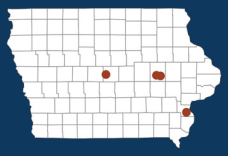
PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

EXPERIMENT



2024

Honeyberry Establishment Trial, Year 3

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In a Nutshell:

- Honeyberries evolved in boreal forests; the cooperators hypothesized that they might benefit from being shaded.
- Honeyberries require pollination from a different variety. For commercial production varieties are developed in pairs with a compatible counterpart that flowers at the same time.

Key Findings:

- Alice McGary found that shade significantly increased her berry yield.
- Jeff Sindelar found that berry yield was significantly affected by variety.
- Jeff Sindelar and Tom Wahl found that plant growth was negatively correlated with starting height—shorter plants grew to 'catch up' and produce more even final heights.
- Eric Franzenburg did not see any significant differences.

Cooperators

Eric Franzenburg, Pheasant Run Farm – Van Horn, IA

Alice McGary, Mustard Seed Farm – Ames, IA

Jeff Sindelar, Deb's Berry Farm – Newhall, IA

Tom Wahl and Kathy Dice, Red Fern Farm – Wapello, IA

Funding

Ceres Trust

BACKGROUND

Honeyberries (*Lonicera caerulea*), aka Haskap and Blue Honeysuckle, are berries that grow in northern forests. They are native to the boreal forests of Siberia, Japan, and North America.

Honeyberries are intolerant of inbreeding, meaning that they must be pollinated by a different variety. Breeding programs at the University of Saskatchewan have produced paired sets of varieties which come into flower at the same time, allowing them to most efficiently pollinate each other [1].

To support the establishment of plantations of these northern berries in the more southerly climate of Iowa, cooperators looked to answer three main research questions:

- Can you effectively establish a fruiting honeyberry population in Iowa?
- Do plants benefit from shading?
- Do different varieties grow differently, or respond differently to shade?

Each cooperator came into the third and final year with their own insights from the work that had already been done and expectations as some plants began yielding berries.

Franzenburg hoped the trial would help in deciding "whether honeyberries are a viable crop in Iowa and for [his] farm."

McGary saw a lot of value in the cooperation with the other farmers that had enabled this trial to go ahead. As a result of the previous year's work, she already knew a lot more about honeyberries than she had at the beginning. This year's trial results would affect whether she plants honeyberries in shade or sun.

Honeyberries growing under shade cloth at Alice McGary's farm. Photo taken June 30, 2024.

Reflecting on the first two years of the project, Sindelar wrote that "the growth under the shade cloth is very surprising" His shaded berries had grown faster than the full-sun berries, a growth advantage that he estimated as an additional year's growth in the first two years under shade cloth. If that advantage was maintained, it could mean bringing berries to market more quickly and would open up a range of management and investment questions. Sindelar said that what he had seen from the first years of growth showed that "the large growers and propagators don't always know all the answers (they recommend full sun)." This project aims to assess the fitness of these boreal plants and inform adaptation of their production to the warmer, sunnier Iowan climate.

METHODS

Design

A pair of varieties was chosen: Beauty and Beast were developed by the University of Saskatchewan as a complementary pair. To enable each variety to most efficiently pollinate the other, the varieties were laid out next to each other, alternating, to maximize 'surface area' with the other variety. Because variety is not an independent variable in this trial, the spatial arrangement of the varieties is not randomized. However, the independent shade vs. open treatment variable was randomized across the replications, see **Figure A1**.

Young plant stocks were obtained from HoneyberryUSA nursery (Bagley, MN) and transplanted in the spring of 2022. The 'shade-treated' plants were grown under 40% shade cloth.

Measurements

Cooperators measured plant dimensions at the beginning and end of each season to calculate growth in height and diameter. This year, cooperators whose plants yielded berries (McGary and Sindelar) measured the berry harvest.

Data analysis

We used Pearson's correlation to examine the correlation between initial and final plant heights and plant growth. The results reported as 'significant' had p-values less than or equal to 0.05. This means that there is less than a 5% chance that the observed relationship could have occurred by chance.

We used Fischer's LSD at a 95% confidence level to determine if there were significant differences in open and shade treatments. For each metric, the difference between any two treatments is compared with the LSD. A difference greater than or equal to the LSD indicates the presence of a statistically significant treatment effect, meaning one treatment outperformed the other and the farmer can expect the same results to occur 95 out of 100 times under the same conditions. A difference smaller than the LSD indicates the difference is not statistically significant and the treatment had no effect. We can perform this analysis because the cooperators had completely randomized and replicated experimental designs (**Figure A1**).

Hail damaged Eric Franzenburg's plants in May 2023. Photo taken May 3, 2023.

TABLE 1. Honeyberry plant measurements at Eric Franzenburg's farm in 2024.

	END-OF-YEAR HEIGHT (in.)		STEM DIAMETER (in.)	
	Beast	**Beauty**	**Beast**	**Beauty**
Open	28.9	24.8	0.75	0.85
Shade	28.6	22.9	0.69	0.89
Diff.	0.3	1.9	0.06	0.04
LSD(95%)	4.95		0.13	
Significant?	No	--	No	--

End-of-year height: Nov. 2024.
Where the difference between treatment means is not greater than or equal to the Least Significant Difference (LSD), there is no statistically significant difference.
LSD calculations not possible for Beauty because plant losses from hail led to uneven group sizes

RESULTS AND DISCUSSION

Results on the effect of shade on the honeyberry plants were mixed. Which variety had larger plants, with which treatment, varied across the different locations. No significant effects on plant vegetative growth could be attributed to shade treatment (**Tables 1, 2, 3**).

Only McGary and Sindelar had measurable berry yields at the end of year three (2024). McGary had significantly higher yield from berries growing under shade cloth in both varieties (**Figure 1**). Beast yielded 4.5 times more berry mass with shade, and Beauty yielded 2.0 times as much berry mass with shade, as compared to control. Sindelar saw a significant difference in berry yield by variety, with Beauty outproducing Beast, when controlling for shade treatment (**Figure 2**).

Although there was no clear effect of shade treatment on vegetative growth as measured by plant dimensions at the end of the 2024 growing season (**Tables 1, 2, 3**), there was a pattern of shorter plants 'catching up' that emerged across both data sets where we had beginning- and end-of-season measurements to compare.

At the beginning of this year, Sindelar remarked that his shaded plants had grown faster during the first two years than the plants in full sun. This was particularly true of his Beauty variety—the shaded plants began the 2024 growing season an average of 6.6 in taller than the full sun plants (**Table 2**). However, honeyberry plant vegetative growth is largely deterministic.

This was demonstrated by the significant negative correlation between plant height increase (growth) and starting height calculated from Sindelar and Wahl's data. Among Sindelar's plants, there was a Pearson's correlation value of -0.69 ($p<0.001$) between starting height and growth. Among Wahl's plants the Pearson's correlation between starting height and growth was -0.83 ($p<0.0001$). These significant negative correlations show that the taller a plant was at the beginning of 2024, the less it grew during the growing season.

If shading benefited young plant growth, and shaded plants went into the third year taller, with less growing to do to reach their full height, one might expect them to have more energy available to put towards berries. However, there was a significant negative correlation, -0.75 ($p<0.0001$) between starting height and berry yield in Sindelar's results. This negative correlation was seen for both treatments and both varieties.

Franzenburg's honeyberries suffered hail damage in 2023 (See photo on previous page) and lost a couple of individual Beauty plants. This affected the statistical comparisons that could be made, because the groups were then of uneven size.

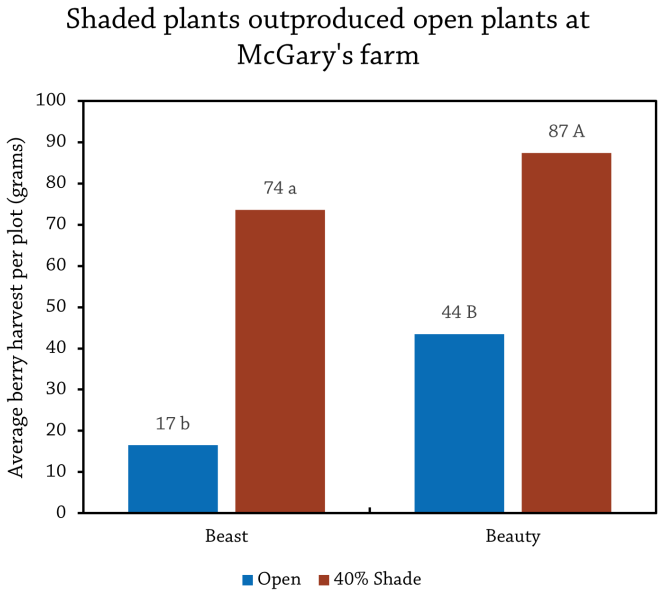

FIGURE 1. Comparing berry yields at McGary's farm between treatments; harvested on June 6, 2024. Where the averages of any two treatments differ by more than the least significant difference (LSD = 26 g/plot for Beast, LSD = 44 g/plot for Beauty) the yields do not share any similar letters and are considered statistically different at the 95% confidence level.

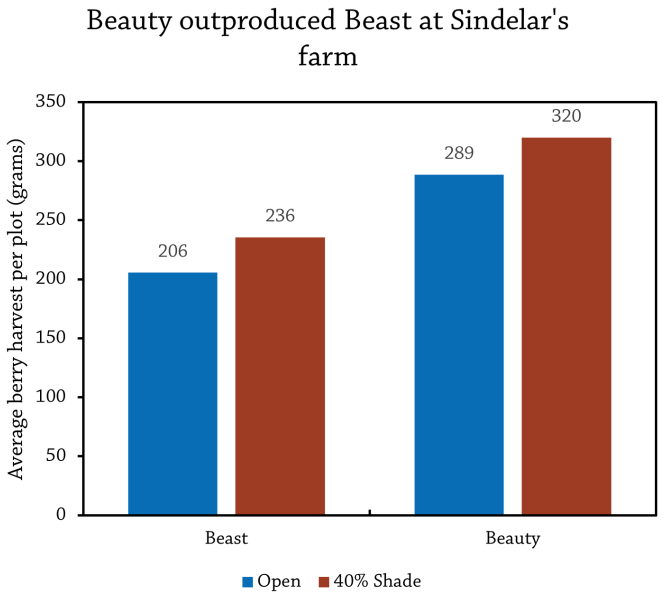

FIGURE 2. Comparing berry yields at Sindelar's farm between varieties and treatments; harvested on May 30, 2024. Variety had a significant effect on berry yield, with Beauty outproducing Beast (significance by ANOVA, $p=0.033$).

TABLE 2. Honeyberry plant measurements at Jeff Sindelar's farm in 2024.

	INITIAL HEIGHT (in.)		END-OF-YEAR HEIGHT (in.)		HEIGHT CHANGE (in.)	
	Beast	Beauty	Beast	Beauty	Beast	Beauty
Open	30.0	20.4	38.9	31.4	9.0	11.0
Shade	25.1	27.0	37.6	35.9	11.3	8.6
Diff.	4.9	6.6	1.3	4.5	2.3	3.6
LSD(95%)	9.4	9.4	5.3	8.1	8.5	8.2
Significant?	No	No	No	No	No	No

Initial height: Spring 2024.
End-of-year height: Autumn 2024.
Where the difference between treatment means is not greater than or equal to the Least Significant Difference (LSD), there is no statistically significant difference.

TABLE 3. Honeyberry plant measurements at Tom Wahl's farm in 2024.

	INITIAL HEIGHT (in.)		END-OF-YEAR HEIGHT (in.)		HEIGHT CHANGE (in.)	
	Beast	Beauty	Beast	Beauty	Beast	Beauty
Open	18.9	16.1	25.8	23.1	6.9	7.0
Shade	22.0	21.4	24.0	25.4	2.0	4.0
Diff.	3.1	5.3	1.8	2.3	4.9	3.0
LSD(95%)	5.4	6.1	2.8	4.7	5.4	8.0
Significant?	No	No	No	No	No	No

Initial height: April 2024.
End-of-year height: Sept. 5, 2024.
Where the difference between treatment means is not greater than or equal to the Least Significant Difference (LSD), there is no statistically significant difference.

CONCLUSIONS AND NEXT STEPS

This concludes a three-year project. Although some plants produced berries this year, fruit production will increase over the next couple of years before beginning to taper off. The cooperators shared their reflections, looking back at the past three years or the project:

Sindelar remarked that deer control was and would continue to be a major issue for him; he was putting up fences to try to keep them away from the berries.

McGary wrote that "It's a slow trial, so I'm learning slowly… I think honeyberries like shade. So I need to give them some shade, maybe planting tall sunflowers near them."

All of the cooperators wrote about how important teamwork between participants in the project was for their knowledge gain. A visit to Sindelar's farm at the beginning of the project provided a valuable orientation for the other cooperators, sharing what works for the Sindelars in their established patches for the others to apply to their own setups. Ongoing collaboration enabled researchers to learn from one another, and helped build a mini network of producers growing this niche crop in a novel environment.

Honeyberries evolved in boreal forests; they can weather even the harshest Iowa winters. Photo taken at Eric Franzenburg's farm, February 2024.

APPENDIX — TRIAL DESIGN AND WEATHER CONDITIONS

	Plot#	Variety	Plant_ID
REP 1	1	Beauty	1101
		Beauty	1102
		Beast	1103
		Beast	1104
	2	Beauty	1205
		Beauty	1206
		Beast	1207
		Beast	1208
REP 2	3	Beauty	2309
		Beauty	2310
		Beast	2311
		Beast	2312
	4	Beauty	2413
		Beauty	2414
		Beast	2415
		Beast	2416
REP 3	5	Beauty	3517
		Beauty	3518
		Beast	3519
		Beast	3520
	6	Beauty	3621
		Beauty	3622
		Beast	3623
		Beast	3624
REP 4	7	Beauty	4725
		Beauty	4726
		Beast	4727
		Beast	4728
	8	Beauty	4829
		Beauty	4830
		Beast	4831
		Beast	4832

FIGURE A1. Experimental design used by Franzenburg, McGary, Sindelar, and Wahl

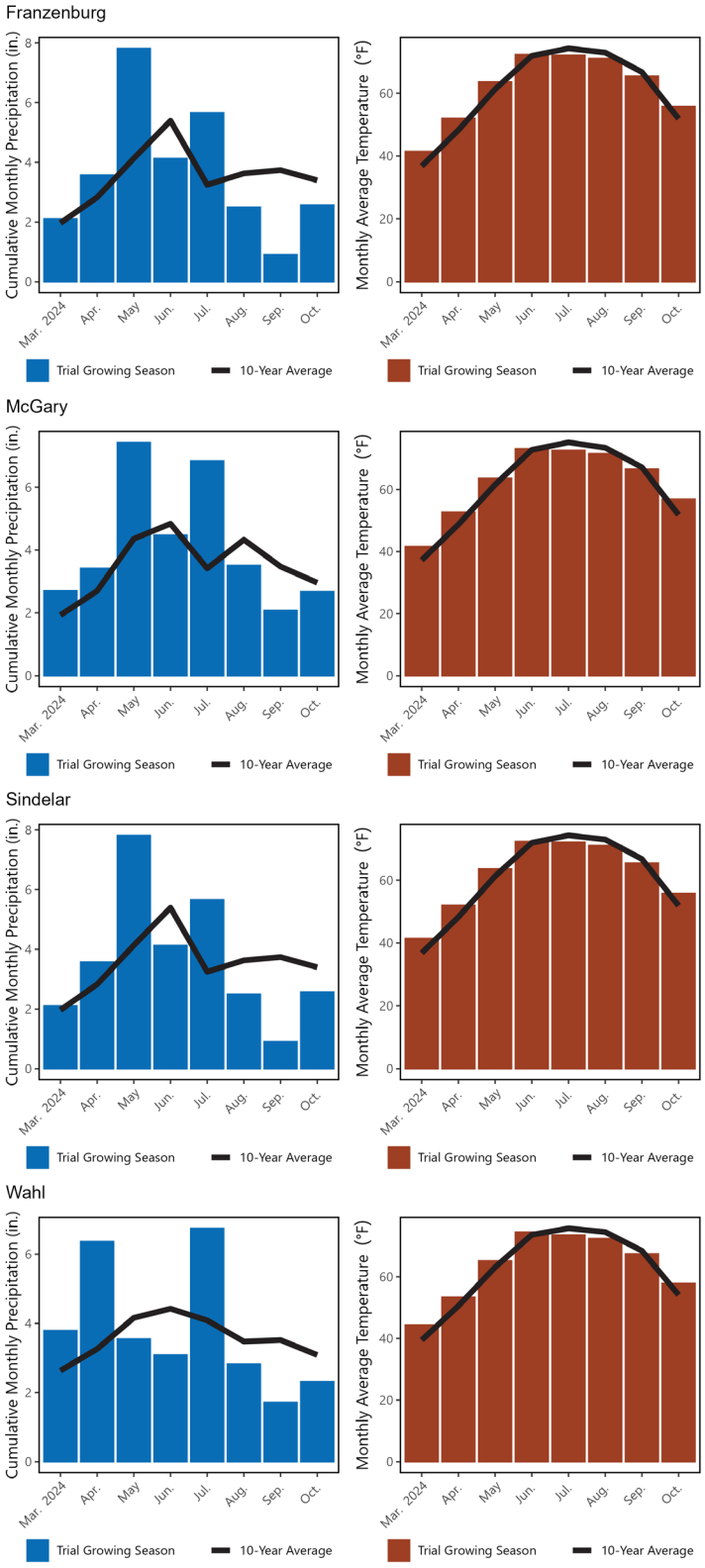

FIGURE A2. Monthly cumulative temperature and precipitation in Vanhorn, Ames, Newhall, and Wapello, IA during the growing season March–October 2024 [2], [3].

REFERENCES

[1] "Honeyberry Establishment with Shade Cloth - Practical Farmers of Iowa." Accessed: Feb. 20, 2025. [Online]. Available: https://practicalfarmers.org/research/honeyberry-establishment-with-shade-cloth/

[2] 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.

[3] A. Sparks, *nasapower: NASA-POWER Data from R*. (2024). [Online]. Available: https://CRAN.R-project.org/package=nasapower

PRACTICAL FARMERS of Iowa

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