

Major Cultivar Releases by the ISU College of Agriculture and Life Sciences

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Brian Meyer, director of college relations
Mark Honeyman, associate dean
for operations
College of Agriculture and Life Sciences

Introduction

In addition to productive graduates, practical scientific advances, and progressive extension programs, a major product of the land grant colleges of agriculture has been the development of new varieties or cultivars of plant species adapted to the climate of the area. Land grant plant breeders employ comprehensive scientific processes to develop and then release these adapted cultivars. At Iowa State University (ISU), a wide variety of plant species have been improved and released. The purpose of this article is to list some of the major ISU releases.

Materials and Methods

Individuals active in plant breeding were contacted and ISU records were reviewed to assemble the list. The total number of releases is considerable (several hundreds). The goal of this listing is to highlight the major releases from across spectrum of plant species.

Results and Discussion

Not surprisingly, the Iowa list of 33 releases focuses on agronomic crops important to Iowa (corn, soybeans, popcorn, sorghum, and oats). Also included are fruit (apples), vegetable, and ornamental plants.

Table 1. Selected top cultivar releases (Agriculture Experiment Station, College of Agriculture and Life Sciences, February 2020).

	Crop	Scientific name	Cultivar name/ genetic line	Year released	Notes
1.	Corn	Zea mays L.	B73	1972	An inbred line highly prized for making hybrids used for food, feed, and industrial feedstocks, including fuel. These high-performing commercial hybrids led to unprecedented corn yields for farmers. A team of USDA and Iowa State University scientists developed the B73 line in the 1970s and continued refining into the 1980s. It remains the basis for nearly all the seed-parent lines of corn used in the United States and throughout the temperate areas of the world. B73 played a central role in the completion of the maize genome sequence. In 2005, NSF funded the Maize Genome Sequencing Consortium to provide a comprehensive foundation to systematically understand maize biology with the goal of breeding higher yielding, disease-resistant and drought-tolerant cultivars. Iowa State University was one of four institutions in this project. The corn variety selected for sequencing was B73, developed at Iowa State. The cultivar remains the basis for many of the world's commercial lines of corn and is used widely in corn genetics research. ISU's Patrick Schnable was lead author for the maize genome sequence publication, featured as the cover story of Science November 2009.
2-7.	Corn	Zea mays L.	B14 B14A B37 B57 B64 B68 B84	1952 1962 1958 1963 1965 1968 1978	Listed are some of the corn lines that transformed agriculture in the Corn Belt and around the world. For more than 70 years, the "B lines," developed cooperatively by Iowa State's Agriculture Experiment Station and the USDA Agricultural Research Service in a long-term corn-breeding partnership, have been the source for dramatic improvements to corn hybrids. Their qualities permeate the seed industry. Trace the lineage of 45 percent (a conservative estimate) of U.S. corn hybrids and find B lines. In the 1990s, it was estimated those hybrids were grown on tens of millions of acres and valued at more than \$1 billion in Iowa alone and billions worldwide. Average U.S. corn yields more than quadrupled from 1930 to the 1990s. Studies show 60 percent of that increase is due to genetic improvements, much of which can be linked to the B lines. The B lines consistently delivered a solid package of valued traits, including yield, root and stalk structure, disease and insect resistance, and maturity. More importantly, these performed exceptionally well when crossed with other lines. The B lines are true Iowa originals. All testing and selection occurred in Iowa fields. These emerged from a unique source of germplasm developed by George Sprague, a USDA scientist at Iowa State from 1939 to 1958. Sprague was a strong proponent of recurrent selection, a constant recycling of the cream of the crop from each breeding cycle. The result: B lines, elite inbred corn lines well-suited for hybrid development worldwide.

Table 1 (continued). Selected top cultivar releases (Agriculture Experiment Station, College of Agriculture and Life Sciences, February 2020).

	Crop	Scientific name	Cultivar name/ genetic line	Year released	Notes
8.	Corn	Zea mays L.	B104	1996	B104 was a significant corn inbred line that has been extensively used commercially for transformation in corn for development of biotechnology corn traits. Developed by Arnel Hallauer, B014 was one of several inbred lines of corn released by Iowa State in 1996 because of their potential value as sources of germplasm in pedigree-selection breeding programs.
9.	Soybean	Glycine max (L.) Merrill	Corsoy	1967	Corsoy yielded 15 percent more than other maturity group II cultivars grown at 42 to 44 degrees N latitude in the Midwest. It became the most widely grown cultivar for that soybean growing region. Developed by Charles Weber.
10.	Soybean	Glycine max (L.) Merrill	Vinton 81	1981	Vinton 81, a cultivar of maturity group II, had a unique combination of high yield, larger than average seed size, higher than average protein content, and seed with a yellow hilum color. The seed characteristics made it well-suited for manufacturing of tofu and other soybean food products. It was considered the most desirable cultivar for food manufacturing grown at 42 to 44 degrees N latitude of the Midwest for more than 20 years. Developed by Walter Fehr.
11.	Soybean	Glycine max (L.) Merrill	IA3024	2004	IA3024 was the first soybean cultivar that contained only 1 percent linolenic acid in its seed oil. By reducing the linolenic acid from about 7 percent in conventional cultivars, the oil had sufficient oxidative stability to eliminate the need for chemical hydrogenation; thereby, eliminating the trans-fatty acids produced by that chemical process. The cultivar was grown at 40 to 42 N latitude of the Midwest. Developed by Walter Fehr and Earl Hammond.
12.	Soybean	Glycine max (L.) Merrill	IA2102RA12	2013	IA2102RA12 was the first soybean cultivar grown at 42 to 44 N latitude in the Midwest that had the combination of high yield, resistance to soybean aphid and resistance to soybean cyst nematode. It was particularly important for organic soybean producers who do not use chemicals for pest control. Developed by Walter Fehr.
13.	Oat	Avena sativa L.	Multiline E77	1977	Research was the first to test theory of the use of multi-lines for controlling cereal rust diseases; Iowa State developed and released the first multiline oat cultivars, which advanced rust resistance. Demonstrated the value of multiline cultivar theory as a sustainable approach to crop protection. Developed by Ken Frey and others.
14.	Apple	Malus domestica	Chieftain	1966	First cross made in 1917: a cross of Delicious and Jonathan varieties, with qualities considered the best of both. Combined shelf life and color appeal of Red Delicious and the taste and baking qualities of Jonathan. Good winter hardiness, good storage life, relatively resistant to apple scab and fire blight. Became one of the top 10 commercially grown varieties in Iowa. Continues to be served today (2020) in Iowa State University dining services and sold by student horticultural club. Developed by S.A. Beach.

Table 1 (continued). Selected top cultivar releases (Agriculture Experiment Station, College of Agriculture and Life Sciences, February 2020).

	Crop	Scientific name	Cultivar name/ genetic line	Year released	Notes
15.	Apple	Malus domestica	Secor	1922	Cross between Salome and Jonathan varieties. Free from soft scald and Jonathan spot in storage; keeps well, extended shelf life. Developed by S.A. Beach.
16.	Apple	Malus domestica	Jonadel	1958	Cross between Jonathan and Delicious varieties; milder in flavor than Jonathan but more acidic than Delicious. Excellent dessert quality, good storage life, durable skin. Tree is more resistant to fire blight than Jonathan. Developed by H.L. Lantz.
17-19.	Rose	Rosa	Aunt Honey rose Carefree Beauty rose Earth Song rose	1984 1977 1975	Griffith Buck served the Department of Horticulture at Iowa State from 1949 to 1985. Buck is credited with developing more than 85 varieties of roses, many hardy enough to withstand the cold and variable Iowa winters. He was the first to develop a hybrid blue rose and is widely known for his developments with geraniums and other flowering plants. The Dr. Griffith Buck Rose Collection at Iowa State has been accepted to the North American Plant Collections Consortium as one of its only cultivar-based collections.
20.	Watermelon	Citrullus lanatus	Crimson Sweet	1963	Most popular type of watermelon grown in the United States. Grown in more than 50 countries. Famous because it contained fewer, smaller seeds, had a sweeter flavor, a thinner rind and superior resistance to plant disease. Crimson Sweet was followed up by Iowa State releases of watermelon selections, including All Sweet, Super Sweet, Petite Sweet and more. Developed by Charles V. Hall and others.
21.	Weigela	Weigela florida	Red Prince	1984	Three of the best performing weigela varieties for Iowa are Red Prince, Pink Princess and White Knight, all introduced by Iowa State horticulturist Jack Weigle. Weigle's new cultivars of weigela, hybrid impatiens and forsythia gained recognition by gardeners throughout the central United States. Several of his plant introductions became popular choices for nurseries and home landscapes.
22.	Walnut tree	Juglans regia	Domoto	2002	Patented by its developer, Paul Domoto of Iowa State University. The Domoto walnut tree is cold-resistant and can be grown in northern climates where other commercial Persian walnut cultivars couldn't be grown in the past. The tree also has resistance to disease and the leaves are relatively tolerant of potato leafhoppers. A Missouri nursery released, in 2005, a new walnut cultivar named Stark Northern Prize, a cold-resistant Persian (Carpathian) walnut, Juglans regia. It was selected from a population of open-pollinated seedlings planted at the Iowa State University Horticulture Station in 1971. In 2002, the U.S. plant patent was received for the walnut tree named Domoto. In 2005, pairs of ISU Domoto, also known as Stark Northern Prize, walnut trees were planted at seven Iowa State research farms around the state and on the Iowa State central campus.

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	Crop	Scientific name	Cultivar name/ genetic line	Year released	Notes
23.	Strawberry	Fragaria ananassa	Cyclone	1960	Cyclone was notable for its large size, brilliant-red color, early growth, high yield and excellence in flavor and freezing quality. The variety, though vigorous, did not have the tendency to overcrowd the garden that many commonly grown strawberries of the time did. The variety was specifically bred to be homegrown and be of dessert quality for the home or local markets. One of 14 strawberry varieties developed by Ervin L. Denisen and released between 1954 and 1965. (Denisen also released three varieties of raspberries between 1954 and 1979.)
24.	Sorghum	Sorghum bicolor	IA 100RPS IA 101RPS	2020	Targeted for the bioenergy/biomass industry, these sorghum male inbred lines are restorer lines developed to generate photoperiod sensitive, high-yielding biomass hybrids. These parental lines will flower in temperate environments, but the hybrids produced from crosses with most female maintainer lines will not flower in Iowa or will flower very late without producing seed. Hybrids generated from these crosses have higher biomass yields with superior lodging resistance and higher dry matter content. Developed by Maria Salas Fernandez.
25.	Popcorn	Zea mays everta	IOPOP12 (yellow)	1961	IOPOP12, a dent sterile yellow hybrid, was widely recognized and produced by the popcorn industry for many years. IOPOP produced a cylindrical ear that didn't taper, which translated into more useable corn on the ear. The variety's very shiny kernels also had a marketing advantage: they looked especially good in plastic bags in which product was sold. It was released in 1961 as "Exp. Iowa 3595," and then designed IOPOP12 in 1965 after four years of use and acceptance by the popcorn industry. Interest in IOPOP12 increased in 1970 because of the southern com leaf blight problem, since one of the parental inbreds (IDS91) was blight tolerant. Developed by J.C. Eldredge, an Iowa State popcorn breeder from 1921 to 1960.
26-28.	Popcorn	Zea mays everta	IOPOP5 (white) IOPOP6 IOPOP7 (white)	Late 1940s-early 1950s	From the 1880s through the mid-1940s, Iowa was the primary popcorn-producing state. The three Iowa State popcorn varieties were among the handful of popcorn hybrids made available through state agriculture experiment stations by release to the public for commercial production in the 1940s and early 1950s. At one time, Iowa State's was the most comprehensive public popcorn breeding program in the nation. Popcorn seed initially distributed in 1937, with hybrids following in 1945. Popcorn germplasm developed at Iowa State has been screened for resistance to corn earworm and European corn borer — and become an important source of insect resistance to popcorn growers in the Pacific Northwest. The popcorn breeding program at Iowa State originated with J.C. Eldredge, who served as Iowa State popcorn breeder from 1921 to 1960. The program was coordinated by Kenneth Ziegler from 1977 to his retirement in 2005 — the nation's last public, academic-based popcorn breeding facility.

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29-32.	Popcorn	Zea mays everta	BSPM1C1 BSPM2C1 BPM1 BPM2	1990 1992 2000 2003	Iowa State released BSPM1C1, a specialized popcorn breeding synthetic developed to provide a source for inbred lines with the mushroom popping trait. Another release, BSPM2C1, was a source of germplasm producing a high frequency of round-ball (mushroom) flakes with dent corn in its background. In 1996, Iowa State popcorn breeding program identified the first lines to pop 100 percent mushroom flakes — the popped product of a popcorn kernel that are rounder with only a few “wings” to break off during handling, a commercially valuable trait. From this research, two inbred lines of popcorn were developed — BPM1, was the first round-ball, or mushroom, release to the industry, followed by BPM2. Developed by Kenneth Ziegler.
33.	Popcorn	Zea mays everta	BSP6CBC0	1999	BSP6CBC0 was an improved South American-type popcorn synthetic with a higher level of natural tolerance to second-generation European corn borer than other popcorn germplasm. Developed by Kenneth Ziegler.