

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

**UNIFORM OATS WINTER HARDINESS NURSERY**

**2007-2008**

Compiled by

D. P. Livingston, Research Agronomist  
T. D. Tuong, Plant Science Research Technician

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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USDA-ARS  
South Atlantic Area  
Department of Crop Science  
North Carolina State University  
Raleigh, NC 27695

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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	R. Bacon/J. Kelly
USA	KS	Manhattan	R. Brengman
USA	SC	Clemson	B. Edge
USA	NC	Laurel Springs/Waynesville	J.P.Murphy
USA	TN	Knoxville	D. West
USA	ID	Aberdeen	D. Obert
Turkey	K.Maras	KSU Field Crops Department	T. Dokuyucu
Lithuania	Akademija	Lithuanian Univ. of Agriculture	A. Sliesaravicius
Poland	Blonie	Plant Breeding and Acclimatization Ins.	B. Lapinski
Czech Republic	Kromeriz	Cereal Research Institute	L. Nedomova
Hungary	Martonvasar	Agric. Res. Inst. of Hungary Academy of	O. Veisz
UK	Aberystwyth	IGER Plas Gogerddan	S. Cowan
Austria	Edelhof	Saatzucht Edelhof	S. Berger

**DIGEST**

NUMBER OF TESTS:	13 tests (6 US States, 7 foreign countries)	
NUMBER OF ENTRIES:	11	
EXPERIMENTAL DESIGN:	Single-row, 5-foot plot Two replications Randomized complete block	
DATA RECORDED:	Percent winter survival	
DATA NOT USED IN ANALYSIS:	Manhattan, KS	0% Survival
	Laurel Spring, NC	100% Survival
	Akademija, Lithuanian	100% Survival
	Clemson, SC	Data not received
	Aberdeen, ID	Data not received

**COMMENTS:**

US STATE/COUNTRY	LOCATION	COOPERATORS' COMMENTS
KS	Manhattan	Complete winter kill of all plants due to interaction of cold and drought.
TN	Knoxville	Very mild winter
Poland	Radzików	Winter was rather sleety than frosty, with only a few days of snow cover.
Czech Republic	Kromeriz	Winter with small amount of snow, all field was under attack of the animals. It is not possible to say which plots are damaged more or less. Birds put out all plants.
Lithuania	Akademija	warm winter with the exception of a short period when temperature went below zero.
Hungary	Martonvasar	Cool spring but relatively mild winter
Turkey	K. Maras and Afsin	In December, the lowest temperature was negative 26°C in Afsin and negative 7°C in
Australia	Edelhof	Late sowing. No closed snow-layer during the whole winter, precipitation (rain) higher during the whole winter season.

**Table 1. Entries in the 2007-2008 Uniform Oat Winter Hardiness Nursery.**

<b>Entry No</b>	<b>Entry name</b>	<b>Pedigree</b>	<b>Yrs in Nursery</b>	<b>Contributors</b>
1	Fulgum (ck)	CI 708	70	
2	Norline (ck)	CI 6903	47	
3	Winter Turf (ck)	CI 3296	67	
4	Wintok (ck)	CI 3424	67	
5	Win/Nor-1	Wintok x Norline	5	Livingston, Murphy NC
6	Win/Nor-10	Wintok x Norline	5	Livingston, Murphy NC
7	Win/Nor-10b	Selection from Win/Nor-10	4	Livingston, Murphy NC
8	NC01-3497	NC93-2978/Rodgers//Rodgers/FL874	3	Murphy NC
9	NC03-2421	Rodgers/Txab29923//Rodgers	2	Murphy NC
10	NC02-8331	NC93-2978/FL874S1G3//ARFOB3D	2	Murphy NC
11	NC02-8057	NC09-7070/TX89D7213//Rodgers	1	Murphy NC

## Top Ten Ranked Survival Entries

### Top 10 ranked survival entries for 2007-2008

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	7	Win/Nor-10b	Selection from Win/Nor-10	<b>88.8</b>
2	6	Win/Nor-10	Wintok x Norline	<b>87.5</b>
3	10	NC02-8331	NC93-2978/FL874S1G3//ARFOB3D	<b>84.9</b>
4	8	NC01-3497	NC93-2978/Rodgers//Rodgers/FL874	<b>82.6</b>
5	5	Win/Nor-1	Wintok x Norline	<b>82.4</b>
6	11	NC02-8057	NC09-7070/TX89D7213//Rodgers	<b>81.5</b>
7	4	Wintok (ck)	CI 3424	<b>80.2</b>
8	2	Norline (ck)	CI 6903	<b>78.6</b>
9	9	NC03-2421	Rodgers/Txab29923//Rodgers	<b>77.3</b>
10	3	Winter Turf (ck)	CI 3296	<b>72.3</b>
<b>LSD (0.05)</b>				<b>5.6</b>

**Table 2. Uniform Oats Winter Hardiness Nursery  
Under Controlled Environment Freeze Test**

<b>Entry #</b>	<b>Entry Name</b>	<b>Survival Rating</b>	<b>% Survival</b>
1	Fulgum (ck)	0	0
2	Norline (ck)	1.95	70
3	Winter Turf (ck)	0.8	35
4	Wintok (ck)	3.3	97.5
5	Win/Nor-1	2.7	85
6	Win/Nor-10	2.9	95
7	Win/Nor-10b	3.4	97.5
8	NC01-3497	0.25	12.5
9	NC01-2421	0	0
10	NC02-8331	0.65	32.5
11	NC02-8057	0.6	27.5
<b>Average</b>		1.5	50.2
<b>LSD (5%)</b>		0.5	18.7
<b>CV</b>		15.6	16.7

**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
- Frozen @ 1°C/hour to -12°C for 3 hours
- Thawed @ 2°C/hour to 3°C
- Roots trimmed and transplant to soil for 3 weeks at 13°C; 12 hours light/dark period; 400µmole light
- Plant survival ratings were visually rated for regrowth after 21 days.

**% Survival:**

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

**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

Table 3a. Winter Oat Survival (%) at Various Stations (sorted by entry number)

Ent. No.	Entry Name	Ranked Means	Means across loc	Edelhof Austria	Waynesville NC	Fayetteville AR	Knoxville TN	Radzikow Poland	Kromeriz Czech Republic	Martonvasar Hungary	Aberystwyth UK
1	Fulgum (ck)	11	58.9	4	63	100	40	88	30	61	86
2	Norline (ck)	8	78.6	29	100	100	100	96	44	84	77
3	Winter Turf (ck)	10	72.3	14	100	100	100	84	47	58	76
4	Wintok (ck)	7	80.2	18	100	95	100	94	72	71	93
5	Win/Nor-1	5	82.4	54	100	100	100	100	53	59	94
6	Win/Nor-10	2	87.5	75	100	100	100	96	52	84	93
7	Win/Nor-10b	1	88.8	79	100	100	100	94	69	79	89
8	NC01-3497	4	82.6	57	100	100	100	95	71	57	80
9	NC03-2421	9	77.3	25	100	100	100	94	60	74	65
10	NC02-8331	3	84.9	68	100	100	100	95	57	73	87
11	NC02-8057	6	81.5	47	100	95	100	88	67	65	90
<b>Average</b>			79.5	42.5	96.6	99.1	94.5	93.2	56.5	69.4	84.5
<b>LSD (0.05)</b>			5.6	35.1	11.9	0	9.5	11.8	29.8	28.5	26.6
<b>CV(%)</b>			3.1	37.1	5.5	0	4.5	5.7	23.7	18.5	14.1

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Edelhof Austria	Waynesville NC	Fayetteville AR	Knoxville TN	Radzikow Poland	Kromeriz Czech Republic	Martonvasar Hungary	Aberystwyth UK
7	Win/Nor-10b	1	88.8	79	100	100	100	94	69	79	89
6	Win/Nor-10	2	87.5	75	100	100	100	96	52	84	93
10	NC02-8331	3	84.9	68	100	100	100	95	57	73	87
8	NC01-3497	4	82.6	57	100	100	100	95	71	57	80
5	Win/Nor-1	5	82.4	54	100	100	100	100	53	59	94
11	NC02-8057	6	81.5	47	100	95	100	88	67	65	90
4	Wintok (ck)	7	80.2	18	100	95	100	94	72	71	93
2	Norline (ck)	8	78.6	29	100	100	100	96	44	84	77
9	NC03-2421	9	77.3	25	100	100	100	94	60	74	65
3	Winter Turf (ck)	10	72.3	14	100	100	100	84	47	58	76
1	Fulgum (ck)	11	58.9	4	63	100	40	88	30	61	86
<b>Average</b>			79.5	42.5	96.6	99.1	94.5	93.2	56.5	69.4	84.5
<b>LSD (0.05)</b>			5.6	35.1	11.9	0	9.5	11.8	29.8	28.5	26.6
<b>CV(%)</b>			3.1	37.1	5.5	0	4.5	5.7	23.7	18.5	14.1