

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

**UNIFORM OAT WINTER HARDINESS NURSERY**

**2019-2020**

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**

<b>Country</b>	<b>State</b>	<b>AES Location</b>	<b>Personnel</b>
USA	AR	Fayetteville	E. Mason
USA	IL	Lawrenceville	L. Phillippe
USA	NC	Raleigh	D. Marshall/M. Fountain
USA	OK	Ardmore	J. Anderson
USA	SD	Brookings	M. Caffé-Tremi
USA	TN	Knoxville	D. West
USA	TX	College Station	B. Simoneaux
Austria	Edelhof	Saatzucht Edelhof	S. Berger & H. Hofbauer
Canada	Saskatchewan	Oat Advantage	J. Dyck
Czech Republic	Kromeriz	Agricultural Research Inst. Kromeriz, Ltd.	M. Závřelová
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. Lapinski

**DIGEST**

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

NUMBER OF ENTRIES: 18

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

DATA RECORDED: Percent winter survival

DATA NOT USED IN ANALYSIS:

Brookings, SD	No Data
College Station, TX	No Data
Fayetteville, AR	No Data
Saskatchewan, Canada	0% Survival
Ardmore, OK	100% Survival
Bad Vibel, Germany	100% Survival
Knoxville, TN	100% Survival
Laurenceville, IL	100% Survival
Martonvásár, Hungary	100% Survival

<b>US STATE/COUNTRY</b>	<b>LOCATION</b>	<b>COOPERATORS' COMMENTS</b>
Radzików	Poland	Mild winter without snow. Only -0.52°C recorded as minimum (March 24). No winter losses recorded in winter oat trials
Oklahoma	Ardmore	Trial was planted on Oct 3, 2019. Above average rainfall and cooler than average temps slowed fall growth, and allowed for earlier than normal winter acclimation. Very little winter damage was noticed and all plots showed 100% survival.
Austria	Edelhof	Late frost in end April. Very dry conditions April/May
Tennessee	Knoxville	Very mild winter.
Hungary	Martonvásár	Winter was very mild, and in a few days below 0 degrees Celsius, the crops were covered with snow. Because of this, all genotypes overwintered without frost damage.

**Table 1. Entries in the 2019-2020 Uniform Oat Winter Hardiness Nursery.**

Entry No	Entry name	Pedigree	Yrs in Nursery	Contributors	
1	Fulgum (ck)	CI 708	82		
2	Norline (ck)	CI 6903	59		
3	Wintok (ck)	CI 3424	78		
4	Winter Turf (ck)	CI 3296	79		
5	NC15-4180	Gerard 224 / Gerard 229	3	Murphy	NC
6	NC17-6440	GERARD 229 / TX07CS3697	2	Murphy	NC
7	NC17-6485	TX05CS556 / GERARD 224	2	Murphy	NC
8	NC17-6563	NC10-5069 / RODGERS	2	Murphy	NC
9	TAMO 412	FL9708-P71=(Coker 92Ab719/Horizon 314)//TAMO 405	2	Simoneaux	TX
10	TX07CS1948	FL9701-P30=(Horizon 314/Chapman)//TAMO 405	2	Simoneaux	TX
11	TX14OCS5212	FL0115-J4/TX02U7047	2	Simoneaux	TX
12	TX15OCS6039	FLO522//TX07CS2783	2	Simoneaux	TX
13	TX15OCS6142	FLO522//TX02U7682	2	Simoneaux	TX
14	TX15OCS6163	FLO522//TX07CS3701	2	Simoneaux	TX
15	TX16OCS7015	FLO522/TX07CS2783//TAMO405/LA9339(PS)	1	Simoneaux	TX
16	TX16OCS7093	UFRGS95252/LA966BIB32-1-1-B(Horz270 sib)//TAMO405/LA9339(PS)	1	Simoneaux	TX
17	TX16OCS7100	LA9339(PS)/TX07CS2783//TAMO406/TAMO405	1	Simoneaux	TX
18	TX17OCS8055	TX09CS069/TX07CS1948	1	Simoneaux	TX

## Top Ten Ranked Survival Entries

### Top 10 ranked survival entries for 2019-2020 based on field data

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	4	Winter Turf (ck)	CI 708	67
2	1	Fulgum (ck)	CI 6903	61
3	13	TX15OCS6142	FLO522//TX02U7682	50
4	15	TX16OCS7015	FLO522/TX07CS2783//TAMO405/LA9339(PS)	50
5	17	TX16OCS7100	LA9339(PS)/TX07CS2783//TAMO406/TAMO405	45
6	5	NC15-4180	Gerard 224 / Gerard 229	54
7	18	TX17OCS8055	TX09CS069/TX07CS1948	58
8	6	NC17-6440	GERARD 229 / TX07CS3697	56
9	14	TX15OCS6163	FLO522//TX07CS3701	66
10	16	TX16OCS7093	UFRGS95252/LA966BIB32-1-1-B(Horz270 sib)//TAMO405/LA9339(PS)	44
<b>LSD (0.05)</b>				<b>19</b>

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Raleigh NC	Edelhof Austria	Radzików Poland	Kromeriz Czech Republic
1	Fulgum (ck)	2	61	35	42	89	79
2	Norline (ck)	11	59	30	61	76	69
3	Wintok (ck)	12	63	43	60	90	59
4	Winter Turf (ck)	1	67	50	73	88	55
5	NC15-4180	6	54	18	46	86	68
6	NC17-6440	8	56	18	44	79	85
7	NC17-6485	13	53	10	41	85	77
8	NC17-6563	14	61	35	54	90	67
9	TAMO 412	15	53	3	57	80	72
10	TX07CS1948	16	58	30	62	72	66
11	TX14OCS5212	17	55	20	54	70	76
12	TX15OCS6039	18	43	23	21	56	70
13	TX15OCS6142	3	50	8	48	65	78
14	TX15OCS6163	9	66	53	59	73	79
15	TX16OCS7015	4	50	15	46	62	77
16	TX16OCS7093	10	44	30	18	53	74
17	TX16OCS7100	5	45	15	21	67	76
18	TX17OCS8055	7	58	15	61	86	69
<b>Average</b>			55	25	48	76	72
<b>LSD (0.05)</b>			19	50	30	28	10
<b>CV(%)</b>			17	95	30	18	6.6

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Raleigh NC	Edelhof Austria	Radzików Poland	Kromeriz Czech Republic
4	Winter Turf (ck)	1	67	50	73	88	55
1	Fulgum (ck)	2	61	35	42	89	79
13	TX15OCS6142	3	50	8	48	65	78
15	TX16OCS7015	4	50	15	46	62	77
17	TX16OCS7100	5	45	15	21	67	76
5	NC15-4180	6	54	18	46	86	68
18	TX17OCS8055	7	58	15	61	86	69
6	NC17-6440	8	56	18	44	79	85
14	TX15OCS6163	9	66	53	59	73	79
16	TX16OCS7093	10	44	30	18	53	74
2	Norline (ck)	11	59	30	61	76	69
3	Wintok (ck)	12	63	43	60	90	59
7	NC17-6485	13	53	10	41	85	77
8	NC17-6563	14	61	35	54	90	67
9	TAMO 412	15	53	3	57	80	72
10	TX07CS1948	16	58	30	62	72	66
11	TX14OCS5212	17	55	20	54	70	76
12	TX15OCS6039	18	43	23	21	56	70
<b>Average</b>			55	25	48	76	72
<b>LSD (0.05)</b>			19	50	30	28	10
<b>CV(%)</b>			17	95	30	18	6.6

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

Entry #	Entry Name	Survival Rating <sup>1</sup>	% Survival <sup>2</sup>
1	Fulgum (ck)	1.0	33
2	Norline (ck)	3.2	83
3	Wintok (ck)	2.5	58
4	Winter Turf (ck)	2.5	65
5	NC15-4180	2.3	62
6	NC17-6440	1.0	38
7	NC17-6485	1.7	53
8	NC17-6563	2.1	55
9	TAMO 412	3.1	75
10	TX07CS1948	3.1	83
11	TX14OCS5212	2.8	68
12	TX15OCS6039	1.0	38
13	TX15OCS6142	2.2	68
14	TX15OCS6163	3.1	80
15	TX16OCS7015	2.9	73
16	TX16OCS7093	2.0	55
17	TX16OCS7100	2.6	68
18	TX17OCS8055	1.3	55
<b>Average</b>		2.2	61
<b>LSD (5%)</b>		0.4	11
<b>CV</b>		8.2	8.7

**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.

**<sup>1</sup>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

**<sup>2</sup>Survival (%):**

50% of plants with rating of 1 plus all plants rated >2 divided by total number of plants frozen multiplied by 100