Cover Crop Management

2023 Row Crop Short Course
Mississippi State University

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USDA
United States Department of Agriculture
Agricultural Research Service

Benefits:

Erosion Control

Photo courtesy: Myron Johnson

Benefits:

Soil Moisture Conservation

Benefits:

Weed Suppression

Benefits:

Soil Organic C

Cover Crop	Carbon sequestration rates			
	0-5 cm	5-10 cm	10-15 cm	Total
	----------kg C ha^{-1} yr^{-1}----------			
None	620	134	27	781
Rye	815	168	37	1020
Wheat	775	165	38	977
SED†	88	35	29	133
P value	0.0689	0.5734	0.9304	0.1742

High Residue Cover Crop

Management Matters:

- **Planting a cover crop does not guarantee an adequate cover crop performance.**

Background:

- **Despite potential benefits, cover crops require a monetary and time investment from growers.**
- **Common question: How can a grower maximize their return on investment (ROI) for cover crops?**
- **Ensure cover crop performance is optimal, which is determined by management.**

Cover Crop Management Factors:

Planting Date:

- **Planting early has proven beneficial to enhance cover crop biomass production.**
- **Conflicts with fall harvest, particularly cotton.**
- **Increasing inputs may enhance growth but costs also increase.**

Cover Crop Management Factors:

- **Seeding Rates – how much to plant?**

Rye
30 lb/ac

Triticale
60 lb/ac

Cover Crop Management Factors:

- **N Fertilizer – how much? Expensive.**

N Fertilizer | **No N Fertilizer**

Hypothesis:

Intense cover crop management for a late planted rye (cv. 'Wrens Abruzzi') cover crop can produce equivalent biomass levels to an early planted rye cover crop.

Experimental Design:

Split-split plot experiment conducted from 2015 – 2020.

Differences significant at $P \leq 0.05$.

Planting Date:
- Late October
- Early November
- Late November
- Early December

Seeding Rate:
- 60 lb ac^{-1}
- 90 lb ac^{-1}

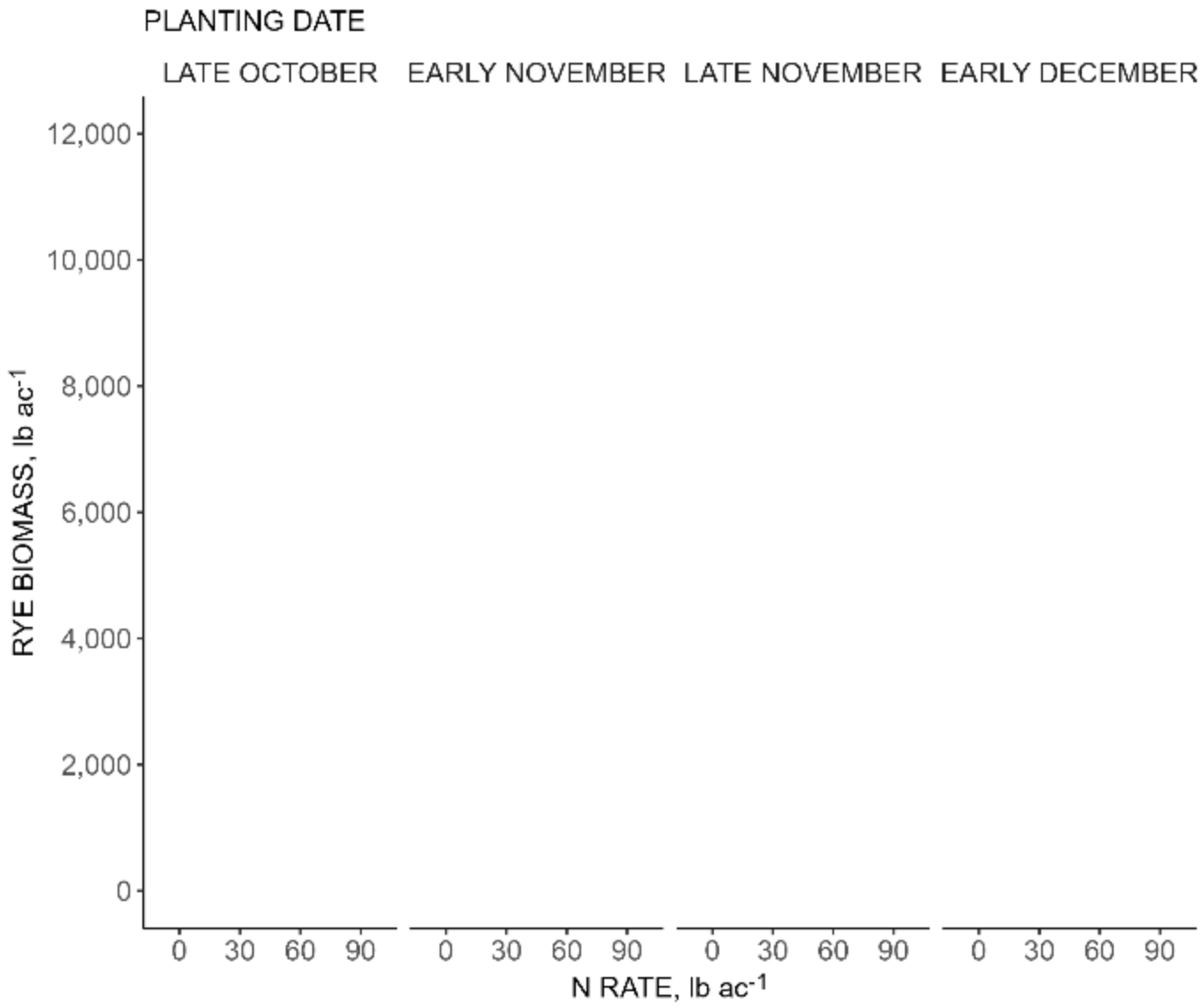
Nitrogen Rate:
- 0 lb ac^{-1}
- 30 lb ac^{-1}
- 60 lb ac^{-1}
- 90 lb ac^{-1}

Balkcom et al. (2023)
Agronomy Journal

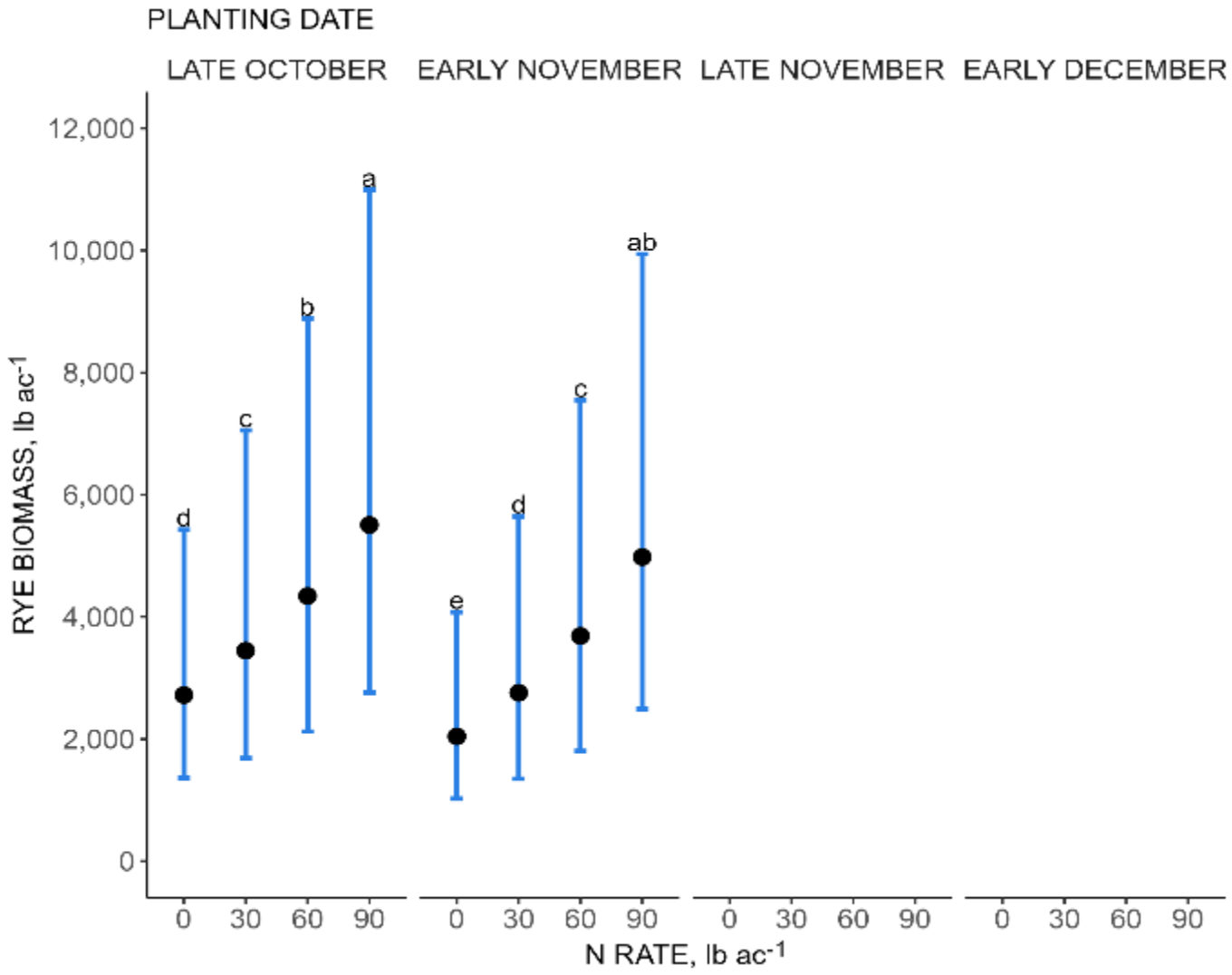
Wiregrass Research and Extension Center
Headland, AL

Biomass Production:

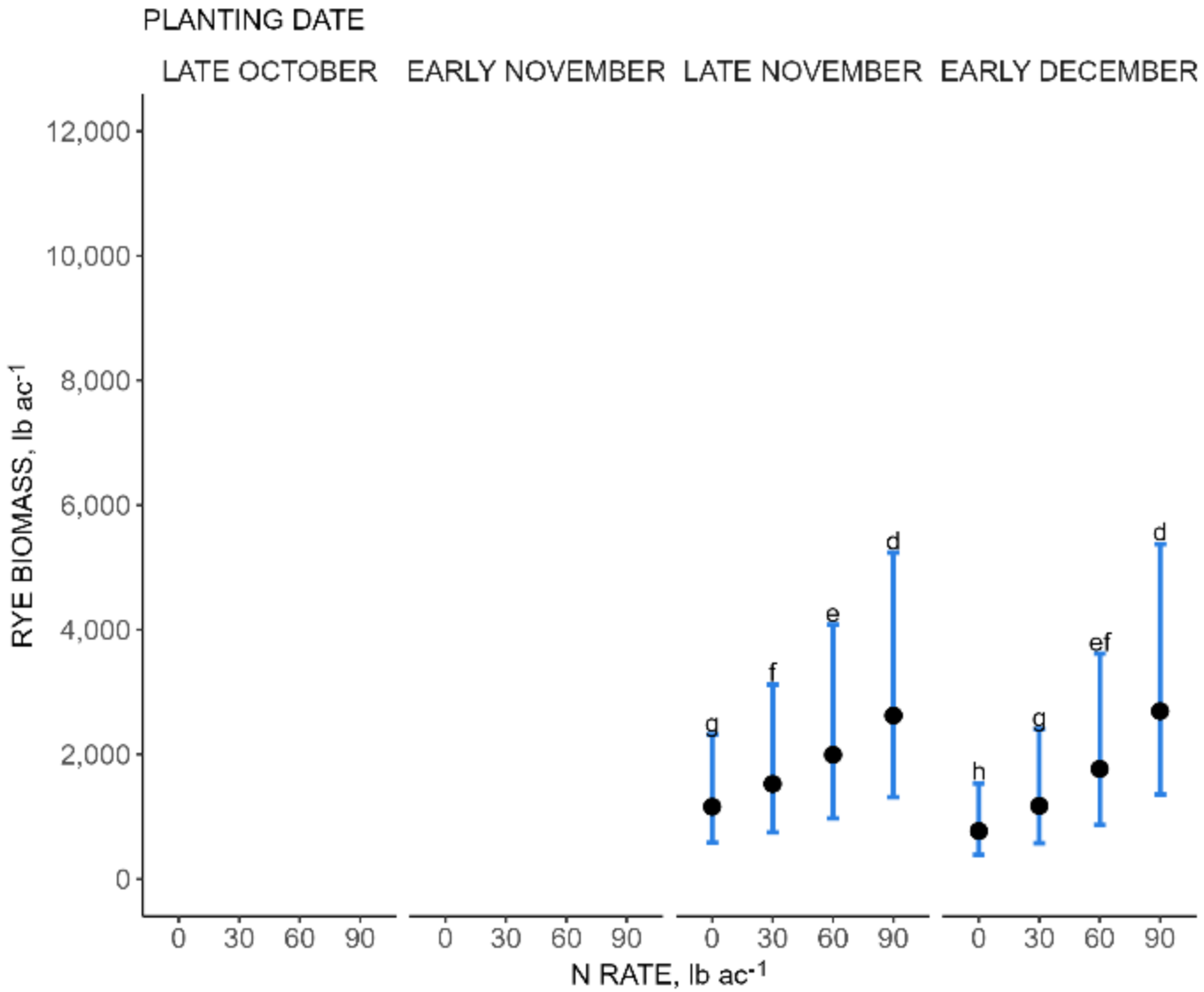
Plant Date x N Rate
***P* <0.0001**



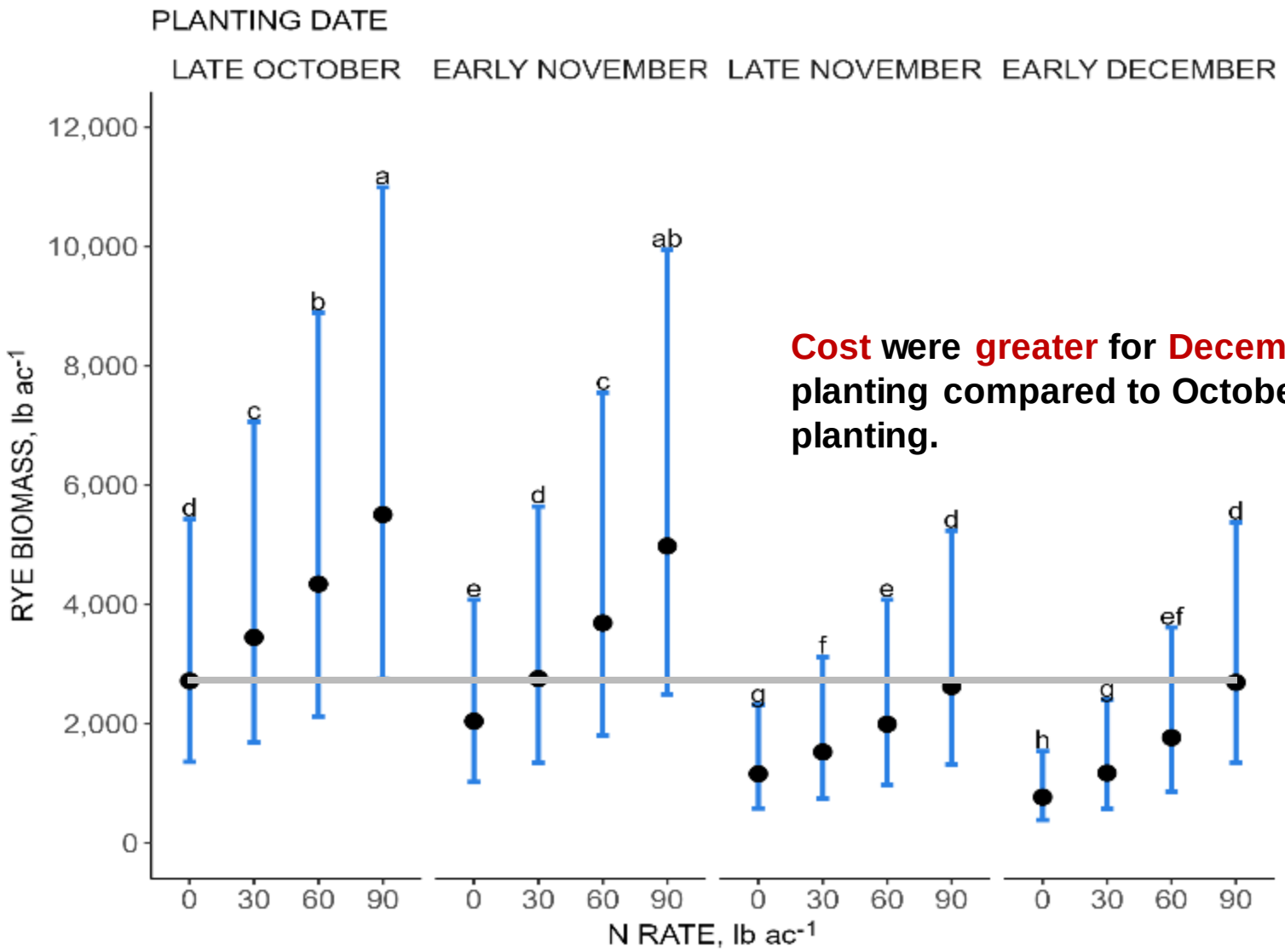
Early Planted Biomass 2.2 times greater for 90 vs 0 lb N ac^{-1}



Late Planted Biomass 2.9 times greater for 90 vs. 0 lb N ac^{-1}, but start and end with less



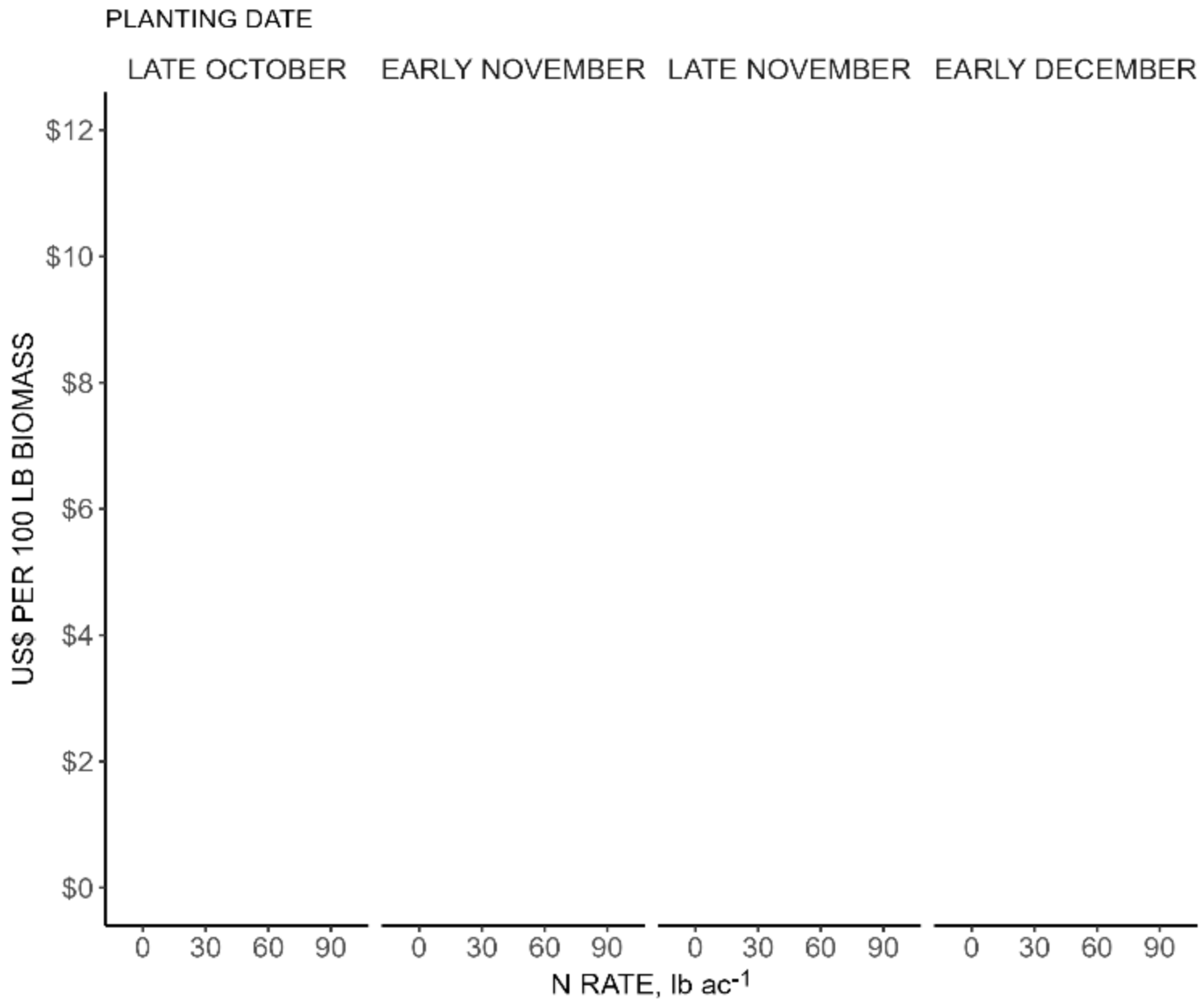
Additional Inputs could not Overcome Environmental Constraints of Late Planting with Current Cover Crop Genetics



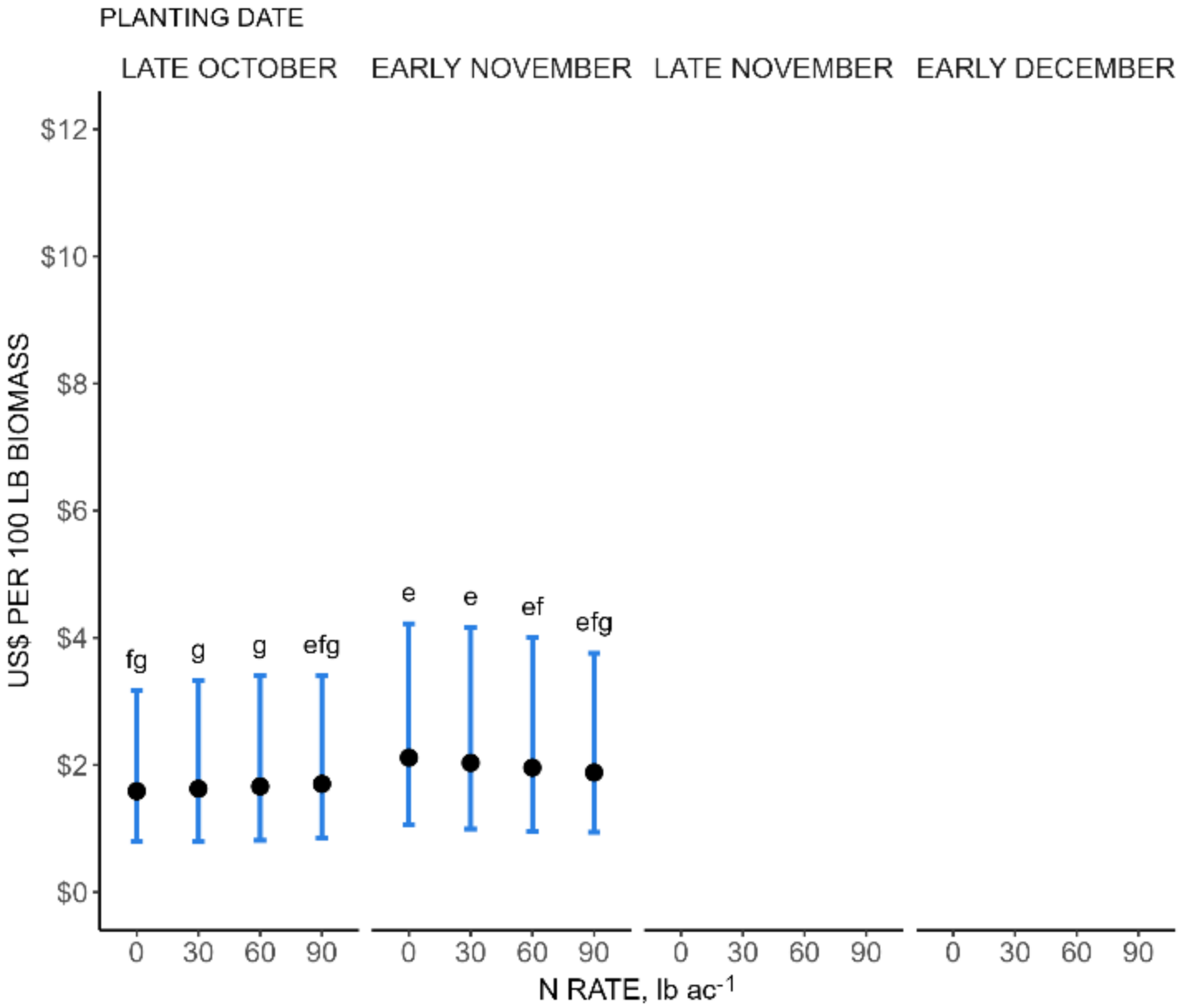
Cost were greater for December planting compared to October planting.

US$ / 100 lb Biomass:

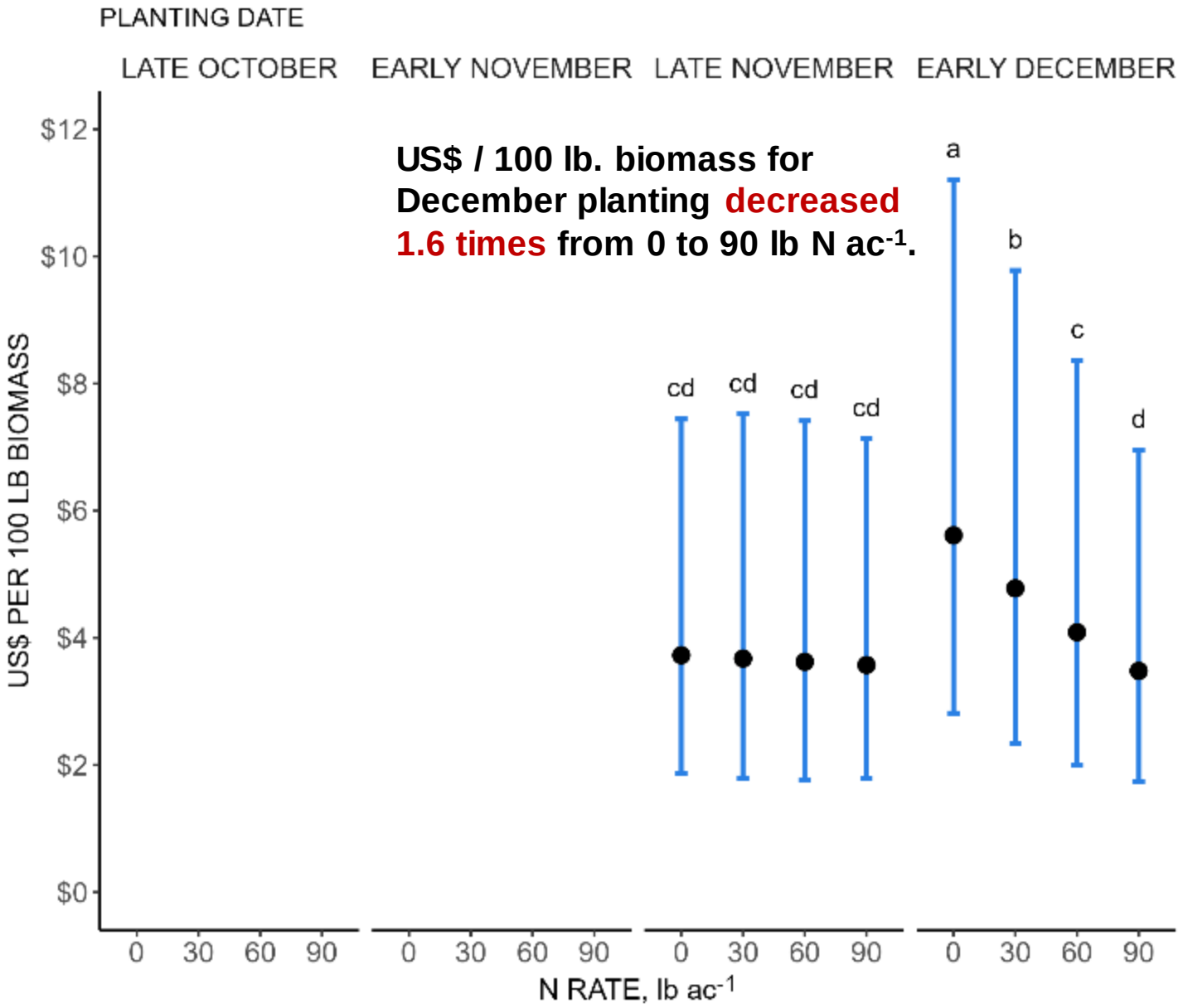
Plant Date x N Rate
***P* <0.0001**



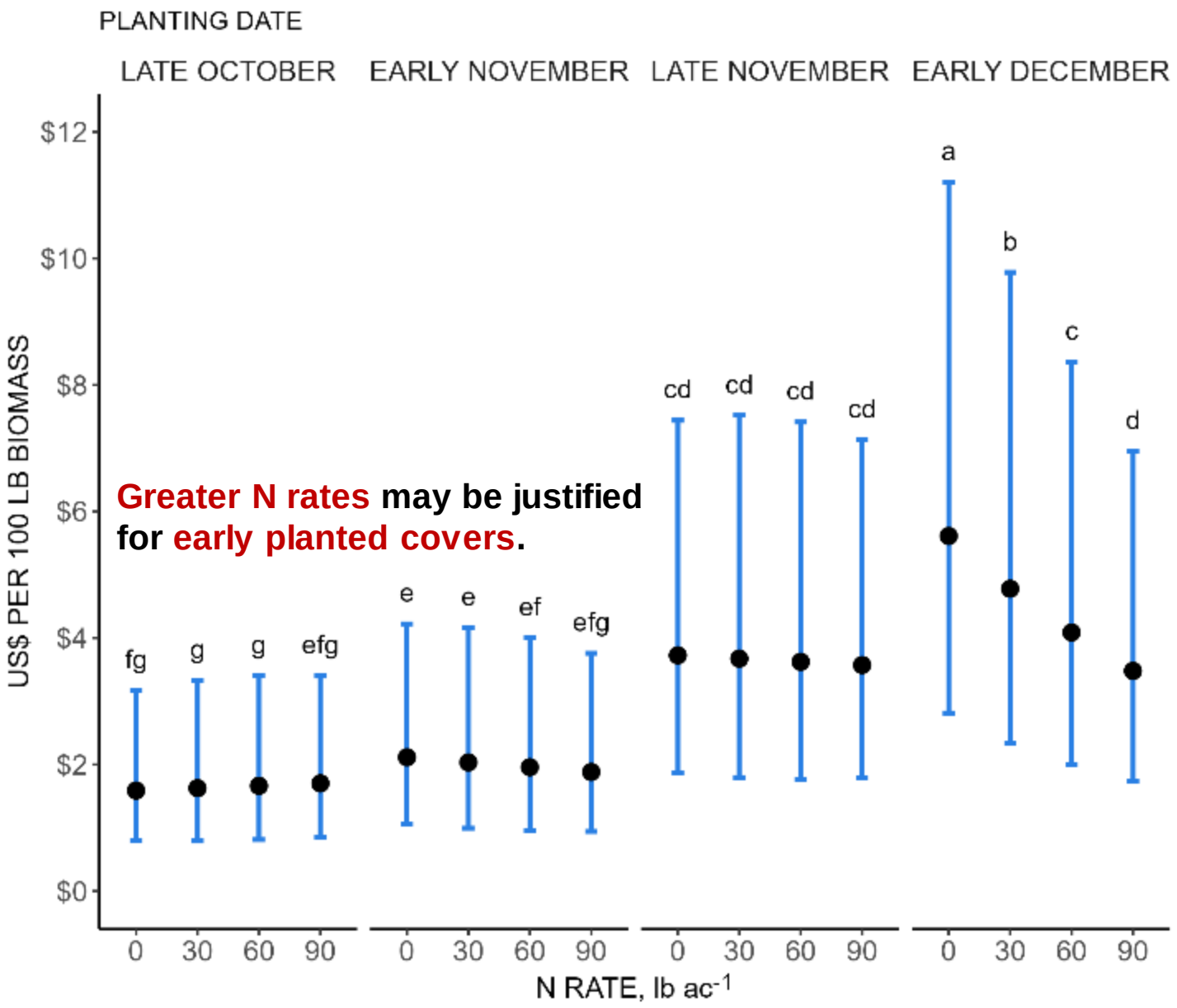
US$ / 100 lb Biomass were Similar across N Rates for Early Planting Dates



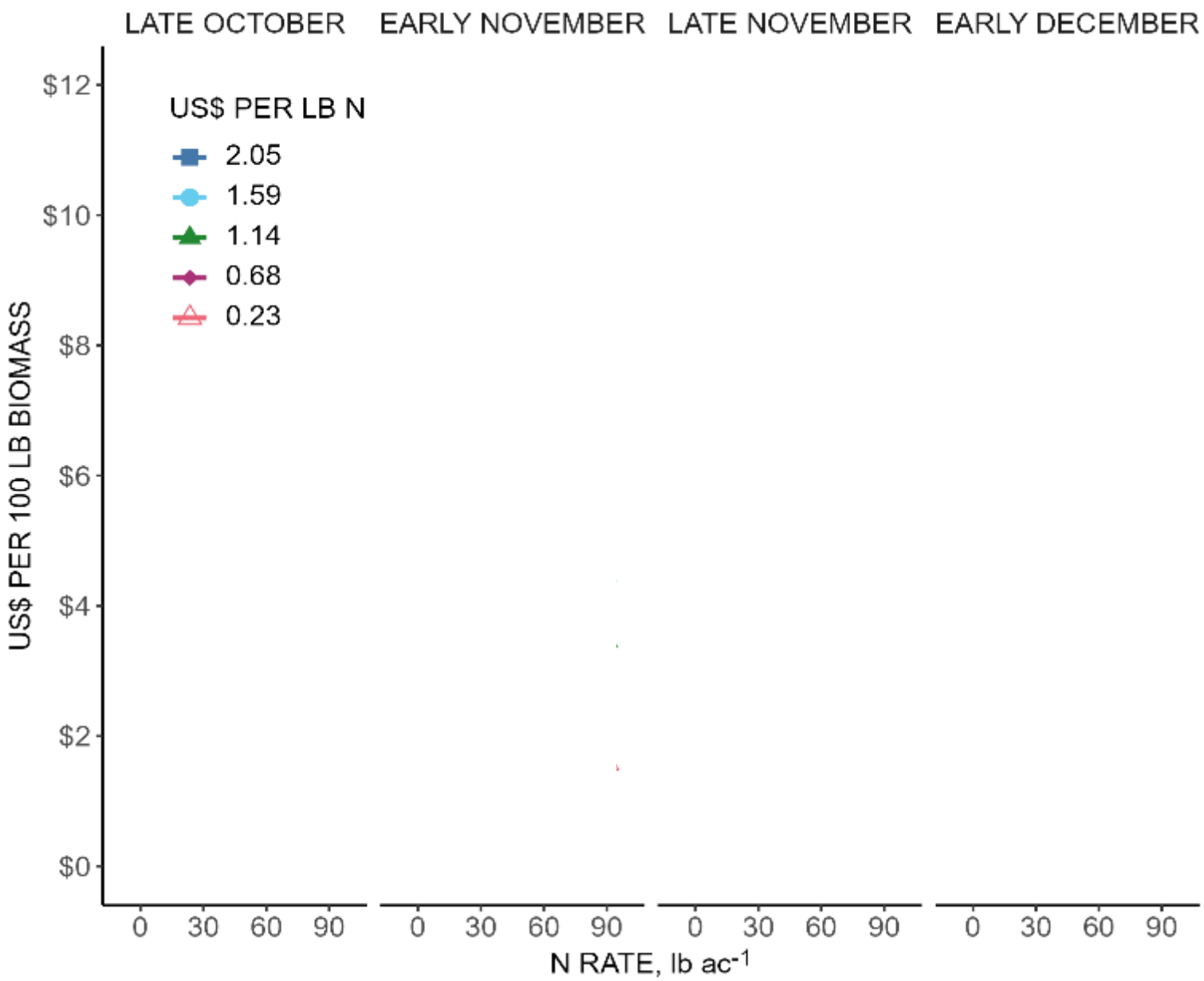
US$ / 100 lb Biomass 2.2 times greater for Late Planted compared to Early Planted



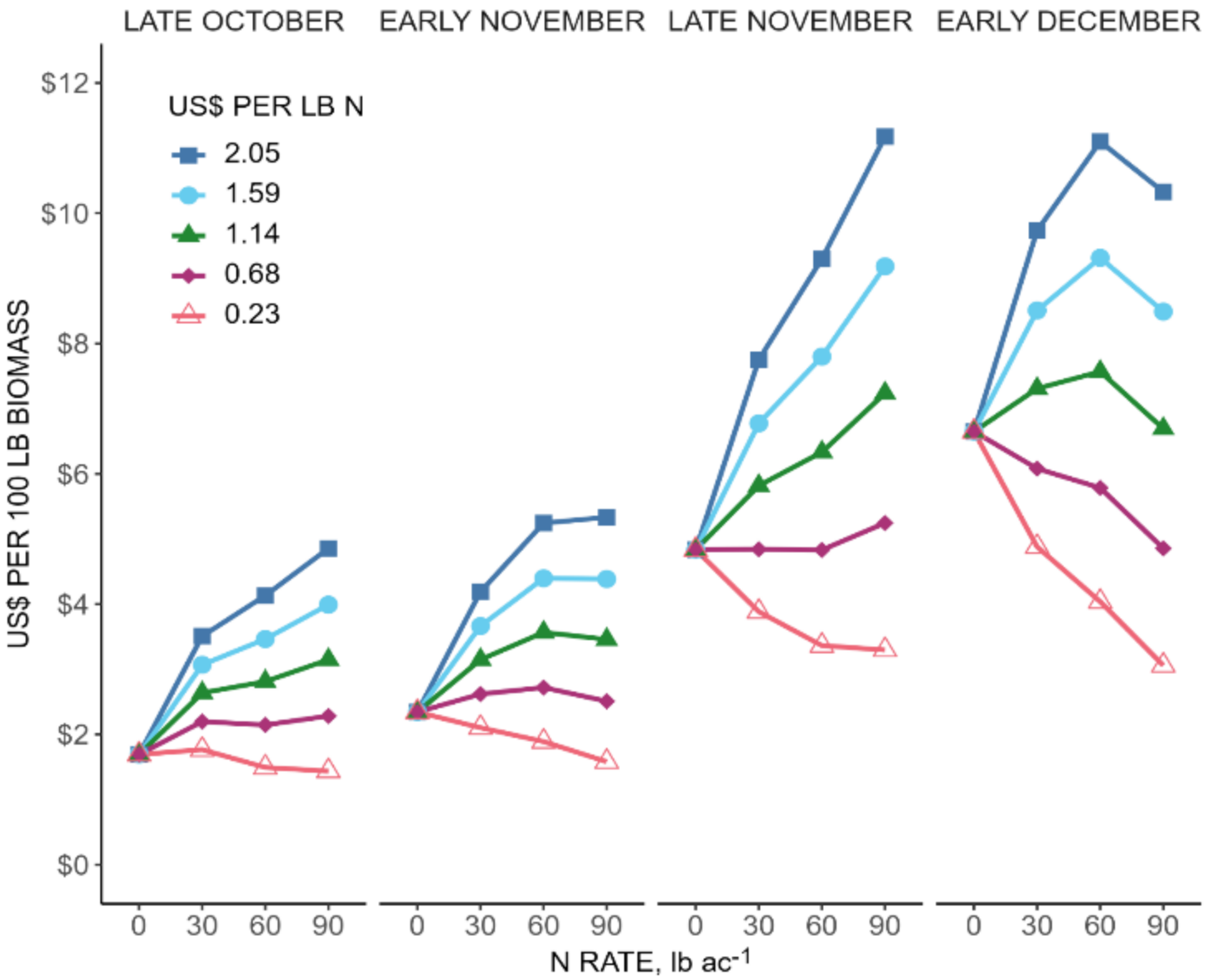
Traditionally, Cover Crop N is Limited to Reduce Cost



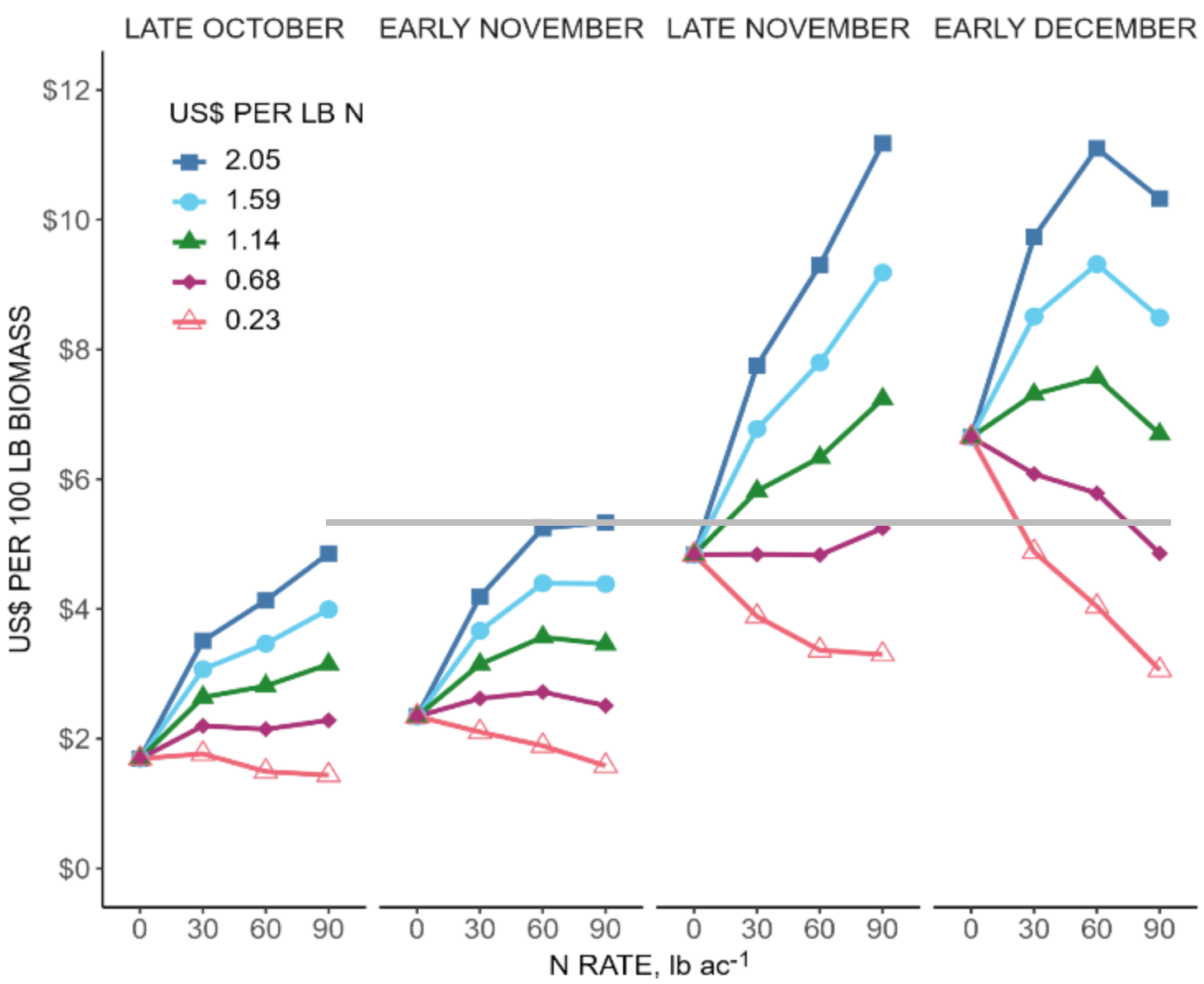
N Price Scenarios:



N Prices > US$0.68 lb^{-1} Increased US$ / 100 lb Biomass, regardless of Plant Date



Early Planting is Advised as N Price Increases

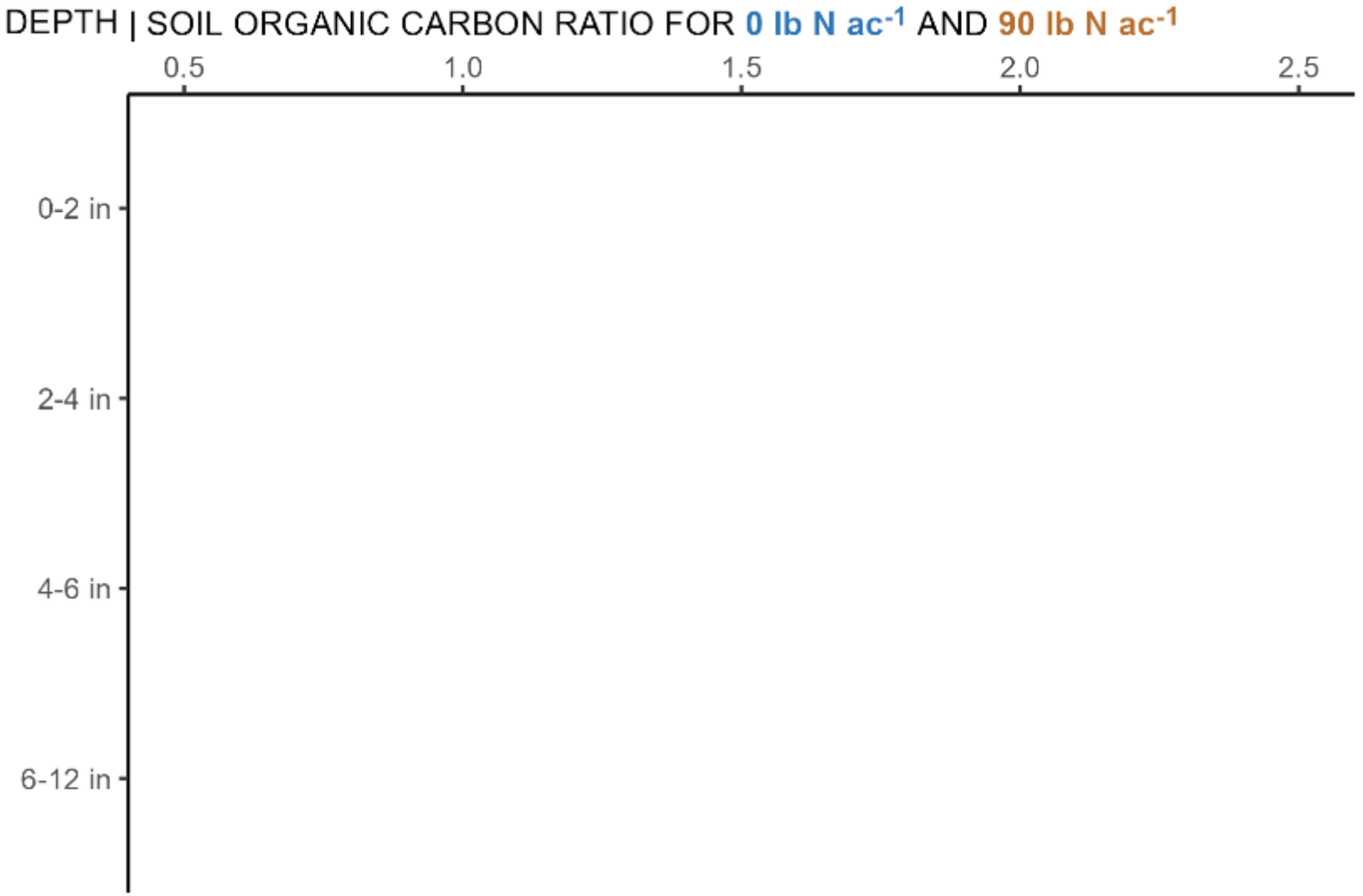


Soil Carbon

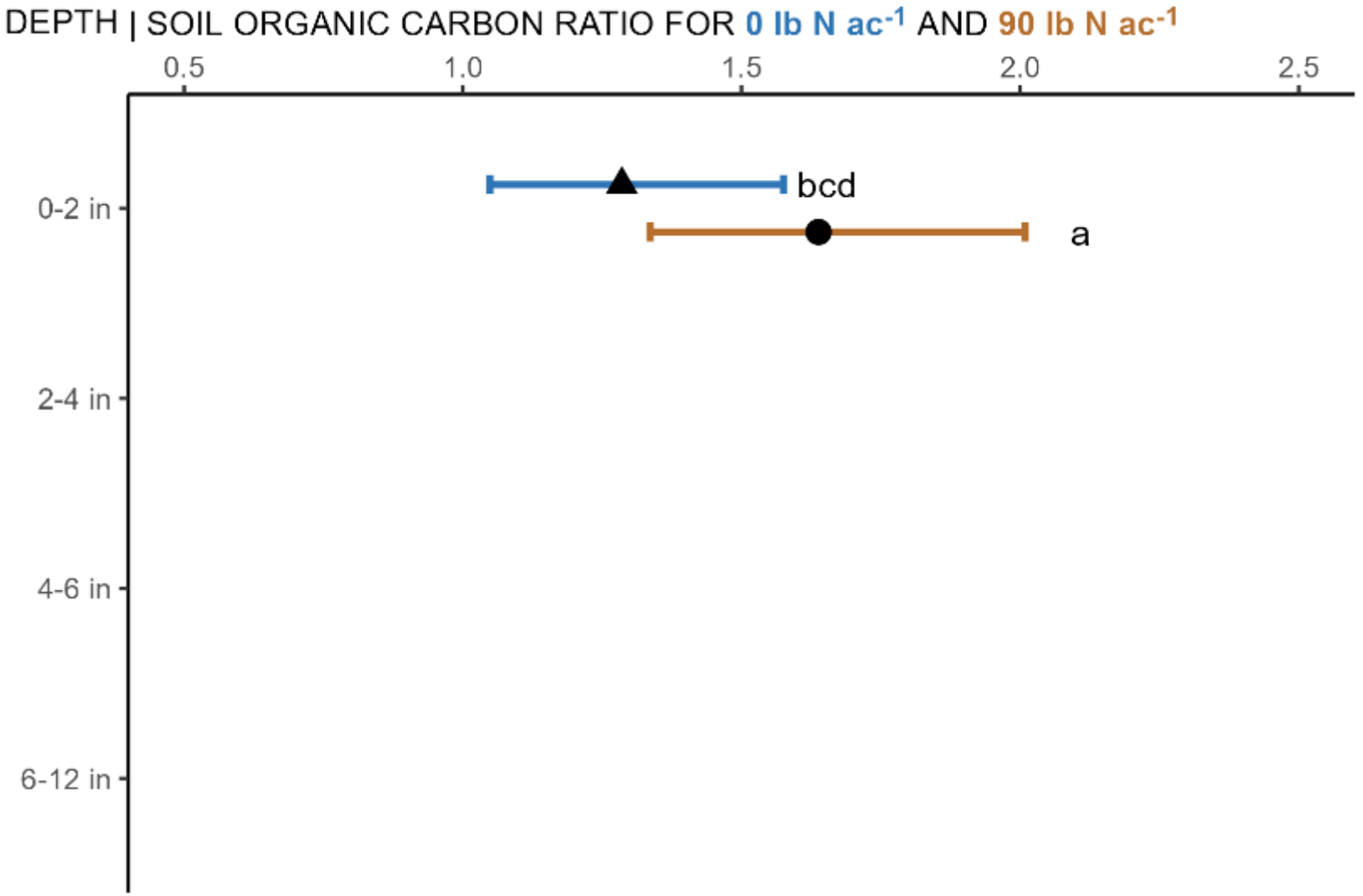
Surface soil effects are most critical.

Soil Organic C for a Fuquay sand:

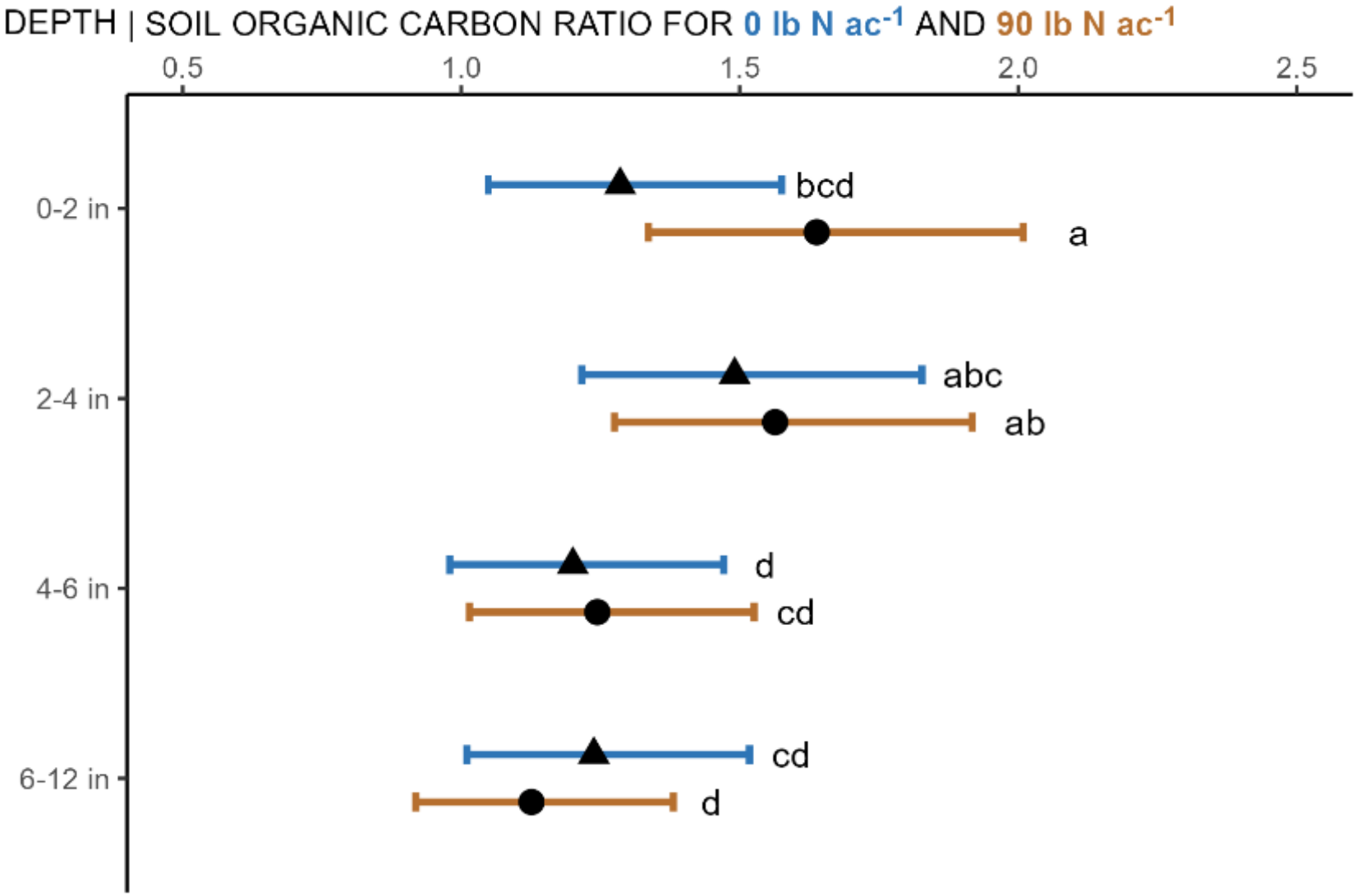
N Rate x Depth
P = 0.003



Aboveground Biomass following 90 lb N ac^{-1} Supplied 2.3 times more C Annually compared to 0 lb N ac^{-1}



Planting Date ($P = 0.765$) nor Planting Date x Depth ($P = 0.083$) affected Soil Organic C.



Cover Crop Management Guidance:

- **Planting** cover crops by **Nov. 15** was crucial to **enhance** rye performance and **maximize** ROI in the region.
- **Nitrogen** applications for **late planted** cereals are **risky**.
- **Cost of additional N** for early planted cover crops can be **offset** by additional **biomass production** and subsequent benefits.
- **Nitrogen** fertilizer was required to **increase** surface **soil organic C** concentrations on the sand soil type.

Conservation Systems Research

More information available at:

Website: **www.ars.usda.gov/sea/nsdl**

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