

Harnessing Cover Crops to Address Unique Farm Needs and Achieve Maximum Benefits

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Introduction and Hypothesis

Cover cropping is a conservation practice intended to “cover” the land when it is not being used for the primary purpose of growing “cash crops.” Cover crops can provide various benefits, such as preventing soil erosion, scavenging nutrients, building soil organic matter, or controlling pests such as weeds. Since cover crops are not a primary source of farm income, farmers may spend less time planning and managing them when compared to their cash crops. Cover crops may be perceived as a one-size-fits-all bridge between the cash crops, with the same cover crop used regardless of other system factors. However, cover crop planning can greatly increase the benefits that cover crops provide, making the overall farming system more productive, sustainable, and profitable.

We hypothesized that designing cover crops with a particular purpose in mind, extending the cover crop growth window, and considering both environmental constraints and the capacity of the farm and farmer would result in more productive and functional cover crops.

Methods

- Extension educators collaborated with farmers to plan cover crops according to desired purpose, crop rotation and growing windows, and environmental and operational constraints.
- Farmers planted cover crops in the late-summer to fall planting window and managed cover crops until spring termination.
- Extension educators measured fall and spring cover crop biomass, and spring cover crop nitrogen and carbon content.



Harvesting vetch + wheat cover crop biomass (credit Haley Sater)

Featured Fields

Situation: Low soil organic matter and fertility

Solution: Grow 10-species cover crop mix including legumes, brassicas, grasses, and forbs planted in July and grazed

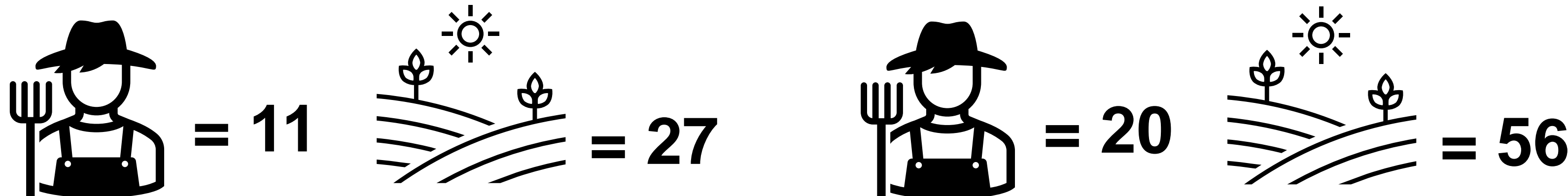
Management: Following July wheat harvest, the cover crop mix was planted instead of the typical rotation to double-crop soybean. This mix served to build soil organic matter and contribute nitrogen for a subsequent corn crop. Photo 8/15/24 (credit Bryan Racine)



Results

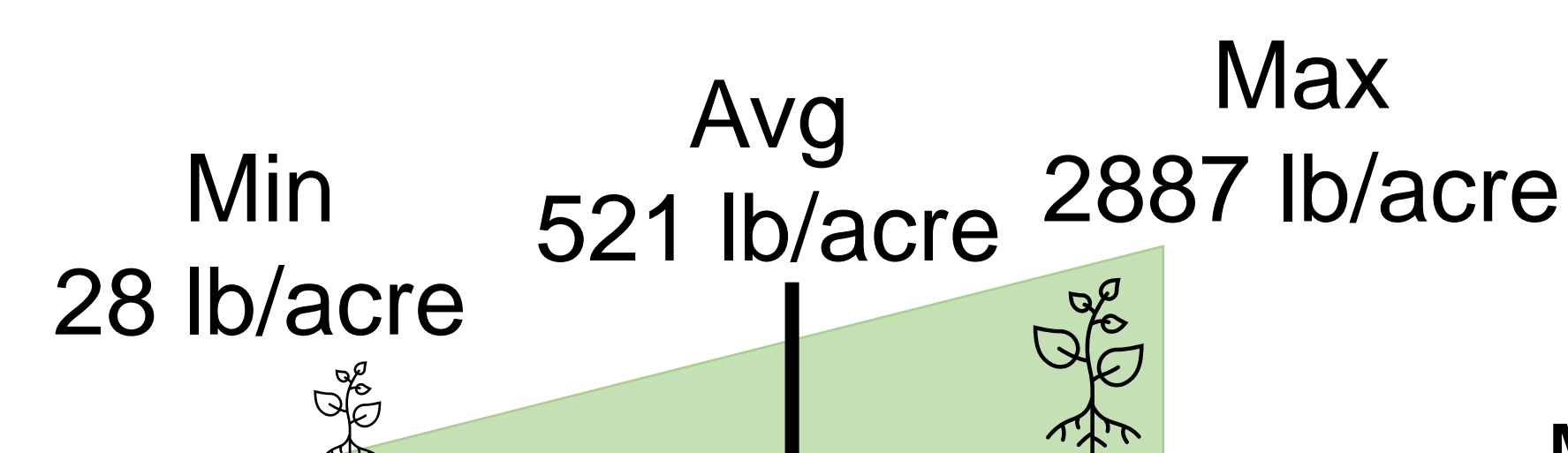
Year 1

Year 2

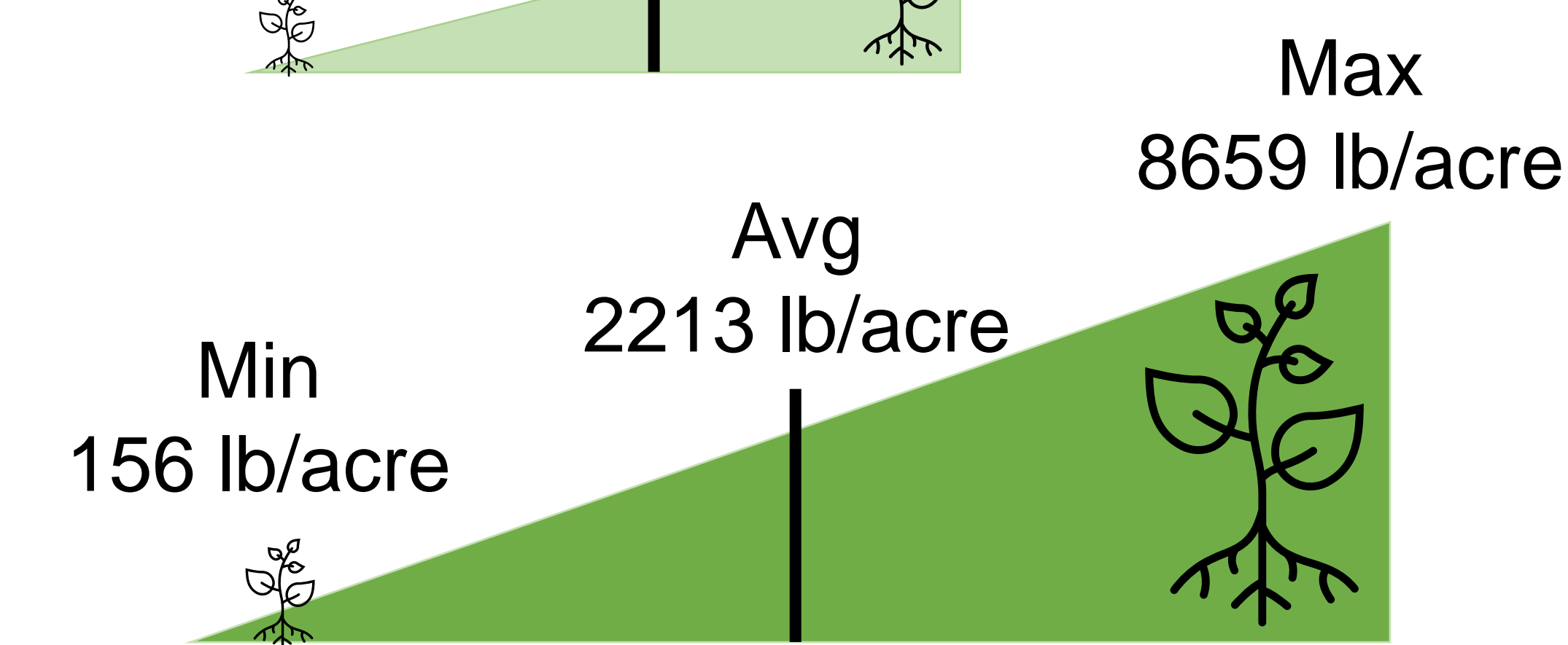


Farmers primary purposes for cover crops included building organic matter, contributing nitrogen, controlling weeds and other pests, and eliminating black plastic.

Fall biomass from 69 fields



Spring biomass from 83 fields



Nitrogen in spring biomass from 56 fields



Cover crop biomass vs spring date for 83 fields

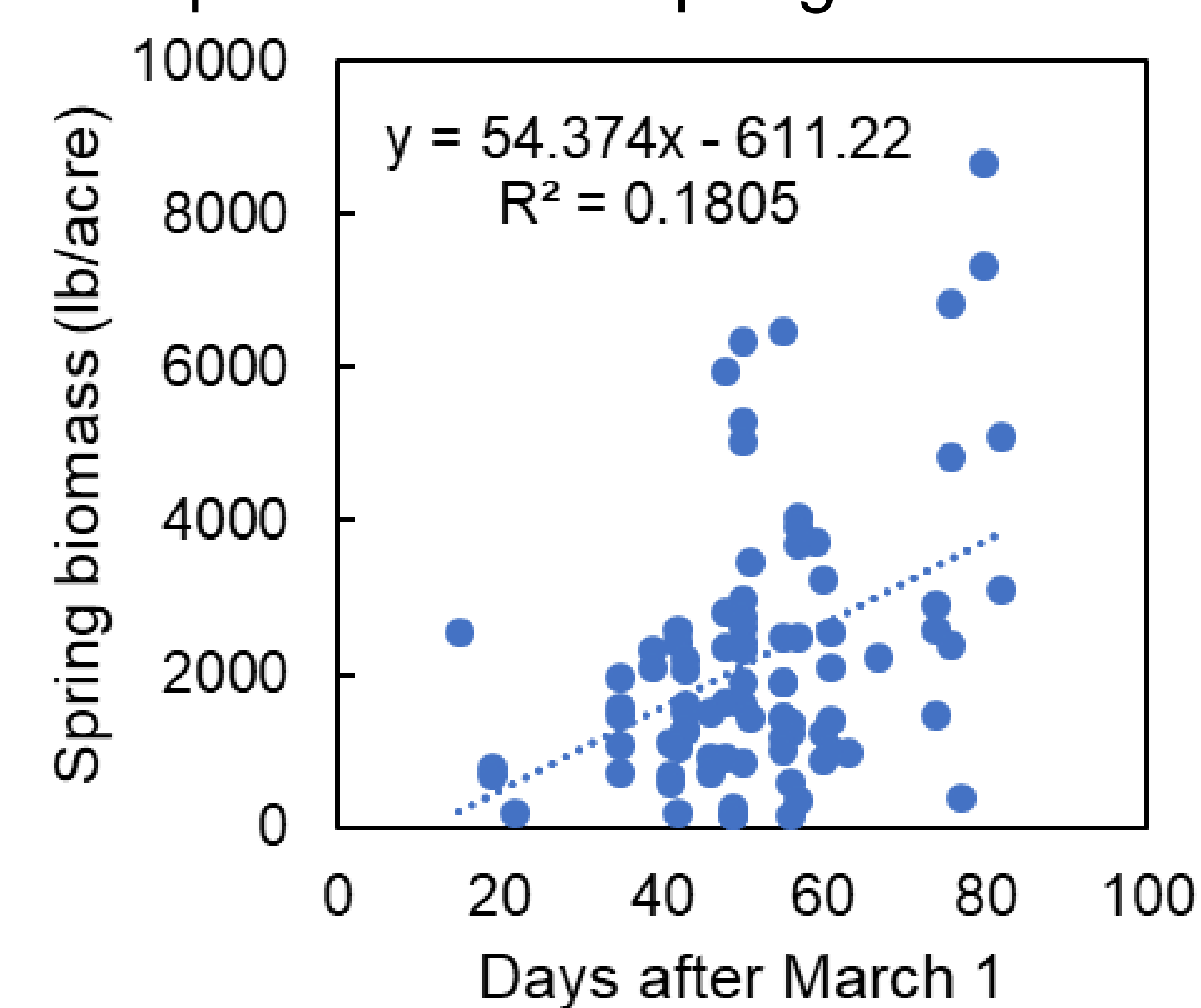


Figure 1. Cover crop biomass versus days after March 1, the date that Maryland farmers enrolled in the state incentive program are allowed to terminate cover crops.

Cover crop carbon to nitrogen ratio for 56 fields

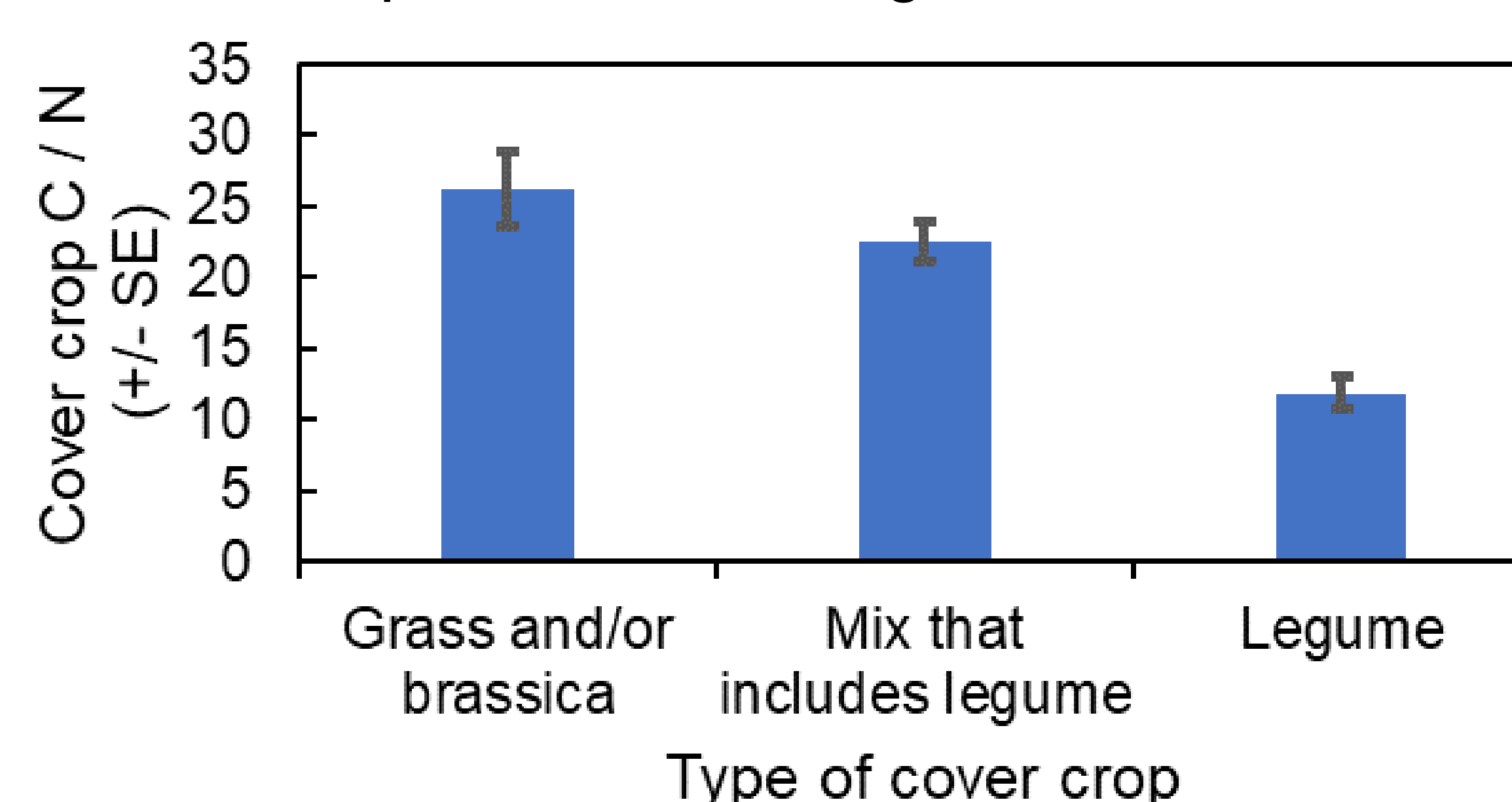


Figure 2. Cover crop carbon to nitrogen ratio for various species groups.

Cover crop biomass was positively correlated with the number of spring growth days (Figure 1). Cover crop carbon to nitrogen ratio differed according to the cover crop species composition (Figure 2).

Conclusions

- Despite all farmers engaging in the cover crop planning process, cover crop biomass, N content, and carbon to nitrogen ratio greatly varied across operations.
- Extending the cover crop season was important for increasing cover crop biomass and functionality.
- In order to achieve the targeted purpose of the cover crop, farmers often had to modify plans and actively manage the cover crops, for example through re-seeding, extending the season later than anticipated, or applying selective herbicides.

Situation: Watermelon disease pressure caused by rain splashing off bare soil in plasticulture system

Solution: Grow vetch + rye cover crop to cover the soil and serve as a natural weed barrier in place of black plastic

Management: In March, narrow strips of the cover crop were terminated where watermelon seedlings would be transplanted, while allowing cover crops in aisles to continue growing. In May, the remaining cover crop was rolled down and sprayed, serving as a weed and soil borne pathogen barrier, and contributing nitrogen for the subsequent watermelon crop. Photo 3/24/23 (credit Haley Sater)

