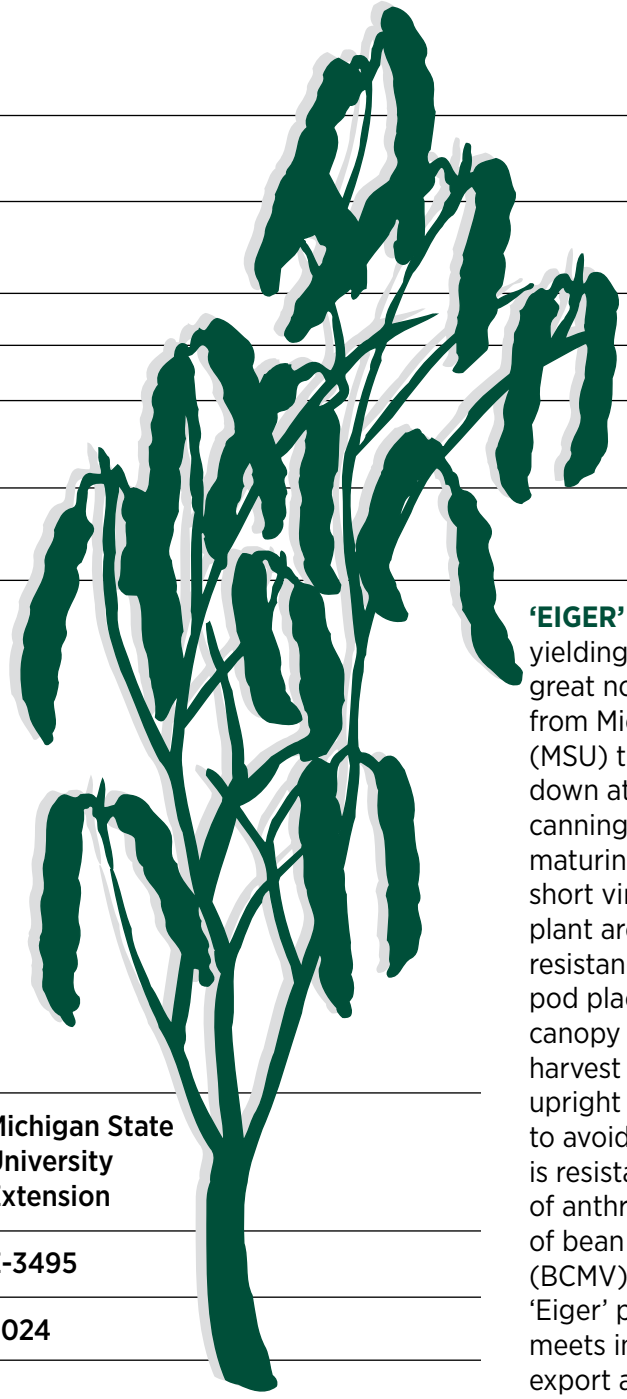
NEW from MSU

'EIGER'

A New Great Northern Bean Variety for Michigan



- New upright full season great northern variety suited for direct harvest.
- Produced an average yield of 30 cwt/acre across 38 locations.
- Matures in 98 days.
- Resistant to races 73 and 109 of anthracnose.
- Exhibits uniform maturity and dry down similar to 'ND Pegasus'.
- Possesses acceptable canning quality similar to 'Powderhorn'.

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'EIGER' is a new upright, high-yielding, anthracnose resistant great northern bean variety from Michigan State University (MSU) that exhibits good dry down at maturity and acceptable 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. The upright structure also contributes to avoidance of white mold. 'Eiger' is resistant to races 73 and 109 of anthracnose as well as strains of bean common mosaic virus (BCMV) present in Michigan. 'Eiger' produces dry seed that meets industry standards for export and packaging and was rated acceptable in canned bean appearance in the great northern bean seed class.

Origin and Breeding History

'Eiger', tested as MSU great northern breeding line G16351, was developed from the cross of 'Eldorado'/G13467. 'Eldorado' was a high yielding pinto variety with improved tolerance to white mold. MSU breeding line G13467 was an upright great northern bean with resistance to anthracnose races 73 and 109 conferred by the *Co-4*^{2} gene. The pedigree breeding method was used to advance the cross to the F_4 generation, and the final reselection that produced 'Eiger' was made at the $F_{4:8}$ generation for resistance to anthracnose race 109 using direct

inoculation and confirmed using marker assisted selection. 'Eiger' is the first high yielding, anthracnose resistant great northern variety suitable for direct harvest.

Agronomic and Disease Information

'Eiger' exhibits the upright type-II indeterminate short vine growth habit combined with good resistance to lodging equivalent to ND Pegasus (1.3 on a 1–5 scale, Table 1) and displays the upright architecture of the 'Eldorado' parent. Varieties such as 'Aries' and 'Taurus' lodge more (2.0-2.3) making direct harvest difficult and favoring the development of white mold. 'Eiger' plants average 21 inches in height, similar to that of 'ND Pegasus'. 'Eiger' is a full season bean, flowering in 44 days and maturing in 98 days after planting on average. The range in maturity is from 94 to 108 days, depending on season and location. It matures 2-d earlier than 'ND Pegasus', 1-d later than 'Taurus', 5-d later than 'Powderhorn', and 3-d later than 'Aries'. 'Eiger' exhibits similar maturity and dry down as 'ND Pegasus' and is more erect than 'Aries' or 'Taurus'. It has a high agronomic acceptance rating due to upright habit, high pod placement in the plant canopy, and excellent yield potential.

'Eiger' has been tested for 8 years (2016-2023) in 38 locations by MSU researchers in Michigan, and by colleagues in Nebraska, North Dakota, Washington, and Ontario, Canada where it also appears to be well adapted. The combined yield data comparisons are shown in Table 1. Over 38 locations, 'Eiger' yielded 30.1 hundredweight per acre (cwt/acre) and significantly out-yielded 'Powderhorn' by 23%, 'Aries' by 22% and 'Taurus' by 13%. Yield was not significantly different than 'ND Pegasus' (3%). The yield ranged from a high of 47 cwt/acre in Bay County in 2023, to a low of 20 cwt/acre in Tuscola County in 2022.

Eiger 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 from the Saginaw Valley Research and Extension Center (https://www.canr.msu.edu/saginawvalley/) and MSU Weed Science (www.msuweeds.com).

'Eiger' possesses the single dominant I gene, which confers resistance to seed-borne BCMV. All the great northern bean varieties listed in Table 1 possess the same resistance gene. 'Eiger' is resistant to all races of anthracnose known to occur in Michigan. It is the first MSU great northern bean variety that possesses the *Co-4*^{2} gene that confers broad resistance to anthracnose, including races 7, 73, and 109 that have been most frequently isolated in recent years. All other varieties listed in Table 1 are susceptible to race 109. Susceptibility to common bacterial blight was similar for all these varieties. Over eight years of field testing 'Eiger' has exhibited moderate levels of tolerance to white mold in high fertility, frequently irrigated trials conducted in Montcalm County and designed to encourage disease development. It has shown similar results under rainfed conditions throughout the Saginaw Valley region. 'Eiger' averaged 54% white mold infection across all locations evaluated as favorable for white mold development. Disease incidence was rated slightly lower than 'ND Pegasus' and 'Taurus', while 'Powderhorn' (70%) and 'Aries' (82%) were rated higher.

Quality Characteristics

'Eiger' has a typical sized great northern bean seed, averaging 1172 seeds/pound, similar to 'Aries', and a size range from 1260 to 1008 seeds/pound (Table 1). The seed is slightly smaller than 'ND Pegasus' and equivalent in size to the other varieties. In canning trials, 'Eiger' was subjectively rated by a team of panelists as being average in cooking quality. It was rated 3.3 for visual appearance which was similar to 'Powderhorn' (3.4), but better than 'Aries' (2.9), 'Taurus' (2.7) and 'ND Pegasus' (2.1). Texture of cooked beans ranged from a softer texture of 28 kg/100 g for 'ND Pegasus' and 31 kg/100 g for 'Aries' to firmer texture of 41 kg/100 g for 'Eiger' and 44 kg/100 g for 'Powderhorn' (Table 1). 'Eiger' exhibits acceptable overall canning quality in the great northern bean market class.

Release and Research Fee

'Eiger' was released by Michigan State University with the option that 'Eiger' 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 hundredweight 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 'Eiger' 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 'Eiger' with four other great northern bean varieties over 8 years and 38 locations testing (2016-2023) in Michigan, Nebraska, North Dakota, Washington, and Ontario.

Traits	Varieties				
	'Eiger'	'Powderhorn'	'Aries'	'Taurus'	'ND Pegasus'
Agronomic traits					
Days to flower	44	41	40	43	42
Days to maturity	98	93	95	97	100
Height in inches	21	19	19	19	21
Lodging score[a] Average (1–5)	1.3	1.2	2.0	2.3	1.2
Agronomic index[b] Average (1–7)	5.3	4.4	3.5	4.0	4.6
Seeds/pound	1172	1213	1172	1184	1077
Mean yield[c] (cwt/acre)	30.1	23.3	24.1	27.4	29.5
Yield percentage	100	77	78	87	97
Disease resistance traits					
BCMV[d,e]	R	R	ND	ND	R
Anthracnose Races 73 & 109[f]	R/R	S/S	S/S	S/S	S/S
Common bacterial blight	S	S	S	S	S
White Mold (%)[g]	54	70	82	60	61
Canning quality traits					
Texture[h](kg/100g)	41	44	31	43	28
Visual rating[i] (1-5)	3.3	3.4	2.9	2.7	2.1

[a] Lodging: 1 = Erect, 5 = Prostrate
[b] Agronomic index: 1 = Worst, 7 = Excellent
[c] Yield was averaged over 38 locations from 2016 to 2023
[d] Diseases: R = Resistant, S = Susceptible, ND = No data
[e] BCMV = Bean Common Mosaic Virus
[f] Anthracnose: race 73/race 109
[g] White Mold: % disease incidence
[h] Texture: Kg of force needed to compress 100 g canned beans
[i] Visual rating: 1 = Very undesirable, 3 = average, 5 = Very desirable