

Release document for Norwest 553 (approved 8-20-07)

Release of 'Norwest 553' Hard Red Winter Wheat

Norwest 553 is a hard red winter wheat (*Triticum aestivum* L.) developed by Oregon State University and Nickerson International Research SNC, a division of Limagrain Verneuil Holding SA, in cooperation with USDA-Agricultural Research Service. Norwest 553 is being released for its high yield potential, disease resistance, and milling and baking quality which is considered acceptable for the hard red winter wheat market class.

Norwest 553 was derived from the cross 95B343/Isengrain made in 1996 by the Verneuil Company. The experimental line 95B343, also known as Lander3, was bred by Verneuil. Isengrain was bred by Florimond Desprez and registered for production in France in 1996. Norwest 553 was derived as a doubled haploid from an F1 plant in the 1997-1998 growing season and given the selection designation 00B553. From 1998 to 2001, 00B553 was evaluated in France in Verneuil breeding trials. In 2001, Verneuil was acquired by Limagrain Agro-Industrie S.A. In fall, 2001, seed of 00B553 was provided to Oregon State University under a germplasm exchange agreement with Limagrain Agro-Industries. The selection was subsequently tested in Oregon under the experimental designation ORN00B553. A sister line, 00B556, was registered for production in Italy in 2004 under the name Copernico.

Norwest 553 is a semidwarf variety best adapted to moderate to high rainfall areas of north east Oregon and south east Washington. Crown freezing tests conducted by USDA-ARS suggest that Norwest 553 has cold tolerance similar to the soft white winter variety Tubbs; greater than Stephens, but less than the hard red winter variety Paladin. Field evaluations conducted by the WSU Cereal Variety Testing program suggest Norwest 553 has winterhardiness similar to Stephens, less than both Paladin and Tubbs. Winter damage on Norwest 553, as indicated by slow recovery and reduced growth in early spring, increased when association with other stress conditions, such as drought or late fall plantings.

In USDA-ARS stripe rust (*Puccinia striiformis* Westend.) evaluations, Norwest 553 has a resistant reaction type with low infection intensities; similar to Stephens, less than Paladin or Boundary. Norwest 553 has an intermediate response to strawbreaker footrot (*Psuedocercospora herpotrichoides* (Fron.) Deighton) and does not carry the Pch-1 gene for resistance from VPM-1. In inoculated trials, Norwest 553 has shown moderate levels of resistance to cephalosporium stripe (*Cephalosporium gramineum* Nis. & Ika.). Disease ratings were similar to those for Madsen, lower than for Stephens or Tubbs. Norwest 553 is moderately susceptible to Septoria leaf blotch (*Septoria tritici* Roberge in Desmaz.), with disease ratings similar to Madsen or Tubbs.

Norwest 553 was evaluated in the 2005 and 2006 Oregon hard wheat variety trials and in the 2006 Washington hard wheat variety trials. Over 20 site by years of combined

Oregon and Washington testing, Norwest 553 averaged 82 bu/a, as compared with Paladin and Bauermeister at 75.5 and 72.8 bu/a, respectively. In 2006, grain test weight of Norwest 553 averaged 61.7 lb/bu, higher than that for Boundary at 61.0 lb/bu, but 0.9 lb/bu lower than for Paladin. Grain protein concentration of Norwest 553 averaged 11.7%, similar to Paladin and 0.5 percentage points higher than for either Bauermeister or Boundary. Heading date for Norwest 553 is similar to Boundary, approximately 1 day later than Paladin and 3 days earlier than Bauermeister. Plant height of Norwest 553 averages 72 cm, 8 cm less than Paladin and 15 cm less than Bauermeister.

End-use quality of Norwest 553 was evaluated through the USDA-ARS Western Wheat Quality Lab in 2005 and 2006. Results from the milling and baking evaluations suggest that Norwest 553 has acceptable quality for the hard red winter market class. Dough mixing strength is its most positive attribute. When limited to paired observations with over 10.4% flour protein, Norwest 553 was similar to Paladin and Bauermeister for flour yield, flour ash, and bake absorption. Milling score for Norwest 553 was slightly higher than for Paladin, similar to Bauermeister. Norwest 553 had a significantly longer mixing time, averaging over 5 min as compared with 4 min for Paladin and 3 min for Bauermeister. Bread loaf volumes for Norwest 553 averaged slightly less than expected, 40 cc less than Paladin, but with good internal crumb grain scores.

Norwest 553 was evaluated by the PNW Wheat Quality Council in 2007. Norwest 553 was considered acceptable for the hard red winter class. In milling comparisons with Bauermeister, Norwest 553 had lower flour yield, but with significantly lower flour ash. It was considered generally superior to Bauermeister for dough mixing and handling properties, loaf volume, internal loaf structure, and overall baking quality. Dough water absorption was considered slightly less than optimal.

In fall, 2005, 750 heads of Norwest 553 were threshed, screened for seed color and seed size, and provided to Washington Foundation Seed for production of Breeder seed. These were planted as individual headrows and off-type rows were removed prior to bulk harvest of Breeder seed. Breeder and Foundation seed will be maintained by Washington State Crop Improvement Association (WSCIA). Norwest 553 is being submitted for Plant Variety Protection with the Title 5 option. Certification classes recognized for Norwest 553 include Foundation, Registered and Certified. Certified seed will be produced and sold under non-exclusive license with Oregon State University. Seed of Norwest 553 has been deposited in the USDA National Small Grains Collection, Aberdeen, Idaho. It is requested that the source of this material be acknowledged in future use by wheat breeding and genetics programs.

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Grain yield, test weight, and protein summary for HRW selection NORWEST 553.

2006 Entry No.	Selection	Grain Yield								
		2006 HWELT		2005 HWELT		2006 WSU Trials		HWEYT 07	WSU 07	McGregor 07
		7-site bu/a	rank	6 sites bu/a	rank	7 - site bu/a	rank	7-site bu/a	9 sites bu/a	9 - site bu/a
1	NORWEST 553	76.9	4	83.7	6	85.7	7	85.3	74.2	103.2
2	Paladin	72.3	22	70.0	20	83.3	12	79.7	71.2	94.9
3	Eddy					85.6	8	80.2	76.2	93.8
4	Boundary	70.8	26			95.1	3	78.6	81.4	
5	Declo	71.4	25	75.4	13			81.7	65.5	
6	Bauermeister	66.3	30	70.3	19	81.4	14	81.7	81.7	
7	Tubbs 06	77.7	3					88		100.9

Grain yield, test weight, and protein summary for HRW selection NORWEST 553.

2006 Entry No.	Selection	Test Wt. 2006		Test Weight 2007			Grain Protein '06		Grain Protein '07	
		2006 HWELT 6-sites lb/bu	2006 WSU Trials lb/bu	2007 HWELT 7-sites lb/bu	2006 WSU Trials lb/bu	2006 McGr. Trials lb/bu	2006 HWELT 6-sites %	2006 WSU Trials %	2007 HWELT 7-sites %	2007 WSU Trials 9-site %
		1	NORWEST 553	62.5	61	63.0	61.3	60.7	11.2	12.2
2	Paladin	63.0	62.3	63.3	61.4	60.8	11.0	12.2	11.0	13.1
3	Eddy		62.9	63.0	61.7	59.8		12.0	10.3	12.7
4	Boundary	61.0	61	61.2	60.3		10.6	11.6	10.2	12.4
5	Declo	61.8		63.0	61.1		10.4		10.6	13.4
6	Bauermeister	59.1	59.3	61.4	60		10.7	11.7	10.1	12.1
7	Tubbs 06	59.2		60.0		57.4	9.8		10.0	

Evidence of Uniformity and Stability

Norwest 553 has been observed to be uniform and stable based on evaluations in multilocation replicated yield trials. From 2005 through 2007, Norwest 553 was evaluated in a total of 45 replicated yield trials in Oregon and Washington.

Norwest 553 hard red winter wheat may contain up to 20 white seed per pound in Breeders, Foundation, Registered, or Certified classes of seed multiplication. Norwest 553 also may contain up to 1 in 10,000 combined of the naturally occurring variants: plants that are 2" to 6" taller; plants with awnless spike; and plants with bronze (red or tan) chaff spikes. Variations in plant height will be more distinct when grown in environments that are conducive to high grain yield, including irrigated or high rainfall conditions.

These variants described are distinct within the variety and are stable and predictable with a degree of reliability comparable to other varieties of the same kind, and within recognized tolerances, when the variety is reproduced or reconstructed and was originally part of the variety when released.

To further determine variants in kernel color, a phenol staining reaction was determined. It was observed that 39% of kernels stained are light brown, 55% are brown, and 6% are dark brown.