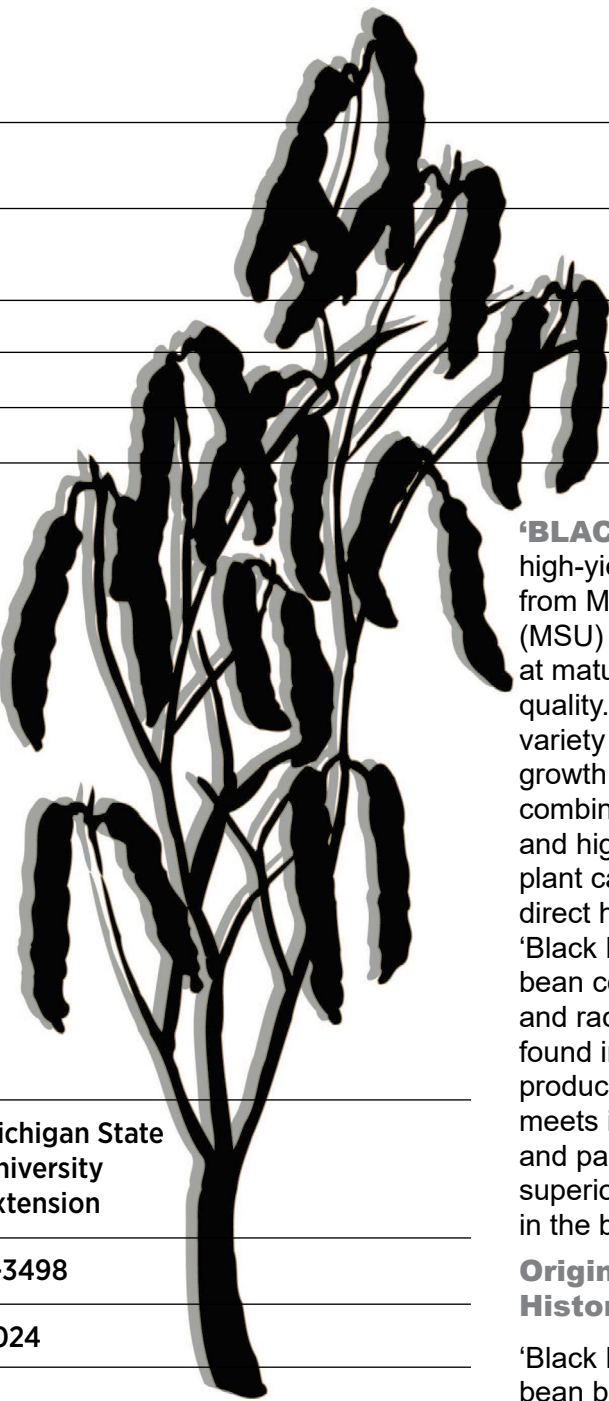


NEW from MSU

'BLACK PEARL'

A New Bean Variety
for Michigan



- New upright full season black bean variety suited for direct harvest.
- Produced an average yield of 30 cwt/acre across 29 locations.
- Resistant to anthracnose.
- Excellent canning quality.
- Exhibits uniform maturity and dry down.

'BLACK PEARL' is a new upright, high-yielding black bean variety from Michigan State University (MSU) that exhibits good dry down at maturity and excellent canning quality. This full season maturing variety has an upright, short vine growth habit. The plant architecture, combined with resistance to lodging and high pod placement within the plant canopy make it suitable for direct harvest production systems. 'Black Pearl' is resistant to strains of bean common mosaic virus (BCMV) and races 7 and 73 of anthracnose found in Michigan. 'Black Pearl' produces a black bean seed that meets industry standards for export and packaging and was rated superior in canned bean appearance in the black bean seed class.

Origin and Breeding History

'Black Pearl', tested as MSU black bean breeding line B19344, was developed from the cross between

two MSU black bean breeding lines B16506/B16507. B16506 exhibited upright architecture, and very high yield performance. B16507 was derived from the cross B12720/'Zenith' intended to combine the excellent color retention of 'Zenith' following canning, with additional yield potential and efficient dry down at maturity. The pedigree breeding method was used to advance the cross to the F₄ generation followed by pure line selection for disease, agronomic and quality traits.

Agronomic and Disease Information

'Black Pearl' exhibits the Type-IIa upright indeterminate short vine growth habit combined with good resistance to lodging (1.8 on scale 1 to 5, Table 1). 'Black Pearl' is as erect as 'Zenith', but generally more upright than the other black varieties tested. Plants averaged

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18 inches in height similar to the other black varieties. 'Black Pearl' is a full-season bean, flowering in 47 days and maturing in 98 days after planting (Table 1). The range in maturity is from 83-110 days depending on the environment. The earliest maturity was observed under abnormally hot dry conditions in 2021, and the latest during 2023 when the harvest period was abnormally wet and cold. Maturity was not significantly different than the varieties 'Zenith' and 'Black Beard' but was significantly earlier than 'Black Bear' (3 days), Nimbus (2 days), and 'Spectre' (4 days). The black bean marketplace in Michigan has increasingly become dominated by fuller season varieties such as 'Nimbus' and 'Spectre' which offer increased yield potential proportional to their increased days to maturity. However, there remains a market for varieties with more traditional moderate maturity (<100 days), with uniform dry down more similar to 'Zenith'. Grower motivation for selecting varieties with better dry down characteristics may be driven by balancing harvest constraints and timing, the need to reduce the use of chemical desiccants to enhance sustainability, or by the increasing amount of organic production. 'Black Pearl' has a high agronomic acceptance rating (4.4) similar to the other black varieties due to its upright habit, resistance to lodging, uniform dry down and favorable high pod placement in the plant canopy (Table 1).

'Black Pearl' has been tested for 5 years (2019-2023) in 29 locations by MSU researchers in Michigan. The combined yield data comparisons are shown in Table 1. Over 29 locations, 'Black Pearl' yielded 30.1 hundredweight per acre (cwt/acre), which was equivalent to the average test

means of 29.6 cwt/acre. It did not significantly differ in yield with 'Black Beard' (-1%), 'Zenith' (2%), 'Nimbus' (2%), 'Black Bear' (3%), or 'Spectre' (4%). Yield ranged from a high of 44.5 cwt/acre under ideal growing conditions in Huron County in 2020 to a low of 16.6 cwt/acre under excessive irrigation and severe white mold infection at Montcalm Research Center in 2021.

'Black Pearl' appears well adapted across a range of environmental conditions and well suited to the narrow row, direct harvest management system commonly used in Michigan. Growers should follow current recommended practices for fertility and weed control in growing this variety. Recommendations can be found online at the SVREC site (<https://www.canr.msu.edu/saginawvalley/>) and at MSU Weed Science (canr.msu.edu/weeds/).

'Black Pearl' possesses the single dominant I gene, which confers resistance to seed-borne BCMV. All the black bean varieties listed in Table 1 possess the same resistance gene. 'Black Pearl' exhibits resistance to anthracnose races 7 and 73 and rated lowest (3.3) in percent damping-off to Rhizoctonia strain AG2-2. It is susceptible to common bacterial blight, similar to the other black bean varieties shown. Over five years of field testing 'Black Pearl' has exhibited moderate levels of tolerance to white mold under high fertility, frequently irrigated trials designed to encourage disease development in Montcalm County. It has shown similar results under rainfed conditions throughout the Saginaw Valley region. 'Black Pearl' averaged 72% white mold infection incidence across all locations evaluated for white mold development under conditions conducive to natural infection.

Disease incidence was rated similar to 'Black Beard', while other varieties generally scored lower.

Quality Characteristics

'Black Pearl' has a typical sized traditional black bean seed, averaging 2,070 seeds/pound, with a size range from 1,850 to 2,340 seeds/pound (Table 1). The seed is intermediate in size to many other varieties, larger in size than 'Black Bear' (2,250 seeds/pound) and smaller compared to 'Nimbus' (1,930 seeds/pound) and 'Spectre' (1,990 seeds/pound). Dark black canned bean color is important to the canning trade, and several widely grown newer varieties suffer from inferior color retention, which has become a concern to the industry in recent years. In canning trials, 'Black Pearl' was rated by a team of panelists as being exceptional in color retention, scoring 4.6 on a scale of 1= very undesirable to 5 = very desirable. Therefore, 'Black Pearl' was superior to all other varieties tested.

Release and Research Fee

'Black Pearl' was released by Michigan State University with the option that 'Black Pearl' be sold for seed by variety name only as a class of certified seed under the three-class system used in Michigan (breeder, foundation, certified). A royalty will be assessed on each hundred-weight unit of either foundation seed or certified seed sold. Plant Variety Protection (PVP) from the USDA Agricultural Marketing Service is anticipated. Parties interested in licensing 'Black Pearl' may contact MSU Technologies (<http://technologies.msu.edu>) by phone at 517 355-2186 or by e-mail at msut@msu.edu.

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Table 1. Comparison of yield, agronomic, disease and canning characteristics of 'Black Pearl' with five other black bean varieties over 5 years and 29 locations testing (2019-2023) in Michigan.

Traits	Varieties					
	'Black Pearl'	'Zenith'	'Black Beard'	'Black Bear'	'Nimbus'	'Spectre'
Agronomic traits						
Days to flower	47	47	47	45	49	50
Days to maturity	98	97	98	101	100	102
Height in inches	18	18	20	18	19	18
Lodging score ^a (1–5)	1.8	1.7	2.3	2.2	2.2	2.2
Agronomic index ^b (1–7)	4.4	4.7	3.9	3.5	3.7	4.0
Seeds/pound	2070	2000	2000	2250	1930	1990
Mean yield ^c (cwt/ acre)	30.1	30.7	29.8	31.0	30.7	31.3
Yield percentage	100	102	99	103	102	104
Disease resistance traits						
BCMV ^{d,e}	R	R	R	R	R	R
Anthraxnose Race 7 Race 73	R R	R R	S S	S R	R S	-- S
Rhizoctonia % damping-off	3.3	9.7	11.3	10.9	8.2	3.6
White Mold (%) ^f	72	43	72	59	52	25
Canning traits						
Color rating ^g (1-5)	4.6	4.3	4.1	2.1	2.3	2.9

^a Lodging: 1 = Erect, 5 = Prostrate

^b Agronomic index: 1 = Worst, 7 = Excellent in appearance and dry down

^c Yield was averaged over 29 locations from 2019 to 2023

^d Diseases: R = Resistant, S = Susceptible

^e BCMV = Bean Common Mosaic Virus

^f White Mold = % disease incidence

^g Visual color rating: 1 = Very undesirable, 3 = Average, 5 = Very desirable