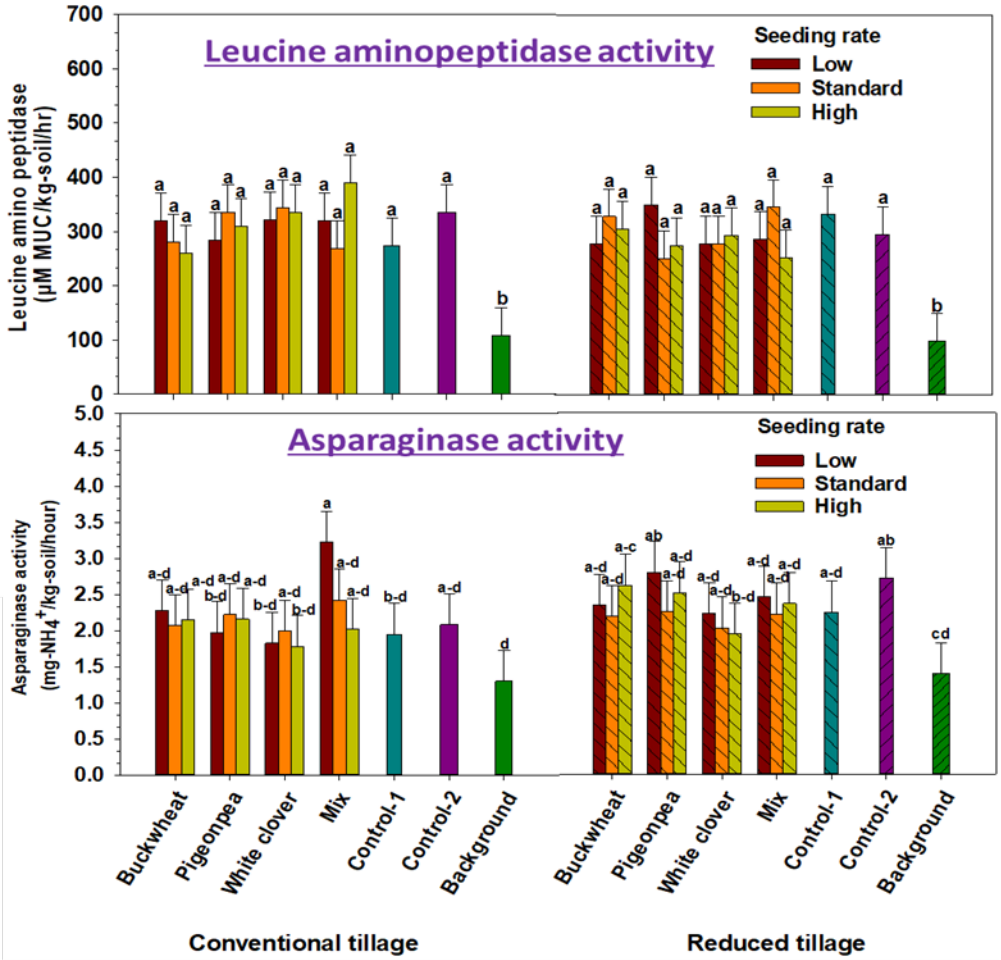

Figure 9. Effect of interseeded cover crops on leucine aminopeptidase and asparaginase enzyme activities under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer. Background was soil samples collected before corn planting.

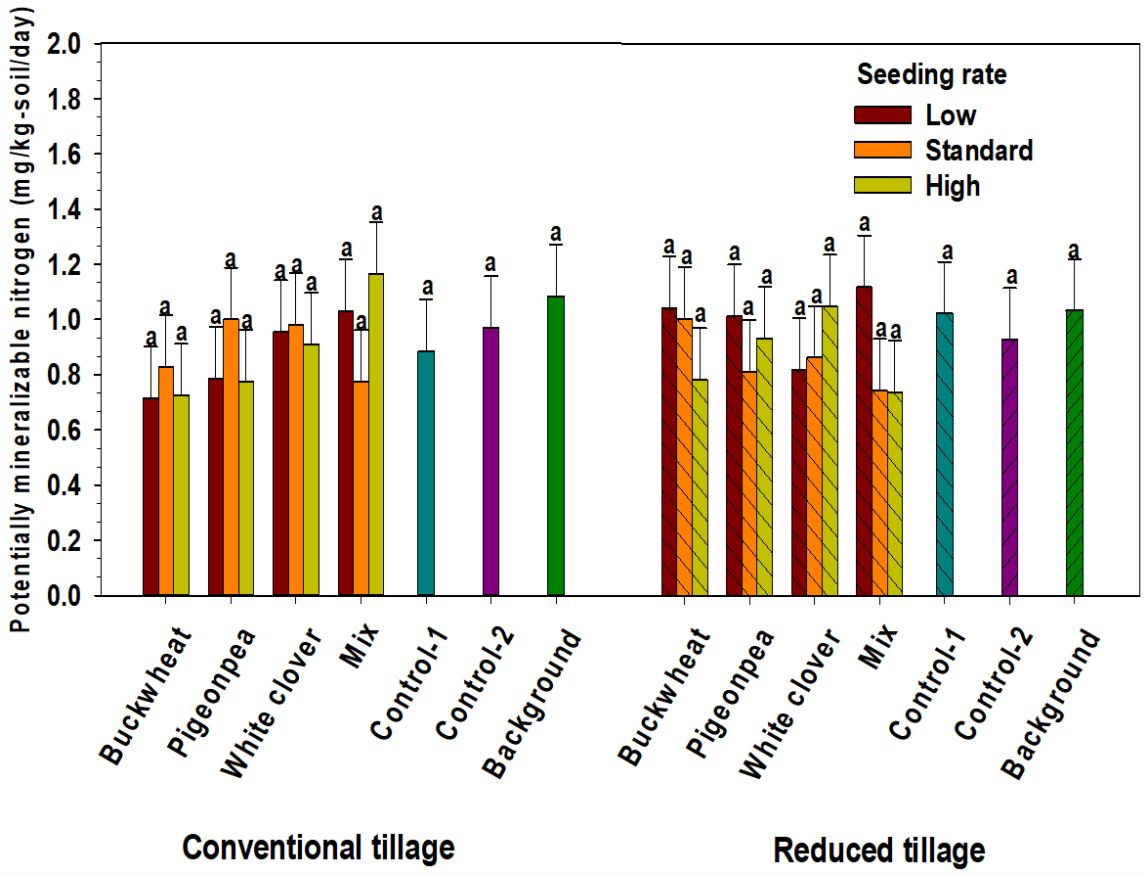

Figure 10. Effect of interseeded cover crops on potentially mineralizable nitrogen under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer. Background was soil samples collected before corn planting.

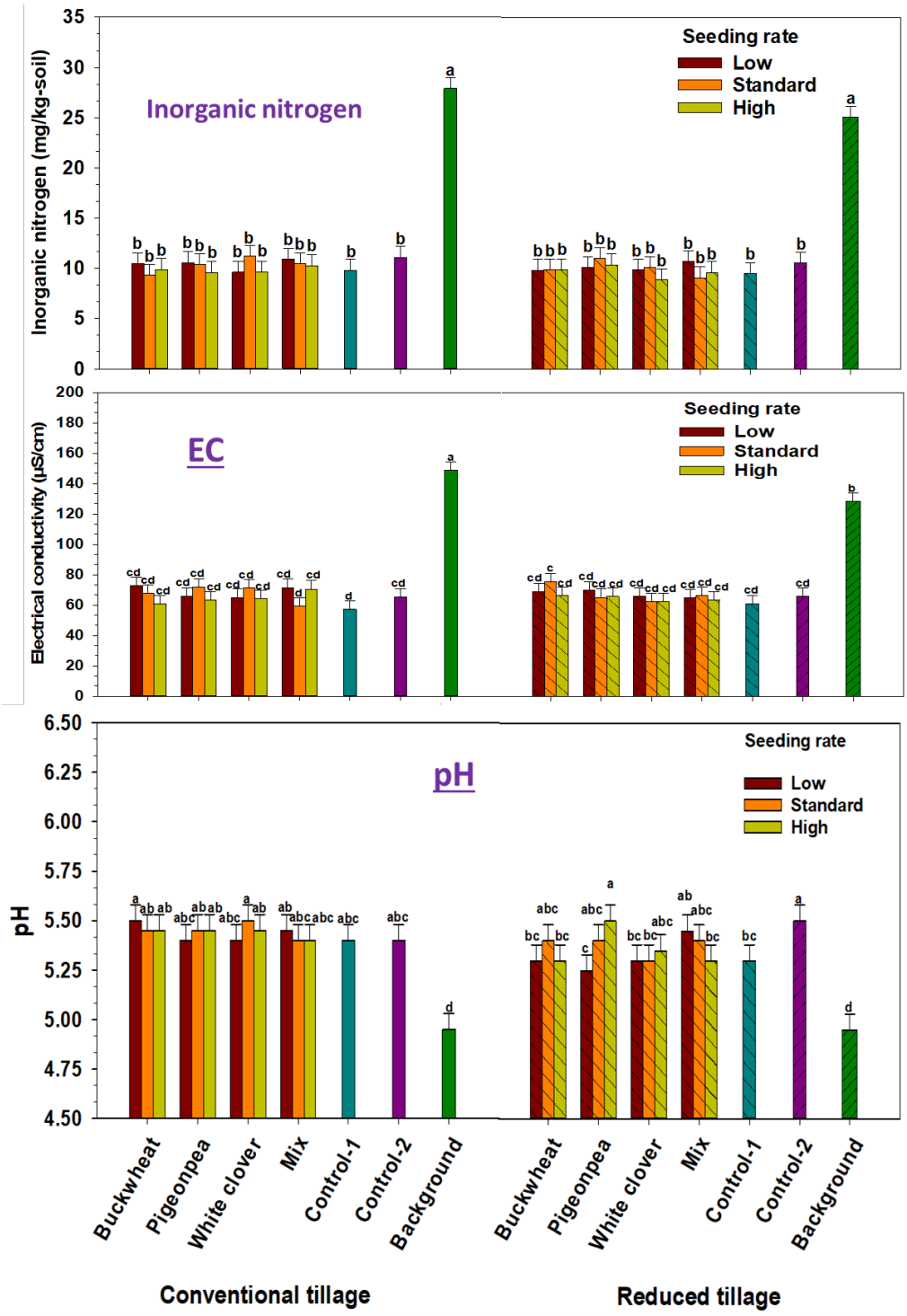

Figure 11. Effect of interseeded cover crops on inorganic nitrogen, EC and pH under conventional tillage and reduced tillage conditions. Cover crops buckwheat, pigeonpea, white clover and their mixture were interseeded at standard, low (1.5 times less than the standard rate), and high (1.5 times higher than the standard rate) seeding rates. Control-1: No cover crops, with fertilizer; Control-2: No cover crops, no fertilizer. Background was soil samples collected before corn planting.

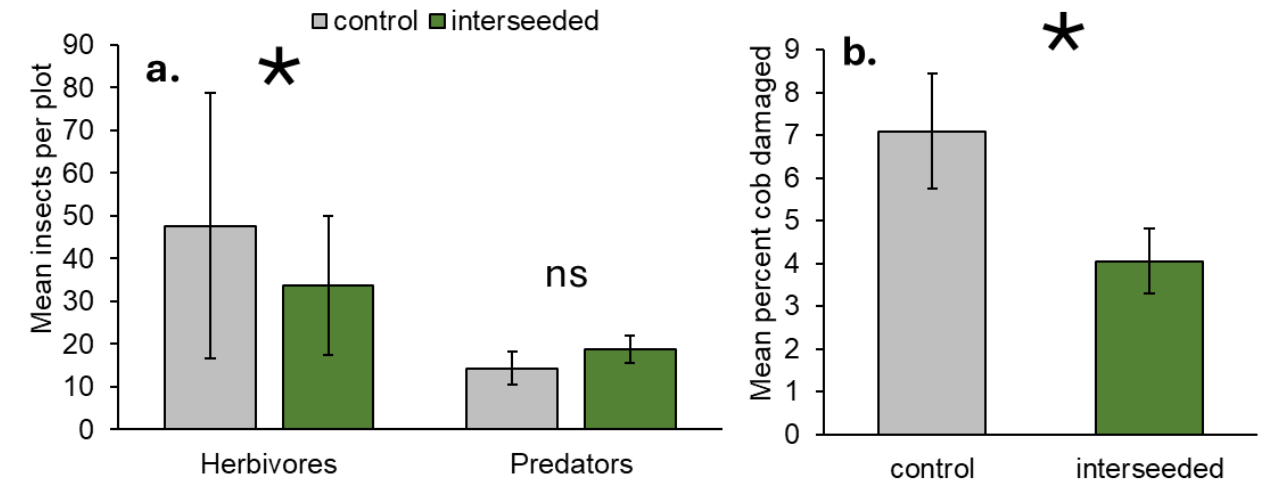

Figure 12. Herbivore and predatory insect responses to inter-seeded cover crop treatments (a), and cover crop effects on herbivore damage to organic corn cobs in Clemson, SC, 2023.

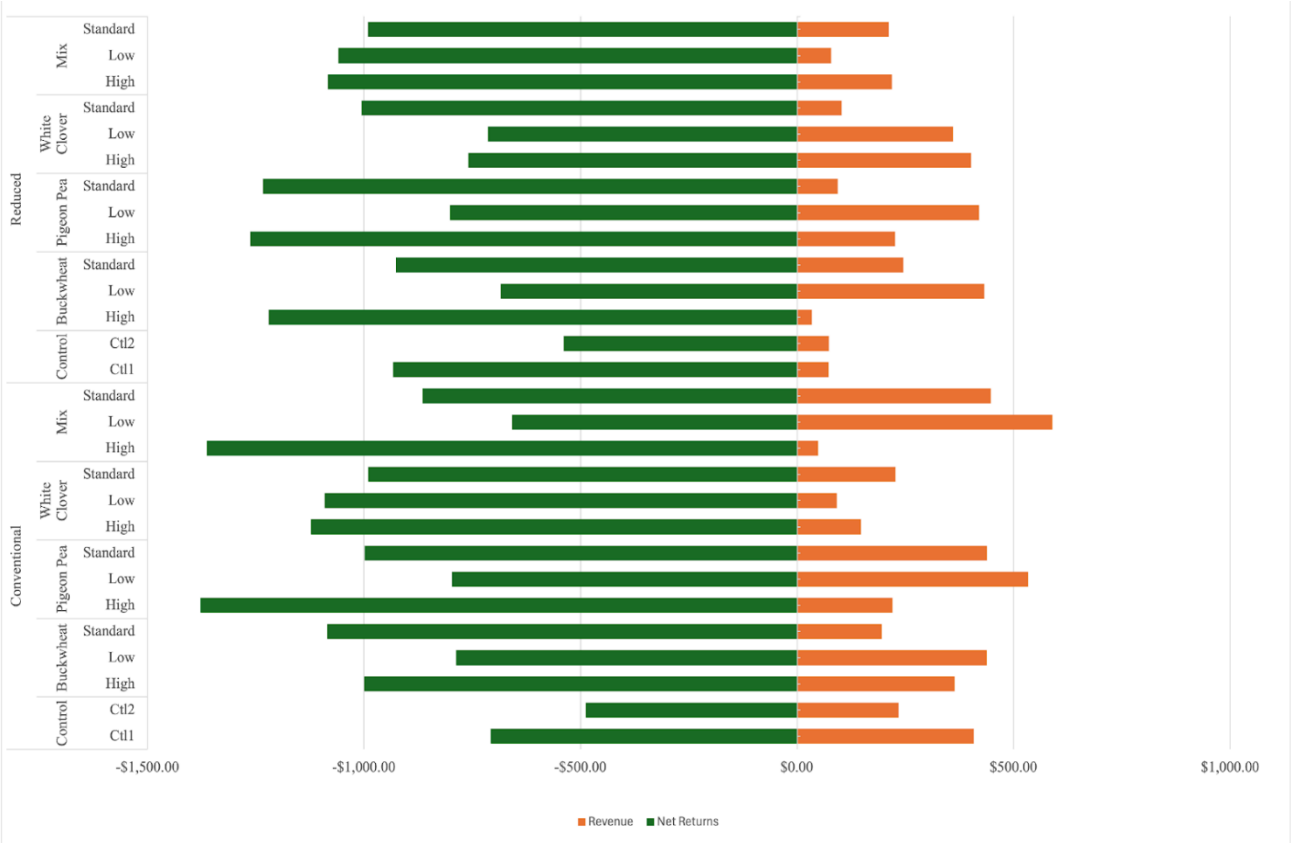

Figure 12. Revenue and net returns from corn yield with interseeded cover crops under conventional tillage and reduced tillage conditions in 2022.

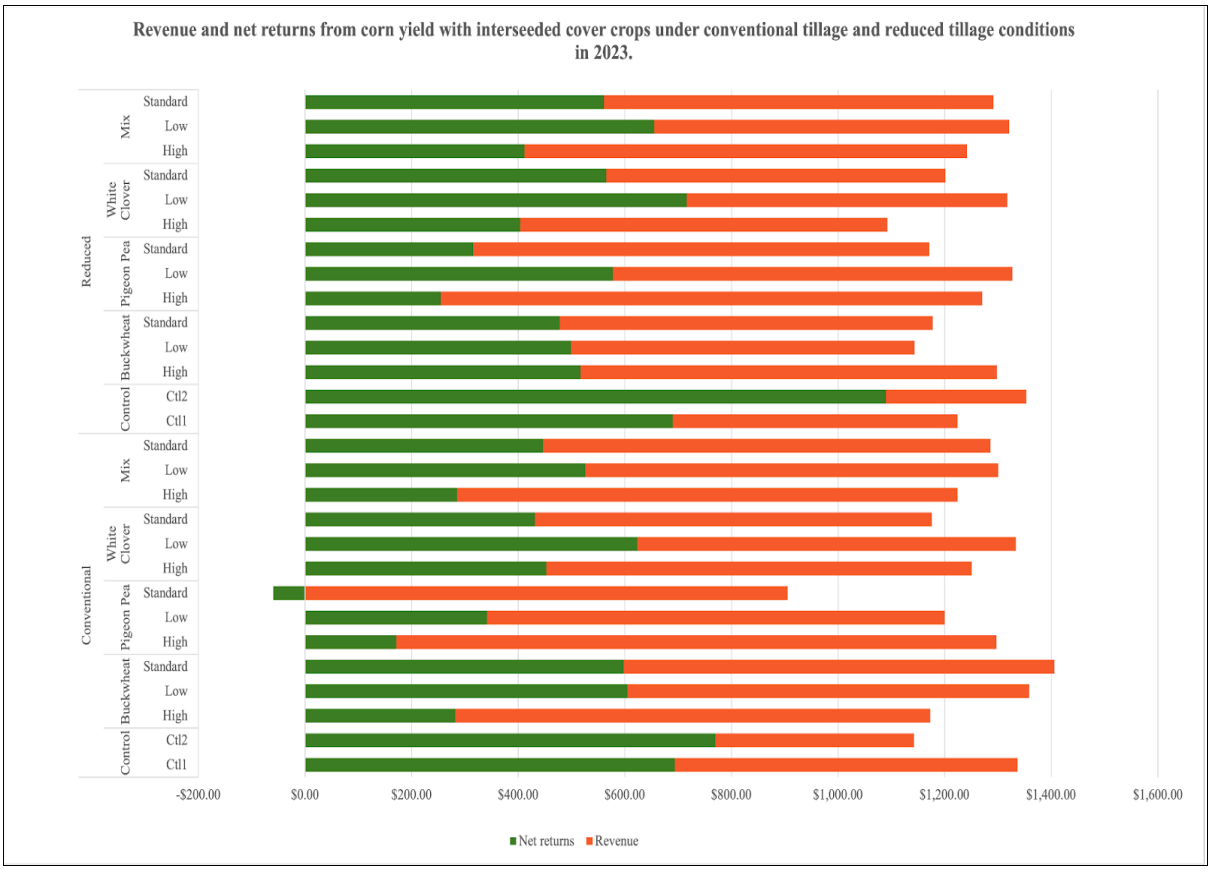

Figure 13. Revenue and net returns from corn yield with interseeded cover crops under conventional tillage and reduced tillage conditions in 2023.