

Growth of the Nebraska Potato Industry

Alexander D. Pavlista, Crop Physiologist

The Nebraska potato industry has fluctuated substantially in acreage and production in the past 149 years. This publication chronicles changes in the total harvested potato acreage, potato tuber yields, production, value, and markets from 1866 to 2014.

The Beginning

The Nebraska Agricultural Statistics Service (NASS) began tracking the potato industry in 1866, a year before Nebraska's statehood. At that time, Nebraska's total acreage for potato production was 5,000; the yield was 36 cwt/a (cwt = hundredweight = 100 lb), and the crop value was \$500,000. The late 19th century saw the advent of the "Mechanical Revolution," the first modern agricultural milestone. With the advent of steam-powered and, later, gasoline-powered tractors, growers were able to increase the number of acres

that could be farmed with the same amount of labor. Potato acreage in Nebraska steadily increased, reaching a plateau of around 100,000 acres in 1907 that lasted to 1935 (Figure 1). Production during this period was directly related to increased acreage. There was no change in yield, which remained at about 50 cwt/acre (Figure 2).

The sudden 37 percent decline in potato acreage between 1935 and 1936 was caused by the Dust Bowl and the Great Depression. From 1936 through World War II to 1946, a short plateau was maintained at 70,000 acres in Nebraska. During this period, production attained its highest level to that time (Figure 3). At about 7 million cwt, production was nearly double of that attained during World War I. The value of production, at about \$13 million from 1942–48, was the highest to that time as well (Figure 4). Several forces account for this plateau and record highs,

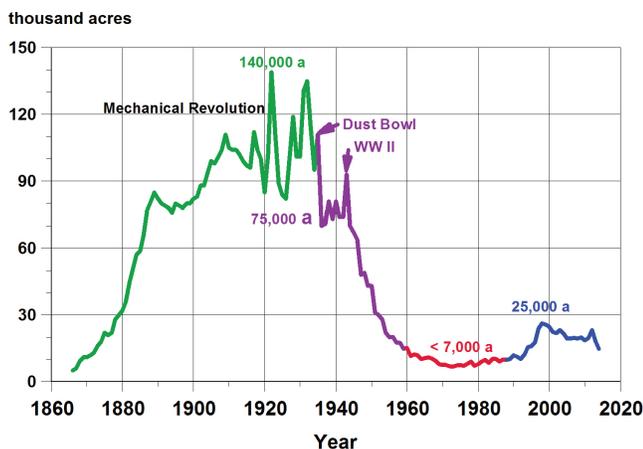


Figure 1. Harvested Potato Acreage from 1866–2014.

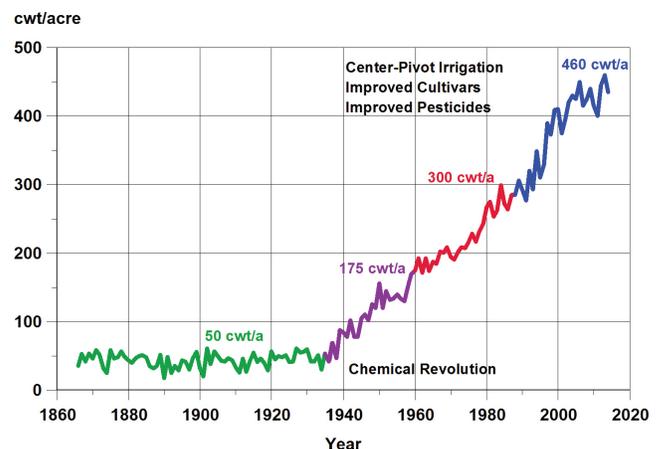


Figure 2. Potato Yield from 1866–2014.

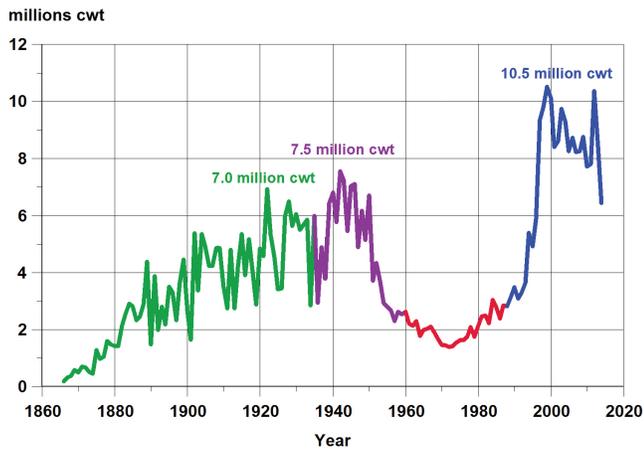


Figure 3. Potato Production from 1866–2014.

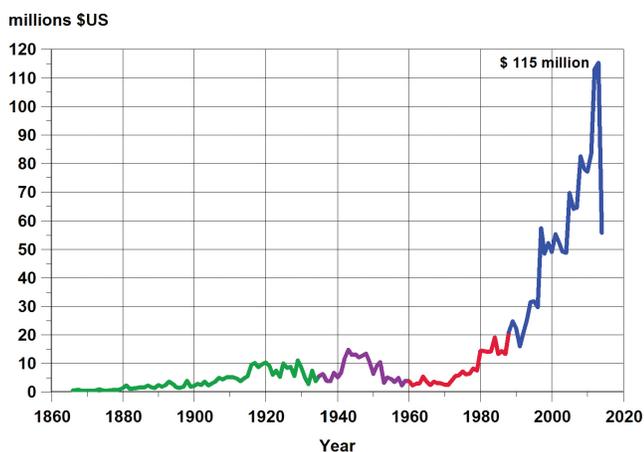


Figure 4. Potato Value to Nebraska from 1866–2014.



Harvey Werner, Ph.D.: *In 1910, the Scotts Bluff Experiment Station, currently known as the Panhandle Research and Extension Center, was formed by the University of Nebraska. After Werner came to the university in 1918, he established a potato program in 1920 and was the first potato specialist/ horticulturist in Nebraska. He was president of the Potato Association of America in 1925. Werner focused on developing new varieties for growers, releasing 11 potato cultivars. He worked extensively on potato storage and helped initiate the seed certification program, which is conducted by the Potato Certification Association of Nebraska.*

including the federal government’s identification of potato as an essential commodity for the wartime effort.

The second modern agricultural milestone, the “Chemical Revolution,” began with the advent of wide-scale pesticide usage in the early 1940s. Some of the new, inexpensive chemicals that gained popular use were 2,4-D for weed control, DDT for insect control, and captan for disease control. From 1935 to the present, yield steadily improved at 4–5 cwt/acre per year. Improved potato cultivars were selected and gained popularity even to today; among the cultivars were Katahdin (1932), Sebago (1938), Kennebec (1948), and Red Pontiac (1945). Yields also increased because of progressive cultural practices such as fertilization; water management; pest recognition, monitoring, and control; emphasis on soil husbandry; and a shift from rain-fed to

irrigated production. These innovations were largely due to university research that was adopted by progressive growers.

Nebraska’s potato acreage dropped from 49,000 in 1948 to an all-time low of less than 7,000 in 1972–73. During this time, production declined due to acreage decreases from over 6 million cwt to less than 1.5 million. Gross income was reduced from over \$6 million to less than \$2.5 million for Nebraska. The declines would have been even more cataclysmic if not for ongoing research in improving potato yield, which continued to increase at 4–5 cwt/acre per year. This period of decline may be attributed to many factors, including increased urbanization and the decline of small family farms growing potatoes. The potato market was becoming more and more national, and less local.

1960 to 1990

The Nebraska potato industry was at its low point from 1960 to 1990. During this period, the fast food industry grew and began to dominate potato production. The premier cultivar for french fry production was, and still is, the Russet Burbank. Nebraska's environment does not favor production of the quality required of Russet Burbank tubers, so the state's growers could not take advantage of this boom. Due to its leadership in potato certification, Nebraska, specifically the Panhandle, became known for seed tuber production. Nebraska produced red-skinned cultivars for use in the southern states, and the main fresh market potato was the Norgold Russet released by North Dakota State University in 1964. Norgold Russet tasted great but was not visually appealing.

During this period, several major developments influenced the future of the Nebraska potato industry into the 21st century. Center pivot irrigation gained widespread acceptance, which allowed the growers to control when and how much water to apply to potatoes. Through research, irrigation management was found to partially control infection by common scab and black scurf, two major diseases.

Potato farms were aggregating into larger, corporate farming operations, allowing for major investment in specialized equipment and cultural practices. The chipping cultivar Atlantic was released by the USDA-ARS at Beltsville, Maryland, in 1978. Atlantic became, and still is, the standard chipping cultivar. It grows well in Nebraska, although it tends to be prone to common scab. The ability to grow Atlantic attracted the potato chip industry to western Nebraska, increasing not only chip but also seed production. Frito-Lay® was becoming the dominant corporation in the chip market and its presence in Nebraska was increasing with contracts to Panhandle growers.

In 1987, the cultivar Russet Norkotah was released by North Dakota State University. It quickly replaced Norgold Russet because of its better appearance, albeit poorer taste. This cultivar for the fresh market grows well in Nebraska and began to revitalize the state's fresh market industry in the 1990s. The third cultivar to influence the Nebraska industry was Yukon Gold. It was released in 1981 by the University of Guelph but did not become popular until around 2000.

1990 to 2014

In the late 1980s, Nebraska's potato acreage leveled at about 10,000 acres. During this decade, production and its value gradually increased. After 1992, acreage took a sharp



Robert O'Keefe, Ph.D.: *Upon Werner's retirement in 1962, O'Keefe, one of Werner's graduate students, became the second University of Nebraska potato specialist. He was president of the Potato Association of America in 1980 and was awarded an Honorary Life Membership for his life's work in 1990. Like Werner, O'Keefe, focused on improving potato cultivars, emphasizing common scab resistance. He released seven cultivars, helped expand seed production, and successfully promoted Nebraska's potato chip industry.*

upswing to a peak of 26,000 in 1998–99 and then plateaued at about 20,000 acres, partially due to a 10-year drought. In 1999 and 2012, record production of 10.5 and 10.4 million cwt, respectively, were attained. This was 40 percent higher than the record set previously in 1942, which was produced on four times the acres that were harvested in 1999 and 2012. Yield was more than 400 cwt per acre for the first time in 1999 and reached 460 in 2013.

In the past 20 years, the rate of yield increased to 8–9 cwt/acre per year, accounting for the difference between 1942 and 1999. Yield increases were associated with water

and nitrogen management; new cultivars (Atlantic and Norkotah Russet) and their management; pesticide development and management, e.g., integrated pest management; and pest identification and monitoring. Russet Norkotah, which sometimes is referred to as the “Nebraska Russet,” dominates nearly all fresh market production in Nebraska. Chip production, nearly all of which is contracted to Frito-Lay, also dominates. Seed production remains an important part of the overall industry.

With the stabilizing of the national potato acreage in the past several years, potato prices have shown major improvement. In 2008, the average price was about \$10/cwt for Nebraska growers, resulting in a record value of over \$82 million. This compares with \$110 million for dry bean, \$61 million for grain sorghum, and \$20 million for sunflower in 2008, and \$42 million for sugar beet in 2007. In 2012 and 2013, production value increased to over \$110 million, but in 2014, acreage decreased by 36 percent, compared with 2012, and production and value decreased accordingly. New strains of late blight that were resistant to traditional fungicides—and more aggressive and virulent than the one that caused the Irish potato famine in the 19th century—appeared in Nebraska in the late 1990s. New fungicides were developed and their management incorporated.

Future of Nebraska Potato Industry

Nebraska’s potato acreage is expected to remain stable at between 15,000 and 20,000 acres, and yield is expected to continue to increase. The income from potato to Nebraska growers could continue to rise to \$100 million as cultural practices and cultivars keep improving. A key factor for the future is the third modern agricultural milestone, the “Genetic Revolution.”

Genetic modification of Organisms (GMO) has become prominent in corn and soybean production. In the late 1990s, GMO ‘New Leaf’ potato cultivars were introduced. Pressure from various groups concerned about the safety of GMO foods hindered the use of GMO potatoes in the fast food and other industries. As a result, GMO potato cultivars, which have pest resistance and improved tuber quality, are not produced in North America.



Alexander Pavlista, Ph.D.: In the late 1980s, potato growers decided to shift emphasis from cultivar development to production. When O’Keefe retired in 1988, Pavlista, a plant physiologist, came to Nebraska as the third potato specialist. He was president of the Potato Association of America in 2008 and was awarded an Honorary Life Membership for his life’s work in 2015. Major projects were sulfur fertilization for disease control, pesticide evaluation, plant growth regulators, and limited irrigation to deal with climate change and the decreased availability of water.

If GMO technology gains acceptance by the public, GMO potato production could become one of the keys to a sufficient 21st century food supply. With the growing recognition of climate change as a major problem, research has been initiated on plant management under limited availability of water for potato as well as potential rotational crops such as canola and camelina for biofuels. Research on growth regulators expanded recently to rotational crops such as wheat and rye in potato production. New diseases, insects and pests are always on the horizon, especially with a warming climate. Examples include zebra chip disease, which is carried by potato psyllids, and new virulent, aggressive strains of late blight and early blight. Research will continue to combat these diseases.

This publication has been peer reviewed.

UNL Extension publications are available online at <http://extension.unl.edu/publications>.

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture. University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

© 2016, The Board of Regents of the University of Nebraska on behalf of the University of Nebraska–Lincoln Extension. All rights reserved.