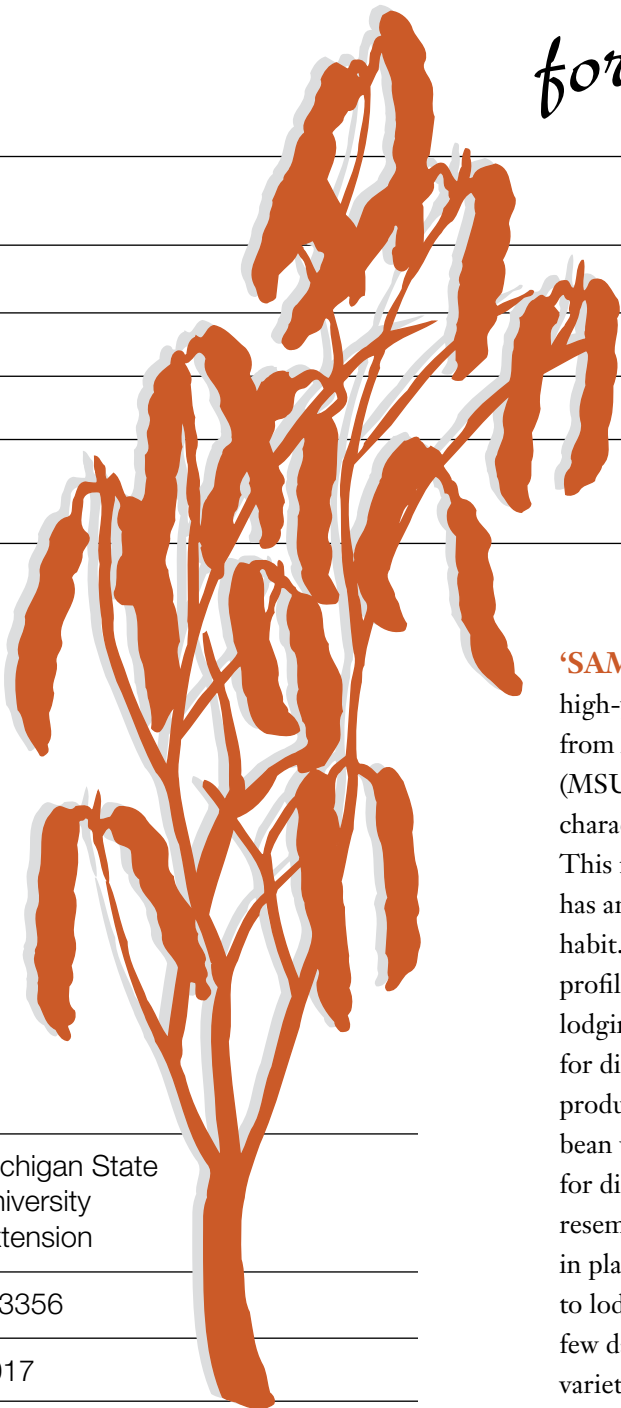


NEW from MSU

# 'Samurai'

A New Otebo Bean Variety  
for Michigan and Ontario



- New upright full-season otebo bean variety suited for direct harvest.
- Highest yielding otebo bean variety in five years of testing.
- Full-season 100-day maturity.
- Resistant to *bean common mosaic virus*.
- Attractive white otebo bean seed that possesses unique pasting properties.

'SAMURAI' is a new erect, high-yielding otebo bean variety from Michigan State University (MSU) that combines unique characteristics for bean producers. This full-season maturing variety has an upright, short vine growth habit. The upright narrow plant profile, combined with resistance to lodging, makes 'Samurai' suitable for direct harvest under narrow row production systems. Current otebo bean varieties are not suitable for direct harvest. 'Samurai' best resembles the 'Alpena' navy bean in plant architecture and resistance to lodging. 'Samurai' matures a few days later than current bush varieties and in certain seasons may

exhibit leaf retention, requiring chemical desiccation. Samurai is resistant to *bean common mosaic virus* (BCMV) but is susceptible to white mold, common bacterial blight and specific strains of bean rust present in Michigan. The seed of this variety is smaller than that of 'Fuji' and 'Hime' otebo bean varieties but possesses similar pasting properties.

## Origin and Breeding History

'Samurai', tested as MSU otebo bean breeding line G12901, was developed from the cross of G07321/'Fuji' made in 2007.

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G07321 is a medium-sized great northern breeding line from the MSU breeding program that has an upright type-II indeterminate habit. ‘Fuji’ is a BCMV-resistant otebo bean variety that has a short-statured determinate bush habit. The purpose of the cross was to develop a new high-yielding, upright otebo bean variety that had the short vine indeterminate growth habit suitable for direct harvest. All current otebo bean varieties have a determinate bush habit that prevents growers from direct harvesting the crop.

## Agronomic and Disease Information

‘Samurai’ is the first otebo bean variety to possess the upright type-II indeterminate short vine growth habit combined with good resistance to lodging (1.6 on a 1–5 scale). Current otebo varieties are short-statured determinate bush types, which require traditional pulling-windrowing harvest methods and cannot be direct harvested. Plants average 21 inches in height, similar to the height of ‘Alpena’ navy and taller than other otebo bean varieties. ‘Samurai’ is a full-season bean maturing 100 days after planting. The range in maturity is from 91 to 106 days, depending on season and location. ‘Samurai’ is similar in maturity to ‘Alpena’ and matures one day later than ‘Fuji’. In some seasons, ‘Samurai’ has exhibited a green stem characteristic and leaf retention when pods are dry, requiring the use of a desiccant to facilitate direct harvest. ‘Samurai’ has an average agronomic acceptance rating based on its upright habit, resistance to lodging, excellent pod load and favorable high

pod placement in the plant canopy despite the tendency to retain leaves at maturity in some seasons.

‘Samurai’ has been tested for five years (2012–2016) in 39 locations by MSU researchers in cooperation with colleagues in Michigan and Ontario. The combined yield data comparisons with other otebo cultivars are shown in Table 1. Over 39 locations, ‘Samurai’ yielded 26.3 hundredweight per acre (cwt/acre). It has significantly outperformed both bush otebo bean varieties, ‘Fuji’ and ‘Hime’. ‘Samurai’ out-yielded ‘Fuji’ by 28% over 26 locations and ‘Hime’ by 11% over eight locations. In comparison with other upright varieties ‘Samurai’ out-yielded ‘Alpena’ navy by 5% over 30 locations and ‘Powderhorn’ great northern by 8% over 23 locations. Yields of ‘Samurai’ have ranged from a high of 39 cwt/acre in Gratiot County, Michigan, in 2015, to a low of 18.8 cwt/acre under severe white mold conditions in Bay County, Michigan, in 2014.

Planted in narrow rows (20 inches) and combined with direct harvest, ‘Samurai’ has produced competitive yields over 30 cwt/acre in Michigan and Ontario, where otebo beans are grown commercially. ‘Samurai’ appears well adapted to this increasingly popular management system and should replace current bush varieties that have to be pulled and windrowed ahead of harvest. Growers should follow current recommended practices for fertility and weed control in growing ‘Samurai’ beans. Recommendations can be found online from the Saginaw Valley Research and Extension Center

([http://www.canr.msu.edu/saginawvalley/saginawvalley\\_resources\\_and\\_reports](http://www.canr.msu.edu/saginawvalley/saginawvalley_resources_and_reports)) and MSU Weed Science ([www.msuweeds.com](http://www.msuweeds.com)).

‘Samurai’ possesses the single dominant hypersensitive *I* gene, which confers resistance to seed-borne BCMV. ‘Fuji’ otebo possesses the same resistance gene but ‘Hime’ otebo lacks this gene and is susceptible to virus. ‘Samurai’ exhibits greater susceptibility to white mold when compared to other upright bean varieties that display avoidance due to the upright habit. Percent white mold in ‘Samurai’ was 50% compared to ‘Alpena’ (33%), and ‘Powderhorn’ (28%) when grown in irrigated trials over 3 years. ‘Samurai’ is susceptible to anthracnose and common bacterial blight; it possesses resistance to some races of rust but is susceptible to rust race 22:2 now prevalent in Michigan.

## Quality Characteristics

‘Samurai’ has a typical small- to medium-sized round white otebo bean seed, averaging 28 g/100 seeds and a size range from 25 to 31 g/100 seeds. The seed is smaller than ‘Fuji’ and ‘Hime’ (30g/100 seeds), whereas the overall appearance and color is similar to other otebo bean varieties. Since otebo beans are not canned but are used in paste products, no canning trials were conducted with ‘Samurai’. Data were collected on seed color and seed constituents. The L-color (lightness scale) of cooked beans showed that ‘Samurai’ was similar in color (68) to ‘Alpena’, slightly darker than ‘Fuji’ (70) and ‘Powderhorn’ (74). Preliminary data showed ‘Samurai’ to be lower in oligosaccharides (sugars that contribute to flatulence) than

‘Alpena’. The resistant starch in both the raw and cooked seed of ‘Samurai’ was compared with other white bean varieties. Both otebo beans had a significantly lower percent resistant starch (8%) in the raw uncooked beans when compared to the navy and great northern varieties (38%). This difference disappeared following cooking and all varieties averaged 5%. Both navy and great northern beans have been developed to meet canning standards, so higher levels of resistant starch may ensure that processed beans retain whole seed integrity following cooking. In the case of otebo beans that have been selected for paste products, lower resistant starch levels should allow faster cooking to produce a product better suited for paste. ‘Samurai’ exhibits these properties based on low levels of resistant starch in the uncooked (raw) seed.

## Release and Research Fee

‘Samurai’ was released by Michigan State University with the option that ‘Samurai’ 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 depending on the production location (east or west of the Continental Divide). Plant Variety Protection (PVP) from the USDA Agricultural Marketing Service is anticipated. Parties interested in licensing ‘Samurai’ may contact MSU Technologies (<http://technologies.msu.edu>) by phone at 517-355-2186 or by email at [msut@msu.edu](mailto:msut@msu.edu).

## Acknowledgments

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**Table 1. Comparison of yield, agronomic, disease and seed characteristics of ‘Samurai’ with ‘Fuji’ otebo, ‘Alpena’ navy and ‘Powderhorn’ great northern bean varieties over 5 years testing (2012–2016) in Michigan and Ontario**

Traits	Varieties			
	‘Samurai’	‘Fuji’	‘Alpena’	‘Powderhorn’
Agronomic traits				
Days to flower	45	44	45	42
Days to maturity	100	99	99	93
Height in inches	21	18	22	20
Lodging score <sup>a</sup> Average (1–5)	1.6	2.1	1.6	1.1
Agronomic index <sup>b</sup> Average (1–7)	4.5	3.2	5.3	5.1
100-seed weight in grams	28.1	29.5	19.3	38.1
Mean yield <sup>c</sup> (cwt/acre)	26.3	19.3	25.1	24.0
Yield percentage	100	72	95	92
Disease resistance traits <sup>d</sup>				
BCMV <sup>e</sup>	R	R	R	R
White mold percentage <sup>f</sup>	50	–	33	28
Quality traits				
Color L-scale <sup>g</sup>	68	70	68	74
Resistant starch raw seed (%)	8	8	38	39
Resistant starch cooked seed (%)	5	5	5	5

<sup>a</sup> Lodging: 1 = Erect, 5 = Prostrate

<sup>b</sup> Agronomic Index: 1 = Worst, 7 = Excellent

<sup>c</sup> Yield was averaged over 39 locations from 2012 to 2016

<sup>d</sup> Diseases: R = Resistant

<sup>e</sup> BCMV = Bean Common Mosaic Virus

<sup>f</sup> White Mold: Percentage of disease incidence and severity

<sup>g</sup> Color L-scale: Lightness scale following cooking, higher number indicates