

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM BARLEY WINTER HARDINESS NURSERY

2017-2018

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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	Raleigh	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: 28

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Raleigh, NC	No Data
Corvallis, OR	100% Survival
Lawrenceville, IL	100% Survival
Knoxville, TN	100% Survival
Ardmore, OK	0% Survival

COMMENTS:

Mead, NE Planted in blocks of 4 rows. 1 was at the south edge of the field.
As the field went north, winterkilling was more severe.

Raleigh, NC 2017-18 plots flooded after planting, 0 plants emerged for all plots
in field

Table 1. Entries in the 2017-2018 Uniform Barley Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors
1	Tenn. Winter(ck)	CI 6034	82	
2	Trebi (ck)	CI 936	78	
3	Kearney (ck)	CI 7580	70	
4	Kenosha (wht ck)	CI 14025	42	
5	Dicktoo (ck)	CI 5529	70	
6	Kentucky 1 (ck)	CI 6050	82	
7	NB10444	Unknown	1	Baenziger
8	NB12434	NE98936/NE97891/NB03439=(Perkins/88Ab926)	1	Baenziger
9	NB12437	NE98936/NE97891/NB04436=(NE97971/NE94738)	1	Baenziger
10	NB14422	NB99845/NB05419	1	Baenziger
11	NB14428	NB07443/NB99845	1	Baenziger
12	NB14430	NB07443/NB99845	1	Baenziger
13	NB10425	ND17687/SC010475=(VA75-4-24/SC793556//CIho2457 (hullless))	1	Baenziger
14	NB14404	NB07410/NB018187	2	Baenziger
15	NB14405	Stab 47/51-20/NB07416	2	Baenziger
16	Dan (VA03H-61)	VA96-41-17 / SC872143	13	Griffey
17	Eve (VA01H-68)	SC860974 / VA94-42-13	15	Griffey
18	Amaze 10 (VA07H-31 WS)	Thoroughbred / SC872143	9	Griffey
19	VA11B-141	SPONT03-44 / VA01B-44	4	Griffey
20	VA14B-63	VA05B-58 // VA05B-65 / VA05B-74	1	Griffey
21	VA14H-58	VA05H-03 / VA05H-128 // VA05H-158	1	Griffey
22	VA14B-59	VA04B-178/3/VA96-44-304//FEG 43-46/VA03B-171	2	Griffey
23	VA14B-74	VA05B-58//VA05B-65/VA05B-74	2	Griffey
24	VA14B-79	VA05B-58//VA05B-65/VA05B-74	2	Griffey
25	TCFW6-033	NB3437f / OR71	4	Hayes
26	10.0777	Wintmalt/Charles	3	Hayes
27	DH140322	2Ab09-X05W048-378HL/Tamalpais	1	Hayes
28	Buck	Strider/Doyce	2	Hayes

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2017-2018

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	4	Kenosha (wht ck)	CI 14025	84
2	8	NB12434	NE98936/NE97891/NB03439=(Perkins/88Ab926)	81
3	12	NB14430	NB07443/NB99845	80
4	7	NB10444	Unknown	77
5	9	NB12437	NE98936/NE97891/NB04436=(NE97971/NE94738)	77
6	10	NB14422	NB99845/NB05419	73
7	3	Kearney (ck)	CI 7580	73
8	11	NB14428	NB07443/NB99845	72
9	15	NB14405	Stab 47/51-20/NB07416	72
10	14	NB14404	NB07410/NB018187	70
LSD (0.05)				14

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Hays KS	Blacksburg		Mead NE	St. Paul MN
					VA	VA		
1	Tenn. Winter(ck)	16	68	100	95	78	0	
2	Trebi (ck)	28	23	10	80	3	0	
3	Kearney (ck)	7	73	100	100	88	5	
4	Kenosha (wht ck)	1	84	100	95	100	40	
5	Dicktoo (ck)	17	68	90	98	85	0	
6	Kentucky 1 (ck)	20	64	100	68	90	0	
7	NB10444	4	77	100	93	85	31	
8	NB12434	2	81	100	100	83	40	
9	NB12437	5	77	100	93	88	28	
10	NB14422	6	73	100	93	93	9	
11	NB14428	8	72	100	95	85	8	
12	NB14430	3	80	100	95	90	35	
13	NB10425	14	69	100	90	85	0	
14	NB14404	10	70	100	100	78	3	
15	NB14405	9	72	100	90	88	10	
16	Dan (VA03H-61)	21	64	100	83	73	0	
17	Eve (VA01H-68)	18	66	90	95	78	0	
18	Amaze 10 (VA07H-31 WS)	22	58	95	93	45	1	
19	VA11B-141	11	70	100	98	83	0	
20	VA14B-63	12	70	100	95	85	0	
21	VA14H-58	23	58	90	93	50	0	
22	VA14B-59	24	54	90	93	35	0	
23	VA14B-74	13	70	100	98	83	0	
24	VA14B-79	19	65	95	95	70	0	
25	TCFW6-033	15	69	100	90	85	0	
26	10.0777	27	42	35	98	35	1	
27	DH140322	26	44	40	98	40	0	
28	Buck	25	54	80	95	43	0	
Average			66	90	93	72	7	
LSD (0.05)			14	16	20	34	*	
CV			10	8.7	10	23	*	

* Non significant

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

Entry #	Entry Name	Ranked means	Means Across Loc.	Hays KS	Blacksburg		Mead		St. Paul	
					VA	VA	NE	NE	MN	MN
4	Kenosha (wht ck)	1	84	100	95	100	100	100	40	40
8	NB12434	2	81	100	100	100	83	83	40	40
12	NB14430	3	80	100	95	95	90	90	35	35
7	NB10444	4	77	100	93	93	85	85	31	31
9	NB12437	5	77	100	93	93	88	88	28	28
10	NB14422	6	73	100	93	93	93	93	9	9
3	Kearney (ck)	7	73	100	100	100	88	88	5	5
11	NB14428	8	72	100	95	95	85	85	8	8
15	NB14405	9	72	100	90	90	88	88	10	10
14	NB14404	10	70	100	100	100	78	78	3	3
19	VA11B-141	11	70	100	98	98	83	83	0	0
20	VA14B-63	12	70	100	95	95	85	85	0	0
23	VA14B-74	13	70	100	98	98	83	83	0	0
13	NB10425	14	69	100	90	90	85	85	0	0
25	TCFW6-033	15	69	100	90	90	85	85	0	0
1	Tenn. Winter(ck)	16	68	100	95	95	78	78	0	0
5	Dicktoo (ck)	17	68	90	98	98	85	85	0	0
17	Eve (VA01H-68)	18	66	90	95	95	78	78	0	0
24	VA14B-79	19	65	95	95	95	70	70	0	0
6	Kentucky 1 (ck)	20	64	100	68	68	90	90	0	0
16	Dan (VA03H-61)	21	64	100	83	83	73	73	0	0
18	Amaze 10 (VA07H-31 WS)	22	58	95	93	93	45	45	1	1
21	VA14H-58	23	58	90	93	93	50	50	0	0
22	VA14B-59	24	54	90	93	93	35	35	0	0
28	Buck	25	54	80	95	95	43	43	0	0
27	DH140322	26	44	40	98	98	40	40	0	0
26	10.0777	27	42	35	98	98	35	35	1	1
2	Trebi (ck)	28	23	10	80	80	3	3	0	0
Average			66	90	93	72	72	72	7	7
LSD (0.05)			14	16	20	34	34	34	*	*
CV			10	8.7	10	23	23	23	*	*

* Non significant

**Table 4. 2017-18 Uniform Barley Winter Hardiness Nursery
Under a Controlled Environment Freeze Test**

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Tenn. Winter(ck)	0.9	30
2	Trebi (ck)	0.9	43
3	Kearney (ck)	2.0	73
4	Kenosha (wht ck)	3.3	100
5	Dicktoo (ck)	1.0	40
6	Kentucky 1 (ck)	2.2	65
7	NB10444	2.7	88
8	NB12434	3.0	85
9	NB12437	2.1	80
10	NB14422	2.6	90
11	NB14428	3.1	88
12	NB14430	3.6	100
13	NB10425	3.2	93
14	NB14404	2.2	75
15	NB14405	1.9	55
16	Dan (VA03H-61)	1.1	45
17	Eve (VA01H-68)	1.6	65
18	Amaze 10 (VA07H-31 WS)	2.8	95
19	VA11B-141	0.6	23
20	VA14B-63	2.4	78
21	VA14H-58	2.2	88
22	VA14B-59	1.6	68
23	VA14B-74	1.6	75
24	VA14B-79	1.7	78
25	TCFW6-033	2.0	65
26	10.0777	1.2	38
27	DH140322	1.4	58
28	Buck	1.2	40
	Average	2.0	68
	LSD(0.05)	0.5	14
	CV	12.0	10

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
2016-17	40	53	85	88	58	45	15
2017-18	30	43	73	100	40	65	14
Avg.	58	37	77	93	71	70	