

Description of CDC Tatra and CDC Yon spring emmer wheat cultivars.

Background:

Currently, most of the emmer product sold in Canada is imported from either Italy or the USA. Emmer produced in Italy has a winter growth habit while the US material tends to be similar to the feed emmer variety 'Vernal'.

Breeding history:

CDC Tatra (09EMMER9) and CDC Yon (09EMMER10) were selected from the cross Vernal/97Emmer19 made at the University of Saskatchewan in early 2006. The F₁ generation was grown in a crossing shelter during the summer of 2006 while the F₂ and F₃ generations were advanced via Single Seed Descent in a greenhouse during the winter of 2006-2007. A total of 702 F₄ head rows were grown in a hill field nursery in 2007. Lines selected from the 2007 hill nursery were grown in an unreplicated yield trial nursery in 2008. From 2009 to 2017 the two emmer selections were grown in replicated (r=2 per trial) yield trials in the Saskatoon region. Breeder seed was developed starting in the F₁₁ generation in 2012.

Cultivar attributes:

Data averaged over trials is presented in Table 1. The data was obtained from trials that were statistically sound (CV < 15%). The emmer grain yields presented in Table 1 are with the hull attached to the grain. On average, the hull content of emmer is in the 25 to 30% range. Thus, the naked grain yield of emmer is approximately 20% lower than that of CWRS and CWAD wheat.

CDC Tatra is lower-yielding than CDC Yon and Vernal (Table 1). CDC Tatra, however, was selected primarily based on its dough handling and baking properties (Table 4). The vast majority of emmer wheats lack the ability to produce doughs that rise. The loaf volume of CDC Tatra approaches that of the spring wheat cultivar AC Barrie (Table 4).

The parental line 97EMMER19 is a line selected from the USDA emmer accession PI254476 that originated in Iran. 97EMMER19 is the source of the baking quality in CDC Tatra.

The baking quality of 97EMMER19 has been documented previously (R B. N. Rao, C. J. Pozniak, P. J. Hucl and C. Briggs. 2010. Baking quality of emmer-derived durum wheat breeding lines. *J. Cereal Science* 51: 299-304.)

CDC Tatra is earlier heading and maturing than Vernal by about two days and is shorter but slightly weaker strawed. It should be noted that emmer wheat is weak strawed and should be grown under low soil fertility conditions to limit excess straw development. CDC Tatra is resistant to leaf, stem and stripe rust and common bunt (Table 2).

CDC Tatra has a slightly lower hulled (hull-on) test weight than Vernal but a similar kernel weight and grain protein content (Table 3). CDC Tatra produces Falling Number values higher than those of Vernal and the CWAD check Avonlea. The kernel hardness (SKCS Hardness Index) of the emmer lines (Tables 3 and 4) is intermediate between that of spring wheat and durum wheat and is classified as hard.

CDC Yon was selected on the basis of a higher grain yield (+10%) relative to Vernal combined with slightly earlier maturity, shorter straw and slightly less lodging (Table 1). The disease reaction of CDC Yon is similar to that of CDC Tatra and Vernal. CDC Yon has a quality profile similar to that of Vernal (Tables 3 and 4) and is more suited to producing a pilaf-type product or other non-baking applications such as whole grain salads.

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Table 1. Agronomic data for emmer wheat lines grown in field trials conducted between 2009 and 2017 in the Saskatoon region.

Name	Grain yield (kg/ha)	Days to head	Days to maturity	Height (cm)	Lodging (1to9)
Vernal	3926	62.1	95.6	103.6	6.0
Avonlea	3794	56.7	100.1	89.8	2.0
AC Barrie	3876	56.3	94.1	93.8	1.8
CDC Tatra	3871	58.9	93.5	94.1	6.8
CDC Yon	4331	60.2	94.1	97.0	5.1
# of trials	25	25	25	25	24

Table 2. Disease reaction of emmer wheat lines. CDC disease nurseries.

Name	Leaf rust (sev)	Stem rust (rxn)	Stripe rust (inc)	Stripe rust (sev)	Stripe rust (rxn)	Bunt (%)	Leaf blight (%)
Vernal	25	RMR	37	3	MRMS	19	22
Avonlea	5	RMR	0	0	R	11	17
AC Barrie	62	RMR	100	40	S	36	45
CDC Tatra	22	RMR	33	7	MRMS	19	27
CDC Yon	22	RMR	27	5	R	17	22
# of trials	9	8	3	3	3	8	4

Table 3. Predictive quality analyses of emmer wheat lines in trials conducted between 2009 and 2017.

Name	Hulled Test weight (kg/hL)	1000 kwt (grams)	Grain Protein (%)	SDS sedimentation (cc)	FN (sec)	Peak Time (min)	Peak Height	Total Energy	Peak band Width	Slope after peak	Energy to peak	Band width 6	SKCS (HI)
Vernal	52.3	35.3	16.5	12	346	1.44	41	245	19	-2.2	47	8.8	76
Avonlea	76.4	42.2	15.7	30	340	2.07	53	315	43	-1.8	84	20.0	76
AC Barrie	78.2	36.6	15.8	70	395	1.93	64	391	37	-2.4	94	20.3	55
CDC Tatra	49.4	35.4	16.6	47	384	2.22	62	383	29	-2.3	108	15.5	68
CDC Yon	54.5	35.0	15.7	30	359	1.64	52	319	24	-3.1	67	8.5	66
# of trials	15	15	12	12	12	9	9	9	9	9	9	9	3

Table 4 continued. Detailed milling and bake quality analyses for emmer wheat, 2009 to 2011.

2010	Grain Protein	Semolina					Gluten	RVA Pk	SKCS	Gluten Index
Name	%	Yield (%)	Protein (%)	Ash (%)	Agtron	PPO	Wet (%)	PkVisc	H.I.	
Vernal	15.9	61.2	14.3	0.73	65.7	1.762	nd	86	78.4	nd
Avonlea	16.3	59.3	14.0	0.68	55.0	0.082	38.3	35	86.3	12.9
AC Barrie	16.3	71.8*	15.1	0.62*	41.8	0.971	46.2	111	64.3	86.2
CDC Tatra	16.1	61.6	14.2	0.68	50.0	0.653	45.1	74	77.6	14.9
CDC Yon	16.0	59.5	13.5	0.60	62.1	2.105	41.5	90	73.6	9.2
		* = Flour								

2010	Farinograph				CSP Bake Test			Mixing		
Name	FAB (%)	DDT (min)	MTI (BU)	STA (min)	LV (cc)	App	Struct	CrColor	Time (min)	Energy Whr/Kg
Vernal	56.8	1.4	185	0.4	470	0.0	0.0	1.5	1.4	0.9
Avonlea	56.7	1.8	88	1.9	770	2.5	2.5	2.0	4.1	3.1
AC Barrie	58.0	7.2	30	8.5	1025	3.8	3.2	3.0	7.2	4.0
CDC Tatra	58.2	3.0	55	3.4	960	2.8	2.8	2.8	4.2	2.8
CDC Yon	55.9	1.8	73	1.9	825	2.2	2.5	2.7	1.4	1.1

2011	Grain Protein	Semolina				Agtron Slurry			RVA Pk		Gluten Index
Name	%	Yield (%)	Protein (%)	Ash (%)	Agtron	L*	a*	b*	PkVisc	PSI	
Vernal	12.9	65.0	10.7	0.59	67.0	87.00	1.12	13.58	120	43.8	nd
Avonlea	13.3	63.5	11.2	0.58	69.8	86.02	0.86	24.26	97	44.8	22.9
AC Barrie	12.5	70.3*	11.4	0.52	58.7	85.97	0.86	14.11	154	55.1	nd
CDC Tatra	13.6	65.8	11.6	0.58	57.9	85.90	1.35	15.68	139	50.7	31.5
CDC Yon	12.0	64.9	10.1	0.52	66.5	86.88	1.13	14.52	127	48.7	nd

2011	Farinograph				CSP Bake Test			Mixing		
Name	FAB (%)	DDT (min)	MTI (BU)	STA (min)	LV (cc)	App	Struct	CrColor	Time (min)	Energy Whr/Kg
Vernal	51.4	1.8	166	2.6	nd	nd	nd	nd	nd	nd
Avonlea	53.2	2.7	87	3.0	770	2.5	2.5	2.0	4.5	3.6
AC Barrie	57.2	5.3	26	14.3	950	3.5	3.2	3.0	6.9	4.5
CDC Tatra	53.5	2.7	75	4.5	895	3.0	2.8	2.8	3.0	4.7
CDC Yon	48.3	2.2	126	3.0	nd	nd	nd	nd	nd	nd

Emmer



Emmer: 09Emmer10 2016

Emmer: 09Emmer9 2016

Emmer: Strongfield 2016