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AAC Profit field pea

Deng-Jin Bing, Don Beauchesne, Richard Cuthbert, and Hamid Naeem

Abstract: AAC Profit is a semi-leafless, yellow cotyledonary field pea (*Pisum sativum* L.) cultivar developed at Agriculture and Agri-Food Canada Lacombe Research and Development Centre, Lacombe, Alberta, Canada. It has a maturity of 101 d, thousand-seed weight of 218 g, and a lodging score of 4.1 on the scale of 1–9 (1 = upright, 9 = prostrate). The seed crude protein content of AAC Profit is 24.5%. AAC Profit is resistant to powdery mildew (caused by *Erysiphe pisi*), and moderately susceptible to mycosphaerella blight (caused by *Mycosphaerella pinodes*) and fusarium wilt (caused by *Fusarium oxysporum*).

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

Résumé : AAC Profit est une variété semi-aphylle de pois de grande culture (*Pisum sativum* L.) à cotylédons jaunes créée au centre de recherche et de développement d'Agriculture et Agroalimentaire Canada de Lacombe, en Alberta (Canada). Le cultivar parvient à maturité à 101 jours. Il a un poids de mille graines de 218 g et une résistance à la verse de 4,1 sur une échelle allant d'un à neuf (1=port dressé, 9=port prostré). La concentration d'AAC Profit en protéines brutes s'élève à 24,5 %. AAC Profit résiste au blanc causé par *Erysiphe pisi* et est modérément sensible à la brûlure causée par *Mycosphaerella pinodes* ainsi qu'à la flétrissure causée par *Fusarium oxysporum*. [Traduit par la Rédaction]

Mots-clés : pois de grande culture, *Pisum sativum*, résistance au blanc, description de cultivar.

Introduction

Field pea (*Pisum sativum* L.) is the most widely grown pulse crop in Canada, and Canada is the leading producer and exporter of field pea in the world. Development of improved field pea varieties is the primary focus of the breeding program of Agriculture and Agri-Food Canada, Lacombe Research and Development Centre (AAFC LRDC). In this cultivar description, we provide the information of AAC Profit, a yellow pea variety developed in recent years and registered on 22 Mar. 2019 in Variety Registration Office, the Canadian Food Inspection Agency. The registration number is 8697.

Pedigree and Breeding Methods

AAC Profit was developed from the cross CDC715S-4/MP1816. CDC 715S-4, which derived from the cross 92-46Y-PMR-1Y/ 974D, was a yellow pea breeding line developed at the Crop Development Centre, University

of Saskatchewan. MP1816 was a breeding line developed at AAFC from the cross MP1392/MP1101. Both parents were elite breeding lines with high yield, good lodging resistance, and resistance to powdery mildew, but had different pedigrees. The objective of the cross CDC715S-4/MP1816 was to develop varieties with broader genetic background than the parents. The breeding method for AAC Profit was pedigree selection in combination with single seed descent (SSD) for generation advance.

The cross CDC715S-4/MP1816 was made in the greenhouse in the winter of 2003 at AAFC LRDC. The F₁ and F₂ generations were grown in the field in Morden, MB and Lacombe, AB in the summers of 2004 and 2005, respectively. Three hundred and fourteen plants were harvested from the F₂ nursery, and then advanced to the F₃ generation in the greenhouse of AAFC LRDC in the winter of 2005 using SSD. The F₄ generation was grown in the field in Lacombe, AB in 2006, and 204

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Table 1. Agronomic performance, seed quality, and disease resistance of AAC Profit and the check cultivars in the 2011–2012 field pea co-operative registration test.

	Yield (kg·ha ⁻¹)	DTM ^a	Height (cm) ^b	PHL (1–9) ^c	TSW (g) ^d	Shape (1–5) ^e	SCB (%) ^f	Protein (%) ^g	MB (1–9) ^h	PM ⁱ	FW (%) ^j
Agassiz (CK)	4922	99	86	4.2	217	2.6	5	24.0	5.4	R	11.5
CDC Golden (CK)	4458	98	83	4.6	200	2.4	2	24.5	4.9	R	18.9
AAC Profit	5299	101	90	4.1	218	2.3	2	24.5	4.4	R	28.3
LSD (<i>p</i> = 0.05)	260	1	4	0.5	7	0.1	2	0.5	1.2		13.0
Location-year	17	15	16	16	17	17	7	11	4	2	2

^aDays to maturity.^bPlant height (cm).^cPre-harvest lodging score, 1 = upright, 9 = prostrate.^dThousand seed weight (g).^eSeed shape, 1 = round, 5 = cubed.^fSeed coat breakage (%).^gCrude protein content of seeds (%) determined by near-infrared spectroscopy (NIR) (at 0% moisture) using a FOSS model 6500 near-infrared spectrometer calibrated by AOAC 990.03 combustion/Dumas method (Leco model CN-2000).^hMycosphaerella blight score, 0 = no disease, 9 = whole plant severely blighted.ⁱPowdery mildew score, R = resistant, S = susceptible.^jFusarium wilt score, percentage of the wilted plants.

single plants were selected on the basis of appropriate maturity and good lodging resistance. In 2007 each of the selected single plants was grown in 1 m² plot in the field in Lacombe, AB. Twenty-three lines were selected on the basis of visual evaluation of maturity, pod canopy and lodging resistance. The selected lines were evaluated in replicated preliminary yield tests in 2008 in Lacombe, AB, from which nine lines were selected on the basis of high yield potential, good lodging resistance and good seed quality. In 2009, the selected lines were evaluated in replicated yield tests at eight sites in western Canada with two sites each in Lacombe, AB, and Morden, MB, and one site each in Barrhead and Namao, AB, and Rosthern and Saskatoon, SK. One line designated as P0410-16 was selected from the tests for its high yield (7372 kg·ha⁻¹), good lodging resistance (4.3 on a 1–9 scale), and medium to large seed size (268 g per thousand seed) and medium maturity (102 d). Line P0410-16 was planted in two 1 × 15 m strips in the field in Lacombe, AB in 2010 for seed multiplication and purification by roguing off-type plants. Line P0410-16 was entered into the 2011–2012 Western Canada Field Pea Cooperative Registration (Pea CO-OP) Test-A using the entry name MP1907, 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, Melfort, Moose Jaw, Saskatoon, Scott, Swift Current and Yorkton, SK. Seventeen of the 26 location-years had a coefficient of variation of 15 or less for yield and were considered as valid tests. The performance information was based on these 17 location-years.

Performance

AAC Profit yielded 8% higher than the check cultivar Agassiz and 19% higher than CDC Golden (Table 1). AAC

Profit had a days-to-maturity (DTM) of 101, 2 d and 3 d later than Agassiz and CDC Golden, respectively. It had a plant height of 90 cm, significantly taller than both check cultivars. AAC Profit was similar to Agassiz and CDC Golden in standability with a lodging score of 4.1 on a 1–9 scale.

Other Characteristics

The thousand-seed weight (TSW) of AAC Profit was 218 g, similar to the TSW of Agassiz (217 g) but significantly greater than that of CDC Golden (200 g). The seed shape of AAC Profit was more spherical than that of the check cultivars. AAC Profit had a seed coat breakage of 2%, similar to CDC Golden, but significantly lower than Agassiz. AAC Profit had a seed protein content of 24.5%, similar to the check cultivars.

As part of the Pea CO-OP Test, AAC Profit was evaluated for its reactions to mycosphaerella blight [caused by *Mycosphaerella pinodes* (Berk. & Blox.) Vestergr.] in disease nurseries in Saskatoon, SK and Morden, MB, to fusarium wilt [caused by *Fusarium oxysporum* Schlecht. emend. Snyd. & Hans. f. sp. *pisi* (van Hall) Snyd. & Hans] and powdery mildew in disease nurseries in Morden, MB in 2011 and 2012 using the methods described by [The Prairie Recommending Committee for Pulse and Special Crops \(2011, 2012\)](#). AAC Profit was resistant to powdery mildew (Table 1), and moderately susceptible to mycosphaerella blight, similar to the check cultivars. AAC Profit was more susceptible to Fusarium wilt than Agassiz, but it was similar to CDC Golden.

Maintenance and Distribution of Pedigreed Seed

Breeder seed of AAC Profit was derived from a single line in the F₁₁ generation, and is maintained at AAFC Research Farm, Indian Head, SK, Canada, S0G 2K0.

Exclusive rights for the sale and production of the pedigreed seed have been awarded to Legume Logic (201 3rd Street NW PO Box 317, Crosby, ND, USA, 58730) and FP Genetics Inc. (426 McDonald Street, Regina, SK S4N 6E1, Canada).

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