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Cultivar description

# AAC Julius field pea

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## Abstract

AAC Julius is a semi-leafless, yellow cotyledonary field pea (*Pisum sativum* L.) variety developed at Lacombe Research and Development Centre, Agriculture and Agri-Food Canada , Lacombe, AB, Canada. It has a maturity of 100 days, 1000-seed weight of 210 g, and a lodging score of 3.6 on the scale of 1–9. The seed crude protein content of AAC Julius is 24.8%. AAC Julius is resistant to powdery mildew (caused by *Erysiphe pisi* D.C.) and moderately susceptible to mycosphaerella blight (caused by *Mycosphaerella pinodes*) and *Fusarium* root rot (caused by *Fusarium avenaceum* (Fr.) Sacc. and *F. solani*).

**Key words:** field pea, *Pisum sativum* L., powdery mildew resistance

## Introduction

Field pea (*Pisum sativum* L.) is the most widely grown pulse crop in Canada where the yellow pea is the dominant market class. Field pea producers have consistent need for pea varieties with improved yield potential, better lodging resistance, improved disease resistance, and better seed quality. In this article, we provide details on the development and characteristics of AAC Julius, a yellow field pea variety recently developed at Agriculture and Agri-Food Canada (AAFC). The variety was registered on 5 February 2021 at the Variety Registration Office, Canadian Food Inspection Agency. The registration number was 9198.

## Pedigree and breeding methods

AAC Julius was developed from the cross Agassiz/CDC1897-14. Agassiz is a yellow pea variety developed at AAFC (Bing et al. 2006). CDC1897-14, derived from the cross Miami/352-3-Y-2//Eclipse/458B-Y-5, was a breeding line developed at the Crop Development Centre, University of Saskatchewan. The breeding method for AAC Julius was pedigree selection in combination with single-seed descent for generation advance.

The cross Agassiz/CDC1897-14 was made in the greenhouse in the winter of 2008 at AAFC Lacombe Research and Development Centre (LRDC), AB. The $F_1$ generation was grown in the field in Morden, MB and Lacombe, AB in the summer of 2009, and the $F_2$ generation was grown in the field in 2010 in Lacombe AB. In total, 205 plants were harvested from the $F_2$ nursery, and then advanced to the $F_3$ generation in the greenhouse of AAFC LRDC and an off-season nursery in Brawley, CA, USA in the winter of 2010/2011 using a modified single-seed descent (mSSD) method, where a single pod was harvested from each plant, and one or more seeds were planted in the following generation. The $F_4$ and $F_5$ generations were grown in the field in Lacombe, AB in 2011 and 2012, and 209 and 344 plants were selected using mSSD, respectively. The $F_6$ generation was planted in the field in Lacombe, AB in 2013 and 110 single plants were harvested. In 2014, each of the harvested single plants from the $F_6$ generation was grown in 1 $m^2$ plot in the field in Lacombe, AB. One entry designated as line P0937-4006 was selected on the basis of visual evaluation of maturity, pod canopy, and lodging resistance. P0937-4006 was evaluated in the replicated preliminary yield test-15 in 2015 in Lacombe, AB. In the test, P0937-4006 exhibited high yield potential, good lodging resistance, and good seed quality. In 2016, it was evaluated in the Net-4, a replicated yield test at seven locations in western Canada. The test locations were Barrhead, Rotation-K, Smirnoff, St. Albert, and Vegreville, AB, and Melfort and Saskatoon, SK. P0937-4006 demonstrated high yield (6908 kg $ha^{-1}$), good lodging resistance (5 on a 1–9 scale), small to medium seed size (1000-seed weight (TSW) = 195 g), and medium maturity (100 days). Therefore, it was selected as a candidate for Western Canada Field Pea Cooperative Registration Test (Pea COOP Test). P0937-4006 was planted in two 1 m × 15 m strips in the field in Lacombe, AB in 2017 for seed multiplication and purification by roguing off-type plants. It was entered into the 2018–2019 Pea COOP Test-B, and tested at a total of 26 location-years. The test locations were Fort St. John, BC; Barrhead, Brooks, Lacombe, St. Albert, and Vegreville, AB; Brandon, MB; and Indian Head, Limerick, Kamsack, Melfort, Saskatoon, Scott, and Swift Current, SK. On 5 February 2021, P0937-4006 was registered as variety AAC Julius at the Variety Registration Office of Canadian Food Inspection Agency.

**Table 1.** Agronomic performance, seed quality, and disease resistance of AAC Julius and the check cultivars (CK) in the 2018–2019 Field Pea Cooperative Registration Test-B.

| | Yield (kg ha$^{-1}$) | DTM | Height (cm) | PHL (1–9)[a] | TSW (g) | Shape (1–5)[b] | SCB (%) | Protein (%)[c] | MB (1–9)[d] | PM[e] | FRR (1–7)[f] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AAC Julius | 4138 | 100 | 83 | 3.6 | 210 | 2.3 | 3 | 24.8 | 3.8 | R | 5.0 |
| CDC Amarillo (CK) | 3984 | 100 | 86 | 3.0 | 226 | 2.5 | 12 | 24.4 | 3.5 | R | 5.1 |
| AAC Lacombe (CK) | 3973 | 95 | 84 | 3.2 | 255 | 2.5 | 7 | 23.4 | 3.5 | R | 5.6 |
| LSD ($p = 0.05$) | 147 | 6 | 2 | 0.4 | 6 | 0.2 | 2 | 0.6 | 1.8 | — | 1.0 |
| Location-year | 26 | 25 | 25 | 26 | 25 | 19 | 19 | 18 | 6 | 2 | 2 |

**Note:** DTM, days to maturity; TSW, thousand-seed weight; SCB, seed coat breakage.
[a]Preharvest lodging score: 1 = upright; 9 = completely prostrate.
[b]Seed shape: 1 = round; 5 = cube.
[c]Crude protein content of seeds (%) determined by the NIR method at 0% moisture basis using a FOSS near-infrared spectrophotometer model DS 2500.
[d]Mycosphaerella blight score: 0 = no disease; 9 = whole plant severely blighted.
[e]Powdery mildew: R = resistant; S = susceptible.
[f]*Fusarium* root rot score on 1–7 scale: 1 = no disease; 7 = tap root completely decayed.

### Performance

In 2018–2019 Pea COOP Test-B, AAC Julius yielded 4138 kg ha$^{-1}$, 4% higher than the check cultivars CDC Amarillo and AAC Lacombe (Table 1). AAC Julius had a maturity of 100 days, similar to the check varieties. It had a plant height of 83 cm. AAC Julius had a preharvest lodging score of 3.6 on a 1–9 scale, similar to the check varieties.

### Other characteristics

The seed size of AAC Julius, represented by TSW, is 210 g, significantly smaller than the seed size of CDC Amarillo (226 g) and AAC Lacombe (255 g). The seed shape of AAC Julius is round, similar to that of the check cultivars. AAC Julius had a seed coat breakage of 3%, significantly lower than the check varieties. It had a seed protein content of 24.8%, similar to CDC Amarillo, but higher than AAC Lacombe.

As part of the Pea COOP Test, AAC Julius was evaluated for its reactions to mycosphaerella blight (caused by *Mycosphaerella pinodes* (Berk. & Blox.) Vestergr.) in disease nurseries in Saskatoon, SK and Lethbridge, AB and to fusarium root rot (caused by *Fusarium avenaceum* (Fr.) Sacc. and *F. solani*) and powdery mildew (caused by *Erysiphe pisi* D.C.) in the disease nursery in Lethbridge, AB, using the methods described by the Prairie Recommending Committee for Pulse and Special Crops (2019). AAC Julius was moderately susceptible to mycosphaerella blight and fusarium root rot, and resistant to powdery mildew (Table 1), similar to the check cultivars.

## Maintenance and distribution of pedigreed seed

Breeder seed of AAC Julius was derived from a single line in the $F_{11}$ generation, and is maintained at AAFC Research Farm, Indian Head, SK S0G 2K0, Canada. Exclusive rights for the sale and production of the pedigreed seed for commercialization have been awarded to FP Genetics Inc., 426 McDonald Street, Regina, SK S4N 6E1, Canada and Riverside Communications Inc., PO Box 128, 6373 39th Street, Plaza, ND 58771, USA.

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### Copyright



### Data availability

All data supporting the findings of this study are the property of the Government of Canada, which can be accessed under the data access policy of the Canadian Government.

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### Competing interests

There is no competing interest for all authors.

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Prairie Recommending Committee for Pulse and Special Crops. 2019.Field Pea Cooperative Registration Tests A, B and short-season COOP Test disease evaluations 2019. *In* Report on the Field Pea Cooperative (COOP) Registration Test. *Edited by* T. Warkentin and J. Horner. pp. 10–13.