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## Sequential Buckwheat Plantings to Support Pollinators on Vegetable Farms

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## **Sequential Buckwheat Plantings to Support Pollinators on Vegetable Farms**

Vern Grubinger and Laura Johnson

October 24, 2025

A 2-year project titled *Cover Crop Sequences to Support Soil Health and Pollinators on Diversified Vegetable Farms* was conducted in Vermont. Cover crops are widely used by growers to support soil health, but they have not been used as intentionally to provide floral resources for insect pollinators. On-farm trials were conducted statewide to assess cover crop flowering to better understand practices that could not only provide soil health benefits but also support pollinators and be easily adopted by farmers. In both years, a cover crop sequence plan was developed for participating farmers. Plan implementation varied among participating farms due to the unique conditions of each farm, and weather conditions.

In 2024, a cohort of 10 farms conducted on-farm trials to assess sequences of cold-season and warm-season annual cover crop species planted in individual blocks. Sequences that included some combination of buckwheat, oats and peas, phacelia, and mustard were grown on a total of 10 acres. These farms had an aggregate 91 acres in horticultural production, with estimated annual vegetable sales of \$1.4 million based on 2024 National Agricultural Statistics Service data. Farmers were instructed to plant 0.5-1 acre of individual species of cover crops, allowing them to flower. Farmers monitored the establishment and growth of the crops and documented pollinator activity when they flowered. The growing season was unusually wet; cover crop establishment and performance varied across farms.

The cohort met in person at participating farms during and after the growing season to share their observations and to better understand cover crop performance and ease with which different species fit into each farm's vegetable rotations. Buckwheat was identified by growers as relatively easy to establish and reliable for flower production. So, in 2025 we focused our statewide on-farm trial on buckwheat.

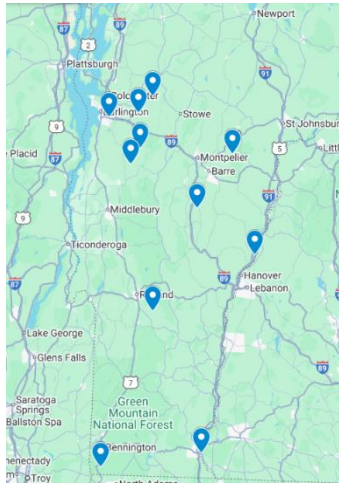
The goal of the 2025 trials was to document the growth and flowering periods of buckwheat planted at different times during the season, to understand the potential of buckwheat to provide floral resources to pollinators for most of the growing season. Fifteen farms across Vermont were recruited to participate in this study. They were asked to complete a google form to identify where they would plant buckwheat (which fields) and how much seed would be needed, based on recommended seeding rates of 100 lbs./acre broadcast or 70/lbs./acre drilled. Between April 25 and May 12, a total of 2,174 lbs. of certified organic buckwheat seed was delivered to participating farms free of charge.

Farmers were instructed to make the first planting once soil had warmed to 70°F, or late May in most locations. The second planting was to be in early July, and the third planting in early August, with the goal of maximizing the number of days with buckwheat flowers present.

A google photo album was created for each farmer, and a visual guide provided for taking photos to document cover crop performance. The goal was to collect the following information using time-stamped images for each buckwheat planting: 1) seeding - when the field is planted, 2) establishment - when the seedlings emerge and the stand density is clearly visible, 3) vegetative growth up until flowering, 4) initial flowering date, 5) full flowering, and 6) termination -just before cover crop is killed. Reminders were sent by email to encourage timely picture taking.

The 2025 season was cold and wet in May and early June and then became dry and eventually droughty in July and August. These conditions delayed or negatively affected the first plantings on most farms, and a few farms were unable to establish later plantings due to lack of rainfall. A total of 12 farms submitted photo documentation. These farms have aggregate crop production of 155.5 acres, producing an estimated \$1.73 million in annual vegetable sales, based on 2024 National Agricultural Statistics Service data.

*Location of participating farms*



The period of pollinator support from buckwheat ranged from 23 to 91 days with buckwheat flowers present. Three farms made 1 planting with an average of 35 days with flowers, six farms made 2 plantings with an average of 58 days with flowers, and three farms made 3 plantings with an average of 71 days with flowers (Fig. 1). Some farms allowed buckwheat to continue to flower while also setting seed, and other farms terminated buckwheat before or in the early stages of seed set.

Figure 1

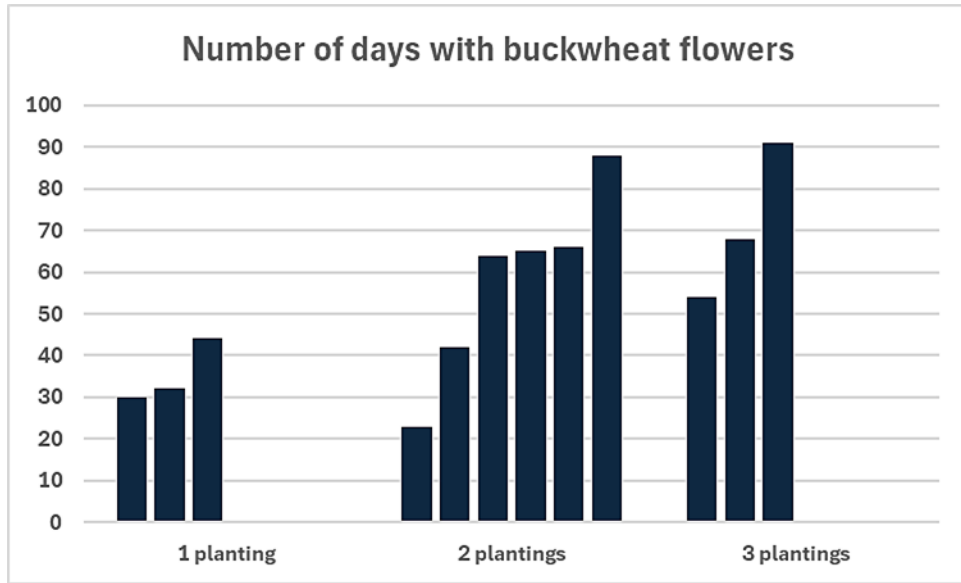


Figure 2

*Images of a single buckwheat planting on a farm in central Vermont: at establishment, initial flowering, full flowering, and just after termination; flowers were present for 33 days.*



July 12



August 2



August 10



September 4

Figure 3

*Images of two sequential buckwheat plantings on a farm in southern Vermont: at seeding, initial flowering, full flowering, and prior to termination; flowers were present for 88 days.*



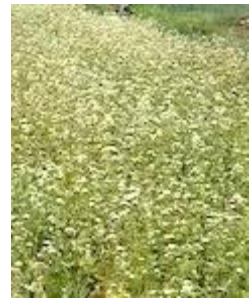
June 8



July 5



July 19



September 5



August 8



September 5



September 18



October 2

Figure 4

*Images of three sequential buckwheat plantings on a farm in Northwest Vermont in various stages of development; flowers were present for 91 days.*



June 3



June 23



July 14



August 4



June 27



July 14



August 4



August 18



August 18



August 26



September 12



September 24

The results of this trial suggest that multiple, sequential plantings of a buckwheat cover crop on vegetable farms in Vermont can provide flowers to support pollinators for most of the growing season, i.e. for three months, if weather conditions allow timely sowing and stand establishment. If two rather than three plantings are made, the cover crop must be allowed to flower during some of the seed set period in order to provide season-long pollinator support.

*Feedback from participating farmers:*

“I enjoyed having the buckwheat on the farm and the bees clearly loved it. There was always a loud humming sound coming from flowering plantings. The buckwheat seemed to smother weeds well too.”

“We do believe that the buckwheat successions provided a benefit to the pollinators and soil. The pollinators were out in full force and loving the buckwheat flowers. I timed the mowing of the cover crop for early in the day for the least negative impact on the pollinators. The buckwheat was a great space holder mid-season for ground cover, weed suppression and nutrient scavenging. I love the versatility of this cover crop as it is easy to terminate, breaks down quickly and sows with ease! Our farm would definitely be interested in trying this or another trial again and utilizing buckwheat more intensively farm wide as a space saver mid-season. Thanks so much for the opportunity!”

“I’ve thoroughly enjoyed participating in the two years of research on cover crops for pollinators. It has worked well to incorporate these plantings as we build soil and open new fields. Since we grow a lot of pollinator dependent crops, it was an easy choice that appears to be having an impact. After the first season, we have begun incorporating phacelia into many of our cool season cover crop mixes and have been blown away by the number of bees on it when it flowers. All of the flowering cover crops have also been good conversation starters with friends, neighbors, and customers.”

“We observed continuous pollinator activity throughout the trial. Tried to wait for the next planting to be flowering before we terminated the one before. We also appreciate the buckwheat straw on the soil surface. Also the soil underneath seems a bit mellower after buckwheat. We will continue to use buckwheat especially if we are trying to suppress weeds in a particular garden or for a quick cover crop.”

