

ACS-C18 Summer Turnip Rape

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ACS-C18 summer turnip rape (*Brassica rapa* L.) is a canola quality, two-parent population-synthetic (Syn₁) cultivar adapted to the short-season growing areas of western Canada. On average, it yielded 17% more than the WCC/RRC checks over three years of testing and has high seed oil and meal protein contents.

ACS-C18 summer turnip rape (*Brassica rapa* L.), a canola quality population-synthetic (Syn₁), was developed at Agriculture & Agri-Food Canada, Beaverlodge Research Farm. It was tested in the short-season growing zones of the Western Canada Canola/Rapeseed Recommending Committee (WCC/RRC) co-operative trials in 2006 – 2008 under the experimental designation ACS-C18. ACS-C18 was issued registration no. 6620 on 15 July 2009 by the Registrar, Variety Registration, Seed Section, Canadian Food Inspection Agency, Government of Canada, Ottawa, Ontario.

Breeding Methods and Pedigree

ACS-C18 is a two-parent population-synthetic. The Syn₀ is composed of equal proportions of the populations 93-6757 and TR8. 93-6757 was derived from a canola quality breeding population, 89-411, which was derived from a population closely related to cv. Tobin. 89-411 was developed by Dr. D.S. Hutcheson, formerly a breeder at Agriculture and Agri-Food Canada, Saskatoon Research Centre (AAFC-SRC). Following four cycles of recurrent selection for superior agronomic performance (vigour, uniformity and straw strength), high seed oil, yellow seed coat colour and low glucosinolate content, the population was selected twice for low erucic acid content using the half-seed technique (Downey and Harvey, 1963). Following this, 89-411 went through two cycles of mass selection for improved resistance to white rust Race 7a (*Albugo candida* (Pers.) Kunze). This was carried out in the greenhouse with a minimum of 1000 plants screened in each cycle. Breeder seed of 93-6757 was produced by bulking seed of 680 zero erucic acid, white rust resistant plants of the population 89-411. Following that, an additional cycle of mass selection (1000 plants) for improved resistance to white rust (Race 7a) was carried out in the greenhouse.

TR8 is a canola quality strain derived from natural sexual crosses between cv. Tobin and a strain closely related to cv. Horizon. Following three cycles of recurrent selection for exceptional plant vigour, seed oil and meal protein content and low glucosinolate content, an equal bulk of 23 individuals (500 seeds) were screened for low erucic acid content using the half-seed method. The population was also screened in the field under shade cloth isolation tents for resistance to white rust (*Albugo candida*) in 1997. The breeding strain TR8 is uniform and stable, no phenotypic off-types or mutants have been observed. It is a high yielding canola quality open-pollinated population. Seed oil content is approximately 1.5% lower than AC Parkland and meal protein content is 0.8% higher than AC Parkland.

Performance

On average, ACS-C18 yielded 17% more than the mean of the checks AC Parkland and AC Sunbeam over three years of testing (Table 1). Two sites, one at Beaverlodge and another at Ft.

Vermilion, were not used in calculations owing to high CV in 2007. It also had 0.6% more seed oil and 0.6% less protein than the checks. ACS-C18 is slightly shorter than AC Parkland and has very good resistance to white rust race 7a (*Albugo candida* (Pers.) Kuntze).

Other Characteristics

Plant Characteristics

Maturity: 87 d, 1 d earlier than AC Parkland, 1d later than AC Sunbeam.

Height: 94 cm, similar to AC Parkland.

Lodging resistance: Fair, similar to AC Parkland and AC Sunbeam.

Seed Characteristics

Seed colour: Mixed yellow-brown.

Thousand kernel weight: 2.7 g, similar to AC Parkland.

Saturated fatty acid content: 5.6%.

Erucic acid content: 0.2%.

Glucosinolate content: 14.2 $\mu\text{mol g}^{-1}$ whole seed, on a 8.5% moisture basis.

Availability of Propagating Material

The parents of ASC-C18, 93-6757 and TR8, will be maintained by AAFC-SRC, 107 Science Place, Saskatoon, Saskatchewan, S7N 0X2.

Table 1. Performance and quality of ACS-C18 in the Western Canada Canola/Rapeseed Recommending Committee private and public co-operative trials, 2006-08.

Cultivar	Yield (kg ha ⁻¹) by year ^x				Seed oil ^y (% whole seed)	Protein ^y (% whole seed)
	2006	2007	2008	Mean		
ACS-C12	1664	2046	2267	2099	48.2	23.1
AC Parkland	1558	1461	1921	1680	47.8	23.6
AC Sunbeam	1603	1805	2126	1908	47.5	23.8
SED	101	118	89	65	0.3	0.2
Tests (n)	3	6	7	16	13	13

^x 2006 tests grown at Beaverlodge, Ft. Vermilion and Berwyn, AB; 2007 tests grown at two sites at Beaverlodge (early and late planting), two sites near Ft. Vermilion, Fairview and Hines Creek, AB and Fort St. John and Dawson Creek, B.C.; 2008 tests were grown at Didsbury, Fairview, Ft. Vermilion, Westlock, and Penhold, AB and Prince Albert and Glaslyn, SK..

^y Data combined over 3 years. Near-infrared reflectance according to AOCS standard procedure Am 1-92: Determination of oil, moisture and volatile matter, and protein by near-infrared reflectance using a Foss NIRSystems Model 6500 analyzer. Results are reported on a zero moisture basis.