UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM OAT WINTER HARDINESS NURSERY

2017-2018

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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CONTENTS

COOPERATING AGRICULTURAL EXPERIMENT STATIONS AND PERSONNEL

Country	State	AES Location	Personnel
USA	AR	Fayetteville	E. Mason
USA	IL	Lawrenceville	L. Phillippe
USA	NC	Raleigh	D. Marshall / M. Fountain
USA	TN	Knoxville	D. West
USA	SD	Brookings	M. Caffe-Treml
USA	OK	Ardmore	J. Anderson
Austria	Edelhof	Saatzucht Edelhof	S. Berger & H. Hofbauer
Canada	Saskatchewan	Oat Advantage	J. Dyck
Czech Republic	Kromeriz	Agricultural Research Inst. Kromeriz, Ltd.	M. Zavřelová
Germany	Bad Vilbel	Dottenfelderhof 1	B. Schmehe
Hungary	Martonvasar	Agric. Res. Inst. of Hungary Academy	O. Veisz
Poland	Blonie	Plant Breeding and Acclimatization Ins.	B. Plonkowski / B. Lapinski
UK	Wales	IBERS Aberystwyth University	S. Cowan

DIGEST

NUMBER OF TEST LOCATIONS: 13 (6 US States, 7 foreign countries)

NUMBER OF ENTRIES: 12

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Wales, UK	No Data
Fayetteville, AR	No Data
Knoxville, TN	No Data
Brookings, SD	0% Survival
Saskatchewan, Canada	0% Survival
Ardmore, OK	100% Survival
Bad Vibel, Germany	100% Survival
Laurenceville, IL	100% Survival

US STATE/COUNTRY	LOCATION	COOPERATORS' COMMENTS
Okalahoma	Ardmore	Planted Nov 6 into clean till. 100% senescence on all plots. 7 days of high temperatures below 32 F and 4 days with lows below 10 F. Winter survival notes taken on March 11.
North Carolina	Raleigh	2017-18 plots flooded after planting, 0 plants emerged for all plots in field.
Austria	Edelhof	Very warm winter with very few precipitation. Cold period in March with few snow.
Germany	Dottenfelderhof	The winter began very mild with temperatures mostly over 0°C in December and January. Although the temperatures dropped significantly in February with minimum temperatures around -10˚C (which killed all wild mustard) no losses in winter oat nursery occured. In NC12-3742 and Wintok, loose smut was spotted both in the second replication.

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

Entry No	Entry name	Pedigree	Yrs in Nursery	Contributors	
1	Fulgum (ck)	CI 708	80		
2	Norline (ck)	CI 6903	57		
3	Wintok (ck)	CI 3424	76		
4	Winter Turf (ck)	CI 3296	77		
5	NC12-3578	SS76-40 / NC02-7989 // LA98105B	4	Murphy	NC
6	NC12-3742	NC02-7989 / SC961246 // Gerard 224	4	Murphy	NC
7	NC12-3922	Rodgers / NC03-2421	3	Murphy	NC
8	NC15-4180	Gerard 224 / Gerard 229	1	Murphy	NC
9	Gerard 224	Rodgers/Txab29923//Rodgers (=NC03-2421v)	1	Murphy	NC
10	Win/Nor-1	Wintok x Norline	10	Livingston, Murphy	NC
11	Win/Nor-10	Wintok x Norline	11	Livingston, Murphy	NC
12	Win/Nor-10b	Selection from Win/Nor-10	9	Livingston, Murphy	NC

Top 10 ranked survival entries for 2017-2018

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	3	Wintok (ck)	CI 3424	67
2	2	Norline (ck)	CI 6903	65
3	10	Win/Nor-1	Wintok x Norline	65
4	8	NC15-4180	Gerard 224 / Gerard 229	64
5	6	NC12-3742	NC02-7989 / SC961246 // Gerard 224	63
6	12	Win/Nor-10b	Selection from Win/Nor-10	62
7	5	NC12-3578	SS76-40 / NC02-7989 // LA98105B	62
8	11	Win/Nor-10	Wintok x Norline	59
9	9	Gerard 224	Rodgers/Txab29923//Rodgers (=NC03-2421v)	58
10	7	NC12-3922	Rodgers / NC03-2421	55
			LSD (0.05)	**12**

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Edelhof Austria	Martonvasar Hungary	Kromeriz Czech Republic
1	Fulgum (ck)	11	55	64	84	17
2	Norline (ck)	2	65	88	94	13
3	Wintok (ck)	1	67	77	95	30
4	Winter Turf (ck)	12	51	61	86	6
5	NC12-3578	7	62	68	84	34
6	NC12-3742	5	63	72	100	18
7	NC12-3922	10	55	63	89	13
8	NC15-4180	4	64	66	92	35
9	Gerard 224	9	58	70	94	10
10	Win/Nor-1	3	65	80	89	26
11	Win/Nor-10	8	59	73	78	26
12	Win/Nor-10b	6	62	78	90	18
	Average		61	72	86	21
	LSD (0.05)		12	15	36	14
	CV(%)		9.6	9.3	19	32

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Edelhof Austria	Martonvasar Hungary	Kromeriz Czech Republic
3	Wintok (ck)	1	67	77	95	30
2	Norline (ck)	2	65	88	94	13
10	Win/Nor-1	3	65	80	89	26
8	NC15-4180	4	64	66	92	35
6	NC12-3742	5	63	72	100	18
12	Win/Nor-10b	6	62	78	90	18
5	NC12-3578	7	62	68	84	34
11	Win/Nor-10	8	59	73	78	26
9	Gerard 224	9	58	70	94	10
7	NC12-3922	10	55	63	89	13
1	Fulgum (ck)	11	55	64	84	17
4	Winter Turf (ck)	12	51	61	86	6
	Average		61	72	86	21
	LSD (0.05)		12	15	36	14
	CV(%)		9.6	9.3	19	32

Table 3. Uniform Oat Winter Hardiness Nursery Under a Controlled Environment Freeze Test

Entry #	Entry Name	Survival Rating[1]	% Survival[2]
1	Fulgum (ck)	1.2	55
2	Norline (ck)	2.3	87
3	Wintok (ck)	2.1	79
4	Winter Turf (ck)	1.6	66
5	NC12-3578	1.5	72
6	NC12-3742	0.6	29
7	NC12-3922	1.2	51
8	NC15-4180	1.4	63
9	Gerard 224	0.6	29
10	Win/Nor-1	3.0	95
11	Win/Nor-10	2.8	87
12	Win/Nor-10b	2.7	89
	Average	1.7	68
	LSD (5%)	0.5	19
	CV	14	12

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.

[1]Rating:
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

[2]Survival (%):
50% of plants with rating of 1plus all plants rated >2 divided by total number of plants frozen multipled by 100