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CULTIVAR DESCRIPTION

AAC Oriental 200 oriental mustard

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Abstract

AAC Oriental 200 is a doubled-haploid (DH) line. It was produced via microspore culture from the F₁ hybrid plants resulting from a cross between the oriental mustard cultivars Cutlass and Forge. AAC Oriental 200 has a higher (6.5%) yield than the check cultivar Cutlass, and similar levels of blackleg and white rust resistance as Cutlass. AAC Oriental 200 is well adapted to all mustard growing areas of western Canada.

Key words: Oriental mustard, *Brassica juncea*, Microspore culture, Cultivar description

For Review Only

Introduction

Brown and oriental mustard (*Brassica juncea*) is an amphidiploid species originated from the interspecific hybridization between *B. rapa* and *B. nigra*. It has been used as vegetables, condiment and oilseeds. In Canada, *B. juncea* is grown as a condiment mustard crop in the western provinces. Low oil and high protein contents are the desirable quality traits for condiment mustard.

AAC Oriental 200 is an oriental mustard (*Brassica juncea* L.) cultivar developed at Agriculture and Agri-Food Canada - Saskatoon Research and Development Centre (AAFC - SRDC). It was issued registration number 7834 by the Variety Registration Office, Canadian Food Inspection Agency on October 23, 2015.

Breeding Methods and Pedigree

AAC Oriental 200 is a doubled-haploid (DH) line. In 2009, the oriental mustard cultivar Cutlass was crossed with the oriental mustard cultivar Forge to produce F₁ hybrids. The resulting F₁ plants were used as donor genotypes to produce DH lines via microspore culture according to the protocol of Lionneton et al. (2001) with the following modifications: The donor plants for microspore culture were grown at 10/5°C day/night condition and 0.001% colchicine was added to the initial culture media to promote chromosome doubling. In total, 178 DH lines were produced and evaluated for agronomic performance including maturity, growth vigour, lodging resistance and quality traits (protein, oil and chlorophyll contents) in a two-replicate nursery at Saskatoon in 2011. Twenty-five DH lines with high yielding potential and desirable quality traits (low oil and high protein contents) were advanced into four-replicate yield trials at three locations in 2012. Based on the agronomic performance and quality traits observed in these trials, the DH line O60DH17 was selected and further evaluated in the Co-op Mustard Test in 2013 to 2014. O60DH17 was registered as AAC Oriental 200 in 2015.

A sub-sample of approximately 60 g seed from each plot of two replicates from trials with C.V. less than 16% for yield is cleaned of chaff and dried for 48 hours and then used for quality analysis (PRCO Operating Procedures Appendix B (Condiment Mustard). Oil and protein contents were determined by nuclear magnetic resonance spectroscopy, while chlorophyll content was analyzed by solvent extraction of chlorophyll and spectrophotometry (Rakow et al. 2009). Glucosinolate content was measured using the method described by Raney et al. (1995).

Performance and Adaptation

Based on the evaluation in the yield trial in 2012 and the Co-op Mustard Test in 2013 to 2014 in western Canada (Saskatoon, Scott, Swift Current, Vanguard, Oyen, Lethbridge, Coaldale, Taber and Medicine Hat), AAC Oriental 200 had a higher (6.5%) yield than the check cultivar Cutlass, but the difference was not statistically significant (Table 1). It had significantly lower oil content (37.0%) and lower chlorophyll content (1.47 mg/kg seeds) than Cutlass (oil: 38.8%; chlorophyll content: 3.34 mg/kg seeds) (Table 1). AAC Oriental 200 had significantly lower allyl glucosinolate content (118 µmol/g seed) than Cutlass (132 µmol/g seed) and significantly smaller seed (2.87 g/1000 seeds) than Cutlass (2.97 g/1000 seeds). It had the same protein content as Cutlass (37.1%). The oil and ally glucosinolate contents can be used to distinguish AAC Oriental 200 from Cutlass. AAC Oriental 200 was well adapted to all mustard growing areas of western Canada.

Other Characteristics

Lodging: There was no difference in lodging resistance between AAC Oriental 200 and Cutlass.

Blackleg Disease: Resistance to blackleg disease was evaluated in field disease nurseries in 2014 following the protocol described in the Prairie Recommending Committee for Oilseeds Operating

Procedures for Condiment Mustard (PRCO 2009). AAC Oriental 200 had a similar level of blackleg resistance as the check cultivar Cutlass, and was classified as resistant to blackleg (Table 2).

White rust: White rust evaluation, using the race 2a of *Albugo candida* prevalent in western Canada, was performed in a growth chamber with appropriate checks to monitor disease severity and race purity (PRCO 2009). The severity of white rust infection is evaluated on a minimum of 100 plants for AAC Oriental 200 and Cutlass. AAC Oriental 200 had a similar level of white rust resistance as the check cultivar Cutlass (Table 2). The oriental mustard cultivar Forge was susceptible to white rust race 2a (Rakow and Rode, 2009). Resistance to white rust 2a can be used to distinguish Cutlass and AAC Oriental 200 from Forge.

Maintenance and Distribution of Pedigreed Seed

Breeder Seed of AAC Oriental 200 was produced by AAFC -SRDC, 107 Science Place, Saskatoon, Saskatchewan, S7N 0X2. Mustard 21 Canada Inc., Bay 6A - 3602 Taylor Street East, Saskatoon, Saskatchewan is the distributor of AAC Oriental 200.

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Table 1. Agronomic performance of the oriental mustard (*Brassica juncea*) cultivar AAC Oriental 200 in the Preliminary yield test (2012)^a and Co-op Mustard Test (2013 to 2014)^b

	Yield		Seed Weight	Oil content	Protein content	Glucosinolate		Seed Colour	Distinct Green	Chlorophyll	Height	Maturity
	(kg.ha ⁻¹)	% Check	(g.1000 ⁻¹ Seed)	(% whole seed)		Allyl	Butyl	W1 E313	(%)	(mg. kg ⁻¹ seed)	(cm)	(days)
Cutlass (check)	2390	100	2.97 <i>a</i>	38.8 <i>b</i>	30.1	132 <i>a</i>	0.56 <i>a</i>	-31.2 <i>a</i>	0.88 <i>b</i>	3.34 <i>b</i>	116	94
AAC Oriental 200	2540	107	2.87 <i>b</i>	37.0 <i>a</i>	30.1	118 <i>b</i>	0.65 <i>b</i>	-23.7 <i>b</i>	0.23 <i>a</i>	1.47 <i>a</i>	123	95
No. of trials	17		17	17	17	17	17	17	17	17	12	10
L.S.D. (0.05) ^c	205		0.06	0.57	0.51	3.91	0.08	1.05	0.28	0.60	5.64	1.34

Note: Means within a column not sharing a lowercased italic letter differ significantly at the P<0.05 level.

^a Trial sites in 2012: Saskatoon date 1, Saskatoon date 2 and Taber.

^b Trial sites in 2013: Saskatoon date 1, Saskatoon date 2, Scott, Swift Current, Coaldale; trial sites in 2014: Saskatoon date 1, Saskatoon date 2, Scott, Swift Current, Vanguard, Medicine Hat, Oyen, Coaldale, Lethbridge

^c LSD (0.05), least significant difference ($P \leq 0.05$) includes the appropriate genotype $\times$ environment interaction variation.

Table 2. Summary of disease reactions^a for the oriental mustard (*Brassica juncea*) cultivar AAC Oriental 200 (2014).

Entry	Blackleg severity (0-5) ^b	White rust severity (0-9) ^c	
		Race 2a	Race 2v
Cutlass (check)	0.45	0.0	8.9
AAC Oriental 200	0.47	0.0	8.8
LSD _(0.05) ^d	0.21		

^a A detailed description of evaluation methodology and disease rating scales can be found in the PRCO Operating Procedures Appendix B (Condiment Mustard), Sub-Appendix B3 Disease Evaluation of the Co-operative Mustard Test, which is available at http://www.pgdc.ca/committees_oc.html.

^b Resistance: 0-1; Susceptible: 3-5

^c Resistance: 0-1; Susceptible: 6-9

^d least significant difference ($P \leq 0.05$) includes the appropriate genotype $\times$ environment interaction variation.