

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON, D.C.

**NOTICE OF RELEASE OF LP1-2581, LP640-1304, LP3-1159, LP1-2163H, BARLEY
GERMPLASM LINES**

Release of LP1-2581 (PI xxxxxx), LP640-1304 (PI xxxxxx), LP3-1159 (PI xxxxxx), and LP1-2163H (PI xxxxxx) spring, low phytate feed barley germplasm lines.

The Agricultural Research Service, U.S. Department of Agriculture, announces the release of a group of four low-phytate (LP) spring barley germplasm lines. These lines will be useful for the production of low phytate barley cultivars and for genetic and biochemical studies. Each line represents a unique combination of genetic background and source of the LP mutant-derived trait and differs from the previously released LP germplasm lines LP1, LP2, LP3, and LP4 and from the ARS-developed LP cultivars 'Clearwater' and 'Herald,' and from 'Lophy,' a cultivar developed in Canada. Reductions in phytate levels are coupled with equivalent increases in inorganic phosphorus (iP) and result in grain with increased phosphorus (P) digestibility and reduced fecal P when fed to monogastric animals. Each LP allele is derived from sodium azide-induced mutations in the background 'Harrington.' Harrington is a two-rowed spring malting cultivar developed in Canada and is the current quality standard for two-rowed malting barley. Scientists participating in their development include Phil Bregitzer, Victor Raboy, and Don Obert (ARS-Aberdeen, ID).

LP1-2581 is a two-rowed, hulled spring barley with the pedigree 01ID2330/ 'Camas.' 01ID2330 was one of the lines that was bulked to produce germplasm line LP1 which has the pedigree Harrington*4/lpa1-1. Camas is a two-rowed feed cultivar developed by North Dakota State University and jointly released with the University of Idaho. The mutant lpa1-1 allele conditions an approximate reduction in phytate of 50% and an approximate reduction in total P of 10%. It also is associated with a slight reduction in overall agronomic performance, especially under conditions of environmental stress, and a relatively larger reduction of test weight in all environments. LP1-2581 was developed as a source of lpa1-1 in a two-rowed background with the expectation of superior test weight relative to 'Herald,' a six-rowed cultivar containing the lpa1-1 allele. LP1-2581 is similar to Herald for agronomic traits including yield and percentage plump kernels and is higher for test weight (Table 1).

LP640-1304 is a six-rowed, hulled spring barley with the pedigree 01ID552/98Ab12904, both breeding lines developed at ARS-Aberdeen. 01ID506 contains the mutant allele 640, which is also present in the LP hulless cultivar Clearwater. The 640 allele conditions a similar reduction in phytate as lpa1-1 (~50%). Detailed studies of the effects of mutant 640 on agronomic performance have not been conducted, but based on extensive yield trials of Clearwater, its effects appear to be similar to lpa1-1 except for less apparent sensitivity to environmental stress. LP640-1304 is superior relative to Herald for grain yield and test weight and is competitive for grain yield relative to the popular two-rowed feed cultivar 'Baronesse' (Table 1).

LP3-1159 is a six-rowed, hulled spring barley with the pedigree 01ID506/98Ab12904, both breeding lines developed at ARS-Aberdeen. 01ID506 contains the lpa3-1 allele in the background of the six-rowed malting cultivar 'Stander'; 98Ab1290 also is a six-rowed line with good malt quality. Previous studies have shown lpa3-1 to condition an approximate 70% reduction in phytate, but also that it confers more severe reductions in agronomic performance than lpa1-1. LP3-1159 appears to represent a unique blend of phytate reduction and good agronomic performance. Grain yield and test weight are superior relative

to Herald, and yield is competitive relative to LP640-1304 and to the popular feed cultivar 'Baronesse' (Table 1).

LP1-2163H is a six-rowed, hulless spring barley with the pedigree 'Herald'/'Godiva.' Godiva is the source of the hulless trait, and Herald is the source of the lpa1-1 allele conditioning the LP phenotype. LP1-2163H was developed as a source of the lpa1-1 allele in a six-rowed, hulless background. It is similar in agronomic performance to the two-rowed hulless LP cultivar Clearwater, and has as good or better test weight as Clearwater despite its six-row phenotype (Table 2).

Table 1. Agronomic performance and phosphorus profile of hulled germplasm lines and check cultivars derived from irrigated yield trials in 2007 and 2009 (Aberdeen and Filer, ID), and dryland yield trials in 2007 (Potlach, ID) and 2009 (Fenn, ID).

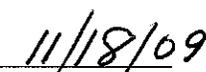
Line	Grain yield bu/acre	Test weight lb/bu	Plump kernels %	iP ng/mg	Total P ng/mg
Creel	122	49.3	61	nd	nd
Baronesse	112	52.4	76	197	3480
LP640-1304	111	50.5	73	774	3172
LP3-1159	109	49.5	71	1090	3384
LP1-2581	106	50.8	68	930	3130
Harrington	106	51.9	79	238	3470
Herald	102	48.2	70	815	3030

Table 2. Agronomic performance and phosphorus profile of hulless germplasm line LP1-2163H and check cultivars derived from irrigated yield trials in 2007 and 2009 (Aberdeen and Filer, ID), and dryland yield trials in 2007 (Potlach, ID) and 2009 (Fenn, ID).

Line	Grain yield bu/acre	Test weight lb/bu	Plump kernels %	iP ng/mg	Total P ng/mg
CDCMcGwire	84	60	29	198	3705
Clearwater	83	57	47	849	3242
05ID2163H	82	59	47	773	3259
CDCAIamo	67	58	53	nd	nd

Signature:


 Deputy Administrator, Crop Production and Protection
 Agricultural Research Service, U.S. Department of Agriculture


 Date