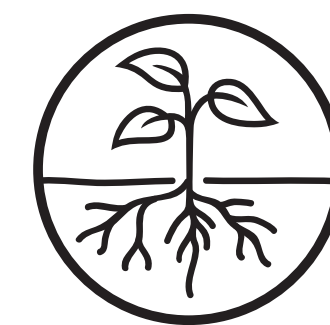


Does planting timing of green mulches affect yield of garlic and labour?



COVER CROPS



WEED CONTROL



Farmer-Researcher

Eric Barnhorst
Eva Mae Farm- East

Project Timeline:
July 2017 - September 2018

In A Nutshell

This project compared yield and labour for garlic planted into established oats, garlic and oats planted together, and garlic without a cover crop.

Key Findings

- Garlic survival and proportion of medium garlic was highest when garlic was planted with oats or into bare soil (control); and lowest when garlic was planted into an established oat cover crop.

- Garlic planted into an established cover crop required more planting labour and delayed emergence. Delayed emergence, in turn, delayed weeding and allowed perennial species to establish.
- Eric won't use the oat treatments as tested again; but seeing the biomass of the early oat planting has motivated him to tweak the system to make it work.

METHODS

Design

Eric randomly assigned 6 beds to one of three treatments:

- Garlic planted in November into early oats (early oats)
- Garlic planted at the same time as an oat cover crop in November (late oats)
- Garlic planted in November into bare soil with no cover crop (control)

He made three sections per bed and randomly assigned 6 varieties of garlic to each section (Figure 1). The garlic he used was: Tibetan (T), Persian (P), Chesnok Red (CR), Northern Quebec (NQ), Korean Purple (KP), French Rocambole (FR).

Figure 1. Layout of Eric's trial with 6 beds, 3 rows of garlic and 3 sections per bed, each with a randomly assigned variety. This is a semi-randomized design and each variety is a replicate. Treatments: **Early oats**, **late oats**, and **no cover crop control**.

Bed 1	Bed 2	Bed 3	Bed 4	Bed 5	Bed 6
NQ	CR	FR	P	P	T
KP	FR	NQ	NQ	T	P
CR	T	KP	KP	FR	CR

Management

On September 12, 2017, Eric precision seeded the oats in the early oats treatment beds at about 120 lbs per acre using an Earthway seeder (www.sare.org, Using Manually Operated Seeders for Precision Cover Crop Plantings on the Small Farm).

On November 14, 2017, Eric seeded the late oats treatment beds using the same specifications. He randomly assigned 3 varieties to each bed and planted the garlic using a homemade multi-row dibbler.

In spring, Eric measured survival by counting the number of sprouted plants. He controlled weeds twice by rototilling the pathways and hoeing, then hand weeding, the beds.

On July 31, 2018, Eric harvested the garlic. For each section, he counted garlic heads by size class using a peg board with 1/4" increments with medium size garlic ranging between 1.5-1.75".

RESULTS

Seed Quantity: Yield

- Garlic that was planted at the same time as oats (late oats) and planted without a cover crop (bare) had similar survival of around 50%. Garlic planted into an established cover crop (early oats) had lower survival of 26% (Figure 2).

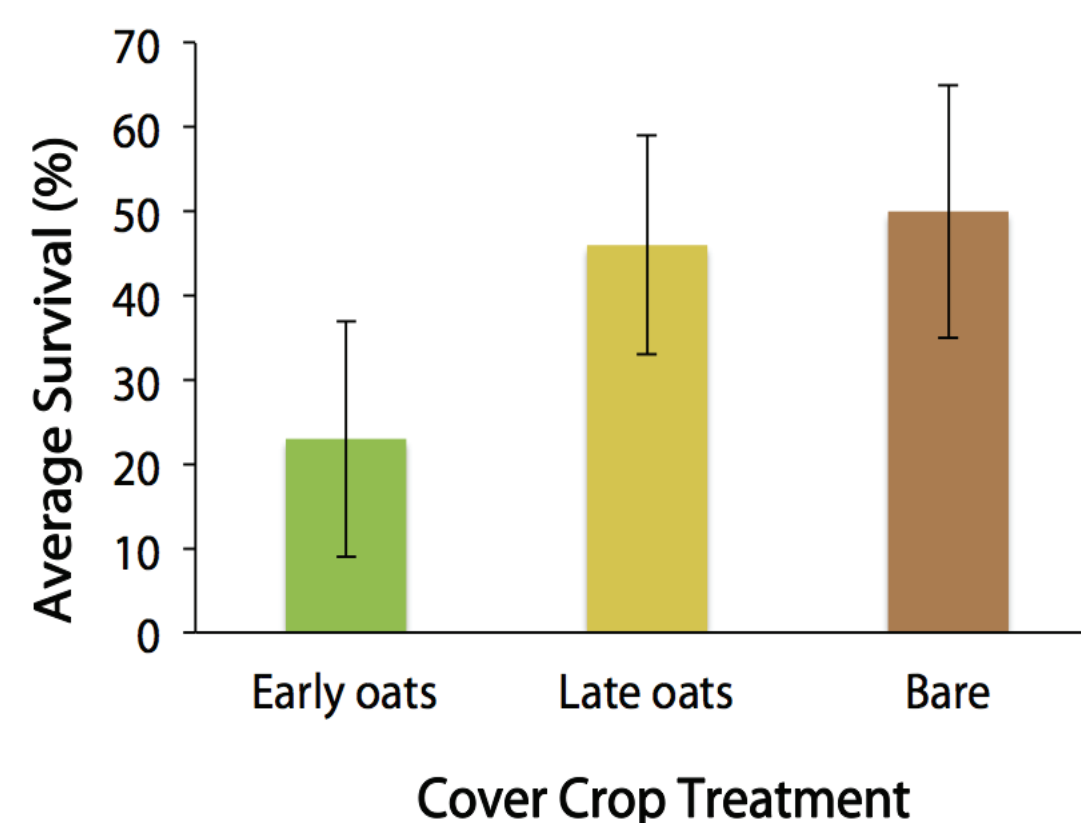


Figure 2. Percent survival of garlic planted for each treatment. Bars are means +/- standard deviation.

Seed Quality: Size Class

- Total large+XL and medium-sized garlic was greatest when planted with late oats and with no cover crop (bare).
- Garlic planted after early oats had 35% less medium and 22% less large+XL garlic (Figure 3).

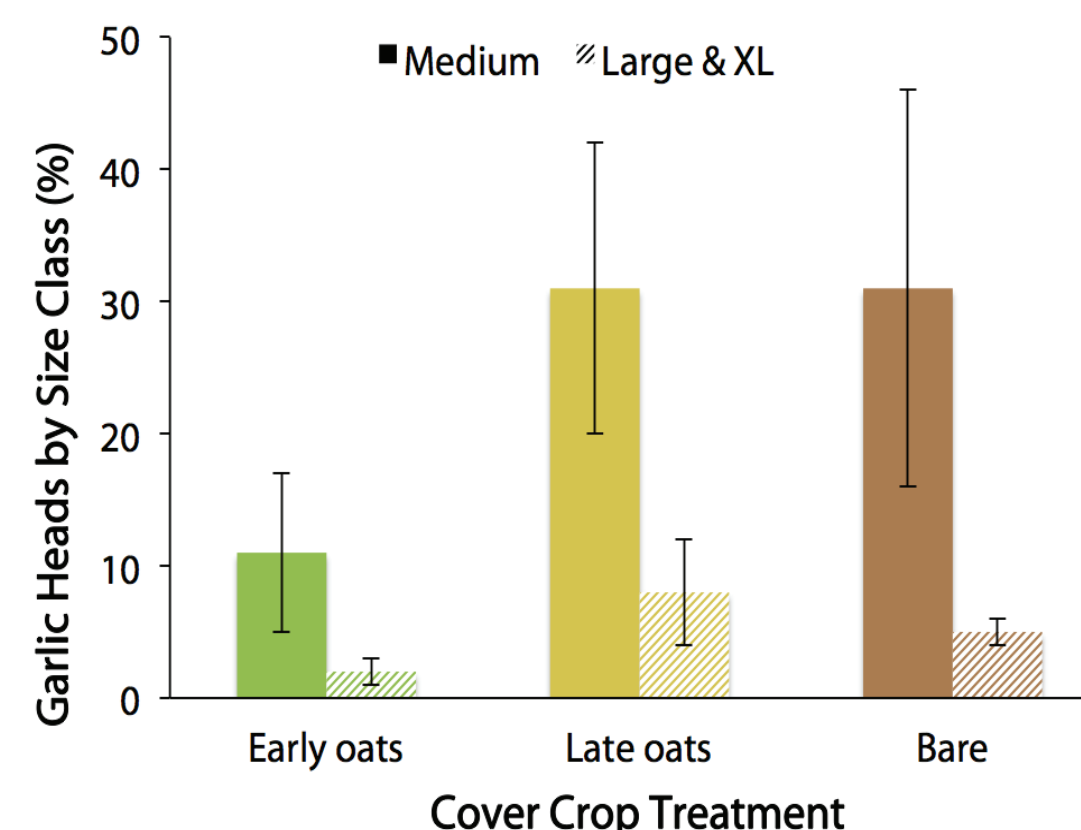


Figure 3. Garlic heads by size class for the three treatments. Bars are means +/- standard deviation.

Table 1

Management differences among the two oat cover crop treatments and bare soil control.				
Trt	Oat establishment	Garlic planting	Spring soil	Weeds present
Early oats	Great, but planting garlic crimped and killed oats early (photo below)	2x as long to find holes; more force needed	Residue delayed emergence and first weeding	Perennial grasses
Late oats	Didn't grow enough to establish cover	Easy	Bare	Pigweed, lambsqrts
Bare	N/A	Easy	Bare	Pigweed, lambsqrts

TAKE HOME MESSAGE

Using oats as a winterkill mulch for garlic is a compelling idea to keep living roots in the ground in the fall and reduce weed pressure the next growing season.

For garlic planted with oats, yield and quality were similar to the bare soil control. The oats grew a small amount of biomass in the fall but decomposed in the spring.

Seeding oats early and planting garlic into an established oat cover crop resulted in lower garlic yield and lower quality. While early oats produced a nice mulch, management was harder since planting through the oats took twice as long and perennial grasses established, making weed control more difficult.



NEXT STEPS

Eric will not use the specific methods he tested again but is keen to try planting garlic at the same time as an early oat cover crop.

He was excited by the oat establishment, but will consider planting oats in 4 widely spaced rows that will allow for easier planting and mechanical weed control.

Before he tries this, however, he wants to figure out ways of removing the cover crop residue in the spring so that garlic emergence is not delayed.