

POTATO EYES



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Nebraska's potato industry: A history

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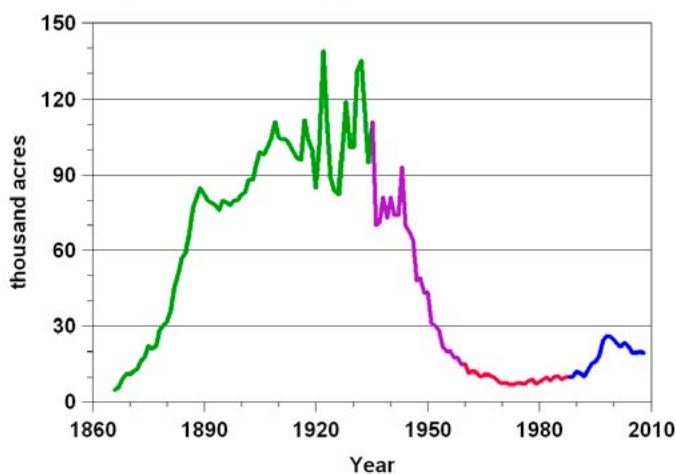
The Beginning

The Nebraska Agricultural Statistics Service (NASS) began tracking the potato industry in 1866, a year before statehood. Then, acreage was 5,000; 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. Acreage steadily increased reaching a plateau of around 100,000 acres in 1907 (Figure 1) that lasted to 1935. Potato production during this period was directly related to increased acreage. There was no change in yield which remained at about 50 cwt/a (Figure 2).

The sudden 37% decline in potato acreage between 1935 and 1936 can be accounted for by the Dust Bowl and the Great Depression. From 1936, through WWII to 1946, a short plateau was maintained at 70,000 acres. Interestingly, during this period, production attained its highest level to that time (Figure 3). At about 7 million cwt, production was nearly double that attained during WWI. 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. During WWII, the US government identified potato as an essential commodity for the wartime effort. The second modern agricultural milestone, the "Chemical Revolution," began with the advent of pesticide usage in the late 1930s. Also from 1935 to the present, yield has undergone a steady improvement at 4-5 cwt/a per year. This yield increase resulted from improved cultivars, progressive cultural practices such as fertilization, pest recognition, monitoring and control, emphasis on soil husbandry, and a shift from rain-fed to irrigated production. These innovations were due to University research and usage by progressive growers.

After 1948, potato acreage dropped from 49,000 to an all-time low of less than 7,000 in 1972-73. During this time, production declined due to acreage from over 6 million cwt to less than 1½ million. Gross income was reduced from over 6 million \$US to less than 2½ million for the State. However, the declines would have been more cataclysmic if it were not for the continual research in improving potato yield which continued to improve at 4-5 cwt/a

Figure 1. Potato History, 1866-2008: Harvested Acres



per year. This period of decline may be attributed to many factors including increased urbanization with a decline of the small family farm growing potato. The potato market was becoming more and more national, and less local.

Dr. Harvey Werner:

In 1910 the Scotts Bluff Experiment Station, currently known as the Panhandle Research and Extension Center, was established. After Dr. Harvey 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 (PAA) in 1925. Dr. Werner focused on developing new varieties for growers, releasing 11 potato cultivars. See the *S.B. Exp. Sta. 50th Anniversary "Profiles of Progress" p. 8-9 (1960)*. He worked extensively on potato storage and initiated the Seed Certification Program.



From 1960 to 1990

From 1960 to 1990, the Nebraska potato industry was at its low point. During this period, the fast food in-

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dustry grew and began to dominate potato production. The premier cultivar for french fry production was, and still is, the Russet Burbank. But, this cultivar grows unacceptably in Nebraska so the State could not take advantage of this boom. Due to its leadership in potato certification, Nebraska, specifically the Panhandle, became known for seed tuber production. The State produced red-skinned cultivars for use in the southern states and the main fresh market potato was the Norgold Russet, released by Dr. Robert Johansen of North Dakota State University in 1964. Norgold Russet was great tasting but not visually appealing.

However, during this period, several major developments were beginning that would influence the future of the Nebraska industry in the 21st Century. Center-pivot irrigation began and was gaining wide-spread acceptance. Center-pivot irrigation 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 disease problems. 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, MD, in 1978. Atlantic became, and still is, the premier chipping cultivar, and it grows well in Nebraska although it

grows in the Panhandle. In 1987, the cultivar Russet Norkotah was released by NDSU and it quickly replaced Norgold Russet because of its nicer appearance albeit poorer taste. Again, this cultivar for the fresh market grows well in Nebraska and revitalized the industry here in the 21st Century. The third cultivar that was to influence the Nebraska industry was Yukon Gold, released in 1981 by the Univ. of Guelph but not reaching popularity until around 2000.

Dr. Robert O'Keefe:

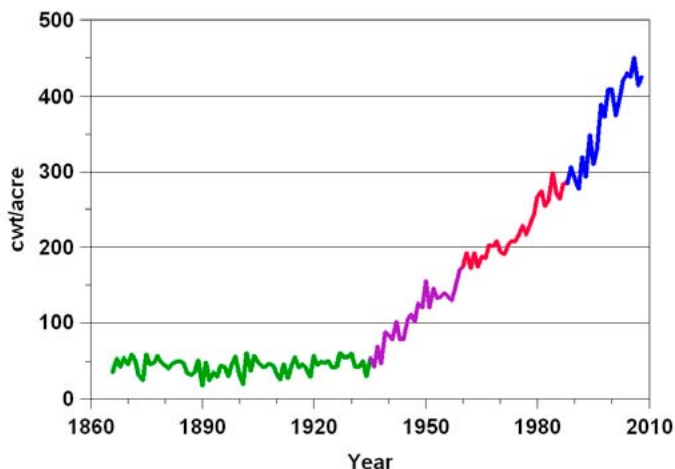
Upon Werner's retirement in 1962, his graduate student, Dr. Robert O'Keefe became the second Potato Specialist. He was President of the Potato Association of America (PAA) in 1980. O'Keefe, as did Werner, focused on improving potato cultivars emphasizing common scab resistance. He released seven cultivars, helped expand seed production and successfully promoted Nebraska as a potato chip industry.



From 1990 to the Present

In the late 1980s, potato acres were level at about 10,000. During this decade, production and its value gradually increased. After 1992, acreage took a sharp upswing to a peak of 26,000 in 1998-99 and then leveled at about 20,000 acres partially due to a drought that may be ending in 2009. In 1999, a record production of 10½ million cwt was attained, 40% higher than the record set in 1942 when there were four times the acreage. That year, yield went over 400 cwt/a for the first time. In the past 20 years, the rate of yield change increased to 8-9 cwt/a per year, accounting for the difference between 1942 and 1999. Yield increase was associated with water and nitrogen management, new cultivars (Atlantic and Norkotah Russet) and their management, and pesticide development and management, e.g., integrated pest management, and pest identification and monitoring. Today, Russet Norkotah is sometimes referred to as the "Nebraska Russet" and dominates nearly all fresh market production in the State. Chip production, all of which is contracted to Frito-Lay with about 85 percent of the national market, also dominates. Seed production remains an important part of the overall industry. With the stabilizing of national potato acreage in the past several years, 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, \$42 million for sugar beet (2007), \$61 million for grain sorghum, and \$20 million for sunflower. New strains of the late blight pathogen, with resistance to current fungicides, and more aggressive and virulent than the one that caused the Irish potato famine in

Figure 2. Potato History, 1866-2008: Yield



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 growing with contracts to

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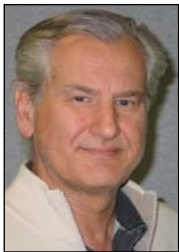
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the 19th Century, appeared in Nebraska in the late 1990s. New fungicides were developed and their management incorporated.

Dr. Alexander Pavlista:

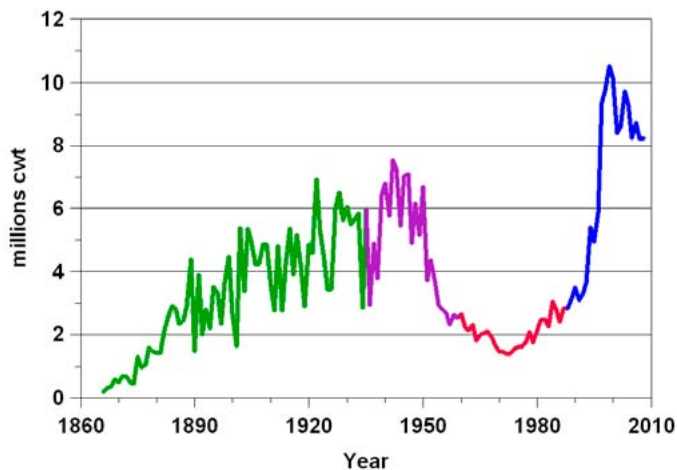
In the late 1980s, potato growers decided to shift emphasis to production. When O'Keefe retired in 1988, Dr. Alexander Pavlista, a plant physiologist from the chemical corporate world, came to Nebraska as the third (and current) Potato Specialist and President of the PAA in 2007. Major projects were sulfur fertilization to control common scab, fungicides to control early and late blights, insecticides for potato psyllids, plant growth regulators for yield, and cultivar evaluations. New projects were initiated recently to deal with limited irrigation and crop rotation with regard to climate change and biofuels.



Next 10 years

Dr. Pavlista expects acreage to be stable near 20,000 while yield inclines. The income from potato to State growers could continue to rise to \$100 million level as practices and cultivars keep improving. A key factor for the future is the third modern agricultural milestone, the "Genetic Revolution," heralded with the 'Flavr Savr' tomato in the 1980s.

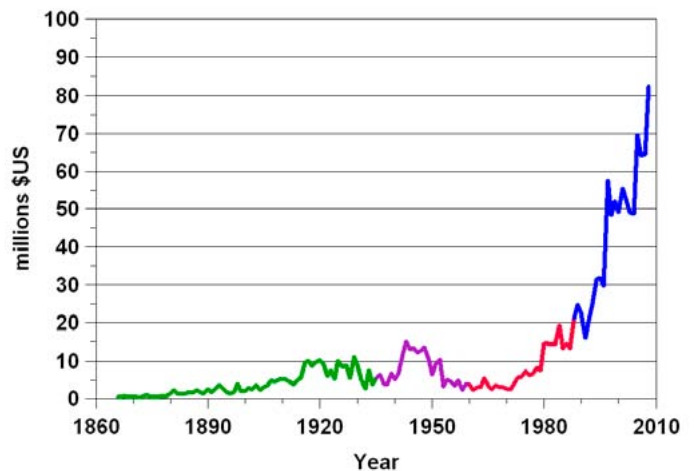
Figure 3. Potato History, 1866-2008: Production



Genetic modification (GMO) has become prominent in corn and soybean production. In the 1990s, GMO potato cultivars were introduced but due to pressure by interest groups on fast-food industry, they were withdrawn. As GMOs ac-

ceptance by the public increases, GMO potato production will be key in the 21st Century food supply. With the growing identification of climate change as a major problem in the 21st Century, research on plant management under limited water availability for potato and for potential rotational crops such as canola and camelina for biofuels was initi-

Figure 4. Potato History, 1866-2008: Value



ated. Research on growth regulators expanded recently to rotational crops in potato production. New problems are always on the horizon, such as zebra chip disease transmitted by potato psyllids, and new virulent and aggressive strains of late and early blight pathogens.

Potato Certification Association of Nebraska

The Potato Certification Association of Nebraska (PCAN) was designated by the Institute of Agriculture and Natural Resources to conduct the potato certification program in Nebraska under State law. PCAN was established at the request of seed potato growers. The Vice-Chancellor of IANR and an advisory committee specify the standards and review all appointments, rules and procedures. Following the incorporation of PCAN in 1951, Warren Trank was the Secretary-Manager until retiring in 1980 when Gary Leever took this position. Upon Gary's recent retirement in 2009, Steve Marquardt became the Secretary-Manager. The Secretary-Manager of PCAN has a courtesy appointment to the Department of Agronomy-Horticulture at the University of Nebraska. Since its incorporation, the seed potato program of PCAN and UNL's potato program have been closely aligned. Cultivar development under the Potato Specialists, provided PCAN with pertinent data on new cultivars adaptable to Nebraska. Prior to the mid-1970s, material coming into industry use from breeding, testing,

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and development programs carried significant levels of disease. In order to solve this problem and provide a disease free basis of cultivars, PCAN used the Panhandle Research and Extension Center (PREC) facilities, greenhouse, cellar and laboratory/office space at the Mitchell Ag Lab. At that time, PREC headquarters was transferred to new facilities vacated by Hiram Scott College in Scottsbluff. The NPCA holds up standards for the seed potato industry and is centered in Box Butte County. To remain competitive, the seed

potato industry must be progressive and have disease-free seed stocks. The open channels of communication between the Departments of Plant Pathology, Agronomy-Horticulture, and Entomology and the NPCA are viewed by the seed potato industry as extremely important to keep Nebraska potato industry current with the new techniques. The Potato Certification Association is the University's designated agent to conduct Potato Certification in Nebraska. As such by law as a non-profit Association, it can only charge a fee to cover the cost of service provided to the industry which it serves.



**The Nebraska Potato Eyes
is on the World Wide Web at:
www.panhandle.unl.edu/peyes.htm**

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