Breeding beans for direct harvest systems

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**Institution:** Michigan State University  
**Crop:** Common bean, Phaseolus vulgaris

Advances in plant breeding drive agronomic change. In dry beans (Phaseolus vulgaris) the traditional harvest method across the U.S. was to undercut and pull bean plants at maturity, windrow these plants into larger rows and thresh plants when dry using a pickup reel on the combine, all in separate operations. These traditional operations are costly in terms of time, equipment, fuel and labor and constrain growers from expanding bean acreage. In the mid-1970s the bean breeding program at Michigan State University embarked on developing an improved plant type. The program used black bean germplasm from Central America to breed a taller more upright bean plant that resisted lodging. With the release of these new upright varieties in the 1990s, growers started to explore the possibility of direct harvesting beans similar to soybean harvest. Without that change in improved plant architecture growers would not have had that opportunity. In Michigan over 80% of beans planted are direct harvested in a shorter time period with minimum wear to the combine (no root/soil entering the machine), resulting in a cleaner product to sell to the elevator. The same growers can plant 25-30% more acres to beans compared to those using traditional harvest methods, freeing up additional tractors for other farm operations. The change in plant architecture has positively impacted all the major bean classes, including navy, black, pinto, great northern, small red and pink market classes, grown in Michigan and North Dakota.

**Indicate all funding sources**
- Hatch Funds (These are also known as USDA formula funds. They are often used for salary support for agricultural faculty and technicians, and to fund experiment station operating costs)
- Commodity Groups
- USDA-CSREES Special Research Grant

**What problem was addressed by this success?**
- Quality
- Costly harvest operations, in terms of time, equipment, fuel and labor

**Please indicate all stakeholders that benefited from this success story**
- Growers
- End-users
- Plant Breeders

**Indicate the number of each type of participant in this success story**
- Undergraduate Students: 1 Minority Serving
- Graduate Student: 1 Minority Serving
- Post Doc: 1 Minority Serving
- Research Technician: 1 Minority Serving
- Other: 1 Minority Serving

**What are the outputs? Output = (product, goods and services resulting from success e.g. varieties or germplasm released, new genetic tools etc.)**
- New upright varieties and germplasm

**What are the impacts? Impact = (long term, sustainable change due to success story e.g. change in disease, yield, quality including acreage planted)**
- In Michigan over 80% of beans planted are direct harvested in a shorter time period with minimum wear to the combine (no root/soil entering the machine), resulting in a cleaner product to sell to the elevator. The same growers can plant 25-30% more acres to beans compared to those using traditional harvest methods, freeing up additional tractors for other farm operations. The change in plant architecture has positively impacted all the major bean classes, including navy, black, pinto, great northern, small red and pink market classes, grown in Michigan and North Dakota.

**Which category below best describes this success story?**
- New germplasm (breeding line, population, etc.)