

Wheat-Phacelia Intercrop

Project duration: May 2020 – September 2021

Objectives: To evaluate intercropping potential for wheat and phacelia

Collaborators: PCDF

Background

Phacelia is a flowering broadleaf plant that may be included in cover crops mixtures as an outstanding pollinator species with moderate soil texture-building characteristics. Honey producers prize the crop for its long flowering period and light honey quality. Conversely, cereals crops such as wheat rely on wind for pollination, and do not provide good habitat for pollinators. Intercropping wheat and phacelia increases in-crop diversity, provides pollinator habitat in cereals crops (which are usually less attractive to pollinators), and can attract beneficial predators, such as wasps that predate wheat midge. This trial evaluates the potential for intercropping wheat and phacelia, and the effect of different rates of phacelia on wheat yield in particular. For a detailed summary of phacelia cultivation, see this [USDA Plant Guide](#).



Figure 1: (top) wheat-phacelia intercrop; (bottom) phacelia blossoms with a pollinator.

Results

The wheat yield (bu/ac) for treatments is shown in Figure 2. The phacelia yield (lb/ac) for treatments is shown in Figure 3.

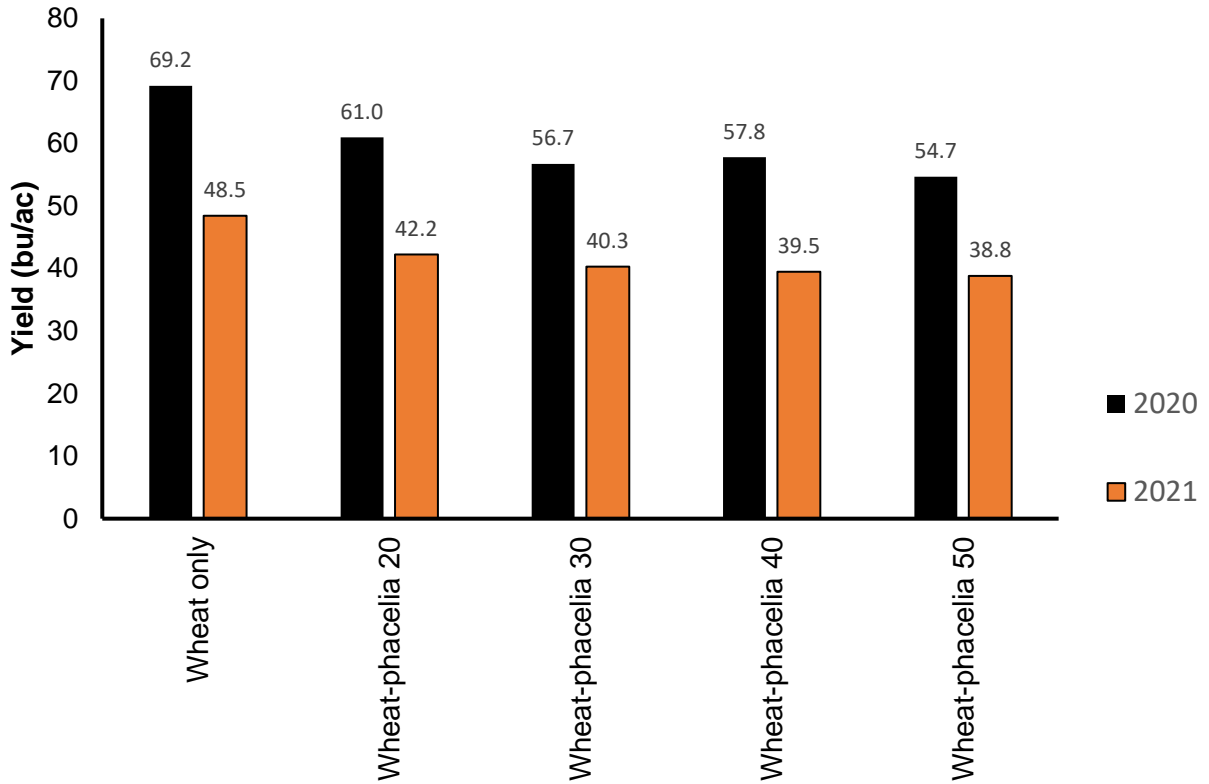


Figure 1: Wheat yield (bu/ac) by treatment.

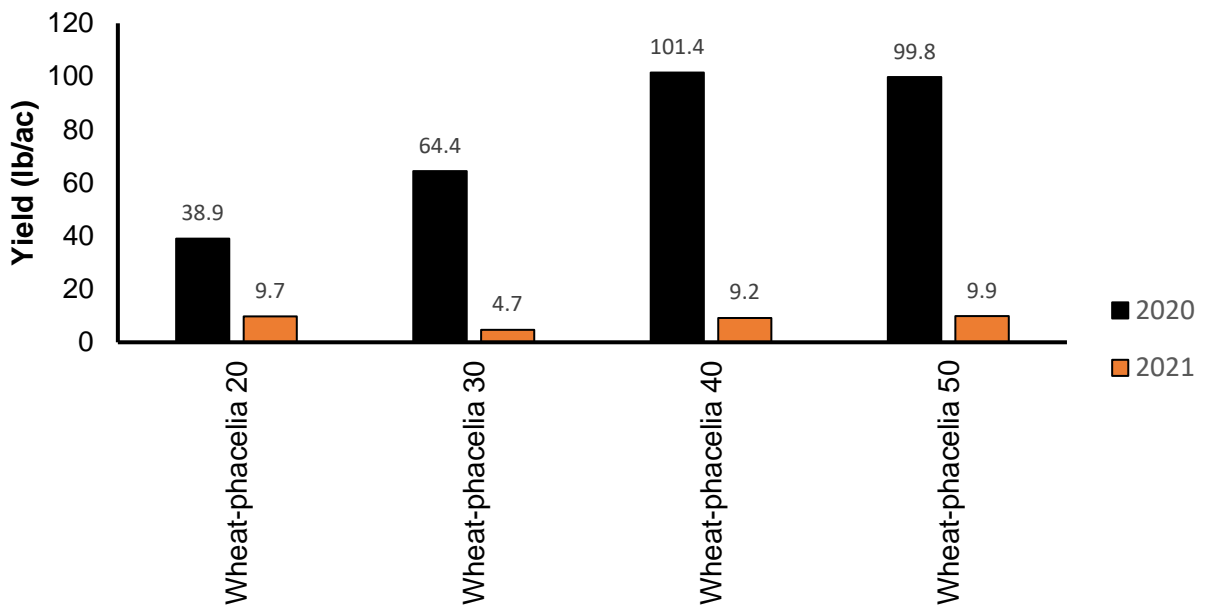


Figure 3: Phacelia yield (lb/ac) by treatment.

The results for wheat yield differ statistically by treatment (Table 1). Including phacelia treatment decreased the yield for wheat (by up to 14.5 bu/ac in 2020 and 9.7 bu/ac in 2021), likely due to increased water usage by the phacelia crop. In 2021, due to very dry field conditions, wheat yield was lower than for 2020, but the spread of yields was less.

Phacelia yield for 2020 and 2021 increased with seeding rate, but the reliability of those results is low due to high percent CVs. Additionally, due to the indeterminate nature of phacelia flowers, the seed ripens at different times and may have a low germination rate.

Table 1: Summary of statistical information for wheat and phacelia yield

Entry	Wheat yield (bu/ac)		Phacelia yield (lb/ac)		Statistical significance: Wheat*				Statistical significance: Phacelia*				
	2020	2021	2020	2021	2020		2021		2020		2021		
Wheat only	69.2	48.5	-	10.0	A		A						
Wheat-Lupin 20	61.0	42.2	38.9	9.9	A	B	A	B			C	A	
Wheat-Lupin 30	57.8	40.3	64.4	9.6	A	B	A	B		B			A
Wheat-Lupin 40	56.7	39.5	101.4	8.8		B	A	B	A				A
Wheat-Lupin 50	54.7	38.8	99.8	7.8		B		B	A				A
LSD (0.05)	37.0	7.95	11.3	7.7									
CV (%)	12.6	14.0	36.4	52.1									

* Treatments not marked with the same letter are statistically different from other treatments.

There are no herbicides registered for phacelia, making intercropping with wheat a challenge. Good weed control prior to seeding is crucial. The trial was hand-weeded.

Materials and methods

Experimental Design: Random Complete Block Design
 Wheat variety: 2020: AC Goodeve; 2021: AC Magnet
 Entries: 5
 Seeding: 2020: May 22; 2021: May 14
 Harvest: 2020: Sept 11; 2021: Sept 2

Table 2: Treatments

	Wheat	Phacelia
Treatment 1	90 lb/ac	-
Treatment 2	90 lb/ac	2 lb/ac
Treatment 3	90 lb/ac	3 lb/ac
Treatment 4	90 lb/ac	4 lb/ac
Treatment 5	90 lb/ac	5 lb/ac

Data collected Date Collected
 Emergence: Wheat: May 20-25, Phacelia: May 26-30
 Wheat Heading: Jul 1-2
 Phacelia Flowering: Jul 6-12
 Stand rating: Jul 1

Vigor Rating: Jul 1
 Yield: Oct 21
 Moisture: Oct 21
 Agronomic info
 Previous year's crop: Oat Silage
 Soil Type: Erickson Loam Clay
 Landscape: Rolling with trees to the east
 Seedbed preparation: Vertical tilled

Table 3: Fertility Information

	Available	Added	Type
N	61 lb/ac	128 lb/ac	46-0-0
P	47 ppm	10 lb/ac	11-52-0-0
K	393ppm		

No herbicide applied (hand weeded)