N.E. Hansen's Impact on the Great Plains

N.E. Hansen was the first United States Department of Agriculture (USDA) plant explorer. He lived from 1866 to 1950. He traveled to collect plant material to benefit the northern parts of the United States. The plant introductions he made during his lifetime have had a significant impact on the Great Plains.

Hansen's trips through Europe, Russia, Siberia, China, Canada, and the United States led to over 400 plant introductions. In his earlier trips, Hansen's main purpose was to collect forage crop seed (alfalfa in particular) that could be used by farmers in the northern Great Plains. The scope of his work grew to include the introduction of fruits (apples, crabapples, plums, cherries, sand cherries, pears, apricots, grapes, raspberries, gooseberries, currents, and strawberries), vegetables (watermelon, muskmelon, sweet corn, tomatoes and radishes), ornamental trees, shrubs, and perennials (May Day Tree, chokecherry, bird cherry, hawthorne, walnut, maple, ash, willow, almond, buckthorn, caragana, pea shrub, hazelnut, artemisia, sage brush, sandthorn, honeysuckle, peonies, monarda, larkspur, and mallow), and hardy roses, as well as forage crops and grasses (alfalfa, clover, proso, brome grass, chee grass, crested wheat grass, sage grass, wheat, vetch, timothy, barley, and oats).

Hansen, in his own words, described breeding hardy plants for the "prairie northwest" as a process of "importation, exploration, and amelioration." He imported plants from various countries, searched for desirable plant variations in native woods and prairies, and improved upon the material gathered from different parts of the world by combining the desirable traits of both races (Bailey, 1908). He also made the distinction that "inventing and manufacturing are two distinct processes. The nurserymen cooperated by testing the new fruits as soon as distributed and by propagating them as fast as they proved their value." (Hansen, N.D.)

The impact of Hansen's introductions can be measured by their continued availability for use in the plant industry, their continued distribution all over the world, their use in today's research, and their overall presence on the Great Plains. The material covered in this paper will be divided into four groups of plant material that Hansen introduced: 1) fruits, 2) ornamental trees/shrubs/perennials/vegetables, 3) roses, and 4) forage/grasses. I compiled the numbers of introductions from various publications. I

used some major publications (Hansen, 1927; Alderman, 1962) as well as unpublished material from the South Dakota State University archives (Faculty, 2006; Loen, 2004). I also used other less readily available sources such as personal interviews and correspondence with retired breeders and private growers. I compiled the numbers of germplasm requests and plants available from the USDA from information supplied by the germplasm resources information network (GRIN, 2007). I obtained much of the information on commercially available suppliers through the online plant sources website (Andersen, 2007).

Fruits

Hansen introduced 299 fruit varieties consisting of 113 apples and crabapples, 72 plums, cherries, and sandcherries, 33 pears, 13 apricots, 35 grapes, 8 raspberries, 13 gooseberries, 10 currents, and 2 strawberries. The widespread availability and distribution of these plants provides a measure of the impact of these introductions.

At least eight of the apple and crabapple varieties are commercially available, and over 40 varieties are available as germplasm samples through the USDA's germplasm resources information network (GRIN). The commercially available sources are located in 17 different US states (New York, Michigan, Minnesota, Washington, California, Maine, Oregon, Alaska, Georgia, Wisconsin, Montana, Pennsylvania, Idaho, Indiana, Tennessee, Utah, Colorado), and Canada. The GRIN storage location for apples and crabapples is in Geneva, New York (Seeds, 2006). In the last twenty years GRIN received 503 requests for 56 different apple and crabapple varieties from 15 countries (Argentina, Canada, China, Egypt, Kazakhstan, South Korea, Russian Federation, Switzerland, Belgium, France, Italy, Japan, Bulgaria, Netherlands, and New Zealand) in addition to 34 different US states.

It is difficult to determine exactly what the germplasm is being used for at these diverse locations due to the USDA's confidentiality agreements, but some varieties are still being used in research. Hansen's 'Alexis,' 'Dolgo,' and Hansen's baccata #2 were recently used in apple breeding programs where Hansen's baccata #2 was a defined gene pool for resistance to apple scab (Janick, 2006).

Thirteen varieties of Hansen's plums, cherries and sand cherries are available commercially from 36 different US states and Canada. GRIN does not list any

germplasm available for these fruits. Two of Hansen's plums, 'Toka' and 'Waneta' are currently recommended to fruit growers in South Dakota. The 'Toka' plum is noted as "an excellent pollinator" which is important because many plum varieties require cross-pollination (Burrows, 2006). The 'Hansen Bush Cherry' is also recommended in this publication and is available through Gurney's catalog (Gurneys, 2008).

Two pear varieties are available commercially, and GRIN has seven varieties of Hansen's pear germplasm available. GRIN had 50 requests for six different pear varieties in the last 20 years. These requests came from India, Russian Federation, Belgium, and 16 different US states.

Only one of Hansen's 35 grape varieties, 'Chontay,' is currently available commercially, but 16 varieties are available through GRIN. In the last 20 years GRIN had 350 requests for 15 different grape varieties from 5 different countries (Norway, Russian Federation, Germany, Japan, and Turmenistan) and 18 different US states.

Ornamental Trees/Shrubs/Perennials/Vegetables

Hansen introduced 26 ornamental trees and shrubs, 8 perennials, and 13 vegetables (4 watermelon, 4 muskmelon, 2 tomatoes, 1 sweet corn, 1 radish, and 1 garden pea). It is difficult to attribute any of these introductions specifically to Hansen, because only a few specific cultivars or variety names were assigned. GRIN does not list any of these introductions as being available for distribution, but GRIN did receive one request from China in 2007 for Hansen's garden pea (*Pisum sativum* Lando).

One can speculate that perhaps the weeping willows growing near the Hansen garden at McCrory Gardens in Brookings, SD were introduced by Hansen. There is also a good chance that Hansen's Manchurian elm trees, collected in 1934 in East Siberia by N.E. Hansen and his son, Carl (Loen, 2002) are still living on the plains. This variety of elm had proven resistance to Dutch elm disease. Hansen did not develop all of the germplasm that he brought back from his travels. He left much of the development to other horticultural scientists. For example, some of the Persian winter melon seed that Hansen collected in Turkestan in 1897 went to Utah and California and led to the development of Honey Dew melons (Kephart, 2006).

Roses

There are 32 hardy roses on the list attributed to N.E. Hansen. Only two of these varieties, 'Alika' and 'Lillian Gibson,' are commercially available from Oregon, Utah, California, South Carolina, and Minnesota. However, fourteen of these varieties were growing in Sangerhausen, Germany over forty years ago. From contacts through the Rose Hybridizers Association (RHA) four varieties, not commercially available, were found growing in rose gardens in Canada ('Hansen Hedge,' 'Mrs. Mina Lindell,' 'Tetonkaha,' and 'Yatkan'). 'Pax Apollo,' a thornless variety, is currently growing in South Dakota and Maine. Cuttings from 'Pax Apollo' were recently shared with rose growers and hybridizers in Nebraska, Minnesota, Idaho, Ohio, Maryland, Tennessee, and California. 'Zitkala,' another thornless rose, grows in Maryland and Maine and was also distributed to Nebraska, Minnesota, Idaho, Ohio, Maryland, Tennessee, and California. Hansen named a rose 'Emmadora' after his first wife, Emma Pammel, and his second wife, Dora Pammel (Emma's sister). This rose can be found growing in Kalamazoo, Michigan, at the home of Hansen's grand daughter, Helen Hansen Loen.

It was in Hansen's later years that he spent the most time trying to develop a thornless rose. He said of developing a thornless rose, "It is for man to perfect what Nature has left imperfect" (Taylor, 1941). I proposed the use of Hansen's thornless rose germplasm in current rose breeding programs. I was delighted to discover that a rose grower in Akron, Ohio has already obtained some of Hansen's thornless rose plant material for just that purpose, hoping to retain the qualities of hardiness and thornlessness. The 'Alika' and 'Lillian Gibson' roses were evaluated in a study conducted at the Minnesota Landscape Arboretum in Chanhassen, Minnesota. Floral traits, bloom pattern, cold hardiness, plant size and habit, and diseases data were reported in the 1995 publication to compare the growth and performance of old garden and shrub rose cultivars (Zuzek, 1998).

Forage/Grasses

Hansen introduced 34 different forage and grasses including 14 alfalfa varieties, 6 sweet clovers, 2 prosos, 4 grasses, 3 wheats, 1 barley, 1 oats, and Siberian vetch, timothy, and esparsette. The first clover accessions in GRIN were collected by Hansen from the

steppes of the Ukraine in 1897 (Morris, 2001). Even the first soybeans listed in GRIN were collected by Hansen from South Ussurie, Siberia and received by GRIN in March,1898 (Hymowitz, 1990). GRIN does not list any Hansen varieties as currently available, but 170 requests were made for Hansen's germplasm in the last 20 years. GRIN received requests for 75 durum wheat (*Triticum turgidum* subsp. durum), 57 wheat (*Triticum aestivum* subsp. aestivum), 27 barley (*Hordeum vulgare* subsp. vulgare), and 12 oats (*Avena sativa*). These requests were made from 20 different countries in addition to 24 different US states.

N.E. Hansen's greatest economic impact was from his work in forage crops: alfalfa, smooth bromegrass, and crested wheat grass (Kepart, 2006). Hansen was able to see, during his lifetime, the impact that his forage crop introductions (alfalfa, brome grass, and crested wheat grass) made on the landscape and for farmers. During his second trip to Russia he discovered a natural cross of blue-flowered alfalfa and yellow-flowered alfalfa that grew further north. He called this Cossack alfalfa. By 1920, the USDA reported, "Alfalfa has become, in a generation, almost the basic crop of the West." Cossack alfalfa had some resistance to bacterial wilt which made it useful in early planting programs (Smith, 1999). Cossack alfalfa was used to develop 'Vernal,' 'Ranger,' and other bacterial wilt resistant varieties (Kephart, 1993). Seventy-five varieties of alfalfa were traced back to Hansen's plant material in 1975 according to Kevin Kephart, acting associate director of the South Dakota Agricultural Experiment Station in 1999 (Brashier, 1999).

N.E. Hansen's collection of diverse genetic material was a benchmark in alfalfa breeding in this century (Rumbaugh,1999). Hansen was personally responsible for the distribution of teaspoons of seed of his Semipalatisk strain of alfalfa. Hansen sent this seed to each new member or membership renewal of the South Dakota State Horticultural Society. Hansen thought this strain would do well because it originated in a low rainfall region of far eastern Kazakhstan that lies at approximately the same latitude as northern South Dakota (Adams, 1999). Adams was inspired by Hansen's optimism and adopted Hansen's viewpoint throughout his work at South Dakota State University. "To Professor Hansen must go the credit for not only recognizing the agronomic potential of the Turkistan and Semipalatinsk alfalfas, but having the vision of placing them in the

South Dakota grasslands for grazing purposes." (Adams, 1999). South Dakota ranchers can still trace back alfalfa growing in their fields to seed received from Hansen (Kephart, 1999).

Breeding programs for new forage grasses depend on a genetic diversity that comes from germplasm, much of what was collected from other continents. N.E. Hansen was a significant contributor of such germplasm. He collected smooth bromegrass (*Bromus inermis* Leyss.) from the Penza region of the USSR in 1889 "which led to the predominance of the northern strains in the United States and Canada" (Assay, 1993).

Hansen found crested wheat grass as a forage crop when he was searching for alfalfa seed during his first USDA expedition in 1897. This drought tolerant forage grass was later used to reclaim millions of acres of abandoned and eroded rangelands in the Western U.S. and Canada (Friggins, 1949). In the publication, "*South Dakota: 50 Years of Progress*," Hansen wrote that crested wheat grass sown in the fall, right into patches of Russian thistles, entirely exterminated the thistles in less than two years (Hansen, N.D.). Hansen was also given credit for the first introduction of Siberian wheatgrass (*Agropyron fragile*) in 1910, but this species does not appear on his list of introductions in the South Dakota Agriculture Experiment Stations bulletins.

The first USDA plant explorer, N.E. Hansen, was clearly successful in his goal to import, explore and ameliorate hardy plants in order to benefit the northern Great Plains in the United States. The impact of his work can be seen today by the presence of his plant material in commerce, in research, and growing on the fields and plains. His introductions made a difference both then and now.

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