

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM BARLEY WINTER HARDINESS NURSERY

2012-2013

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	G. Zhang
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
USA	OK	Ardmore	M. Newell
Russia	Krasnodar	Kuban Agrarian University	V.Shevtsov
Canada	Ontario	Nairn	M. Etienne

DIGEST

NUMBER OF TESTS: 11 tests (9 US States, 2 foreign countries)

NUMBER OF ENTRIES: 14

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Krasnodar, Russia	No Data
Lincoln, NE	No Data
Ontario, Canada	No Data
St. Paul, MN	No Data
Pendleton, OR	No Data
Lawrenceville, IL	No Data
Knoxville, TN	No Data
Ardmore, OK	100% Survival

COMMENTS: None

Table 1. Entries in the 2012-2013 Uniform Barley Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors
1	Tenn. Winter(ck)	CI 6034	77	
2	Trebi (ck)	CI 936	73	
3	Kearney (ck)	CI 7580	65	
4	Kenosha (wht ck)	CI 14025	38	
5	Dicktoo (ck)	CI 5529	65	
6	Kentucky 1 (ck)	CI 6050	77	
7	Dan (VA03H-61)	VA96-41-17/SC872143	8	Griffey
8	Eve (VA01H-68)	SC860974/VA94-42-13	10	Griffey
9	VA07H-31 WS	Thoroughbred/SC872143	4	Griffey
10	VA06H-79	VA96B-315/SC871077//Wysor	4	Griffey
11	VA06B-19	VA97B-176/VA92-44-279	5	Griffey
12	VA09H-4	Nomini/SC871077	2	Griffey
13	VA08B-85	VA00B-199/VA00B-259	2	Griffey
14	VA08B-109	VA00B-259/3/Rounder//VA97B-233/Price	1	Griffey

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2012-2013

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	3	Kearney (ck)	CI 7580	100
2	4	Kenosha (wht ck)	CI 14025	98
3	1	Tenn. Winter(ck)	CI 6034	94
4	5	Dicktoo (ck)	CI 5529	88
5	6	Kentucky 1 (ck)	CI 6050	88
6	7	Dan (VA03H-61)	VA96-41-17/SC872143	83
7	9	VA07H-31 WS	Thoroughbred/SC872143	83
8	10	VA06H-79	VA96B-315/SC871077//Wysor	71
9	11	VA06B-19	VA97B-176/VA92-44-279	70
10	13	VA08B-85	VA00B-199/VA00B-259	70
LSD (0.05)				7.7

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Blacksburg VA	Ardmore OK	Laurel Spring NC	Hays KS
1	Tenn. Winter(ck)	3	94	85	100	100	98
2	Trebi (ck)	14	48	53	100	90	3
3	Kearney (ck)	1	100	99	100	100	100
4	Kenosha (wht ck)	2	98	100	100	100	95
5	Dicktoo (ck)	4	88	90	100	100	75
6	Kentucky 1 (ck)	5	88	85	100	100	80
7	Dan (VA03H-61)	6	83	99	100	90	60
8	Eve (VA01H-68)	13	63	93	100	80	18
9	VA07H-31 WS	7	83	95	100	100	55
10	VA06H-79	8	71	97	100	100	15
11	VA06B-19	9	70	99	100	100	10
12	VA09H-4	12	68	99	100	90	15
13	VA08B-85	10	70	100	100	100	10
14	VA08B-109	11	69	97	100	100	10
Average			78	92	100	96	46
LSD (0.05)			7.7	4.0	ns	16.9	14.5
CV			4.6	1.9	ns	8.1	14.6

ns: not significant

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Blacksburg VA	Ardmore OK	Laurel Spring NC	Hays KS
3	Kearney (ck)	1	100	99	100	100	100
4	Kenosha (wht ck)	2	98	100	100	100	95
1	Tenn. Winter(ck)	3	94	85	100	100	98
5	Dicktoo (ck)	4	88	90	100	100	75
6	Kentucky 1 (ck)	5	88	85	100	100	80
7	Dan (VA03H-61)	6	83	99	100	90	60
9	VA07H-31 WS	7	83	95	100	100	55
10	VA06H-79	8	71	97	100	100	15
11	VA06B-19	9	70	99	100	100	10
13	VA08B-85	10	70	100	100	100	10
14	VA08B-109	11	69	97	100	100	10
12	VA09H-4	12	68	99	100	90	15
8	Eve (VA01H-68)	13	63	93	100	80	18
2	Trebi (ck)	14	48	53	100	90	3
Average			78	92	100	96	46
LSD (0.05)			7.7	4.0	ns	16.9	14.5
CV			4.6	1.9	ns	8.1	14.6

ns: not significant

**Table 4. 2012-13 Uniform Barley Winter Hardiness Nursery
Under Controlled Environment Freeze Test**

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Tenn. Winter(ck)	1.3	55
2	Trebi (ck)	0.6	23
3	Kearney (ck)	4.2	100
4	Kenosha (wht ck)	4.3	99
5	Dicktoo (ck)	2.1	68
6	Kentucky 1 (ck)	2.3	75
7	Dan (VA03H-61)	2.9	88
8	Eve (VA01H-68)	1.9	53
9	VA07H-31 WS	1.2	48
10	VA06H-79	2.4	80
11	VA06B-19	1.6	58
12	VA09H-4	2.1	63
13	VA08B-85	1.7	55
14	VA08B-109	2.1	65
Average		2.2	66
LSD(0.05)		0.3	25.3
CV		6.9	18.2

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
2012-13	94	48	100	98	88	88	7.7
Avg.	59	33	76	95	76	73	