

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM BARLEY WINTER HARDINESS NURSERY

2008-2009

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This is a joint progress report of an investigation underway in the State Agricultural Experiment Stations and the Agricultural Research Service of the U. S. Department of Agriculture. It contains preliminary data which have not been sufficiently confirmed to justify general release; interpretations may be modified with additional experimentation. Confirmed results will be published through established channels. The report is primarily a tool for cooperators, their staff and those with special interest in agricultural research program development.

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COOPERATING AGRICULTURAL EXPERIMENT STATIONS AND PERSONNEL

Country	State	AES Location	Personnel
USA	KS	Hays	T.J.Martin
USA	NC	Laurel Springs/Waynesville	D. Marshall/M. Fountain
USA	NE	Mead/Lincoln	S.P.Baenziger
USA	OR	Pendleton	P.Hayes
USA	SC	Clemson	B.Edge
USA	TN	Knoxville	D.West
USA	VA	Blacksburg	C.A.Griffey
Russia	Krasnodar	Kuban Agrarian University	V.Shevtsov
Canada	Ontario	Nairn	M. Etienne

DIGEST

NUMBER OF TESTS:	9 tests (7 US States, 2 foreign countries)	
NUMBER OF ENTRIES:	31	
EXPERIMENTAL DESIGN:	Single-row, 5-foot plot Two replications Randomized complete block	
DATA RECORDED:	Percent winter survival	
DATA NOT USED IN ANALYSIS:	Knoxville, TN Clemson/Florence, SC	100% Survival Data not received

COMMENTS:

US STATE/COUNTRY	LOCATION	COOPERATORS' COMMENTS
Russia	Krasnodar	Thick snow cover protected winter barley plants from frost damage.

Table 1. Entries in the 2008-2009 Uniform Barley Winter Hardiness Nursery.

Entry No	Entry name	Pedigree	Yrs in Nursery	Contributors
1	Tenn. Winter(ck)	CI 6034	73	
2	Trebi (ck)	CI 936	69	
3	Kearney (ck)	CI 7580	61	
4	Kenosha (wht ck)	CI 14025	34	
5	Dicktoo (ck)	CI 5529	61	
6	Kentucky 1 (ck)	CI 6050	73	
7	NB018199	NB94723/NB93727	2	Baenziger
8	NB03429	NB92711/NB86954	2	Baenziger
9	NB05419	NE98890/NE98885	2	Baenziger
10	NB07407	NE95711/Legacy	1	Baenziger
11	NB07410	NE95711/NE99868	1	Baenziger
12	NB07411	NE95713/NE99881	1	Baenziger
13	NB07412	NE95713/NE99881	1	Baenziger
14	MCKellar (H159-042)	H30-52 (McGregor)/h30-11(MCDiarmid)	1	Etienne
15	H260-023	H184-001/H159-042	1	Etienne
16	H262-021	H159-045/H159-042	1	Etienne
17	Eve (VA01H-68)	SC860974/94-42-13 (Seed Source: Rep3 Hulless Adv Warsaw)	6	Griffey
18	VA 03H-61(Hulless)	96-41-17/SC872143 (Rep3 Hulless Adv)	4	Griffey
19	VA06H-121	VA96B-315/SC871077//WYSOR	2	Grffey
20	VA05H-147 T/W	Thoroughbred/SC872143 (Hulless)	1	Griffey
21	VA06H-25 W/T	Thoroughbred/SC872143 (Hulless)	1	Griffey
22	VA06B-19	VA97V-176/VA92-44-279	1	Griffey
23	VA06B-32	VA98B-112/VA99B-172	1	Griffey
24	Strider	OR1860164/Steptoe	3	Hayes
25	OR74	Strider/88ab536//88ab536	2	Hayes
26	OR75	Strider/88Ab536//88Ab536	1	Hayes
27	OR76	Stab 47/Kab 51	1	Hayes
28	OR77	Strider/Orca	1	Hayes
29	OR78	Strider/88Ab536//88Ab536	1	Hayes
30	OR711	Kold/Hoody	1	Hayes
31	OR81	Strider/88ab536-RS	1	Hayes

Top Ten Ranked Survival Entries

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Top 10 ranked survival entries for 2008-2009

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	4	Kenosha (wht ck)	CI 14025	98
2	9	NB05419	NE98890/NE98885	83
3	11	NB07410	NE95711/NE99868	82
4	12	NB07411	NE95713/NE99881	79
5	13	NB07412	NE95713/NE99881	78
6	14	MCKellar (H159-042)	H30-52 (McGregor)/h30-11(MCDiarmid)	77
7	10	NB07407	NE95711/Legacy	76
8	8	NB03429	NB92711/NB86954	75
9	5	Dicktoo (ck)	CI 5529	75
10	31	OR81	Strider/88ab536-RS	75
LSD (0.05)				6.4

**Table 2. Uniform Barley Winter Hardiness Nursery
Under Controlled Environment Freeze Test**

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Tenn. Winter(ck)	0.3	15
2	Trebi (ck)	0.1	3
3	Kearney (ck)	4.3	100
4	Kenosha (wht ck)	4.7	100
5	Dicktoo (ck)	2.6	73
6	Kentucky 1 (ck)	4.1	98
7	NB018199	3.8	98
8	NB03429	3.5	98
9	NB05419	3.8	100
10	NB07407	3.4	95
11	NB07410	2.6	85
12	NB07411	3.6	95
13	NB07412	3.4	90
14	MCKellar (H159-042)	2.7	78
15	H260-023	2.9	90
16	H262-021	3.1	93
17	Eve (VA01H-68)	2.0	75
18	VA 03H-61(Hulless)	2.8	80
19	VA06H-121	1.9	70
20	VA05H-147 T/W	2.7	88
21	VA06H-25 W/T	3.1	95
22	VA06B-19	3.2	88
23	VA06B-32	2.8	85
24	Strider	2.0	78
25	OR74	2.6	85
26	OR75	3.0	93
27	OR76	2.9	88
28	OR77	3.0	88
29	OR78	1.9	73
30	OR711	2.3	80
31	OR81	1.8	70
Average		2.8	82
LSD(0.05)		0.5	7.7
CV		8	4.6

Parameters:

- 2 reps/10 plants per rep planted in cone-tainers (Livingston et al. 2005, Crop Science, 45:1545-1558)
- 5 weeks at 13°C; 12 hours light/dark period; 400µmole light intensity
- 3 weeks at 3°C; 12 hours light/dark period; 350µmole light intensity
- 3 days @ -3°C in the dark (subzero acclimation)
- Frozen @ 1°C/hour to -14°C for 3 hours
- Thawed @ 2°C/hour to 3°C
- Plants were watered once with 0.001% (v/v) Vitavax fungicide solution
- Plants were allowed to recover for 3 weeks at 13°C in cone-tainers; 12 hours light/dark period; 400µmole light
- Plant survival ratings were rated for regrowth after 21 days by visually assessing leaves and roots.

¹Rating:

- 0 = Completely dead
- 1 = 1 survived (green) shoot or 1 primary root
- 2 = 1 or 2 survived (green) shoots or 1 survived shoot and 1 or 2 primary roots
- 3 = 1 or 2 survived shoots with developed roots (primary and secondary roots)
- 4 = 95% survived shoots with well developed roots
- 5 = 100% survived with very little or no sign of freeze damage

²Survival (%):

- 50% of plants with rating of 1 plus all plants rated >2 divided by total number of plants frozen multiplied by 100

Table 3. Winter Barley Survival (%) at Various Stations (sorted by entry number)

Entry #	Entry Name	Ranked means	Means Across Loc.	Ontario Canada	Laurel Sprs. NC	Waynesville NC	Lincoln NE	Hays KS	Blacksburg VA	Krasnodar Russia	Pendleton OR
1	Tenn. Winter(ck)	29	53	3	95	100	3	3	90	33	100
2	Trebi (ck)	31	31	0	1	80	0	0	70	0	100
3	Kearney (ck)	24	66	1	100	100	100	0	90	41	100
4	Kenosha (wht ck)	1	98	85	100	100	100	100	95	100	100
5	Dicktoo (ck)	9	75	40	100	100	80	10	100	68	100
6	Kentucky 1 (ck)	22	68	5	100	100	95	15	100	27	100
7	NB018199	13	74	40	100	100	100	13	95	43	100
8	NB03429	8	75	50	100	100	95	8	95	56	100
9	NB05419	2	83	90	100	100	95	10	100	67	100
10	NB07407	7	76	93	100	100	90	10	85	32	100
11	NB07410	3	82	73	100	100	95	28	90	70	100
12	NB07411	4	79	53	100	100	100	8	100	72	100
13	NB07412	5	78	58	97.5	100	100	28	100	54	90
14	McKellar (H159-042)	6	77	83	100	100	75	15	100	41	100
15	H260-023	15	73	98	100	100	60	13	95	21	100
16	H262-021	16	73	75	100	100	50	10	100	51	100
17	Eve (VA01H-68)	28	57	25	90	100	5	3	100	66	65
18	VA 03H-61(Hulless)	27	62	30	100	100	70	5	95	29	65
19	VA06H-121	30	49	55	72.5	97.5	5	3	95	0	65
20	VA05H-147 T/W	25	64	84	90	100	25	5	100	11	100
21	VA06H-25 W/T	12	74	73	97.5	100	50	23	100	58	95
22	VA06B-19	14	73	65	100	100	25	45	100	53	100
23	VA06B-32	26	64	50	92.5	100	18	15	95	42	100
24	Strider	21	68	83	97.5	100	15	18	100	31	100
25	OR74	18	70	88	95	100	35	45	100	0	100
26	OR75	17	73	98	100	97.5	40	30	90	30	100
27	OR76	20	70	95	100	97.5	45	15	95	12	100
28	OR77	23	67	88	97.5	100	30	20	95	8	100
29	OR78	11	74	83	97.5	100	60	35	90	31	100
30	OR711	19	70	85	95	100	30	18	100	33	100
31	OR81	10	75	83	95	100	60	10	100	51	100
Average			70	62	94	99	56	18	95.5	40	96
LSD (0.05)			6.4	23.7	13.8	2.2	31.3	14.6	9.8	17.8	*ns
CV			4.5	18.7	7.2	1.1	27.3	40	5	22.1	15.7

*ns = not significant

Table 4. Winter Barley Survival (%) at Various Stations (sorted by rank)

Entry #	Entry Name	Ranked means	Means Across Loc.	Ontario Canada	Laurel Sprs. NC	Waynesville NC	Lincoln NE	Hays KS	Blacksburg VA	Krasnodar Russia	Pendleton OR
4	Kenosha (wht ck)	1	98	85	100	100	100	100	95	100	100
9	NB05419	2	83	90	100	100	95	10	100	67	100
11	NB07410	3	82	73	100	100	95	28	90	70	100
12	NB07411	4	79	53	100	100	100	8	100	72	100
13	NB07412	5	78	58	97.5	100	100	28	100	54	90
14	MCKellar (H159-042)	6	77	83	100	100	75	15	100	41	100
10	NB07407	7	76	93	100	100	90	10	85	32	100
8	NB03429	8	75	50	100	100	95	8	95	56	100
5	Dicktoo (ck)	9	75	40	100	100	80	10	100	68	100
31	OR81	10	75	83	95	100	60	10	100	51	100
29	OR78	11	74	83	97.5	100	60	35	90	31	100
21	VA06H-25 W/T	12	74	73	97.5	100	50	23	100	58	95
7	NB018199	13	74	40	100	100	100	13	95	43	100
22	VA06B-19	14	73	65	100	100	25	45	100	53	100
15	H260-023	15	73	98	100	100	60	13	95	21	100
16	H262-021	16	73	75	100	100	50	10	100	51	100
26	OR75	17	73	98	100	97.5	40	30	90	30	100
25	OR74	18	70	88	95	100	35	45	100	0	100
30	OR711	19	70	85	95	100	30	18	100	33	100
27	OR76	20	70	95	100	97.5	45	15	95	12	100
24	Strider	21	68	83	97.5	100	15	18	100	31	100
6	Kentucky 1 (ck)	22	68	5	100	100	95	15	100	27	100
28	OR77	23	67	88	97.5	100	30	20	95	8	100
3	Kearney (ck)	24	66	1	100	100	100	0	90	41	100
20	VA05H-147 T/W	25	64	84	90	100	25	5	100	11	100
23	VA06B-32	26	64	50	92.5	100	18	15	95	42	100
18	VA 03H-61(Hulless)	27	62	30	100	100	70	5	95	29	65
17	Eve (VA01H-68)	28	57	25	90	100	5	3	100	66	65
1	Tenn. Winter(ck)	29	53	3	95	100	3	3	90	33	100
19	VA06H-121	30	49	55	72.5	97.5	5	3	95	0	65
2	Trebi (ck)	31	31	0	1	80	0	0	70	0	100
Average			70	62	94	99	56	18	95.5	40	96
LSD (0.05)			6.4	23.7	13.8	2.2	31.3	14.6	9.8	17.8	*ns
CV			4.5	18.7	7.2	1.1	27.3	40	5	22.1	15.7

*ns = not significant