

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM BARLEY WINTER HARDINESS NURSERY

2015-2016

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	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	J. Anderson
USA	OR	Pendleton	P.Hayes

DIGEST

NUMBER OF TEST LOCATIONS: 9

NUMBER OF ENTRIES: 17

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Hays, KS	100% Survival
Ardmore, OK	100% Survival
Lawrenceville, IL	100% Survival
Raleigh, NC	100% Survival
Corvallis, OR	100% Survival
St. Paul, MN	No Data
Knoxville, TN	No Data

COMMENTS:

Blacksburg, VA Deer damaged to entries (plot 6 and 31) at entries at seedling stage making it difficult to rate accurately.

Table 1. Entries in the 2015-2016 Uniform Barley Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors
1	Tenn. Winter(ck)	CI 6034	80	
2	Trebi (ck)	CI 936	76	
3	Kearney (ck)	CI 7580	68	
4	Kenosha (wht ck)	CI 14025	40	
5	Dicktoo (ck)	CI 5529	68	
6	Kentucky 1 (ck)	CI 6050	80	
7	Dan (VA03H-61)	VA96-41-17 / SC872143	11	Griffey
8	Eve (VA01H-68)	SC860974 / VA94-42-13	13	Griffey
9	Amaze 10 (VA07H-31 WS)	Thoroughbred / SC872143	7	Griffey
10	Secretariat (VA08B-85)	VA00B-199 / VA00B-259	5	Griffey
11	VA11B-141	SPONT03-44 / VA01B-44	2	Griffey
12	VA11B-102	VA99B-125 /3/ VA00B-279 // VA00B-214 / H159-005	2	Griffey
13	VA12B-8	Thoroughbred // Thoroughbred / Nomini	1	Griffey
14	VA12B-30	VA04B-120 / VA04B-7	1	Griffey
15	TCFW6-033	NB3437f / OR71	2	Hayes
16	10.0777	Wintmalt/Charles	1	Hayes
17	10.086	Wintmalt/Charles	1	Hayes

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2015-2016

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	1	Tenn. Winter(ck)	CI 6034	93
2	3	Kearney (ck)	CI 7580	93
3	5	Dicktoo (ck)	CI 5529	93
4	13	VA12B-8	Thoroughbred // Thoroughbred / Nomini	93
5	12	VA11B-102	VA99B-125 /3/ VA00B-279 // VA00B-214 / H159-005	92
6	15	TCFW6-033	NB3437f / OR71	92
7	11	VA11B-141	SPONT03-44 / VA01B-44	91
8	16	10.0777	Wintmalt/Charles	91
9	14	VA12B-30	VA04B-120 / VA04B-7	90
10	17	10.086	Wintmalt/Charles	90
LSD (0.05)				15

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Mead NE	Blacksburg VA
1	Tenn. Winter(ck)	1	93	100	85
2	Trebi (ck)	17	61	35	87
3	Kearney (ck)	2	93	100	87
4	Kenosha (wht ck)	16	83	80	87
5	Dicktoo (ck)	3	93	100	85
6	Kentucky 1 (ck)	12	88	95	80
7	Dan (VA03H-61)	13	86	85	87
8	Eve (VA01H-68)	11	89	90	88
9	Amaze 10 (VA07H-31 WS)	14	86	85	87
10	Secretariat (VA08B-85)	15	85	90	80
11	VA11B-141	7	91	100	82
12	VA11B-102	5	92	100	84
13	VA12B-8	4	93	100	85
14	VA12B-30	9	90	95	86
15	TCFW6-033	6	92	100	84
16	10.0777	8	91	100	83
17	10.086	10	90	100	80
	Average		88	91	84
	LSD (0.05)		15	25	11
	CV		8.1	13	6.0

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Mead NE	Blacksburg VA
1	Tenn. Winter(ck)	1	93	100	85
3	Kearney (ck)	2	93	100	87
5	Dicktoo (ck)	3	93	100	85
13	VA12B-8	4	93	100	85
12	VA11B-102	5	92	100	84
15	TCFW6-033	6	92	100	84
11	VA11B-141	7	91	100	82
16	10.0777	8	91	100	83
14	VA12B-30	9	90	95	86
17	10.086	10	90	100	80
8	Eve (VA01H-68)	11	89	90	88
6	Kentucky 1 (ck)	12	88	95	80
7	Dan (VA03H-61)	13	86	85	87
9	Amaze 10 (VA07H-31 WS)	14	86	85	87
10	Secretariat (VA08B-85)	15	85	90	80
4	Kenosha (wht ck)	16	83	80	87
2	Trebi (ck)	17	61	35	87
Average			88	91	84
LSD (0.05)			15	25	11
CV			8.1	13	6.0

**Table 4. 2015-16 Uniform Barley Winter Hardiness Nursery
Under a Controlled Environment Freeze Test**

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Tenn. Winter(ck)	1.1	38
2	Trebi (ck)	0.2	8
3	Kearney (ck)	3.3	88
4	Kenosha (wht ck)	2.5	70
5	Dicktoo (ck)	1.1	28
6	Kentucky 1 (ck)	1.4	65
7	Dan (VA03H-61)	2.1	78
8	Eve (VA01H-68)	1.9	63
9	Amaze 10 (VA07H-31 WS)	1.6	50
10	Secretariat (VA08B-85)	1.1	45
11	VA11B-141	2.1	63
12	VA11B-102	1.3	45
13	VA12B-8	1.1	40
14	VA12B-30	2.1	65
15	TCFW6-033	1.4	58
16	10.0777	0.6	18
17	10.086	2.0	63
Average		1.6	52
LSD(0.05)		0.6	21
CV		19.0	19

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	LSD (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
2013-14	73	46	83	-	69	63	11
2014-15	41	33	75	86	40	44	11
2015-16	93	61	93	83	93	88	15
Avg.	61	35	77	93	74	72	