NOTICE OF RELEASE OF NEW SMALL-RED DRY BEAN (*Phaseolus vulgaris*, L.)
GERmplasm LINES: ARS-R93344, ARS-R93346, AND ARS-R93349

The Agricultural Research Service, United States Department of Agriculture and Michigan State University announce the release of ARS-R93344, ARS-R93346, AND ARS-R93349. Research was conducted by G.L. Hosfield, Sugarbeet and Bean Research Unit, East Lansing; and J.D. Kelly and M.A. Uebersax, Departments of Crop and Soil Sciences and Food Science and Human Nutrition, East Lansing. These germplasm lines (hereafter referred to as new releases) combine a narrow profile plant architecture and upright and short-vine growth habit with the preferred seed size, shape, and pigmentation characteristic of the small-red market class. The new lines have improved yield and longer maturity than ARS-R93001 to ARS-R93008. The new releases provide the dry bean industry with upright small-red germplasm with good combining ability for seed characteristics and acceptable processing quality to improve the market class. The new releases are F₂ derived F₁₁ germplasm lines. Each resulted as a single F₂ plant selection from the third cycle of recurrent selection for plants with superior small-red seed characteristics combined with the Type IIa (upright and short-vine) growth habit. They originated from the following respective crosses: X90108/X90131, X90108/X90123, and X90112/X90116. The parents are ARS accessions crossed with commercially released cultivars and Michigan State University breeding lines. The base population (C₀) contributing to the new releases resulted from crossing upright, Type IIa pinto types with 'Ember', ‘UI-36’, XPB-197; the Asgrow Seed Co., Twin Falls, Idaho; ‘Dessarural’ from Central America, and ‘Revolucion-79’ from Nicaragua. The Type IIa were derived by recurrent crosses using nine commercial pinto bean cultivars and 16 small-seeded and upright navy and tropical black-bean breeding lines.

The mean yield of the three releases was 22% lower than Rufus and 17% higher than Garnet. They average about 50 centimeters in height and exhibit a rigid upright appearance and excellent lodging resistance compared to Rufus and Garnet. They have white flowers and bloom on average in 47 days and mature in about 92 days. Maturity is uniform with exceptional “dry down” and a “straw-yellow” color at harvest.

The new releases carry the Ibc-1² gene combination for resistance to BCMV. ARS-R93349 also carries the UR-6 gene which confers resistance to several races of bean rust, a disease caused by the fungus [*Uromyces appendiculatus* (Pers.:Pers) Unger].
Weight per 100 seed of all three releases averaged 35.3 grams compared to Rufus (35.9 grams) but heavier than Garnet (29.9 grams). Dry seeds of the three releases are slightly darker red than Rufus or Garnet. Following thermal processed (canned), the seed of ARS-R93344 was slightly lighter than Rufus or Garnet.

The three releases were tested for aggregate culinary quality, including dry, soaked, and cooked grains. A processing quality index (PQI) was based on visual properties of canned beans: the amount of clumping, splitting, and overall visual appeal, canning broth characteristics of viscosity, color, and the amount of extruded starch; and cooked seed characteristics of color, size, and shape for the market class. The PQI of the new releases were essentially equivalent to Garnet, but, on average, about four units lower than Rufus.

The washed drained weights of the three releases averaged 282 grams compared to Rufus and Garnet (279 grams). The hydration coefficients were 1.7, 1.6, and 1.7, respectively, and slightly lower than the 1.8 optimum for well-hydrated beans. The washed drained weight ratio of ARS-R93349 (1.5) was identical to Rufus and Garnet, but the values displayed by the other releases were 1.4 and 1.6, respectively. Beans with a washed drained weight ratio of 1.5 are considered to have optimum water retention properties.

Texture ratings of the three releases ranged from 6.2 to 8.2 Newtons force per 100 grams of beans and are within the range of 5.5 to 8.5 Newtons force per 100 grams of beans considered acceptable for small-red beans.

Seed will be maintained by the USDA-ARS and is available from Dr. George L. Hosfield, USDA-ARS, Crop and Soil Sciences Department, 494-E Plant & Soil Sciences Building, Michigan State University, East Lansing, Michigan 48824-1325. Genetic material of these releases will be deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. The USDA-ARS requests that appropriate recognition be made if these germplasm lines contribute to the development of a new breeding line or cultivars.