

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM OAT WINTER HARDINESS NURSERY

2014-2015

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	AR	Fayetteville	E. Mason
USA	IL	Lawrenceville	L. Phillippe
USA	NC	Laurel Springs/Waynesville	D. Marshall/M. Fountain
USA	TN	Knoxville	D. West
USA	LA	Baton Rouge	S. Harrison
USA	OK	Ardmore	J. Anderson
Poland	Blonie	Plant Breeding and Acclimatization Ins.	B. Lapinski & I. Kordulasińska
Czech Republic	Kromeriz	Agricultural Research Institute	M. Kadlíková
Hungary	Martonvasar	Agric. Res. Inst. of Hungary Academy	O. Veisz
Austria	Edelhof	Saatzucht Edelhof	S. Berger & H. Hofbauer
Germany	Bad Vilbel	Dottenfelderhof 1	B. Schmehe
UK	Wales	IBERS Aberystwyth University	S. Cowan
Canada	Saskatchewan	Oat Advantage	J. Dyck
Canada	Brandon	Agriculture and Agri-Food Canada	J.M. Fetch

DIGEST

NUMBER OF TESTS: 14 tests (6 US States, 8 foreign countries)

NUMBER OF ENTRIES: 15

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Bad Vilbel, Germany	100% Survival
Martonvasar, Hungary	100% Survival
Saskatchewan, Canada	0% Survival
Brandon, Canada	0% Survival
Knoxville, TN	0% Survival
Lawrenceville, IL	0% Survival
Baton Rouge, LA	No Data
Kromeriz, CR	No Data
Wales, UK	No Data
Fayetteville, AR	No Data

US STATE/COUNTRY	LOCATION	COOPERATORS' COMMENTS
Tennessee	Knoxville	Powerflex herbicide applied to control cheat in November killed all oats.
Oklahoma	Ardmore	Survival % was recorded in early March. Plots had 100% coverage heading into winter and were clipped on Nov. 11 for forage production.
Austria	Edelhof	Very warm winter, very few days with closed snow-layer, few precipitation. Bad germination of entry numbers: 3,13,15
Germany	Bad Vilbel	Very mild winter so all plants survived. We found loose smut in Fulgum (2 smutted in each rep.) and in Norline (25 smutted in each rep.)
Canada	Saskatoon	Extremely cold winter with no snow cover for much of it
Canada	Brandon	The longest dry spell was from October 3 to October 17, constituting 15 consecutive days with no observed precipitation. The month with the largest fraction of days without observed precipitation was October, with 84% of days reporting no observed precipitation at all. The first reported snow fall in 2014 was on October 28

Table 1. Entries in the 2014-2015 Uniform Oat Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors	
1	Fulgum (ck)	CI 708	77		
2	Norline (ck)	CI 6903	54		
3	Winter Turf (ck)	CI 3296	74		
4	Wintok (ck)	CI 3424	74		
5	NC10-5069y	SC961246 / Rodgers	3	Murphy	NC
6	NC09-4503N	TX98D666/CABALLO // FLLA95131	2	Murphy	NC
7	NC12-3578	SS76-40 / NC02-7989 // LA98105B	1	Murphy	NC
8	NC12-3742	NC02-7989 / SC961246 // Gerard 224	1	Murphy	NC
9	NC12-3753	NC02-7989 / SC961246 // Gerard 224	1	Murphy	NC
10	NC13-6579	NC01-3981/WN10B//NC01-3981	1	Murphy	NC
11	NC13-6584	NC01-3981/WN10B//NC01-3981	1	Murphy	NC
12	NC13-6589	NC01-3981/WN10B//NC01-3981	1	Murphy	NC
13	NC13-6664N	WN10B/NC01-3981	1	Murphy	NC
14	NC13-6665N	WN10B/NC01-3981	1	Murphy	NC
15	NC13-6666N	WN10B/NC01-3981	1	Murphy	NC

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2014-2015

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	4	Wintok (ck)	CI 3424	83
2	2	Norline (ck)	CI 6903	75
3	7	NC12-3578	SS76-40 / NC02-7989 // LA98105B	75
4	10	NC13-6579	NC01-3981/WN10B//NC01-3981	68
5	9	NC12-3753	NC02-7989 / SC961246 // Gerard 224	67
6	12	NC13-6589	NC01-3981/WN10B//NC01-3981	64
7	5	NC10-5069y	SC961246 / Rodgers	63
8	11	NC13-6584	NC01-3981/WN10B//NC01-3981	62
9	3	Winter Turf (ck)	CI 3296	60
10	8	NC12-3742	NC02-7989 / SC961246 // Gerard 224	58
LSD (0.05)				21

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Ardmore OK	Radzików Poland	Edelhof Austria	Laurel Spring NC
1	Fulgum (ck)	13	53	100	1	88	23.5
2	Norline (ck)	2	75	90	32	89	90
3	Winter Turf (ck)	9	60	100	4	100	35
4	Wintok (ck)	1	83	100	49	93	93
5	NC10-5069y	7	63	100	19	81	54
6	NC09-4503N	11	58	90	5	96	40
7	NC12-3578	3	75	95	21	92	90
8	NC12-3742	10	58	100	7	88	39
9	NC12-3753	5	67	95	6	83	85
10	NC13-6579	4	68	90	13	83	85
11	NC13-6584	8	62	100	5	74	68
12	NC13-6589	6	64	100	10	79	65
13	NC13-6664N	12	56	85	17	90	31
14	NC13-6665N	14	53	85	15	90	21
15	NC13-6666N	15	49	80	19	79	18
Average			63	94	15	87	56
LSD (0.05)			21	8	18	30	56
CV(%)			15	4	56	16	46

Table 2b. Winter Oat Survival (%) at Various Stations (sorted by rank)

Ent. No.	Entry Name	Ranked Means	Means across loc	Ardmore OK	Radzików Poland	Edelhof Austria	Laurel Spring NC
4	Wintok (ck)	1	83	100	49	93	93
2	Norline (ck)	2	75	90	32	89	90
7	NC12-3578	3	75	95	21	92	90
10	NC13-6579	4	68	90	13	83	85
9	NC12-3753	5	67	95	6	83	85
12	NC13-6589	6	64	100	10	79	65
5	NC10-5069y	7	63	100	19	81	54
11	NC13-6584	8	62	100	5	74	68
3	Winter Turf (ck)	9	60	100	4	100	35
8	NC12-3742	10	58	100	7	88	39
6	NC09-4503N	11	58	90	5	96	40
13	NC13-6664N	12	56	85	17	90	31
1	Fulgum (ck)	13	53	100	1	88	23.5
14	NC13-6665N	14	53	85	15	90	21
15	NC13-6666N	15	49	80	19	79	18
Average			63	94	15	87	56
LSD (0.05)			21	8	18	30	56
CV(%)			15	4	56	16	46

**Table 3. Uniform Oats Winter Hardiness Nursery
Under Controlled Environment Freeze Test**

Entry #	Entry Name	Survival Rating ¹	% Survival ²
1	Fulgum (ck)	0.7	33
2	Norline (ck)	2.7	80
3	Winter Turf (ck)	1.5	53
4	Wintok (ck)	2.2	63
5	NC10-5069y	1.3	55
6	NC09-4503N	3.1	93
7	NC12-3578	2.9	78
8	NC12-3742	2.5	80
9	NC12-3753	2.6	83
10	NC13-6579	2.1	75
11	NC13-6584	1.5	73
12	NC13-6589	2.0	75
13	NC13-6664N	1.5	60
14	NC13-6665N	2.0	75
15	NC13-6666N	1.4	60
Average		2.0	69
LSD (5%)		0.8	15
CV		19	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 -12°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