

Fava bean variety trial for southern Ontario, Year 2

IN A NUTSHELL

The growers' objectives were to continue the work from their 2022 trial and document the highest yielding fava bean varieties for ecological production across different farms in southern Ontario. From their replicated multi-farm trial they found:

- Fava beans remain a challenging crop to grow with Ontario's climate, especially on rooftop gardens
- Andy's Broad Bean had fewer pods than the other varieties, but the pods were bigger and heavier making it the highest yielding variety by weight
- Growers had overall preference for Andy's Broad Bean and the dwarf breeding line NVDWFLVC

MOTIVATION

Fava beans (*Vicia faba var faba*; *V. faba var equina*; *V. faba var minuta*), also commonly known as faba bean or broad bean, are a species of vetch and are among the most ancient plants in cultivation. Fava beans are a staple food of the Mediterranean region and across Eurasia, including Egypt, Israel, Turkey, Lebanon, Syria, Iraq, Iran, northern India, Pakistan, and southern China, where they form the base of dishes such as ful, falafel, and hummus. In Europe and North America, the large seeded immature beans are eaten fresh as a plant protein—with or without the seed coat.

As a crop not endemic to North America, EFAO farmers were interested in assessing which varieties do well in southern Ontario. Their motivations ranged from enjoying fava beans as a delicious, protein-rich food; to wanting to diversify their crop offerings; to wanting to grow fava beans as a culturally-significant food crop for themselves and CSA customers - particularly new Canadians from areas where fava beans are traditionally grown.

In 2022, a group of growers on four farms assessed six varieties of fava beans including Tendergreen from Backyard Seed Saver; Windsor from Gaia Organics; Witkiem-Monica from William Dam; Vroma from Johnny's Selected Seeds; and two varieties from Vicia Genetics bred by Jessica Hughes in Saskatchewan, which are not yet commercially available. Growers were unable to reach a consensus on the "best" and "worst" fava varieties due to crop failure and missing data. You can read more about the 2022 trial in the research report efao.ca/research-library and magazine article efao.ca/fava-bean-variety-trial-2022/.

To build off of this work, Martina Schaefer, Leslie Moskovits and farmers at Toronto Metropolitan University (TMU) Urban Farm were joined by Dillon Muldoon of Trent Farm Research Centre to conduct a second fava bean variety trial in 2023.

2023



FARMER-RESEARCHERS

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Mature pods of each of the four fava bean varieties grown for the trial.

METHODS

Growers selected four varieties of fava bean, as described in Table 1, including HetLVC and NVDWFLVC from Vicia Genetics by Jessa Hughes, Windsor from Gaia Organics, and Andy's Broad Bean from BC Eco-Coop. NVDWFLVC is a new variety that is a dwarf plant with more of a branching growing habit and shorter pods. Jessa is breeding it in this way with the hope that it has better weed control.

The farmers selected these varieties based on the 2022 varieties that farmers and their customers liked. TMU liked HetLVC, Leslie liked Windsor; and Jessa Hughes, breeder of HetLVC, recommended a new dwarf variety of fava bean, NVDWFLVC, as she thought it would work well in market gardens in Ontario. They included Andy's Broad Bean from a recommendation at a Seed Grower Meet-up hosted by EFAO.

Growers on each farm grew two-to-three replicate sections with 10 plants of each variety (Figure 1). Each variety was randomly assigned to a plot in each replicate block. Depending on the garden plan at each farm, the block could be spread across multiple rows. The key was that growers planted each variety in every replicate block, and they randomized the order of the varieties in each block. They measured germination, early season vigour, yield, marketability, taste and texture, and overall performance; and recorded information on crop management.

Planting, cultivation, and other management details are outlined in the appendix.

DATA ANALYSIS

To evaluate the different 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 the experimental design had replicates, both within and across farms.

FINDINGS

GERMINATION

Germination rates were variable. Dwarf breeding line NVDWFLVC and Andy's Broad Bean had higher germination than HetLVC; while Windsor did not differ from any other variety (Figure 2).

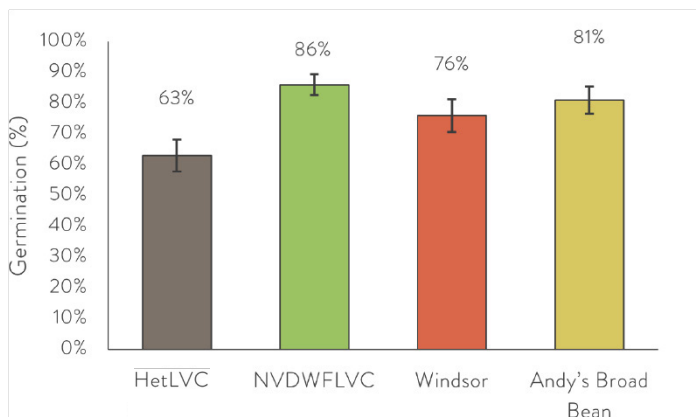


Figure 2. Mean (±SE) percent germination for each variety of fava bean across farms.

Table 1. Fava bean varieties grown in the variety trial in 2023.

VARIETY	DTM	SOURCE	INTELLECTUAL RESTRICTIONS
Andy's Broad Bean	n/a	BC Eco-Coop	No
HetLVC	n/a	Vicia Genetics (Jessa Hughes)	Material transfer agreement
NVDWFLVC (dwarf breeding line)	n/a	Vicia Genetics (Jessa Hughes)	Material transfer agreement
Windsor	75-85	Gaia Organics	No

REPLICATE BLOCK A			
V2 Min. 10 plants	V3 Min. 10 plants	V4 Min. 10 plants	V1 Min. 10 plants
REPLICATE BLOCK B			
V4 Min. 10 plants	V3 Min. 10 plants	V1 Min. 10 plants	V2 Min. 10 plants

Figure 1. Example layout with two replicate blocks of four varieties, with at least ten plants per variety down a single row.



Andy's Broad Bean (top left); HetLVC (top right); NVDWFLVC (bottom left); Windsor (bottom right)

YIELD (ALSO SEE TABLE 2)

SURVIVAL: Dwarf breeding line NVDWFLVC, Windsor and Andy's Broad Bean all had higher survival than HetLVC.

AVERAGE POD COUNT AND WEIGHT: Dwarf breeding line NVDWFLVC had the highest number of pods while Andy's Broad Bean had the lowest number.

TOTAL YIELD AND MARKETABLE YIELD: Despite the low number of pods, Andy's Broad Bean tended to have the greatest total yield and marketable yield, although there was too much variability among replicates for the mean difference to be greater than the LSD.

RATINGS & GROWER NOTES (ALSO SEE TABLE 3)

Early season vigour, pest and disease pressure, flavour and overall rating were similar among the four varieties. Leslie involved Yasser, a Palestinian chef, in her assessment!

Ratings aside, the growers had a lot to say about the different fava beans. It is worth noting that growers at the rooftop garden at TMU said 'No' to all varieties. This response reflects the poor suitability to growing these varieties of fava beans in their context, where they found fava beans attracted pests that decreased fava yield and posed a risk for spreading to surrounding crops.

Table 2. Mean plant count, total pod count, and weight for each variety collected over the growing season in 2023. Mean values are averaged per replicate and per harvest. Total pod weight was summed across replicates throughout the season. Lower case letters denote significant differences between varieties, based on the LSD. NS = not significant.

VARIETY	MEAN NUMBER OF PLANTS IN A REPLICATE SECTION	TOTAL POD COUNT PER REPLICATE	MEAN MARKETABLE POD COUNT PER HARVEST	TOTAL POD WEIGHT (G)	MEAN MARKETABLE WEIGHT PER HARVEST (G)
Andy's Broad Bean	10a	46 b	4 c	1272.2 a	118.9
HetLVC	7 b	78 b	10 ab	665.5b	90.9
NVDWFLVC	9 a	149 a	13 a	830.1 ab	78.0
Windsor	10 a	77 b	7 bc	1168.1 ab	109;9
LSD	2	43	4	431.2	NS

Table 3. Mean early season vigour rating, plant health notes, and flavour and overall ratings for each variety across farms. NS = not significant

VARIETY	EARLY SEASON VIGOUR RATING	PESTS	DISEASE	FLAVOUR RATING	OVERALL RATING
Andy's Broad Bean	3.6	aphids, tarnished plant bug	chocolate spot	3.3	3.3
HetLVC	3.0	aphids, blister beetle, tarnished plant bug	chocolate spot	4.0	3.3
NVDWFLVC (dwarf breeding line)	3.0	aphids, tarnished plant bug	chocolate spot	4.0	2.7
Windsor	3.3	aphids, tarnished plant bug	chocolate spot	3.3	3.7
LSD	NS			NS	NS



GROWER NOTES FOR ANDY'S BROAD BEAN:

"Slightly bitter, but had a nice texture, softer than others. Largest beans, with some bitterness and would eat again. Really nice looking and big pods, larger beans mean good yields weight wise." - Martina

"Buttery, not super sweet, very beautiful, bright green colour, very tender beans with high moisture content. Beautiful healthy plants and gorgeous long slender pods, beans stand out for their bright green colour, flavour fine but not exceptional, beans very very tender so required less cooking." - Leslie

"Really large beans with beautiful colour, nice flavour, high yield in weight but lower pod count." - Dillon

NUMBER OF GROWERS WHO RESPONDED TO THE QUESTION: 'WOULD YOU GROW THIS VARIETY AGAIN?' Yes: 2, Maybe: 1, No: 1

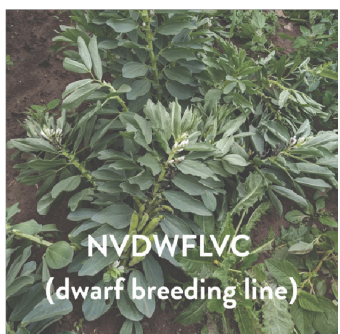


GROWER NOTES FOR HETLVC:

"Good texture, mild, not bitter. Nice big pods, good flavour and texture." - Martina

"Good flavour, meaty beans, tender with a nice texture, nutty. A solid variety, but doesn't stand out particularly." - Leslie

NUMBER OF GROWERS WHO RESPONDED TO THE QUESTION: 'WOULD YOU GROW THIS VARIETY AGAIN?' Yes: 1, Maybe: 2, No: 1



GROWER NOTES FOR DWARF BREEDING LINE NVDWFLVC:

"Less flavourful, with good texture, Smallest beans (pea size) means lots of work to shell. For market gardening this variety isn't the most practical in terms of the pod and bean size being so small, and need a lot more beans to reach the same weight in comparison to other varieties." - Martina

"Tiny beans, nutty flavour, higher in starch so drier, meatier, food flavour very rich. This variety produced very small plants with fairly high yield of pods but the pods are tiny so overall yield is very low. However, the beans are quite unique compared to the other varieties with a dense pleasing texture and nutty, rich flavour." - Leslie

"Small beans, but packed with a nice flavour, nutty, sweet, dense, floral. Smaller plants with tight flower clusters producing 2-3 pods per node. I personally really liked these fava and enjoyed them for raw eating as well. Harder to harvest than other varieties." - Dillon

NUMBER OF GROWERS WHO RESPONDED TO THE QUESTION: 'WOULD YOU GROW THIS VARIETY AGAIN?' Yes: 2, Maybe: 1, No: 1



GROWER NOTES FOR WINDSOR:

"Firm texture, earthy but not bitter. Smaller beans with good flavour." - Martina

"Flavour is fair but not particularly sweet, nice big beans. A fine variety but low yielding comparatively and not as good eating quality as the others." - Leslie

"Flavour and texture are fine, not a stand out for eating when compared to the other varieties." - Dillon

NUMBER OF GROWERS WHO RESPONDED TO THE QUESTION: 'WOULD YOU GROW THIS VARIETY AGAIN?' Yes: 1, Maybe: 1, No: 2

TAKE HOME MESSAGE

Similar to results from 2022, growers found that growing fava beans in southern Ontario— whether on rooftop farms or in-field—is tricky!

"Our spring weather fluctuates wildly and fava seems not to like hot, humid weather or the temperature swings that we've been having," explains Leslie. "They also are afflicted by various insect pressures and in general are challenging to get a fulsome crop," she observed.

With breeding efforts, like those from Jessa Hughes, the hope is that varieties adapted to Canadian conditions could provide a better crop for growers.

APPENDIX

Table A1. Planting and cultivation recommendations for the fava bean trial in 2023.

PLOT SIZE PER VARIETY	Minimum of 10 plants per variety section, 2 or 3 replications = minimum 20 or 30 plants total for each variety in the trial
ROW AND BED SPACING	In-row: 4"-6" ; between row: 18"-36"
SEEDING DATE	As soon as soil can be worked in April/May (direct seeding the last week of April / first week of May.) Michelle wondered if floating row cover should be fine just for the germination/seedling stage so it doesn't get sub-0 in the ground, and then can be removed as it warms up? Just note down what you do in the Crop Management form.
DAYS TO HARVEST	~70 - 100 days
HARVESTING	Pick individual pods when the green shell beans inside are plump. If the pods feel spongy, they aren't ready yet. They should be shiny and firm when ripe. In 2022, TMU found that sometimes the pods would get hard and tough quickly if you didn't pick hard enough or the weather was hot. They ended up harvesting 1-3 times a week last year to maximize the yield we got. So pick as frequently as needed, and we will combine harvests per week for the research report.

Table A2. Crop management record for each farm.

FARM	SEEDLING DATE	IRRIGATION	WEED CONTROL
Leslie	May 10	weekly overhead as needed	hoes and tractor scuffled
Martina	April 24	soaker hose as needed	wheel hoe and hand weeding
TMU	May 1	drip line	hand weeding
Trent	June 2	soaker hose as needed	hand weeding

WARNING: FAVISM

Favism is a rare disease most prevalent in Mediterranean countries and characterized by the red blood cells being destroyed faster than they can be made after the ingestion of fava bean seeds by individuals who have a genetic abnormality caused by deficiency of the enzyme G6PD. The gene is carried on the X chromosome and thus the majority of individuals who express the disease are male.