ECOLOGICAL FARMERS ASSOCIATION OF ONTARIO

2023

Variety trial of easy to pick bush beans

IN A NUTSHELL

To compare harvest speed, Angie tested seven bush bean varieties (three replicated and four screened without replicates), and found:

- EZ Pick and Strike ranked similarly high with respect to superior yield, weight per plant, weight per minute and accessibility rating.
- Overall, farmers preferred EZ Pick because it felt the least onerous to pick.
- Red Tail underperformed with respect to yield, harvest time and pod accessibility.
- Of the screened varieties, Affirmed showed promise.

Angie also gained insight into characteristics to pay attention to in seed catalogue descriptions, which will help with future variety selection.

FARMER-RESEARCHER
Angie Koch, Fertile Ground Farm

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SeedChange

MOTIVATION

Over the years growing and observing the process of growing green beans, Angie noticed that picking bush beans was one of the least liked tasks on her farm—and that some varieties of green bush beans seemed easier to pick than others.

For example, she noticed the variety EZ Pick had pods that are accessible for quick and easy harvest versus others that have their pods buried within the leaf cover, which makes them slower to harvest and results in a higher probability of damage to flowers and immature pods.

This observed difference motivated Angie to find varieties that germinate well, are great tasting and easy and quick to pick. As such, Angie designed this trial to answer the question about harvest speed, and not yield per plant. As Angie says, "if I have to plant more row feet of a bean to get my desired lbs (because its productivity is lower), but it is still faster to harvest the desired pounds that I need for my CSA, I actually don't care a whole lot!"

Photo 1. Weighing green beans

METHODS

To test the ease of harvest of green bush beans, Angie and her team planted seven varieties, each in two succession plantings. For both successions, they planted two replicates of each of three core varieties and one replicate of each of four screening varieties, for a total of ten plots per succession.

Photo 2. Core varieties: EZ Pick, Red Tail and Strike, cooked and raw

VARIETIES

Table 1. The seven varieties tested in this trial.

VARIETY	DTM	SOURCE	VARIETY	NOTES
EZ Pick	-55	David Catzel/ BC Eco Seed Co-op	Core	Non-negotiable inclusion in this trial. From previous experience, this variety is definitely much faster to harvest. However, seed is not easily found for sale.
Red Tail	-55	High Mowing	Core	A variety Angie tried in 2022 and liked for germination, quality, and productivity, but she thinks it is more time-consuming to harvest. The plants are loaded with beans, but are floppy, in contrast to the stiffer upright growth of EZ Pick and Strike.
Strike	-53	High Mowing	Core	One of Angie's standard green beans for years that she would like to include this one to see how it compares as a check variety.
Affirmed	-56	Johnny's	Screening	This variety was new to Angie for this trial. More uniform beans, more upright plant habit, and more concentrated set than other green snap varieties.
Annihilator	-53	Vesey's	Screening	Vesey's identifies this variety as producing large yields with long beans that hang high for ease of picking. Angie also had germination issues in 2022 and wanted to give Annihilator another try. Note that this variety has a PVP on it in the US.
Maxi	-50	William Dam	Screening	William Dam identifies this as easy to pick and slow to get fibrous. Angie had germination issues in 2022, but wanted to give Maxi another try.
Valentino	-53	Vesey's	Screening	This variety was new to Angie for this trial. Described as a strong performer under warm conditions. Dark green, glossy low fiber pods are tender and tasty. 6" pods set high on the plant.

Figure 1. Example layout of each planting, with two replicate blocks of the three core varieties and one block of the four screening varieties. For each planting, Angie randomly chose the order of varieties within blocks.

REPLICATE BLOCK A (CORE VARIETIES)			REPLICATE BLOCK B (CORE VARIETIES)			REPLICATE BLOCK C (SCREENING VARIETIES)			
V2	V3	V1	V3	V1	V2	V4	V5	V6	V7

Bed length ------>

MANAGEMENT

The plot size for each variety was 12 feet long, with a larger than usual gap in the row between varieties than usual. In-row spacing was 2-4" with two rows per bed spaced 28" between rows.

As each bean variety is a different size and the seed plate for ideal spacing for each variety is unknown, the team at Fertile Ground Farm overseeded all beans in the trial to ensure good germination, and then thinned to 3-4 plants/ft.

They planted successions 2-3 weeks apart and and beans matured 50-55 days from seeding. The crew harvested twice per week for a total of 4-6 harvests per succession and collected data from the inner 10 feet of each replicate.

Angie noted the earlier succession grew during a drier period and the second during a wetter period, providing different weather conditions for assessing the varieties across the succession replicates.

Photo 4. EZ Pick plant habit with visible, easy to reach beans

DATA ANALYSIS

CORE VARIETIES

To evaluate the three core varieties, we used a statistical model called analysis of variance (ANOVA) with a 95% confidence level to calculate the least significant difference (LSD). When the difference between two treatment means is greater than the LSD, we can conclude that there's a consistent difference between two treatments 95% of the time. We could make these statistical calculations because Angie's experimental design involved replication of the varieties being trialed.

SCREENING VARIETIES

Angie compared the four screening varieties with only two replicates, meaning we could not run statistics or assign probability to any observed differences. Rather, Angie hoped to identify any large differences or trends among varieties.

FINDINGS

CORE VARIETIES: EZ PICK, RED TAIL, STRIKE

Plant Yield
EZ Pick and Strike had similar average yields per plant, and both were greater than Red Tail (**Table 2**).

Ease and Rate of Picking
Compared to Strike and Red Tail, EZ Pick had the fastest time per row foot, which might have been due to the lower stem count yet high weight per plant (**Table 2**) and both a high accessibility rating and pod detachment rating (**Table 3**).

In terms of rate of yield harvested (gram/min), EZ Pick was also significantly greater than Red Tail, and Strike was between EZ Pick and Red Tail but statistically similar to both (**Table 2**).

Table 2. Mean stem count, yield, and harvest time results from the bush bean variety trial.
Based on the least significant difference, core varieties that share a lowercase letter are not statistically different from each other; whereas core varieties with different lowercase letters are statistically different. If a variety has two letters, it is statistically similar to other varieties with either of those letters.

VARIETY	STEM COUNT	GRAM/ROW FT	GRAM/PLANT	MIN/ROW FT	GRAM/MIN
EZ Pick	19 b	304.05	**30.6 a**	**1:25 a**	**171.8 a**
Red Tail	**36 ab**	485.53	**30.3 a**	3:01 b	**156.4 ab**
Strike	**48 a**	345.55	17.2 b	2:26 b	138.0 b
LSD	**22**	**NS**	**8.8**	**0:45**	**27.1**
Maxi[a]	22	292.50	26.6	1:33	188.9
Annihilator[a]	8	225.30	56.3	1:08	192.0
Valentino[a]	16	198.10	24.8	1:11	145.9
Affirmed[a]	45	509.60	22.2	2:52	163.4

[a]We could not analyze the data using statistics because the trial set-up included only two replicates for the screening varieties.
NS: Not significant

Table 3. Mean pod damage rating, accessibility rating, and pod detachment rating for the bush bean varieties.
Based on the least significant difference, core varieties that share a lowercase letter are not statistically different from each other; whereas core varieties with different lowercase letters are statistically different. If a variety has two letters, it is statistically similar to other varieties with either of those letters.

VARIETY	POD DAMAGE RATING	ACCESSIBILITY RATING	POD DETACHMENT RATING
EZ Pick	4.25	**3.75 a**	**3.50 a**
Red Tail	3.50	**2.00 ab**	1.75 b
Strike	3.75	1.50 b	**2.75 ab**
LSD	**NS**	**1.5**	**1.3**
Maxi[a]	5	4	2
Annihilator[a]	4	2	3
Valentino[a]	NA	NA	3
Affirmed[a]	5	3	3

[a]We could not analyze the data using statistics because the trial set-up included only two replicates for the screening varieties.
NS: Not significant
NA: No data available

Table 4. Mean flavour rating and texture rating for the bush bean varieties

VARIETY	FLAVOUR RATING	TEXTURE RATING
EZ Pick	**3.8 ab**	3.7
Red Tail	**4.2 a**	4.2
Strike	2.6 b	3.6
LSD	**1.2**	**NS**
Maxi[a]	2.5	2
Annihilator[a]	4	5
Valentino[a]	4	4
Affirmed[a]	3.5	4

[a]We could not analyze the data using statistics because the trial set-up included only two replicates for the screening varieties.
NS: Not significant

Flavour and Texture

The Fertile Ground Farm team rated EZ Pick and Strike similary high in terms of flavour and texture and they rated Red Tail the lowest of the three core varieties (**Table 4**).

Overall Assessment

Overall, farmers preferred EZ Pick because it felt the least onerous to pick. EZ Pick with its upright habit, beans and flowers at the ends of the stems, and fewer leaves had a structure that was easier and more pleasant for picking. This was compared to Red Tail that, even with its good fruit set was a "tangled mess" and more laborious to pick.

Angie noted: "Stem count was supposed to control for that, but it still takes more time to crawl down a row past empty space and I wonder whether a trial that equalized the stem count per row ft would be enough to edge EZ Pick into a statistically significant category of gm/min." There was also an effect of insect damage which made some rows more patchy than others.

SCREENING VARIETIES: AFFIRMED, ANNIHILATOR, MAXI, VALENTINO

Of the screened varieties, Affirmed is being added to the planting list for 2024 as it showed promise.

Observing the screening varieties also provided good insight into characteristics and descriptions to pay attention to in seed catalogue description—or to ask the seed company for more information about—which will hopefully allow for the identification of additional varieties to trial in future years.

Specifically, when looking at catalogues or speaking with seed companies Angie now focuses on details in the descriptions for plant structure or growth habit, such as, "whether the beans are held high on the plant for easy access vs buried lower inside the foliage, whether the plant habit is more upright or sprawling, and whether the stems are brittle or strong".

CONTEXT

On Angie's farm and during the trial, the harvest window is between 2-3 weeks, or 5-6 times per succession. She noted EZ Pick began to change in texture and shape during the last picks and perhaps it would not be a suitable variety for someone with a longer harvest window.

Looking back on the process, Angie thinks standardized stem count would have been valuable, and notes that the results from her 2023 trial are biased for short harvest windows (~ 3 weeks).

NEXT STEPS

Angie will continue to search for the best beans with the descriptors that match her needs. She noted it would be great if someone took on stewarding EZ Pick to provide good seed for sale for market growers. She also sees breeding for hand picking efficiency as a desirable next step for improving green beans for market gardens.

Photo 5. Staff at Fertile Ground Farm picking beans

TAKE HOME MESSAGE

Both EZ Pick and strike will remain on the variety list for future years. Red Tail underperformed with respect to yield, harvest time, and pod accessibility, and Angie will not consider this variety in future years.

In the end, for Angie, yield/minute is likely the most important metric in this trial. For her, field space is cheaper than labour. Picking beans is a generally disliked job on the farm, so having it take less time while still getting required yields is priority.

An additional benefit from this trial for Angie was learning which traits were the most useful to watch for and how they are described.

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