

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM BARLEY WINTER HARDINESS NURSERY

2011-2012

Compiled by

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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	S.P.Baenziger
USA	OR	Pendleton	P.Hayes
USA	TN	Knoxville	D.West
USA	VA	Blacksburg	C.A.Griffey
USA	MN	St. Paul	K.P. Smith
USA	IL	Lawrenceville	L. Phillippe
Russia	Krasnodar	Kuban Agrarian University	V.Shevtsov
Canada	Ontario	Nairn	M. Etienne
Germany	Hesse	Bad Vibel	B. Schmehe

DIGEST

NUMBER OF TESTS: 11 tests (8 US States, 3 foreign countries)

NUMBER OF ENTRIES: 30

EXPERIMENTAL DESIGN: Single-row, 5-foot plot
Two replications
Randomized complete block

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Lawrenceville, IL	No Data
Nairn, Canada	No Data
Krasnodar, Russia	No Data
Hays, KS	100% Survival
Knoxville, TN	100% survival

COMMENTS:

Germany	Hesse	A 1-0 scheme (1=0%, 9=100%) were used to rate survival then converted to percentage afterwards.
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Table 1. Entries in the 2011-2012 Uniform Barley Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors
1	Tenn. Winter(ck)	CI 6034	76	
2	Trebi (ck)	CI 936	72	
3	Kearney (ck)	CI 7580	64	
4	Kenosha (wht ck)	CI 14025	37	
5	Dicktoo (ck)	CI 5529	64	
6	Kentucky 1 (ck)	CI 6050	76	
7	NB09405	P-954/ NE94737	2	Baenziger
8	NB09433	NE97891/ P-713	2	Baenziger
9	NB09410	NE99820/ NE94737	1	Baenziger
10	NB09432	NE97891/ P-713	1	Baenziger
11	NB09434	P-954/ NE94737	1	Baenziger
12	MW08-04	Tambar501 /FEG188-02	1	Smith
13	MW08-15	OR76 / Quest	1	Smith
14	Dan (VA03H-61)	VA96-41-17/SC872143	7	Griffey
15	Eve (VA01H-68)	SC860974/VA94-42-13	9	Griffey
16	VA06H-25 WS	Thoroughbred/SC872143	4	Griffey
17	VA07H-31 WS	Thoroughbred/SC872143	3	Griffey
18	VA06H-79	VA96B-315/SC871077//Wysor	3	Griffey
19	VA06B-19	VA97B-176/VA92-44-279	4	Griffey
20	VA06B-48	VA98B-112/VA99B-172	3	Griffey
21	VA09H-4	Nomini/SC871077	1	Griffey
22	VA09B-4	VA00B-244/NFC-298-20	1	Griffey
23	VA08B-85	VA00B-199/VA00B-259	1	Griffey
24	Maja	Strider/88Ab536	4	Hayes
25	OR818	Bu27/Stab47, F1/3/Maja/Stab47	2	Hayes
26	Mathias (OR76)	Stab47/Kab51	4	Hayes
27	Verdant (OR712)	Kold/Hoody	3	Hayes
28	Alba (OR757)	Strider/Orca*/Strider/88Ab 536,F1//88 Ab536	1	Hayes
29	OR101	StabBC 42-3-9/3/Kab51/Legacy//Kab51	1	Hayes
30	NO71DH 13	NB3437f/OR71	1	Hayes

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2011-2012

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	4	Kenosha (wht ck)	CI 14025	91
2	8	NB09433	NE97891/ P-713	89
3	9	NB09410	NE99820/ NE94737	87
4	7	NB09405	P-954/ NE94737	86
5	3	Kearney (ck)	CI 7580	86
6	29	OR101	StabBC 42-3-9/3/Kab51/Legacy//Kab51	86
7	6	Kentucky 1 (ck)	CI 6050	85
8	30	NO71DH 13	NB3437f/OR71	84
9	10	NB09432	NE97891/ P-713	83
10	12	MW08-04	Tambar501 /FEG188-02	81
LSD (0.05)				9.4

Table 2. Winter Barley Survival (%) at Various Stations (sorted by entry number)

Entry #	Entry Name	Ranked means	Means Across Loc.	St. Paul MN	OR	NE	VA	Germany	Laurel Spring NC
1	Tenn. Winter(ck)	13	79	70	80	100	95	31	100
2	Trebi (ck)	30	41	23	25	85	28	6	83
3	Kearney (ck)	5	86	100	80	100	93	44	100
4	Kenosha (wht ck)	1	91	100	93	100	88	69	95
5	Dicktoo (ck)	14	79	90	63	100	88	38	98
6	Kentucky 1 (ck)	7	85	95	68	100	98	50	100
7	NB09405	4	86	100	88	100	93	38	100
8	NB09433	2	89	100	93	100	95	50	98
9	NB09410	3	87	100	85	100	95	44	100
10	NB09432	9	83	100	80	100	93	25	100
11	NB09434	17	78	90	73	100	90	19	98
12	MW08-04	10	81	90	85	100	100	13	98
13	MW08-15	21	75	80	80	100	93	0	100
14	Dan (VA03H-61)	16	78	85	75	100	98	13	100
15	Eve (VA01H-68)	29	62	20	58	100	95	0	100
16	VA06H-25 WS	22	75	75	63	100	95	19	100
17	VA07H-31 WS	25	68	55	48	100	95	13	100
18	VA06H-79	20	76	65	85	100	100	6	98
19	VA06B-19	26	68	20	93	100	95	0	100
20	VA06B-48	27	66	25	75	100	93	6	100
21	VA09H-4	24	70	40	83	100	100	0	100
22	VA09B-4	28	64	0	85	100	100	0	100
23	VA08B-85	23	74	40	95	100	98	13	98
24	Maja	19	78	80	75	100	93	25	95
25	OR818	15	79	70	98	100	95	13	100
26	Mathias (OR76)	11	81	90	90	100	93	13	100
27	Verdant (OR712)	18	78	100	58	100	95	19	98
28	Alba (OR757)	12	81	90	98	100	90	13	95
29	OR101	6	86	90	95	100	85	44	100
30	NO71DH 13	8	84	100	90	100	88	25	100
Average			77	73	78	100	92	21	98
LSD (0.05)			9.4	23	51	7.9	12	13	8.4
CV			6.0	15	32	3.9	6.3	29	4.2

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

Entry #	Entry Name	Ranked means	Means Across Loc.	St. Paul MN	OR	NE	VA	Germany	Laurel Spring NC
4	Kenosha (wht ck)	1	91	100	93	100	88	69	95
8	NB09433	2	89	100	93	100	95	50	98
9	NB09410	3	87	100	85	100	95	44	100
7	NB09405	4	86	100	88	100	93	38	100
3	Kearney (ck)	5	86	100	80	100	93	44	100
29	OR101	6	86	90	95	100	85	44	100
6	Kentucky 1 (ck)	7	85	95	68	100	98	50	100
30	NO71DH 13	8	84	100	90	100	88	25	100
10	NB09432	9	83	100	80	100	93	25	100
12	MW08-04	10	81	90	85	100	100	13	98
26	Mathias (OR76)	11	81	90	90	100	93	13	100
28	Alba (OR757)	12	81	90	98	100	90	13	95
1	Tenn. Winter(ck)	13	79	70	80	100	95	31	100
5	Dicktoo (ck)	14	79	90	63	100	88	38	98
25	OR818	15	79	70	98	100	95	13	100
14	Dan (VA03H-61)	16	78	85	75	100	98	13	100
11	NB09434	17	78	90	73	100	90	19	98
27	Verdant (OR712)	18	78	100	58	100	95	19	98
24	Maja	19	78	80	75	100	93	25	95
18	VA06H-79	20	76	65	85	100	100	6	98
13	MW08-15	21	75	80	80	100	93	0	100
16	VA06H-25 WS	22	75	75	63	100	95	19	100
23	VA08B-85	23	74	40	95	100	98	13	98
21	VA09H-4	24	70	40	83	100	100	0	100
17	VA07H-31 WS	25	68	55	48	100	95	13	100
19	VA06B-19	26	68	20	93	100	95	0	100
20	VA06B-48	27	66	25	75	100	93	6	100
22	VA09B-4	28	64	0	85	100	100	0	100
15	Eve (VA01H-68)	29	62	20	58	100	95	0	100
2	Trebi (ck)	30	41	23	25	85	28	6	83
Average			77	73	78	100	92	21	98
LSD (0.05)			9.4	23	51	7.9	12	13	8.4
CV			6.0	15	32	3.9	6.3	29	4.2

Table 4. Uniform Barley Winter Hardiness Nursery Under Controlled Environment Freeze Test

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Tenn. Winter(ck)	0.6	23
2	Trebi (ck)	0.5	15
3	Kearney (ck)	3.7	100
4	Kenosha (wht ck)	4.3	100
5	Dicktoo (ck)	1.7	63
6	Kentucky 1 (ck)	1.9	73
7	NB09405	3.0	88
8	NB09433	3.4	98
9	NB09410	3.2	95
10	NB09432	2.7	83
11	NB09434	2.2	78
12	MW08-04	2.0	65
13	MW08-15	1.5	58
14	Dan (VA03H-61)	2.0	78
15	Eve (VA01H-68)	1.2	43
16	VA06H-25 WS	1.8	63
17	VA07H-31 WS	1.2	40
18	VA06H-79	2.3	73
19	VA06B-19	1.6	53
20	VA06B-48	1.1	40
21	VA09H-4	1.8	50
22	VA09B-4	0.6	40
23	VA08B-85	1.3	58
24	Maja	0.7	38
25	OR818	1.9	68
26	Mathias (OR76)	2.3	73
27	Verdant (OR712)	2.8	85
28	Alba (OR757)	2.0	73
29	OR101	2.3	88
30	NO71DH 13	2.7	85
Average		2.0	66
LSD(0.05)		0.5	8.8
CV		12	6.5

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)
- Whole plants were 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 in the greenhouse
- Whole plants 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; same as unfrozen plants

2Survival (%):

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

**Table 5. Across Location Percent Survival Means for
Check Cultivars in Previous Winter Hardiness Nurseries**

Nursery Year	Tenn. Winter	Trebi	Kearney	Kenosha	Dicktoo	Kentucky 1	LDS (0.05)
2000-01	50	35	56	87	58	58	14
2001-02	49	10	95	94	92	87	24
2002-03	76	61	91	100	86	93	29
2003-04	96	69	90	97	100	97	48
2004-05	43	22	62	89	65	64	23
2005-06	59	28	76	94	81	74	21
2006-07	32	7.6	59	94	50	59	14
2007-08	50	35	72	96	76	74	27
2008-09	53	31	66	98	75	68	6.4
2009-10	55	23	65	96	69	65	11
2010-11	33	17	67	96	65	43	13
2011-12	79	41	86	91	79	85	9.4
Avg.	56	32	74	94	75	72	