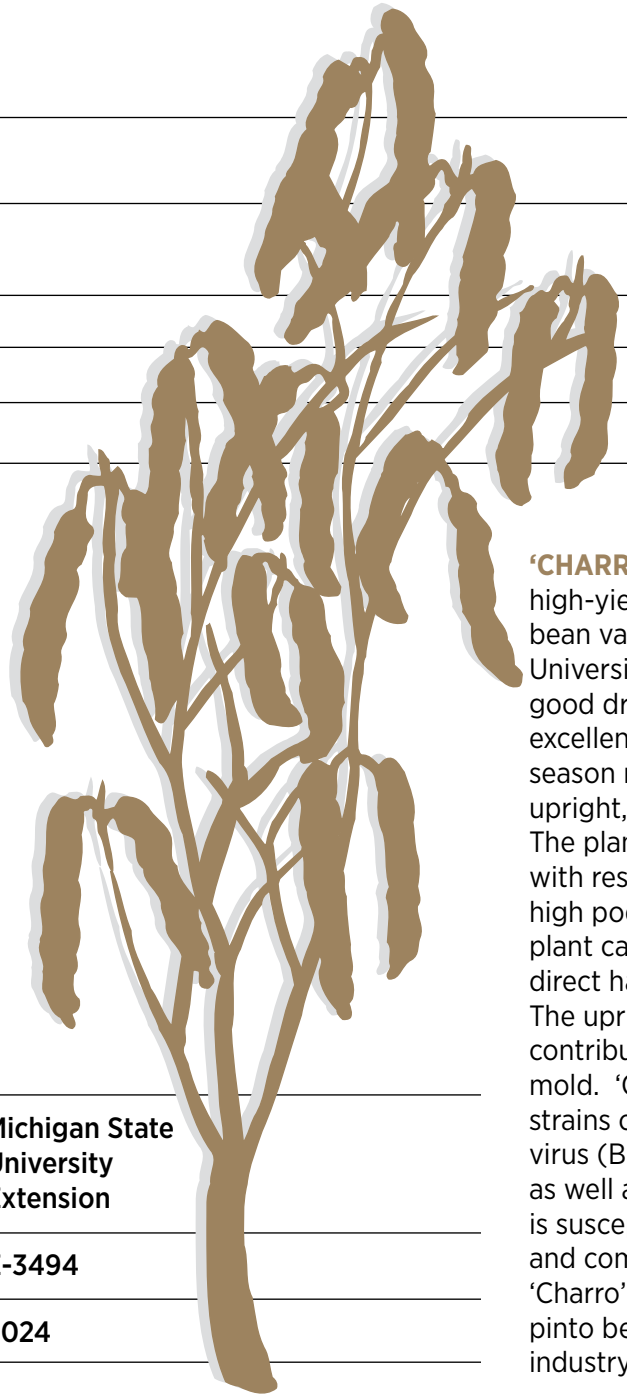
NEW from MSU

'CHARRO'

A New Pinto Bean Variety for Michigan



- New upright full season pinto variety suited for direct harvest.
- Produced an average yield of 31 cwt/acre across 37 locations.
- Matures in 97 days.
- Excellent canning quality.
- Exhibits uniform maturity and dry down.

Michigan State University Extension

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'CHARRO' is a new upright, high-yielding, traditional pinto 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. The upright plant structure also contributes to avoidance of white mold. 'Charro' is resistant to strains of bean common mosaic virus (BCMV) found in Michigan as well as rust race 31:7 but is susceptible to anthracnose and common bacterial blight. 'Charro' produces a conventional pinto bean seed that meets industry standards for export and packaging and was rated above average in canned bean appearance in the pinto bean seed class.

Origin and Breeding History

'Charro', tested as MSU pinto breeding line P16901, was developed from the cross of Eldorado/P11519. 'Eldorado' was a high yielding upright pinto variety with good avoidance to white mold. MSU breeding line P11519 was an upright pinto derived from the variety 'Santa Fe' that had excellent uniform dry down at maturity coupled with good yield potential. The pedigree breeding method was used to advance the cross to the F_4 generation followed by pure line selection for disease, agronomic and quality traits.

Agronomic and Disease Information

'Charro' exhibits the upright type-II indeterminate short vine growth habit combined with good resistance to lodging similar to other traditional pinto bean varieties such as 'La Paz' and 'USDA Rattler' (1.6 on a 1–5 scale, Table 1) while displaying the upright architecture of the 'Eldorado' parent. 'ND Falcon' was slightly more erect, while 'Windbreaker' lodged significantly more (3.3) making direct harvest more difficult and favoring the development of white mold. 'Charro' plants average 21 inches in height, similar in height to 'La Paz', 'USDA Rattler', and 'ND Falcon'; while 'Windbreaker' was much shorter at 16 inches. 'Charro' is a full season bean, flowering in 46 days and maturing in 97 days after planting on average. The range in maturity is from 94 to 104 days, depending on season and location. It matures 1-d later than 'La Paz' and 5-d later than 'Windbreaker'. 'Charro' exhibits similar maturity as 'ND Falcon' and 'USDA Rattler'. It has a high agronomic acceptance rating due to upright plant habit, uniform dry down, high pod placement in the plant canopy, and excellent yield potential.

'Charro' has been tested for 8 years (2016-2023) in 37 locations by MSU researchers in Michigan, as well as by colleagues in Colorado, Nebraska, North Dakota, Washington, and Ontario, Canada where it appears to be broadly adapted. The combined yield data comparisons are shown in Table 1. Over 37 locations, 'Charro' yielded 31.2 hundredweight per acre (cwt/acre) and significantly outyielded 'La Paz' by 7%, 'ND Falcon' by 21% and 'Windbreaker' by 31%. Seed yield was not significantly different than 'USDA Rattler' (15%). The yield ranged from a high of 48.5 cwt/acre in Montcalm County under irrigation and high management conditions in 2018, to a low of 22 cwt/acre in Tuscola County in 2016 under dry conditions at the Saginaw Valley Research Center (SVREC) near Frankenmuth, MI.

'Charro' 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 (www.msuweeds.com).

'Charro' possesses the single dominant *I* gene, which confers resistance to seed-borne BCMV. All the pinto bean varieties listed in Table 1 possess the same resistance gene. 'Charro' exhibits resistance to bean rust race 31:7. It is susceptible to anthracnose, and to common bacterial blight, similar to the other pinto bean varieties shown. Over eight years of field testing 'Charro' has exhibited moderate levels of tolerance to white mold under high fertility, in frequently irrigated trials designed to encourage disease development in Montcalm County. It has shown similar results under rainfed conditions throughout the Saginaw Valley region. 'Charro' averaged 51% white mold infection across all locations evaluated for white mold development under conditions conducive to natural infection. Disease incidence was rated similar to 'USDA Rattler', slightly less than 'ND Falcon', and significantly lower than 'La Paz' and 'Windbreaker'.

Quality Characteristics

'Charro' has a typical sized traditional pinto bean seed, averaging 1101 seeds/pound, with a size range from 1194 to 1008 seeds/pound (Table 1). The seed is similar in size and color to 'La Paz' and 'USDA Rattler' and larger than 'ND Falcon' or 'Windbreaker'. In canning trials, 'Charro' was subjectively rated by a team of panelists as being above average in cooking quality. It was rated 4.2 on a scale of 1=very undesirable to 5=very desirable for visual appearance which was better in comparison to the other pinto varieties. Overall, 'Charro' exhibits excellent canning quality in the traditional pinto bean market class.

Release and Research Fee

'Charro' was released by Michigan State University with the option that 'Charro' 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 'Charro' 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 'Charro' with four other pinto bean varieties over 8 years and 37 locations testing (2016-2023) in Michigan, Colorado, Nebraska, North Dakota, Washington, and Ontario.

Traits	Varieties				
	'Charro'	'La Paz'	'USDA Rattler'	'ND Falcon'	'Windbreaker'
Agronomic traits					
Days to flower	46	44	42	46	44
Days to maturity	97	96	97	97	92
Height in inches	21	20	19	21	16
Lodging score[a] Average (1–5)	1.6	1.4	1.6	1.1	3.3
Agronomic index[b] Average (1–7)	5.3	4.2	4.3	5.3	3.9
Seeds/pound	1101	1131	1065	1172	1203
Mean yield[c] (cwt/acre)	31.2	28.5	28.3	26.3	22.5
Yield percentage	100	93	85	79	69
Disease resistance traits					
BCMV[d,e]	R	R	R	R	R
White Mold (%)[f]	51	81	54	66	85
Canning quality traits					
Visual rating[g] (1-5)	4.2	3.1	2.7	2.8	2.7

[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

[e] BCMV = Bean Common Mosaic Virus

[f] White mold = % disease incidence

[g] Visual rating: 1 = Very undesirable, 3 = average, 5 = Very desirable