

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

in cooperation with

STATE AGRICULTURAL EXPERIMENT STATIONS

Results from the

UNIFORM OAT WINTER HARDINESS NURSERY

2013-2014

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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	Page 2
Digest and Comments	3
Table 1. Entries in the 2013-2014 Uniform Oat Winter Hardiness Nursery	4
Top Ten Ranked Survival Entries	5
Table 2a. Percent Survival at the Various Stations (sorted by entry no.)	6
Table 2b. Percent Survival at the Various Stations (sorted by rank)	6
Table 3. SSR Analyses with Markers of Standards and New oat lines	7

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

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

COMMENTS:

- Percent(%) survival for plants in Ardmore, OK was calculated as average of two assessments taken on 30 January and 11 March, 2013
- Analysis of markers associated with winter hardiness was implemented beginning with the 2008-2009 nursery.
- All new oat lines will be evaluated with Simple sequence repeats (SSRs) associated with winter hardiness traits and continue to be added to the report.

US STATE/COUNTRY	LOCATION	COOPERATORS' COMMENTS
Tennessee	Knoxville	Metribuzin herbicide (Sencor) applied for cheat control on 5 Dec 2013. Herbicide application caused 100% death of oats.
Oklahoma	Ardmore	Gopher damage on Wintok rep #1
Austria	Edelhof	Very warm winter with very few snow (few days of frost or ice; average degrees around 1.5 - 2 °C higher than longtime-data). Very warm spring (around 2 °C higher than longtime-data). Throughout the whole growing period very low precipitation (October - April): 159,7 mm (rain, snow)
Germany	Bad Vilbel	Due to a very mild winter all plants survived however there was a great difference in stocking rate for which I add a 1-9 rating where 1 is an empty plot and 9 is a fully stocked plot.
Canada	Saskatoon	The UOWHN location in Saskatoon was seeded in late October 1st 2013 but did not emerge before cold weather set in. No emergence occurred in spring. Left over seed from the 2012-2013 UOWHN nursery was seeded earlier in September as the seed was available. They established very well but even though the snow cover was 16 inches, the cold winter left no plants alive.

Table 1. Entries in the 2013-2014 Uniform Oat Winter Hardiness Nursery.

Entry No.	Entry name	Pedigree	Yrs in Nursery	Contributors	
1	Fulgum (ck)	CI 708	76		
2	Norline (ck)	CI 6903	53		
3	Winter Turf (ck)	CI 3296	73		
4	Wintok (ck)	CI 3424	73		
5	NC10-5051y	SC961246 / AR0258-7	2	Murphy	NC
6	NC10-5069y	SC961246 / Rodgers	2	Murphy	NC
7	NC11-1651	SS76-40 // IL86-5698 / TX98D666	1	Murphy	NC
8	NC09-4274N	LA 9339/SS76-40 // FLLA95131	1	Murphy	NC
9	NC09-4503N	TX98D666/CABALLO // FLLA95131	1	Murphy	NC
10	NC11-1796v	NC01-3981 / SS76-40	1	Murphy	NC
11	NC11-1798y	NC01-3981 / SS76-40	1	Murphy	NC

Top Ten Ranked Survival Entries

Top 10 ranked survival entries for 2013-2014

Rank	Ent No.	Entry	Pedigree	% Survival (across locations)
1	2	Norline (ck)	CI 6903	82
2	4	Wintok (ck)	CI 3424	75
3	10	NC11-1796v	NC01-3981 / SS76-40	71
4	11	NC11-1798y	NC01-3981 / SS76-40	67
5	5	NC10-5051y	SC961246 / AR0258-7	66
6	1	Fulgum (ck)	CI 708	64
7	6	NC10-5069y	SC961246 / Rodgers	62
8	3	Winter Turf (ck)	CI 3296	61
9	9	NC09-4503N	TX98D666/CABALLO // FLLA95131	57
10	8	NC09-4274N	LA 9339/SS76-40 // FLLA95131	50
LSD (0.05)				15.0

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	Gubałówka Poland	Edelhof Austria	Laurel Spring NC
1	Fulgum (ck)	6	64	59	95	54	88	25
2	Norline (ck)	1	82	81	95	54	100	83
3	Winter Turf (ck)	8	61	75	89	32	100	8
4	Wintok (ck)	2	75	78	98	42	100	58
5	NC10-5051y	5	66	83	95	48	100	6
6	NC10-5069y	7	62	58	95	56	96	4
7	NC11-1651	11	31	50	33	19	53	0
8	NC09-4274N	10	50	45	100	35	69	3
9	NC09-4503N	9	57	67	82	43	94	2
10	NC11-1796v	3	71	73	94	39	86	65
11	NC11-1798y	4	67	67	100	41	93	33
Average			62	67	89	42	89	26
LSD (0.05)			15	ns	22	18	14	42
CV(%)			11	ns	11	19	7	74

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

Ent. No.	Entry Name	Ranked Means	Means across loc	Ardmore OK	Radzików Poland	Gubałówka Poland	Edelhof Austria	Laurel Spring NC
2	Norline (ck)	1	82	81	95	54	100	83
4	Wintok (ck)	2	75	78	98	42	100	58
10	NC11-1796v	3	71	73	94	39	86	65
11	NC11-1798y	4	67	67	100	41	93	33
5	NC10-5051y	5	66	83	95	48	100	6
1	Fulgum (ck)	6	64	59	95	54	88	25
6	NC10-5069y	7	62	58	95	56	96	4
3	Winter Turf (ck)	8	61	75	89	32	100	8
9	NC09-4503N	9	57	67	82	43	94	2
8	NC09-4274N	10	50	45	100	35	69	3
7	NC11-1651	11	31	50	33	19	53	0
Average			62	67	89	42	89	26
LSD (0.05)			15	ns	22	18	14	42
CV(%)			11	ns	11	19	7	74

Table 3. SSR Analyses with Markers of Standards and New oat lines

Primer	AM2	AM102	AM270S-1	HVM20	JAO4042	JAO4234a	JAO4234b	JAO4636	VRN1	Xncs15-3	AME23	AME178	AME184a	AME184b		
Traits	RS, LS, CFT	RS, LS, CFT	FT, TR, LS, CFT	LS, RS, CFT, TR	TR	VRN, RS, LS, CFT	CFT	CFT	VRN	CFT, TR	MAT, LPPD, SPPD, VRN, NO-VRN, MAT-VLD, RS, LS, CFT	RS	CFT	WFS, MAT, LPPD, SPPD, VRN, NO-VRN, MAT-VLD	Number of Significant Alleles	
Allele Size (bp)	164	220	206	142	262	260	283	286	390	232	263	182	190	193		
Entry No.	Entry name															
1	Fulgum (ck)	yes	no	no	no	no	no	no	no	no	no	-	yes	yes	3	
2	Norline (ck)	no	yes	yes	yes	yes	-	-	yes	-	yes	yes	no	no	yes	8
3	Winter Turf (ck)	yes	yes	no	no	yes	no	no	no	no	-	yes	no	no	yes	5
4	Wintok (ck)	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes*	no	no	yes	10
5	NC10-5051y	no	yes	yes	yes	yes	no	no	yes*	no	yes	no	no*	no	yes	6
6	NC10-5069y	-	yes	yes	yes	yes	no	no	yes	no	yes	no	no	-	-	6
7	NC11-1651	yes	yes	yes	no	yes	no	no	no	no	-	no	no	no	yes	5
8	NC09-4274N	no	-	yes	yes	yes	no	no	no	no	yes	yes	yes	no	yes	7
9	NC09-4503N	no	yes	yes	yes	yes	no	no	no	no	yes	yes	no	yes	no	7
10	NC11-1796v	no	yes	yes	yes	yes	no	no	no	no	yes	no	yes	no	yes	7
11	NC11-1798y	-	yes	yes	yes	yes	no	no	no	no	yes	no	yes	no	yes	7

WFS = Winter Field Survival
 FT = Freeze Tolerance
 TR = Translocation 7C-17
 MAT = Maturity

LPPD = Long Photoperiod
 SPPD = Short Photoperiod
 MAT-VLD = Maturity in vernalized long day treatment
 HD = Heading date

RS = Root score
 LS = Leaf Score
 CFT = Crown Freeze Tolerance
 VRN = Vernlization

NO-VRN = No Vernlization

* Results differ from previous testing and may represent variation within these lines using these markers.
 - Missing data