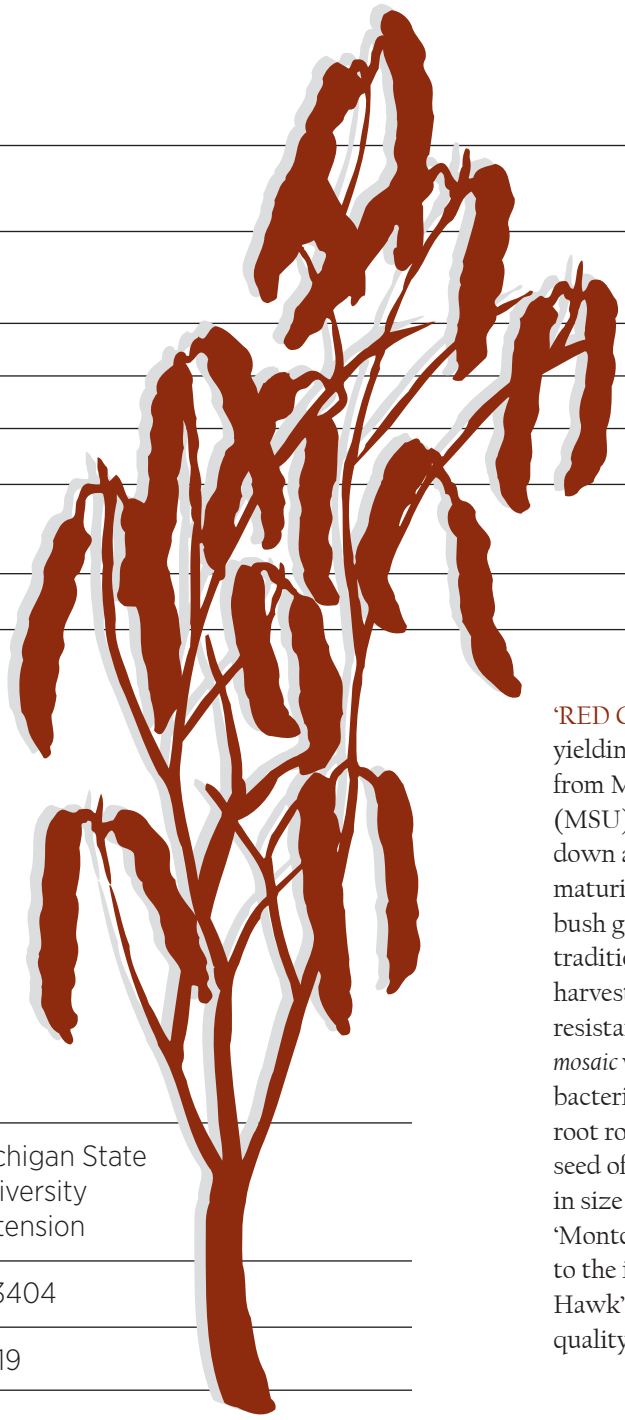
NEW from MSU

'RED CEDAR'

A New Dark Red Kidney Bean Variety *for Michigan*



- New full-season dark red kidney bean variety with improved harvest dry down.
- Produced yields in excess of 40 hundredweight per acre (cwt/acre) under irrigation.
- Exhibits uniform maturity coupled with enhanced dry down.
- High levels of resistance to common bacterial blight.
- Exhibits partial resistance to Fusarium root rot.
- Attractive dark red kidney bean seed, slightly smaller than 'Red Hawk'.
- Possesses acceptable canning quality.

'RED CEDAR' is a new erect, high-yielding dark red kidney bean variety from Michigan State University (MSU) that exhibits improved dry down at maturity. This full-season maturing variety has a determinate bush growth habit more suited for traditional pulling and windrowing harvest methods. 'Red Cedar' is resistant to strains of *bean common mosaic virus* (BCMV), common bacterial blight (CBB) and Fusarium root rot present in Michigan. The seed of this variety is slightly smaller in size than 'Red Hawk', 'Talon' and 'Montcalm'. 'Red Cedar' is equivalent to the industry standards, 'Red Hawk' and 'Montcalm' in canning quality.

Origin and Breeding History

'Red Cedar', tested as MSU dark red kidney bean breeding line K11306, was developed from the cross of light red kidney bean breeding line: K06621 x USDK-CBB-15. USDK-CBB-15 was a germplasm line released by the U.S. Department of Agriculture – Agriculture Research Service (USDA-ARS) program at Prosser, Washington, that combines resistance to CBB with the desirable agronomic and canning quality characteristics of the 'Red Hawk' variety. The MSU breeding line K06621 was an upright determinate light red kidney bean that exhibited

Michigan State University Extension

E-3404

2019

resistance to Fusarium root rot. The cross was made to transfer root rot resistance from the light red kidney class into a dark red kidney bean while retaining the CBB resistance and quality traits of the dark red kidney seed type.

Agronomic and Disease Information

'Red Cedar' exhibits a determinate bush growth habit combined with erect plant structure (1.8 on a 1–5 scale, Table 1). Plants average 19 inches in height, similar to the heights of other dark red kidney bean varieties. 'Red Cedar' is a full-season bean, maturing 101 days after planting. The range in maturity is from 97 to 105 days, depending on season and location. It matures one day later than 'Red Hawk' and three days earlier than 'Montcalm'. 'Red Cedar' has demonstrated uniform maturity and improved dry down compared with 'Montcalm'. 'Red Cedar' has a high agronomic acceptance rating based on its disease resistance package and improved uniform dry down at maturity.

'Red Cedar' has been tested for eight years (2011–2018) in 20 locations by MSU researchers in cooperation with colleagues in Michigan. The combined yield data comparisons with other dark red kidney cultivars are shown in Table 1. Over 20 locations, 'Red Cedar' yielded 29.2 cwt/acre and out-yielded 'Red Hawk' by 3%, 'Montcalm' by 11% and 'Talon' by 5%. Yield ranged from a high of 39.6 cwt/acre in Montcalm County, Michigan, in 2014, to a low of 18.9 cwt/acre under rainfed conditions in Gratiot County, Michigan, in 2017. Under irrigated management systems, 'Red Cedar' has produced competitive yields in excess of 30 cwt/acre in Michigan and is recommended for production in more highly managed production systems, where irrigation is available. Growers should follow current recommended practices for fertility and weed control in growing 'Red Cedar' beans. 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)*.

'Red Cedar' possesses the single dominant *I* gene, which confers resistance to seed-borne BCMV. All the dark red kidney varieties listed in Table 1 possess the same resistance gene. Over three years of field testing, 'Red Cedar' has exhibited moderate levels of resistance to CBB and was rated 1.4 on a 1–5 scale, whereas 'Red Hawk' and 'Talon' rated 3.0 and 'Montcalm' 3.2 (Table 1). 'Red Cedar' is resistant to anthracnose race 73, but is susceptible to the less common race 7 that preferentially attacks kidney beans (Table 1). 'Red Cedar' exhibits improved tolerance to Fusarium root rot compared with other dark red kidney bean varieties, based on stand counts and yield performance in inoculated soils. 'Red Cedar' is partially resistant to bacterial brown spot based on screenings conducted in Wisconsin.

Quality Characteristics

'Red Cedar' has a typical dark red kidney bean seed, averaging 56 g/100 seeds and a size range from 52 to 62 g/100 seeds. The seed is slightly smaller in size to 'Red Hawk' (60 g), "Montcalm' (61 g) and 'Talon' (58 g), and resembles 'Red Hawk' in overall appearance.

In canning trials, 'Red Cedar' has been subjectively rated by a team of trained panelists as being excellent in cooking quality. This evaluation is based on whole bean integrity (no splitting or clumping), uniformity of size (uniform water uptake), cooked seed color (limited color leaching) and clear brine (no starch extrusion into canning liquid). 'Red Cedar' rated 3.3 on a scale of 1 to 5 where 5 is best and 3 is mid-scale (neither acceptable nor unacceptable). Within the commercial dark red kidney bean class, 'Red Cedar' was rated equivalent in visual appearance when compared with 'Red Hawk' (3.8), 'Montcalm' (3.5) and 'Talon' (2.8). Texture for 'Red Cedar' (47 kg) was slightly firmer than 'Red Hawk' (40 kg) and 'Montcalm' (44 kg), the industry standard, and is within the acceptable range of 30 to 60 kg/100 g for processed dark red kidney beans.

Release and Research Fee

'Red Cedar' was released by MSU with the option that 'Red Cedar' 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 'Red Cedar' may contact MSU Technologies *(http://technologies.msu.edu)* by phone at 517-355-2186 or by email at msut@msu.edu.

Table 1. Comparison of yield, agronomic, disease and canning characteristics of 'Red Cedar' with three other dark red kidney bean varieties over 8 years testing (2011–2018) in Michigan.

Traits	Varieties			
	'Red Cedar'	'Red Hawk'	'Montcalm'	'Talon'
Agronomic traits				
Days to flower	40	39	40	42
Days to maturity	101	100	104	102
Height in inches	19	19	19	19
Lodging score[a] Average (1–5)	1.8	1.4	1.9	1.8
Agronomic index[b] Average (1–7)	4.5	3.9	3.4	4.0
100-seed weight in grams	55.8	59.5	61.2	57.8
Mean yield[c] (cwt/acre)	29.2	28.4	26.1	27.0
Yield percentage	100	97	89	95
Disease resistance traits[d]				
BCMV[e]	R	R	R	R
Anthracnose races 7 & 73[f]	S/R	R/R	S/R	S/R
Common bacterial blight (1–5)[g]	1.4	3.0	3.2	3.0
Bacterial brown spot (1–5)[h]	3.8	3.0	--	--
Canning quality traits				
Texture[i] (kg/100g)	47	40	44	58
Visual rating[j]	3.3	3.8	3.5	2.8

a Lodging: 1 = Erect, 5 = Prostrate

b Agronomic index: 1 = Worst, 7 = Excellent

c Yield was averaged over 20 locations from 2011 to 2018

d Diseases: R = Resistant, S = Susceptible

e BCMV = Bean common mosaic virus

f Anthracnose: race7/race 73

g CBB: 1=Highly resistant, 5= Highly susceptible

h Bacterial brown spot: 1,2= Susceptible, 4,5= Resistant

i Texture: Kg of force needed to compress 100 g canned beans

j Visual rating: 1 = Very undesirable, 3 = Average, 5 = Very desirable

Acknowledgments

Authors

- J. D. Kelly, Plant, Soil and Microbial Sciences Department, MSU
- E. M. Wright, Plant, Soil and Microbial Sciences Department, MSU
- G. V. Varner, Production Research Advisory Board, Michigan Bean Commission
- M. I. Chilvers, Plant, Soil and Microbial Sciences Department, MSU
- C. L. Sprague, Plant, Soil and Microbial Sciences Department, MSU

Produced by MSU's ANR Communications & Marketing *(anrcom.msu.edu)*.

Suggested Citation

Kelly, J. D., Wright, E. M., Varner, G. V., Chilvers, C. I., & Sprague, C. L. (2019). *'Red Cedar': A new dark red kidney bean variety for Michigan* [E3404]. East Lansing: Michigan State University, MSU Extension.