

REGISTRATION OF MULTILINE M72 AND M73 OAT CULTIVARS¹

(Reg. Nos. 266 and 267)

K. J. Frey and J. A. Browning²

'MULTILINE M72' (Reg. No. 266) and 'Multiline M73' (Reg. No. 267) cultivars of oats (*Avena sativa* L.) were developed by the Iowa Agric. and Home Economics Exp. Stn. in cooperation with USDA. These agronomically uniform cultivars represent composites of isolines that vary in their inherent resistances to biotypes of the crown rust fungus (*Puccinia coronata* Cda. var. *avenae* Fraser and Led.).

The isolines composited to form Multiline M72 and Multiline M73 cultivars were developed through backcrossing with experimental strain 'CI 7555' as the recurrent parent. This strain was selected from progeny of the cross 'Clintland'* 5 × 'Victoria' × 'Hajira' 2 × 'Banner' 3 × 'Victory' × Hajira 4 × 'Roxton'. The backcrosses to Clintland, from which CI 7555 was developed, were made during 1953-57. During the next 2-year period, CI 7555 was purified and tested for disease reaction and agronomic performance. It carries the *Pg-2* and *Pg-4* genes for reaction to stem rust (*Puccinia graminis* Pers. *avenae* Ericks. and Henning) and gene *Pc-5* for reaction to crown rust. Beginning in 1959, CI 7555 was used as the recurrent parent in a series of crosses with other oat strains that possessed unique genes for crown rust resistance. Isolines that resulted from these backcrossing programs are listed in Table 1.

Seed of seven isolines was composited in the proportions shown in Table 1 to produce breeder seed for Multiline M72 and Multiline M73. Breeder seed of each isolate component in a multiline cultivar is increased periodically, usually in the amount of 1 to 2 metric tons. This provides sufficient seed for

3 to 6 years of compositing. To provide breeder seed for each cultivar, appropriate quantities of the seven isolines were composited to make a seed lot of approximately 4.0 metric tons. The percentage contribution of each isolate in the breeder seed for each multiline cultivar is given in Table 1, together with the acceptable levels of variation in the three classes of certified seed.

Multiline M72 and Multiline M73 cultivars are midseason in maturity, of medium height, and produce predominantly medium-sized yellow seeds. They may contain as much as 2 to 4% white seed. Their panicles are semicompact and the cultivars are lodging resistant. They produce short, upright, dark green leaves. Both multiline cultivars carry the *Pg-2* and *Pg-4* genes for reaction to stem rust, but both are susceptible to the Clintland race of loose smut (*Ustilago avenae* (Pers.) Rostr.) and to the barley yellow dwarf virus. By definition, Multiline M72 and Multiline M73 cultivars are heterogeneous for crown rust reaction. Each is a cultivated unit with population resistance to *P. coronata avenae*.

Multiline denotes that the cultivar is a composite of isolines; M denotes midseason maturity; 72 and 73 denote the year in which the foundation seed lots of specific cultivars were released. We do not anticipate changing the isolate composition of the Multiline M oat cultivars again.

Breeder seed of isolines used in the development of Multiline M cultivars of oats is maintained by the Iowa Agric. and Home Economics Exp. Stn., Iowa State Univ., Ames.

¹ Registered by the Crop Science Society of America. Journal Paper No. J-8210 of the Iowa Agric. and Home Economics Exp. Stn., Ames, Iowa. Project 1752. In cooperation with the ARS-USDA. Accepted 30 Nov. 1975.

² C. F. Curtiss Distinguished Professor of Agriculture and professor of plant pathology, respectively.

Table 1. Multiline M series of oat isolines, their pedigrees, reactions to key races of *Puccinia coronata*, and the percentage of each included in breeder seed of Multiline M72 and Multiline M73 cultivars.

Isoline	CI No.	Pedigree	Reaction to <i>Puccinia coronata</i> race			Percentage contribution in	
			290	326	264B	M72	M73
X104c-7	9182	CI 7555 ⁶ × Ceirch du Bach	MR	S	S	9 (±6)†	5 (±3)
X270I	9183	CI 7555 ⁶ × CI 8079*	R	R	MR	18 (±8)	18 (±8)
X421I	9184	CI 7555 ⁶ × CI 8001*	R	MR	R	10 (±6)	18 (±8)
X424III	9187	CI 7555 ⁶ × Acencao	R	R	S	9 (±6)	5 (±3)
X449I	9189	CI 7555 ⁶ × CI 6665	MS	MR	MS	18 (±8)	18 (±8)
X475II	9190	CI 7555 ⁶ × CI 8078*	R	R	R	18 (±8)	18 (±8)
X765	9191	CI 7555 ⁵ 2 × Clinton × CI 8081*	MR	R	R	18 (±8)	18 (±8)

* *Avena sterilis*.

† Percentages in parentheses indicate acceptable levels of variation in foundation, registered, and certified seed.

REGISTRATION OF MULTILINE E72, MULTILINE E73, AND MULTILINE E74 OAT CULTIVARS¹

(Reg. Nos. 268 to 270)

K. J. Frey and J. A. Browning²

'MULTILINE E72' (Reg. No. 268), 'Multiline E73' (Reg. No. 269), and 'Multiline E74' (Reg. No. 270) cultivars of oats (*Avena sativa* L.) were developed by the Iowa Agric. and Home Economics Exp. Stn. in cooperation with USDA. These agronomically uniform cultivars are composites of isolines that vary in their inherent resistances to races of the crown rust fungus (*Puccinia coronata* Cda. var. *avenae* Fraser and Led.). The isolines composited to form breeders' seed of Multiline E72, Multiline E73, and Multiline E74 cultivars were developed through backcrossing with experimental line 'CI 8044' as the recurrent parent. CI 8044 is a pureline selected from the cross 'Clintland' × 'Garry-5'

made in 1954. The F₁ and F₂ generations were grown at Aberdeen, Idaho, and Ames, Iowa, respectively. From a group of F₃ panicle rows at Ames in 1957, one (CI 7970) which appeared especially promising was selected for intensive testing. Many F₅ panicle progenies of CI 7970 were tested for presence of the *Pg-2* and *Pg-4* genes for stem rust (*Puccinia graminis* Pers. *avenae* Ericks. and Henning) reaction and several genes from Garry for crown rust reaction. Five lines, each homozygous for genes *Pg-2* and *Pg-4*, were isolated with respect to combinations of genes for crown rust reaction. Beginning in 1960, one of these, C-237-89III (CI 8044), was used as recurrent parent in a series of crosses with other lines that possessed unique genes that condition reaction to crown rust. A sister line to CI 8044, i.e., C237-89V, and the Multiline E series isolines of oats developed by backcrossing are listed in Table 1. The percentage contribution of each isolate in breeders' seed for Multiline E72, Multiline E73, and Multiline E74 cultivars is given in Table 1 together with acceptable levels of variation in the various certified seed generations.

Seed of each isolate is increased periodically, usually in the amount of 1.5 to 2.0 metric tons. This provides sufficient seed for 3 to 5 years of compositing. To provide breeders' seed of Multiline E72, appropriate quantities (Table 1) of 10 isolines were composited to make a seed supply of 4.5 to 5.0 metric tons. Breeders' seed lots of Multiline E73 and Multiline E74 were made similarly. Multiline E72, Multiline E73, and Multiline E74 oat cultivars are eligible for propagation under the Seed Certifi-

¹ Registered by the Crop Science Society of America. Journal Paper No. J-8209 of the Iowa Agric. and Home Economics Exp. Stn., Ames, Iowa. Project 1752. In cooperation with the ARS-USDA. Accepted 20 Nov. 1975.

² C. F. Curtiss Distinguished Professor of Agriculture and professor of plant pathology, respectively.

Table 1. Multiline E series of oat isolines, their pedigrees, reactions to key races of *Puccinia coronata*, and percentage of each included in breeders' seed of Multiline E72, Multiline E73, and Multiline E74 cultivars.

Line	CI No.		Reaction to <i>Puccinia coronata</i> race			Percentage contribution in		
			290	326	264B	E72	E73	E74
X292II	9169	CI 8044 ⁴ 2 X CI 7555 ⁴ X Ceirch du Bach	MR	S	MS	12 (±6)†	12 (±6)	18 (±8)
X434**	9170	CI 8044 ⁵ 3 X Clinton X Garry 2 X CI 8079*	R	R	R	24 (±8)	18 (±8)	22 (±8)
X466*	9172	CI 8044 ⁶ X CI 8001*	MR	MS	MS	6 (±4)	4 (±3)	4 (±3)
X467	9173	CI 8044 ⁶ X Victorgrain 48-93	MR	S	S	6 (±4)	--	--
X470*	9176	CI 8044 ⁶ X Acencao	R	MR	S	14 (±6)	4 (±3)	4 (±3)
X539III	9177	CI 8044 ⁴ 3 X Clintland 2 X Chapman 178 X CI 7235	MR	MS	MS	6 (±4)	4 (±3)	4 (±3)
X541	9178	CI 8044 ⁴ 3 X Bonkee 2 X CI 7154 X CI 7171	R	MS	MR	14 (±6)	18 (±8)	18 (±8)
X719	9179	CI 8044 ⁴ 2 X CI 7555 X CI 6665	MS	S	MS	--	18 (±8)	4 (±3)
X721	9180	CI 8044 ⁴ 2 X CI 7555 X CI 7654	MR	MR	MS	6 (±4)	4 (±3)	4 (±3)
X766	9181	CI 8044 ⁵ 2 X Clinton X CI 8081*	MR	R	R	6 (±4)	18 (±8)	22 (±8)
C237-89V	--	Clintland X Garry 5	MR	S	S	6 (±4)	--	--

* *Avena sterilis*.

† Percentages in parentheses indicate acceptable levels of variation in foundation, registered, and certified seed.

cation System for only three generations from breeders' seed, one each for foundation, registered, and certified.

Multiline E72, Multiline E73, and Multiline E74 cultivars of oats are very early in maturity, short, and produce predominantly large plump ivory-colored seed with a bronze basal tip. They may contain from 2 to 4% yellow seeds. They have semi-compact panicles and good lodging resistance. Plants of Multiline E72, Multiline E73, and Multiline E74 cultivars produce short, upright, dark green leaves. They carry the *Pg-2* and *Pg-4* genes for reaction to stem rust, but are susceptible to the barley yellow dwarf virus and to the Clintland race of loose smut (*Ustilago avenae* (Pers.) Rostr.). By definition, Multiline E cultivars are heterogeneous for reaction to crown rust, which results in a cultivated unit with population resistance to *P. coronata avenae*. Additionally, the recurrent parent contributed

a measurable degree of background general resistance to crown rust that further protects these cultivars.

Multiline denotes that the cultivar is a composite of isolines; *E* denotes early maturity; 72, 73, or 74 denote the year in which foundation seed lots of specific cultivars in the series were released. As additional Multiline E isolines with new crown rust resistance genes become available and/or the race structure of the crown rust population changes, future Multiline E cultivars will be constituted to provide the best possible protection from the crown rust fungus. New cultivars will be named in accordance with the naming system outlined herein.

Breeders' seed of the isolines used in the development of Multiline E cultivars of oats is maintained by the Iowa Agric. and Home Economics Exp. Stn., Iowa State Univ., Ames.

REGISTRATION OF CP 67-412 SUGARCANE¹ (Reg. No. 39)

R. J. Matherne, H. P. Fanguy,
P. H. Duncelman, and R. D. Breaux²

CP 67-412 SUGARCANE (*Saccharum* spp.), a trispecies hybrid involving *Saccharum officinarum* L., *S. spontaneum* L., and *S. barberi* Jeswiet, is a selection from the cross CP 44-155 X CP 53-16. The cross was made at Canal Point, Fla., during the 1962 crossing season. CP 67-412 was developed through cooperative research of the ARS-USDA, the Louisiana Agric. Exp. Stn., and the American Sugar Cane League of the U.S.A., Inc., and was released to the Louisiana industry in 1975.

CP 67-412, a medium high sucrose, moderately erect variety, is recommended for both light and heavy soils. It is well suited to machine harvesting. CP 67-412 equalled CP 61-37 in metric tons/ha and CP 48-103 in sugar/metric ton of cane in 54 plant cane and ratoon experiments on both light and heavy soils.

CP 67-412 is susceptible to infection with mosaic but yield tests indicate tolerance to the disease. It is moderately resistant to cold and equal to CP 52-68 in milling and juice extraction. CP 67-412 is moderately resistant to the sugarcane borer.

Seedcane of CP 67-412 will be maintained by USDA at the U.S. Sugarcane Laboratory, Houma, La.

¹ Registered by the Crop Science Society of America. Contribution of ARS-USDA, in cooperation with Louisiana Agric. Exp. Stn. and the American Sugar Cane League of the U.S.A., Inc. Accepted 25 Nov. 1975.

² Research Agronomists, U.S. Sugarcane Laboratory, ARS-USDA, Houma, LA 70360.

REGISTRATION OF RULER WHEAT¹ (Reg. No. 567)

H. N. Lafever²

'RULER' soft red winter wheat (*Triticum aestivum* L. em. Thell.), CI 17314, is a high-yielding cultivar originating from the Ohio cross Purdue L494A1-8-5-5/'Lucas'. Purdue L494A1-8-5-5 was selected from the cross Norin 10-3/R4746A6. R4746A6 originated from a complex cross of 'Kawvale' - 'Fultz' - 'Hungarian' - 'W38' - 'Wabash' - 'Fairfield' - 'Trumbull' - 'Hope' - 'Hussar'/'Trumbull' - 'Fultz' sel-'Minhardi' - 'Wabash' - 'Purplestraw' - 'Chinese' - 'Michigan Amber'. The cultivar traces back to a single head selection made in the F₆ generation in 1965. Further purification of the line was made by bulking 208 head selections made in 1967, 1970, and 1972. The line was first entered in the Uniform Eastern Soft Wheat Nursery in 1971 under the designation 'TN1542'. Along with the applicant, significant contributions to the development of Ruler were made by the USDA Soft Wheat Quality Laboratory, Wooster, Ohio, which conducted quality determinations, and the ARS-USDA, Lafayette, Ind., which conducted Hessian fly resistance determinations³. Ruler was officially released by the Ohio Agricultural Research and Development Center in the summer of 1975.

Ruler is a relatively short, midseason cultivar with dark green foliage. Heads are fusiform, mid-dense, with yellow anthers, and semierect at maturity. Awnlets are present with tip awnlets 1 to

¹ Registered by the Crop Science Society of America. Approved for publication by the Ohio Agricultural Research and Development Center as Journal Paper No. 36-75. Accepted 15 Nov. 1975.

² Professor, Dep. of Agronomy, Ohio Agricultural Research and Development Center, Wooster, OH 44691.

³ The author also wishes to acknowledge the contribution of Dr. C. A. Lamb (retired) who made the original cross.

variations up to 610 m in Arizona.

Breeder seed of Santa Cruz will be maintained by the Arizona Agricultural Experiment Station, Tucson, AZ 85721. Foundation seed will be available from the Foundation Seed Service, Arizona Agricultural Experiment Station, University of Arizona, Tucson, AZ 85721.

D. T. RAY AND R. E. STAFFORD (2)

References and Notes

- Stafford, R.E., Ray, D.T., Johnson, D.L., and Thompson, R.K. 1983. Five guar germplasm lines. *Crop Sci.* 23:808.
- Assistant research professor, Dep. of Plant Sci., Univ. of Arizona, Tucson, AZ 85721; and research geneticist, USDA-ARS, Texas A&M Univ. Agric. Res. and Ext. Ctr., Vernon, TX 76384. Contribution from the Arizona Agric. Exp. Stn. Registration by the Crop Sci. Soc. of Am. Accepted 10 June 1985.

REGISTRATION OF 'MULTILINE E76' AND 'MULTILINE E77' OATS

'MULTILINE E76' oats (*Avena sativa* L.) (Reg. no. 309) and 'Multiline E77' oats (Reg. no. 310) were developed by the Iowa Agricultural and Home Economics Experiment Station in cooperation with USDA-ARS, and released in 1976 and 1977, respectively. These agronomically uniform cultivars are composites of isolines that vary in their inherent resistances to races of the crown rust fungus (*Puccinia coronata* Cda. var. *avenae* Fraser Led.). The isolines composited to form breeder seed of Multiline E76 and Multiline E77 were developed through backcrossing with experimental line CI 8044 as the recurrent parent. CI 8044 is a pure line selected from a 'Clintland' × 'Garry-5' cross made in 1954. The F₁ and F₂ generations were grown at Aberdeen, ID, and Ames, IA, respectively. From a group of F₃ panicle rows at Ames in 1957, one (CI 7970) that appeared especially promising was selected for intensive testing. Many F₅ panicle progenies of CI 7970 were tested for presence of the *Pg-2* and *Pg-4* genes for stem rust (caused by *Puccinia graminis* Pers. f. sp. *avenae* Ericks. and E. Henn.) resistance and several genes from Garry for crown rust resistance. Five lines, each homozygous for genes *Pg-2* and *Pg-4*, were isolated. Beginning in 1960, one of these, C-237-89III (CI 8044), was used as the recurrent parent in a series of matings with other lines that possessed unique genes that condition resistance to crown rust. The Multiline E series isolines of oats, developed by backcrossing, are listed in Table 1. The percentage contribution of each isolate in breeder seed for Multiline E76 and E77 cultivars is given in Table

1 together with acceptable levels of variation in the various certified seed generations.

To provide breeder seed of Multiline E76, appropriate quantities (Table 1) of nine isolines were composited to make a seed supply of 4.5 to 5.0 t. Breeder seed of Multiline E77 was similarly made. Seed of each isolate is increased periodically, usually in the amount of 1.5 to 2.0 t. This provides sufficient seed for 3 to 5 yrs of compositing. Multilines E76 and E77 oat cultivars are eligible for propagation under the Iowa Seed Certification System for only three generations from breeder seed, one each for foundation, registered, and certified.

Multilines E76 and E77 cultivars are very early in maturity, short, and produce predominantly large, plump, ivory seeds with a bronze basal tip. They may contain from 2 to 4% yellow seeds. Plants of both cultivars produce short, upright, dark green leaves. They have semicompact panicles and good lodging resistance. They carry the *Pg-2* and *Pg-4* genes for reaction to stem rust, but are susceptible to the barley yellow dwarf virus and to the Clintland race of loose smut (caused by *Ustilago avenae* [Pers.] Rostr.). Multiline E cultivars are heterogeneous for reaction to crown rust, and this results in population resistance to *P. coronata*. Additionally, the recurrent parent contributed resistance to certain races of crown rust that further protects these cultivars.

Multiline denotes that the cultivar is a composite of isolines. The E denotes early maturity, and 76 or 77 denotes the year in which foundation seed lots of specific cultivars in the series were released. As the race structure of the crown rust population changes, new isolines with different crown rust resistance genes will be included in future Multiline E cultivars to provide the best possible protection from the crown rust fungus. New cultivars will be named in accordance with the naming system outlined herein.

Breeder seed of the isolines used in the development of Multiline E cultivars of oats is maintained by the Iowa Agricultural and Home Economics Experiment Station, Iowa State University, Ames, IA 50011.

K. J. FREY, J. A. BROWNING, AND M. D. SIMONS (1)

References and Notes

- C. F. Curtiss Distinguished Professor in Agriculture, Iowa State Univ., Ames, IA 50011; head professor, Dep. Plant Pathology, Texas A&M Univ., College Station, TX 77843; research plant pathologist and professor, USDA-ARS and Iowa State Univ., Ames, IA 50011. Registration by the Crop Sci. Soc. of Am. Cooperative contribution from USDA-ARS and Journal Paper no. J-11475 of the Iowa Agric. and Home Economic Exp. Stn., Ames, IA 50011. Project 2447. Accepted 10 June 1985.

Table 1. Multiline E series of oat isolines, their pedigrees, reactions to key races of *Puccinia coronata*, and percentage of each included in breeder seed of Multiline E76 and Multiline E77 cultivars.

Line	CI no.	Pedigree	Reaction to <i>Puccinia coronata</i> race			Percentage contribution in	
			294	326	264B	E76	E77
X292II	9169	CI 8044* 2 × CI 7555* × Ceirch du Bach	MR§	S	MS	18 (±8)†	13 (±6)
X434	9170	CI 8044* 3 × Clinton × Garry 2 × CI 8079†	R	R	R	22 (±8)	16 (±8)
X466	9172	CI 8044* × CI 8001†	S	MS	MS	4 (±3)	4 (±3)
X470	9176	CI 8044* × Acencao	MR	MR	S	4 (±3)	4 (±3)
X541	9178	CI 8044* 3 × Bonkee 2 × CI 7154 × CI 7171	S	MS	MR	18 (±8)	13 (±6)
X719	9179	CI 8044* × CI 7555 × CI 6665	MS	S	MS	4 (±3)	--
X721	9180	CI 8044* 2 × CI 7555 × CI 7654	MR	MR	MS	4 (±3)	--
X766	9181	CI 8044* 2 × Clinton × CI 8081†	MR	R	R	22 (±8)	16 (±8)
Y344	9285	CI 8044* × PI 295919†	MS	R	R	--	10 (±5)
Y345	9286	CI 8044* × B437†	R	R	R	4 (±3)	10 (±5)
Y346	9287	CI 8044* × B439†	R	R	MR	--	10 (±5)
Y349	9290	CI 8044* × B433†	R	A	R	--	4 (±3)

† *Avena sterilis*.

† Percentages in parentheses indicate acceptable levels of variation in foundation, registered, and certified seed.

§ R, MR, MS, and S denote resistant, moderately resistant, moderately susceptible, and susceptible, respectively.