MEMORANDUM

TO: Specialty Crop Variety Release Committee

FROM: Norm Weeden, pea breeder/geneticist

DATE: January 10, 2012

RE: Proposal for MSU licensed cultivar of MSUPBLB10-10

The following motion and supporting documentation is presented for consideration at the 2012 Cultivar Release and Recommendation Meeting in Bozeman.

Norman F. Weeden, Professor
Department of Plant Sciences & Plant Pathology
Montana State University
Bozeman, MT 59715-3140
nweeden@montana.edu
PHONE 406-994-7622, FAX 406-994-7600

Motion: That Montana State University pea breeding line B10-10 (MSUPBLB10-10) high-amylose yellow dry pea be approved for release in 2012.

Pedigree: Delta x Carneval/Admiral/Majoret/Bolero

Recommendation: Licensed Release.

Potential names: Amigold

Selection history: MSUPBLB10-10 was derived from a complex cross with 'Delta' as one parent and a line derived from a complex pedigree including 'Carneval,' 'Admiral,' 'Majoret,' 'Bolero,' and a vigorous but tall line B98-434. One F_2 plant was selected in the field in 2008 and taken to an F_5 line, A10-10, by single seed descent. The line was selected for vigorous growth, erect, semi-leafless habit, high amylose, yellow cotyledon, pointed pod, and high yield. Twenty seed of A10-10 was grown in the field during the summer of 2010 as B10-10. Seed harvested from B10-10 was increased and inspected for uniformity during the winter 2010-2011. Yield trials were performed at the Hort Farm in Bozeman, Moccasin and Richland in the summer of 2011.

Purification/seed stocks: MSUPBLB10-10 is derived from a single F_5 plant. The F_6, F_7 and F_8 have been uniform for high amylose, wrinkled seed, yellow cotyledon, white flower, semi-leafless, semi-dwarf, pointed pod, and time to maturity. In the 2010 grow out and 2011 yield trials the line displayed visual uniformity with regard to height, flowering time, color and maturity.

Description: MSUPBLB10-10 is the first high-amylose yellow dry pea proposed for release for the Northern Great Plains. It is semi-leafless, semi-dwarf, good yielding dry pea with medium test weight and maturity. The line has excellent resistance to lodging and bears most of its pods in the top third of the plant, facilitating mechanical harvesting. It is susceptible to powdery mildew, but this disease has not been a problem in the field at Moccasin or at the Hort Farm. The light yellow cotyledon produces whitish flour that does not darken after processing into noodles and should combine well with wheat or other flours to increase protein, reduce gluten, and reduce the glycemic index of the product. The pointed pod character may help reduce pod shattering during harvest. MSUPBLB10-10 could provide growers with a crop in their rotation that commands a premium price because of its nutraceutical properties.

Characteristics/comparisons

Yield. At the Hort Farm MSUPBLB10-10 nearly yields as much as its low-amylose parent, Delta. For the last six years, Delta has been the highest yielding variety planted at the Hort Farm, clearly more productive than Majoret, Bolero, Cruiser and Mozart. Thus, at the Hort Farm, MSUPBLB10-10 is a relatively high yielding line, much higher than Bolero, the source of the high-amylose trait or even Majoret, a good quality low-amylose green dry pea. It also yields more than the green cotyledon high-amylose dry pea, Amigo. In the summer of 2010 MSUPBLB10-10 out-performed all other breeding lines at the Hort Farm and appeared comparable to Delta in both habit and yield. This observation was confirmed in the summer of 2011 in standardized yield trials at the Hort Farm (see Table 1).

Table 1. Yield comparisons of MSUPBLB10-10 with selected dry pea varieties

Variety/selection[1]	Location	Yield (lbs/acre) (average of 2 plots)
Delta (LA)	Hort Farm (11)	3324
Mozart (LA)	Hort Farm (11)	3212
Cruiser (LA)	Hort Farm (11)	2519
Amigo (HA)	Hort Farm (11)	2025
MSUPBLB10-10 (HA)	Hort Farm (11)	3000
MSUPBLB10-11 (HA)	Hort Farm (11)	2537
MSUPBLB10-37A (HA)	Hort Farm (11)	3262
Delta (LA)	Moccasin (11)	991
MSUPBLB10-10 (HA)	Moccasin (11)	913
Delta (LA)	Richland (11)	1501
MSUPBLB10-10 (HA)	Richland (11)	1240

[1] LA = low-amylose dry pea, HA = high-amylose dry pea

MSUPBLB10-10 and its parent, Delta, performed less well at Moccasin and Richland. At Moccasin MSUPBLB10-10 bloomed several days earlier than most of the other lines being tested. In comparison, at the Hort Farm MSUPBLB10-10 was only 1 day ahead of most other lines tested. The faster maturation of MSUPBLB10-10 (and to some extent Delta) at Moccasin relative to other lines may have reduced its ability to take advantage of the available water and sunlight in late spring and early summer. A similar situation at Richland also may have limited yield.

Lodging tolerance. Lodging tolerance is an essential trail for mechanized harvest in Montana. Delta displayed the most erect habit of the varieties that had be examined at the Hort Farm and is the source of the lodging tolerance in MSUPBLB10-10. No difference has been observed between the two lines for susceptibility to lodging.

Seed weight. Hundred seed weight (cwt) for MSUPBLB10-10 is moderate (22.1 g), slightly less than Delta (23.6 g) or Mozart (22.9 g) but more than Cruiser (20.1 g) and comparable to Amigo (22.5 g), the other high-amylose line. All values are from seed grown at Bozeman in 2011, but these are verified by similar trends at Moccasin and Richland.

Dry pea test weight. At about 60.0 lbs/bu the test weight for MSUPBLB10-10 was consistently lower than all other yellow pea lines tested, including Delta, which had a test weight between 64 and 65 lbs/bu. Amigo shows a test weight of 59.9 lbs/bu, and other high-amylose lines display a similar lower test weight. The lower test weight appears to be characteristic of the wrinkled pea type.

Plant height. At the Hort Farm MSUPBLB10-10 is very similar to Delta in height, being among the tallest of the semi-dwarf lines planted over the last six years. At Moccasin and Richland in 2011, both MSUPLB10-10 and Delta were relatively short compared to the other yellow pea lines tested.

Disease reaction. At the Hort Farm and Moccasin MSUPBLB10-10 has been free of foliar disease and did not exhibit signs of wilt in soil know to be infested with *Fusarium oxysporum* f. sp. *pisi* race 1. In Minot and possibly at Richland the line shows susceptibility to powdery mildew (*Erysiphe polygoni* DC).

Shattering. There was no observed difference between Delta (blunt pod) and MSUPBLB10-10 (pointed pod) in their tendency to shatter during harvest. Additional testing is necessary involving machine harvesting of larger plots to determine if the pointed pod character reduces pod shattering.

Summary. MSUPBLB10-10 is a high-amylose yellow dry pea that performs well under a short, cool season such as is experienced in the Gallatin Valley. Its yield is comparable to that of most low-amylose dry peas grown in this region. It performs significantly better, both in yield and lodging resistance, than the other high-amylose dry pea available (Amigo), and its yellow cotyledon can be processed to flour, opening up a much larger market for the high-amylose product. It is the only high-amylose yellow pea developed for this region and offers the grower an opportunity to find markets in the health food industry (with a very low glycemic index starch) and command a much higher price for pea flour than is otherwise available. MSUPBLB10-10 is not recommended for regions where powdery mildew is endemic, and the comparative yield of the line appears to drop significantly in regions with a longer growing season.