

SUPPLEMENTARY MATERIALS

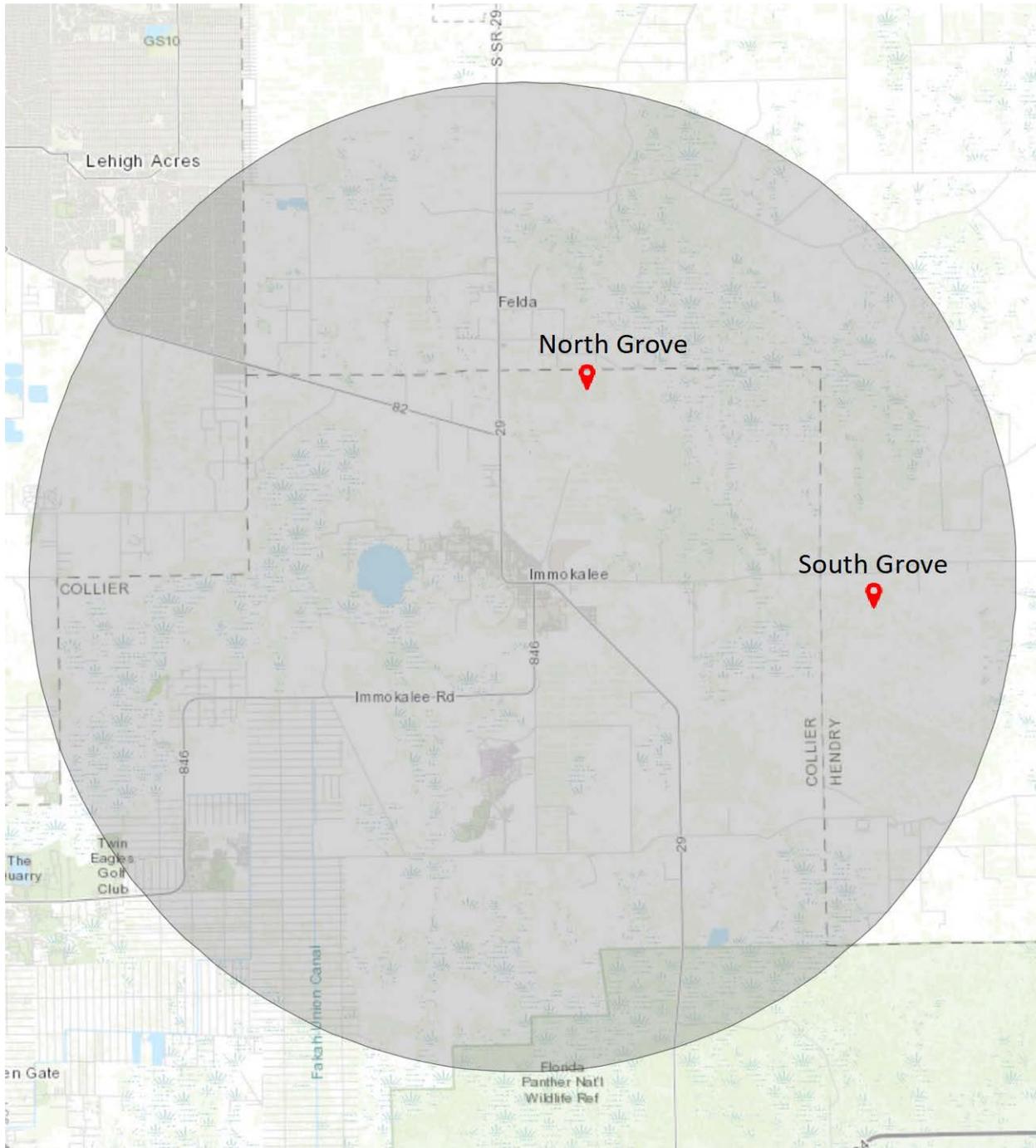


Figure S1: The geographic location of North Grove and South Grove. The approximate distance between groves is 32 km. Collier County, Immokalee, Florida, US. Source: National Oceanic and Atmospheric Administration (NOAA).

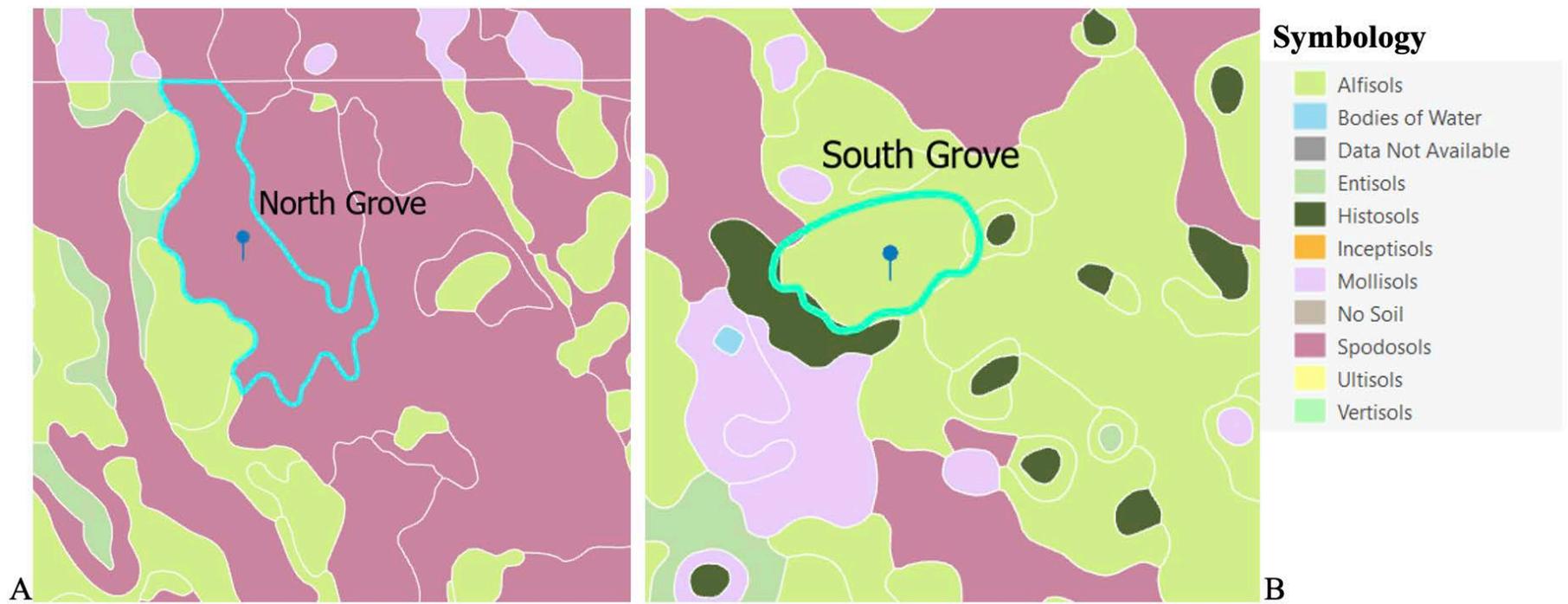


Figure S2: Soil order for each site (North and South Grove). A) North Grove soil order – Spodosol. B) South Grove soil order –Alfisol. Source: United States Department of Agriculture (USDA)- Natural Resources Conservation Service (NRCS), Environmental Systems Research Institute, Inc. (Esri). Software: ArcGIS Pro version 3.0.1



Figure S3: North Grove site. Cover crops were only planted in the row middle area. The row middle width was 3 m, and the distance from the row middle to the trunk of the citrus trees was 2 m. Photo courtesy of Dr. Sarah Strauss and Dr. Antonio Castellano-Hinojosa.

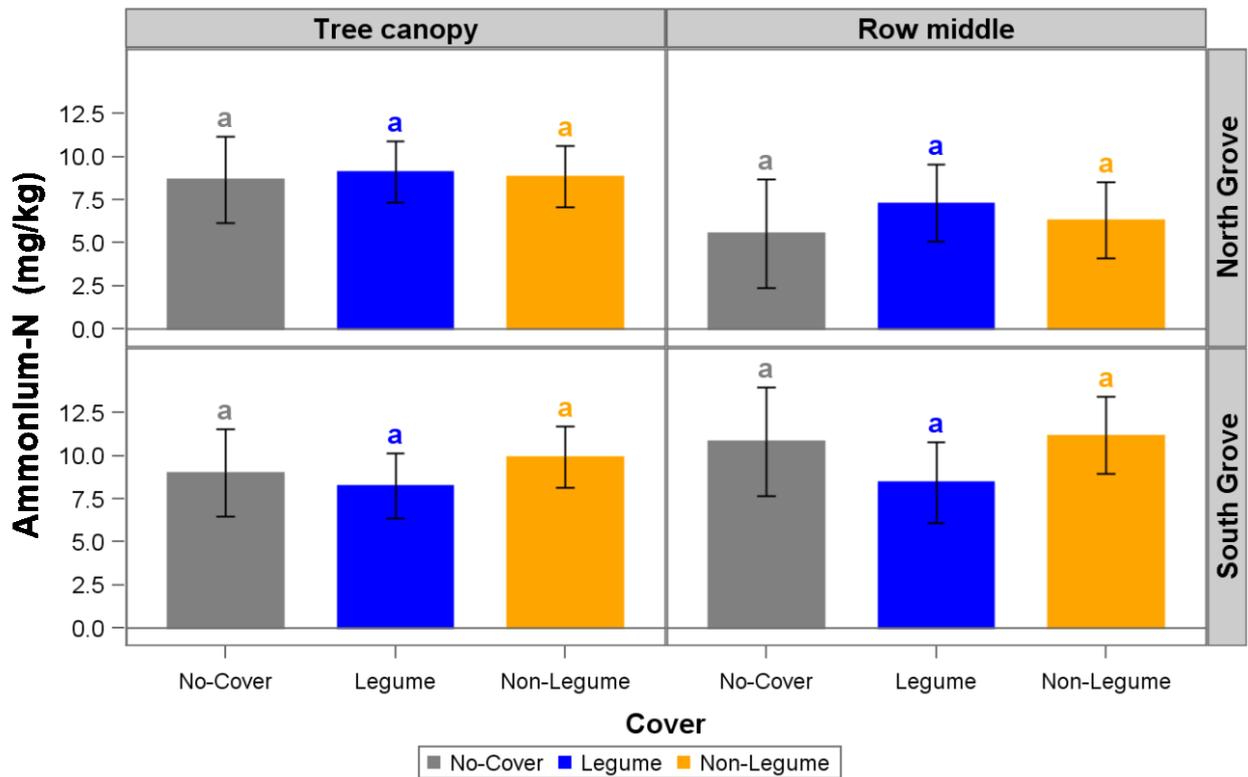


Figure S4: Soil ammonium-nitrogen concentration in the row middles and under the tree canopy in the North and South Groves. Treatments included legume (LG+NL), non-legume (NL), and no cover (control, no-cover cropped). Error bars represent 95% confidence limits based on 12 replicates. Treatments within a cell sharing a given letter are not statistically different at $P \leq 0.05$ based on the least significant difference (LSD) (simple two-sample t-test).

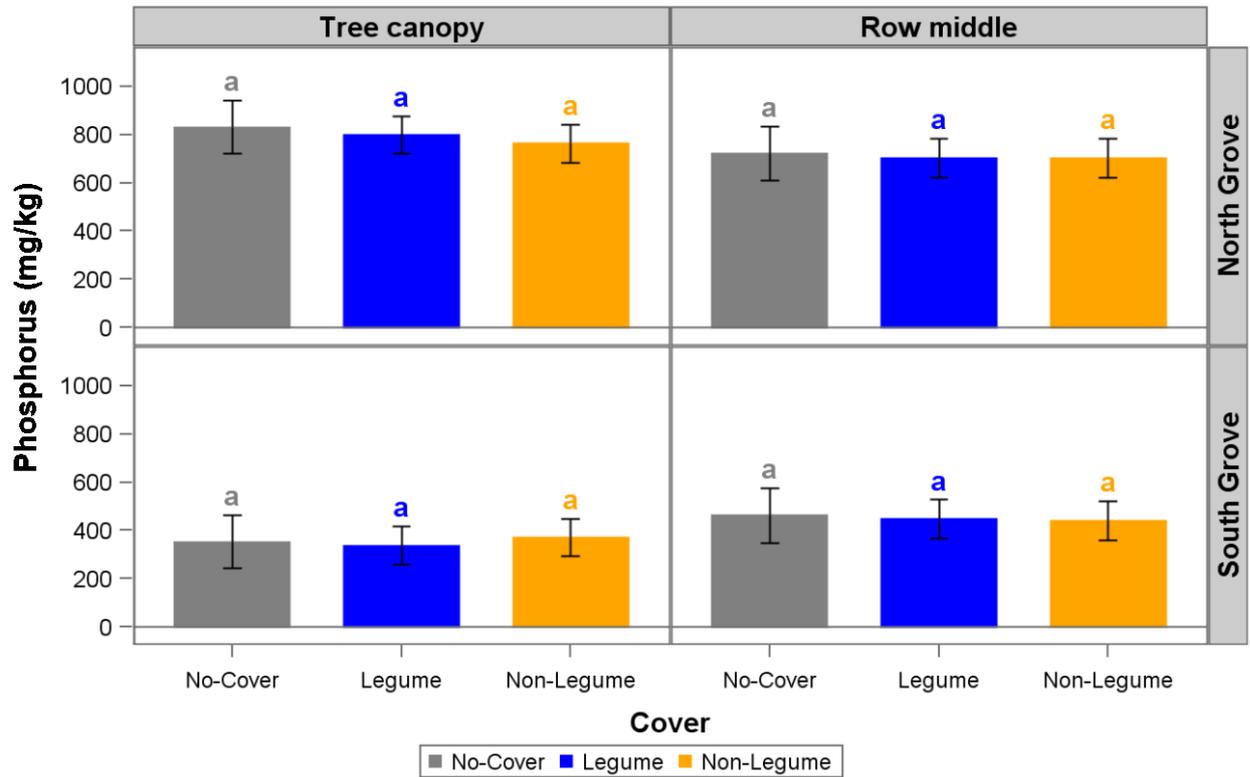


Figure S5: Soil phosphorus concentration in the row middles and under the tree canopy in the North and South Groves. Treatments include legume (LG+NL), non-legume (NL), and no cover (control, no-cover cropped). Error bars represent 95% confidence limits based on 12 replicates. Treatments within a cell sharing a given letter are not statistically different at $P \leq 0.05$ based on the least significant difference (LSD) (simple two-sample t-test).

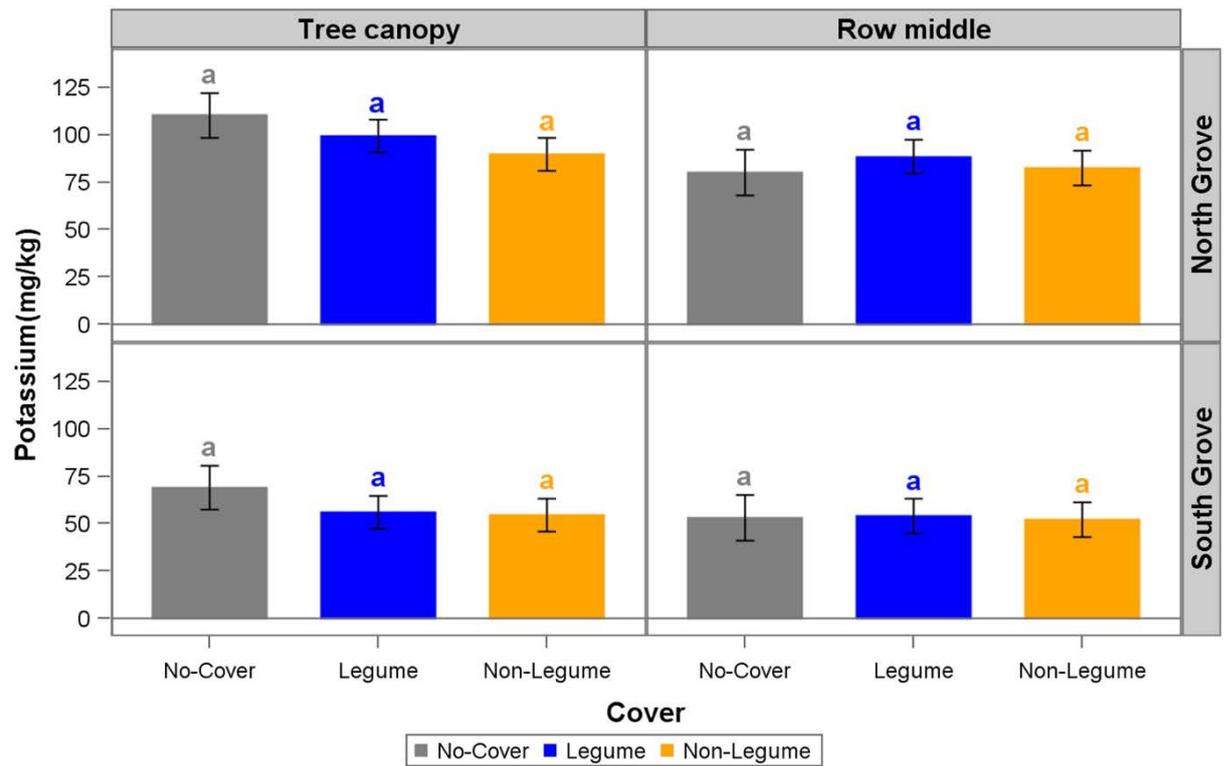


Figure S6: Soil potassium concentration in the row middles and under the tree canopy in the North and South Groves. Treatments include legume (LG+NL), non-legume (NL), and no cover (control, no-cover cropped). Error bars represent 95% confidence limits based on 12 replicates. Treatments within a cell sharing a given letter are not statistically different at $P \leq 0.05$ based on the least significant difference (LSD) (simple two-sample t-test).

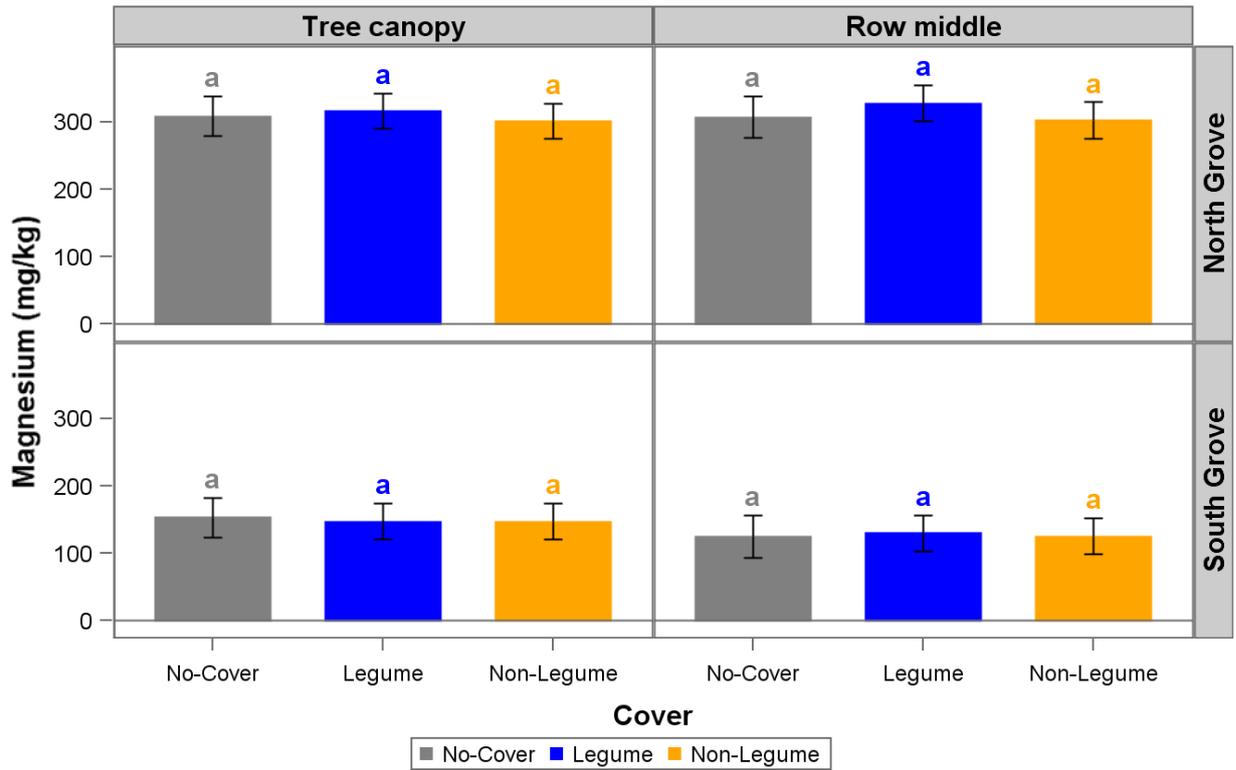


Figure S7: Soil magnesium concentration in the row middles and under the tree canopy in the North and South Groves. Treatments include legume (LG+NL), non-legume (NL), and no cover (control, no-cover cropped). Error bars represent 95% confidence limits based on 12 replicates. Treatments within a cell sharing a given letter are not statistically different at $P \leq 0.05$ based on the least significant difference (LSD) (simple two-sample t-test).

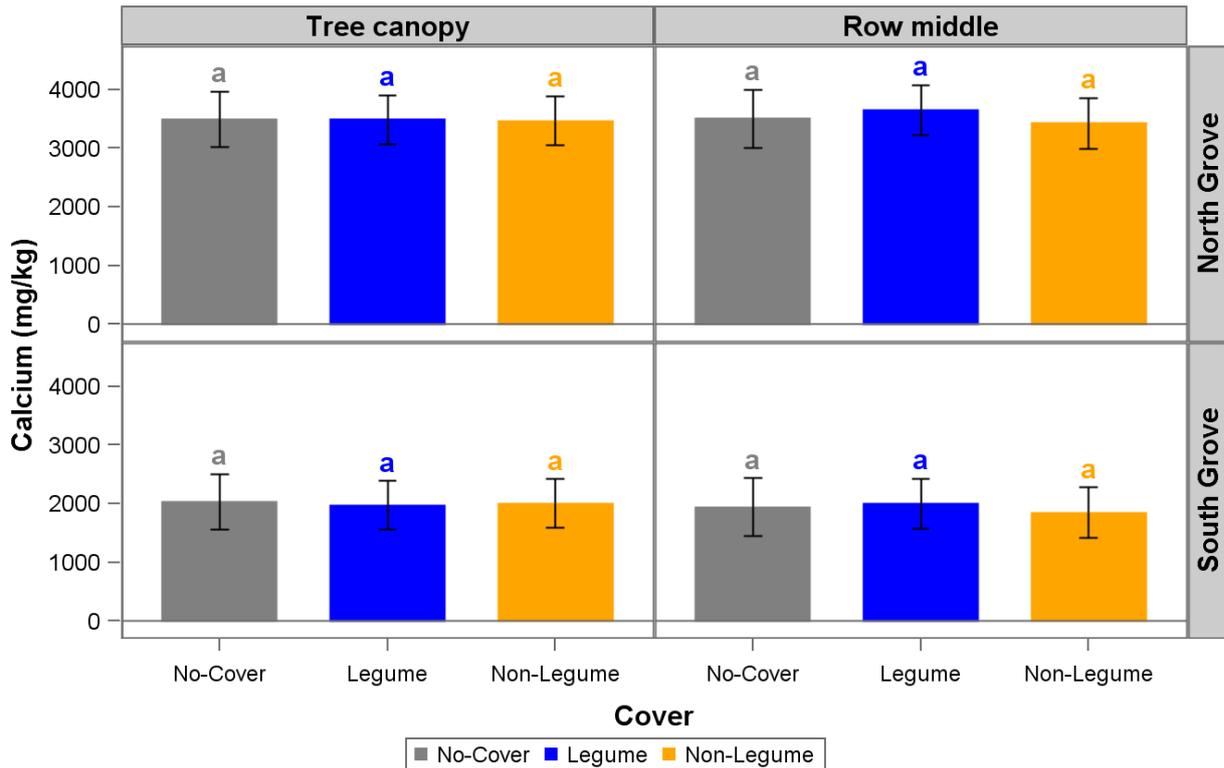


Figure S8: Soil calcium concentration in the row middles and under the tree canopy in the North and South Groves. Treatments include legume (LG+NL), non-legume (NL), and no cover (control, no-cover cropped). Error bars represent 95% confidence limits based on 12 replicates. Treatments within a cell sharing a given letter are not statistically different at $P \leq 0.05$ based on the least significant difference (LSD) (simple two-sample t-test).

Table S1: Analysis of variance (ANOVA) for P, Ca, Mg, NH₄⁺-N, NO₃⁻-N, and organic matter (OM) concentration in the soil.

Source	DF	P	Ca	Mg	NH ₄ ⁺	NO ₃ ⁻ -N	OM
Site	1	***1	***	***	***	***	***
Treatment	2	ns	ns	ns	ns	ns	**
Site*Treatment	2	ns	ns	ns	ns	ns	ns
Location	1	ns	ns	ns	***	ns	***
Site*Location	1	***	ns	*	***	**	***
Treatment*Location	2	ns	ns	ns	*	ns	ns
Site*Treatment*Location	2	ns	ns	ns	ns	*	**
Year	3	***	ns	***	***	***	***
Site*Year	3	***	ns	***	ns	***	ns
Treatment*Year	6	ns	ns	ns	ns	ns	ns
Site*Treatment*Year	6	ns	ns	ns	ns	ns	ns
Location*Year	3	***	ns	***	***	***	***
Site*Location*Year	3	***	ns	***	***	***	***
Treatment*Location*Year	6	*	ns	ns	ns	ns	ns
Site*Treatment*Location*Year	6	ns	ns	ns	ns	ns	ns

¹ns, *, **, *** imply not significant at P=0.05, and significant at P-value 0.05, 0.01, and 0.001, respectively.