

Perry R. Miller, Professor
Dept of Land Resources and Environmental Sciences
Montana State University
Bozeman, MT 59717-3120
pmiller@montana.edu; 406-994-5431

MEMORANDUM

FROM: Perry Miller, Cropping Systems Researcher
DATE: January 3, 2018
RE: Release of 14-24 SB Fababean for cover crop use

Pedigree: Single seed selection from PI 222216 (Afghanistan)

Recommendation: Private release as a specialty crop **Name:** To be determined

Rationale: Cover crops and associated seed markets are a relatively recent phenomenon in the USA. Fababean is reported to have the greatest N fixation capacity among cool-season grain legumes (Walley et al. 2007) and would therefore be a good legume candidate for cover crop use. Further, the use of pea or lentil in cover crop mixtures counts towards the rotational restrictions for those commonly grown crops (USDA-RMA). Thus, a legume not commonly grown for grain (i.e. no acres of fababean were reported in 2017 in Montana) may be a more attractive choice than pea or lentil for use in cover crop mixtures. Lastly, fababean stems provide vertical structure within a cover crop canopy, unlike most other cool-season annual legumes (lupine excepted), which could provide additional benefits in trapping snow and attracting wildlife. There are no important concerns for grazing fababean forage. In 2017, there were 33,000 dryland acres of cover crops grown in Montana (most were mixtures), 325,000 acres of annual crops harvested for forage (hay or silage), another 33,000 acres of annual crops used for grazing, and nearly 5,000 acres of annual crops left standing, presumably for wildlife food plots. This represents a doubling of annual crop acreage totaled for these four categories since 2014. My goal was to engage a small-seeded, dark coated (high tannin) fababean for economic use in cover crop mixtures.

Selection History:

2012:

I obtained seed of a prospective small-seeded fababean (*SSNS-1*) proposed for use as a cover crop, developed at the Crop Development Center in Saskatoon, Canada. The seed size was 380 mg seed⁻¹ and larger than many of the food pea cultivars grown in Montana.

2013:

I obtained 54 'small-seeded' fababean lines from the Plant Germplasm Introduction unit of USDA-ARS in Pullman, WA, and grew them in single rows at the MSU Post Farm. The seed packets for each accession contained 25 seeds, which were highly variable in size and color (i.e. not genetically uniform). Five lines with the greatest proportion of dark seed coats and smallest seed size were chosen for phenotypic selection of dark seed coats and small seed size. Seed size was approximately 220 mg seed⁻¹, +/- 20 mg. Significant progress was made in one cycle of phenotypic selection at the MSU Post Farm but it was obvious that uniformity of seed color could not be achieved in a timely manner.

Winter 2014/15:

I chose 10 small, dark seeds (200-220 mg seed⁻¹) from four of the parental accessions (one was discarded due to larger seed size) and grew them in individual pots in the Plant Growth Center at MSU-Bozeman, isolating each parental accession in separate rooms within the PGC. Self pollination by hand (i.e. 'tripping') of fababean plants was performed over a 2-month period. From each group, a single plant was chosen for advancement based on seed number, size, and color uniformity.

2015:

Forty-eight to 72 seeds from three selected lines were hand-sown in separate areas at the MSU Post Farm with > 100 m isolation, and 11 seeds from one selection in my home garden. These small plots were irrigated and harvested by hand. After threshing seed from the plants, one line was discarded due to a small amount of non-dark seeds (~1.5%).

2016:

Seed was mechanically sown for three selected lines in separate areas with > 100 m isolation at the MSU Post Farm under limited irrigation. After machine harvesting, one line was discarded due to slightly larger seed size than the other two selections.

2017:

From two very similar selections (indistinguishable based on seed color or size), the selection with the greatest amount of seed was chosen for further increase on a 1-ac plot at the MSU Post Farm. 1,500 lb were harvested with the intent of contracting this seed source with a commercial partner via private release.

General performance and characteristics: During seed increase under limited irrigation, 14-24 SB Faba had uniform plant height that varied from 18 – 28" (shorter heights occurred in lower areas of the field that were water-saturated), but were quite uniform within an area. <1% 'tall' plants were observed. Seed size is approximately 210 mg seed⁻¹ and uniformly dark. There is no trial data specific to this exact seed source because there are no existing trials that formally compare cover crops, and especially within mixtures. In fact it is uncertain what performance measures are even important in cover crops, aside from N fixation.

Summary: 14-24 SB Faba represents the first small-seeded, dark-coated fababean for the cover crop seed market. Interested parties have contacted us about seed availability. I think it is my responsibility to secure variety release in a way that appropriately recognizes MSU's investment in the selection and increase of this unique seed source. It is my goal to contract future production of this fababean line before April 1, 2018, if that can be achieved.

References:

Walley, F.L., G.W. Clayton, P.R. Miller, P.M. Carr, and G.P. Lafond. 2007. Nitrogen economy of pulse crop production in the northern Great Plains. *Agron. J.* 99: 1710-1718.