

Summer Broccoli Variety Trial

In a Nutshell:

- Though customers love it, growing broccoli in the summer is a tall task for Iowa farmers. Broccoli generally yields poorly in high heat and wet or intensely humid conditions.
- PFI farmers have previously trialed different varieties of cabbage, cauliflower and broccoli for summer production. A trial in 2016 showed that Imperial broccoli outyielded Belstar and Gypsy [1], [2], [3], [4].
- Farmers Carmen & Maja Black, Kate Edwards, and Ashley & Zach Wenke all decided to trial 3-4 different broccoli varieties on their farms in the summer of 2025. They evaluated yield of each variety and noted growth habits and marketability.

Key Findings:

- 2025 was a historically wet early summer and broccoli yields were poor for all varieties trialed.
- Green Magic produced significantly more marketable broccoli yield than Covina and Imperial at the Blacks'. It also produced more unmarketable broccoli yield than other varieties at the Wenkes'.
- Farmers concluded that while there was no definitively better broccoli variety, the trial gave them an opportunity to pay more attention to their broccoli crop, learn to take better records, and collaborate with other farmers.

Cooperators

Carmen and Maja Black,
Sundog Farm – Solon, IA
Kate Edwards,
Wild Woods Farm – Solon, IA
Ashley and Zach Wenke,
Pleasant Grove Homestead
– Montezuma, IA

Funding

USDA



Rows of broccoli planted for a summer broccoli variety trial by Kate Edwards in July 2025.

BACKGROUND

Growing broccoli to harvest in the middle of summer is a challenge for Iowa farmers. Heat negatively impacts yield and crown quality of this cool-loving crop, and it is very susceptible to disease in wet conditions. Some research suggests that yield and head quality of broccoli is negatively impacted when temperatures are consistently above 70°F in the weeks prior to harvest [5]. Other research shows that broccoli is mostly sensitive to heat above 85-95°F, and only when the plant is shifting into the crown production growth phase [6]. Regardless, Iowa farmers are almost guaranteed to experience these sorts of hot conditions and/or very wet conditions that lead to brassica diseases in late May and June, just in time to negatively impact their summer broccoli crop [7].

In past variety trials, PFI farmers have investigated how specific varieties of brassicas perform in summer production, and they have identified varieties that work best for their farms [2]. For example, farmers participating in a 2016 PFI summer broccoli variety trial found that Imperial broccoli outyielded Belstar and Gypsy. Since 2016, plant breeders have released new broccoli varieties that are intended to be more heat resilient [1]. Hoping to find a superior summer broccoli variety among those currently available, Carmen & Maja Black, Kate Edwards, and Ashley & Zach Wenke each trialed 3-4 different broccoli varieties on their farms in the summer of 2025. They were generally motivated, in

Ashley Wenke’s words, to identify “the correct types of broccolis to have consistent, reliable summer harvest.” Edwards added that she frequently plants a lot of extra summer broccoli to ensure that she has enough for her CSA and would like her trial to result in “some assurance of yield to save time from over planting.”



The field crew at Carmen and Maja Black’s planting the summer broccoli variety trial on May 13, 2025.



Summer broccoli variety trial laid out and ready to plant at Ashley and Zach Wenke’s on April 24, 2025.

METHODS

Design

The Blacks planted three replicates, Edwards planted four replicates, and the Wenkes planted seven replicates of each variety they trialed. All cooperators used a block design and randomly assigned variety treatments within each block. Relevant traits about each trialed variety are found in **Table 1**, and trial planting and management details for each farm are shown in **Table 2**.

TABLE 1: Broccoli varieties grown by cooperators in 2025 and relevant traits.

VARIETY	HYBRID or OP	DAYS TO MATURITY	RELEVANT TRAITS
Covina	Hybrid	75 days	High resistance to Fusarium Yellows, intermediate resistance to Black Rot and White Rust Large heads. Hearty in cold and wet or hot and dry conditions
Fiesta	Hybrid	75 days	High resistance to fusarium Yellows Intermediate resistance to Black Rot and White Rust Medium heads.
Imperial	Hybrid	66 days	Smaller heads. Heat tolerant.
Green Magic	Hybrid	57 days	Smaller heads. Excellent heat tolerance.

TABLE 2: Design and management practices by trial in 2025.

	BLACK	EDWARDS	WENKE
Varieties trialed	Covina, Green Magic, Imperial	Covina, Fiesta, Green Magic, Imperial	Covina, Green Magic, Imperial
Seeding date	Apr. 4	Mar. 26	Mar. 17
Bed preparation	Tilled	Tilled	Tilled twice a week apart and soil bed raised 4 in.
Plants per replicate	56	20	22
Row spacing	36 in.	36 in.	18 in.
Plant spacing	16 in.	10 in.	12 in.
Transplanting date	May 13	May 7	Apr. 24
Mulch	None	None	Straw applied day of planting
Irrigation	Drip as needed	Drip as needed	Watered when transplanted and once a week for 2 weeks
Fertilizer	None	White clover cover crop preceding broccoli	None
Pest management	None	None	BT for cabbage worms applied May 27
Harvest dates	July 6-July 21	July 7 – July 31	July 15

Measurements

At each harvest date, farmers weighed broccoli yield from each replicate, dividing the harvest into marketable and unmarketable categories. Farmers used their discretion when deciding what broccoli was marketable and when to harvest. Edwards also counted the number of marketable and unmarketable heads as she generally sells to a CSA, and the number of heads is important for counting the number of shares she can add broccoli to.

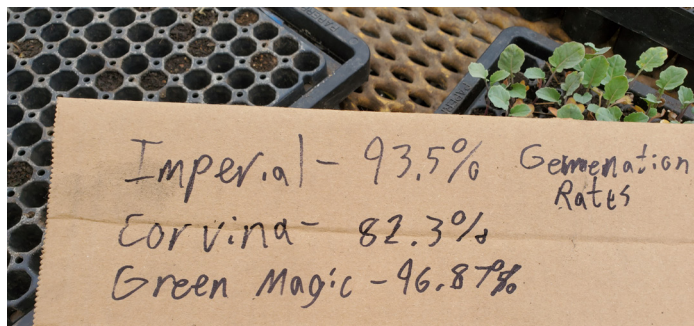
Data Analysis

We used an ANOVA (Analysis of Variance) at a 90% confidence level to determine if there were significant differences in total and marketable yield between varieties at each of the three farms. This means any varieties we declare statistically different would be expected to occur at least 9 times out of 10 if the experiments were carried out in identical conditions. When ANOVA identified significant variance in yield by variety, we followed those ANOVA with a Tukey's Honest Significant Difference test (HSD). We could perform statistical analysis at these farms because they had replicated and randomized experimental designs (**Figure A1**).

RESULTS AND DISCUSSION

Cooperators generally considered their yields poor across all varieties of broccoli, but generally it seemed that Green Magic may have performed a bit better than other varieties. The Blacks found that Green Magic yielded significantly more marketable yield by weight (16 lb/plot) than Covina (9 lb/plot) and Imperial (10 lb/plot) at the 90% confidence level (**Table 3**). Edwards and the Wenkes found no significant differences in marketable broccoli yields by weight (both farms) and number of heads (Edwards) across varieties.

Cooperators also tracked weight of unmarketable broccoli heads. The Wenkes did find that Green Magic yielded significantly more unmarketable broccoli (18 lb/plot) than Covina (9 lb/plot) and Imperial (12 lb/plot) at the 90% confidence level (**Table 3**). This indicates that even if the heads were not salable, Green Magic produced more or larger heads under challenging conditions than Covina and Imperial. The Blacks and Edwards found no differences in unmarketable broccoli yields across variety, though Edwards found that Imperial yielded significantly more unmarketable heads than Covina but Imperial or Green Magic (**Table 4**).



Ashley and Zach Wenke tracked germination rates in their trays of Imperial, Covina and Green Magic broccoli as part of their 2025 summer variety trial.

TABLE 3: Marketable and unmarketable summer broccoli yields at the three farms in 2025. * indicates a variety that yielded statistically significantly higher than others. Carmen & Maja Black found that Green Magic yielded significantly more marketable broccoli than Covina and Imperial at the 90% confidence level. Ashley & Zach Wenke found that Green Magic yielded significantly more unmarketable broccoli than Covina and Imperial at the 90% confidence level.

	BLACK		EDWARDS		WENKE	
	Marketable Broccoli Yield (lb/plot)	Unmarketable Broccoli Yield (lb/plot)	Marketable Broccoli Yield (lb/plot)	Unmarketable Broccoli Yield (lb/plot)	Marketable Broccoli Yield (lb/plot)	Unmarketable Broccoli Yield (lb/plot)
Covina	9	17	2	1	0.6	9
Fiesta	NA	NA	3	3	NA	NA
Green Magic	16 *	14	4	2	0.3	18 *
Imperial	10	23	2	3	0.5	12

When reviewing project results, Carmen Black reflected that “Since the weather was uniquely challenging for summer broccoli, I’m not sure how representative this data will be. It was the 2nd wettest July on record, and this really impacted the broccoli in particular. I think we learned some things from growing broccoli in these conditions, but I don’t feel conclusive about which varieties I’d like to continue growing or not growing from the data we collected.” The Wenkes and Edwards echoed these sentiments. The Blacks also attributed the fact that they harvested any summer broccoli at all in 2025 to the trial and the extra attention they paid to the broccoli because of it. “Without the trial I fear we may have given up on the crop because of the poor weather conditions.”

Despite not reaching their goal of identifying a superior summer broccoli variety, the Wenkes, who were new to on-farm research in 2025, found the experience of conducting a trial to be quite helpful for their farm. Ashley reports that “Zach and I showing each other and our crew the importance of both observing and collecting data was very beneficial for our daily systems. We developed clearer ways of using our white boards in our pack shed and double checking when things were done being collected or ready to be erased.” She also reported that the trial created a sense of camaraderie between participating farms in a challenging weather year. “I would have believed the bad broccoli harvest was only on our farm if I didn’t reach out to fellow producers to know they were experiencing similar issues.”

TABLE 4: Number of marketable and unmarketable summer broccoli heads at Kate Edwards’ in 2025. Imperial yielded significantly more unmarketable heads than Covina at the 90% confidence level.

EDWARDS		
	Number Marketable Broccoli Heads per Plot	Number Unmarketable Broccoli Heads per Plot
Covina	4	3
Fiesta	5	6
Green Magic	7	4
Imperial	3	7 *



Broccoli crowns harvested at Kate Edwards’ in July 2025.



Broccoli crown at Ashley and Zach Wenke’s in July 2025.

CONCLUSIONS AND NEXT STEPS

In an extremely wet summer, none of the trialed broccoli varieties truly shone above the rest. However, participating farmers still reflected that conducting the trial was a valuable experience as it allowed them to pay more attention to their summer broccoli growing practices, develop new systems for tracking management information and harvest data, and collaborate with other participating farms. The farmers will not repeat this trial in 2026 but may revisit the question of summer broccoli varieties again in the future.

APPENDIX – TRIAL DESIGN AND WEATHER CONDITIONS

REP 1	Covina	Imperial	Green Magic
REP 2	Green Magic	Covina	Imperial
REP 3	Imperial	Green Magic	Covina
REP 4	Covina	Green Magic	Imperial

FIGURE A1. Example randomized block experimental design used by the Blacks, Edwards, and the Wenkes.

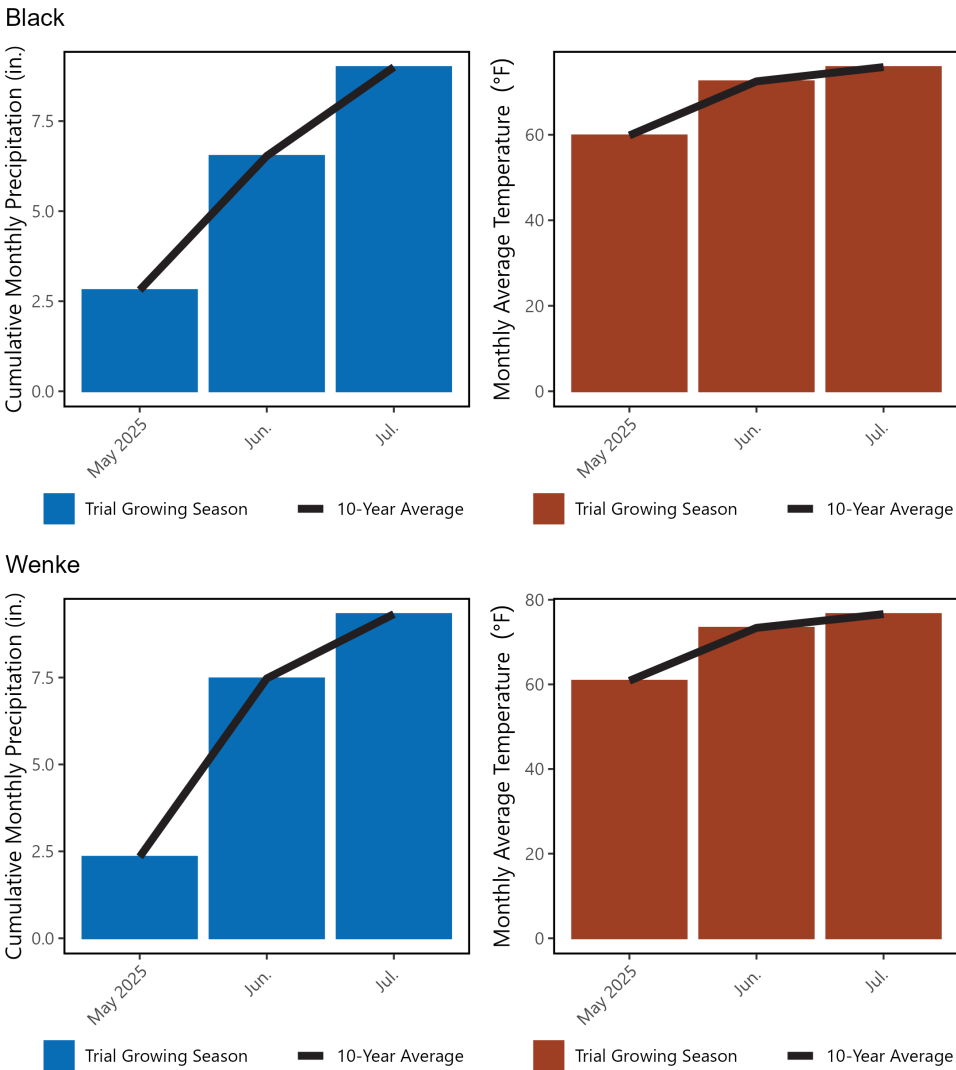


FIGURE A2. Monthly cumulative precipitation and average temperatures in Solon (the Blacks and Edwards) and Montezuma (the Wenkes) [8], [9]

FUNDING ACKNOWLEDGEMENT

Funding for this project was made possible by a grant/cooperative agreement from the U.S. Department of Agriculture (USDA) Agricultural Marketing Service. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.

REFERENCES

1. L. Kolbe *et al.*, “Summer Broccoli Variety Trial,” Practical Farmers of Iowa, 2016.
2. E. Liddle, M. Black, C. Black, H. Breckbill, E. Fagan, and A. McGary, “Cabbage Variety Trial,” Practical Farmers of Iowa, May 2021. [Online]. Available: <https://practicalfarmers.org/research/cabbage-variety-trial-2/>
3. L. Kolbe, M. Quee, and S. Shellz, “Cauliflower Variety Trial,” Practical Farmers of Iowa, 2019. [Online]. Available: <https://practicalfarmers.org/research/cauliflower-variety-trial/>
4. A. Carrey *et al.*, “Fall Cauliflower Variety Trial,” Practical Farmers of Iowa, 2022. [Online]. Available: https://practicalfarmers.org/wp-content/uploads/2023/04/22_H-Fall-Cauliflower-variety-trial.pdf
5. A. Kałużewicz, W. Krzesiński, and M. Knaflowski, “Effect of Temperature on the Yield and Quality of Broccoli Heads,” *J. Fruit Ornament. Plant Res.*, vol. 71, no. 1, pp. 51–58, Jan. 2010, doi: 10.2478/v10032-009-0026-7.
6. “Broccoli and Summer Heat : Vegetable : Center for Agriculture, Food, and the Environment (CAFE) at UMass Amherst.” Accessed: Mar. 30, 2026. [Online]. Available: <https://www.umass.edu/agriculture-food-environment/vegetable/fact-sheets/broccoli-summer-heat>
7. “Broccoli Production in the Midwest.” Accessed: Mar. 30, 2026. [Online]. Available: <https://shop.iastate.edu/extension/farm-environment/crops-and-soils/vegetable-crops/hort3130.html>
8. A. H. Sparks, “nasapower: A NASA POWER Global Meteorology, Surface Solar Energy and Climatology Data Client for R,” *J. Open Source Softw.*, vol. 3, no. 30, p. 1035, Oct. 2018, doi: 10.21105/joss.01035.
9. A. H. Sparks *et al.*, *nasapower: NASA POWER API Client*. (May 18, 2024). Accessed: Sep. 11, 2024. [Online]. Available: <https://cran.r-project.org/web/packages/nasapower/index.html>



PFI COOPERATORS' PROGRAM

PFI's Cooperators' Program helps farmers find practical answers and make informed decisions through on-farm research projects.

The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs.

If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or stefan@practicalfarmers.org.