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5-1-1927

## Plant Introductions

N.E. Hansen

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Bulletin  
224

May  
1927

# PLANT INTRODUCTIONS



Horticulture Department  
Agricultural Experiment Station  
of the  
South Dakota State College of  
Agriculture and Mechanic Arts  
Brookings



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# Plant Introductions

(1895-1927)

N. E. Hansen, Horticulturist

The breeding of hardy fruits has been the leading work of the Department of Horticulture of South Dakota State College ever since the fall of 1895. Many requests have been received for bulletins containing the record of this work. Many of these are out of print and are no longer available. This bulletin contains a complete record of plant introductions from the beginning of the work up to 1927.

## The Apple

In the northwestern prairie states several million people need a hardy winter apple. It is the most important fruit problem in this region. Many million dollars have been spent in trying to grow apples for the northern Mississippi valley. There are now many desirable summer and fall varieties but the winter apple problem is still unsolved. After growing fully 10,000 apple seedlings along various lines of pedigree, the department of Horticulture has as yet no apple to offer as the ideal hardy winter apple. However, a number of seedlings are being developed along many lines of pedigree, although many of these are of value only as intermediate steps. The evolution of this apple will probably be a step-by-step process rather than a single stride.

The cultivated apples are said to have descended since prehistoric times from six different species in the temperate parts of Europe and western Asia. In later years, the native wild apples of Siberia and eastern Asia and the native wild apples of America must be added to the list of ancestors. The hybrid origin of all cultivated apples is indicated by their variable pollen, as compared with the uniform pollen of the pure wild species. The hybrid origin is also apparent in the very great variation in apple seedlings.

During the past generation, many thousands of apple seedlings have originated in the northern part of the Mississippi Valley. Many people have taken part in this effort to secure hardier apples, especially winter apples. The general experience indicates very strongly that the future behavior of a new seedling apple is not determined by the behavior of the original tree. The final test is when the trees propagated from it come into full bearing. Crucial test winters, such as 1855-56, 1872-73, 1884-85, 1898-99, and others that were unusually cold, must be reckoned with in estimating the value of any new apple. One must not be too hasty to praise or condemn any new apple but wait until it comes into full bearing as a budded or grafted tree.

Since so much work has been done by hundreds of orchardists in the growing of seedling apples, the writer has deemed it best to work along new lines as far as possible, to make new combinations of species and in late years to work largely with the Siberian and native wild crab-apples. To grow apple seedlings of purely west European ancestry is something that has been tried by hundreds of orchardists, and there are very few that have survived the test winters. It is best to start with trees that are hardy in the first place. The following is a record of seedling apples named and introduced thus far.



Many good seedlings have been discarded or are still held for further observation. If a new seedling is not superior to the Wealthy in size, color and quality of fruit it has little chance of becoming a popular variety. In apples, the standard can be lowered somewhat if the desired quality of long winter keeping could be obtained.

#### Apples on Siberian Crabapple Roots

Root-killing of the common apple stocks is now one great source of failure in apple culture in the prairie Northwest. It is time that definite experiments were conducted over a wide area with standard varieties of apples grown on the Siberian crab roots. Such trees will be free from root-killing, will attain less size and bear earlier. The tests so far at this station indicate that such trees bear earlier, may be planted closer together and will be easier to spray.

In Bulletin 65 of this Station, published July, 1899, Siberian roots were recommended to prevent the root-killing which is often disastrous in the North. The experiments are still in progress and indicate that the Siberian crab is the best stock in regions subject to winter-killing of the common apple stocks.

The seedlings of the true Siberian Crab (*Pyrus baccata*) are good for park or lawn planting owing to its wealth of blossoms and for the very small fruit from which to raise seedlings for budding in the nursery. In this list see "Nertchinsk crab seedlings" and "Irkutsk crab seedlings."

#### Seedlings of Named Siberian Crabs

In 1924, in response to repeated requests, seedlings of some of the most promising named Siberian crabs were distributed. The main varieties were Dolgo, Alexis, Amur, Beauty, Olga, and several more. As the original trees are in a mixed orchard containing many cultivated apples, some interesting seedlings may be expected from these seedlings.

#### Testing the American Wild Crabapple

The wild crabapple was the only apple known to the Indians before the white man brought over the cultivated apple which is a native of the temperate regions of Europe and Asia. The Indians cached or buried the fruit in the earth over winter. This served to tone down the astringency.

The chief hope in growing many thousands of apple and crab apple seedlings has been to tame the wild American crabapple enough so that the fruit would be desirable at least for culinary use. In the seedling plantations of this station, the wild crab apple from Elk River, some forty miles northwest of Minneapolis, Minnesota, has proved hardy, productive and practically immune to blight. The abundant, fragrant pink and white blossoms in the spring make the trees of great value for lawn and park plantings, although the fruit is too sour and astringent to tempt anyone. However, the fruit will keep at least a year and is useful to impart a quince-like flavor to common apple sauce. In fact some people consider wild American apples a fair substitute for quinces in making preserves.

While the six first generation hybrid varieties: Bismar, Chinook, Kola, Shoko, Tipi and Zapta, are by no means perfect, they are worthy

of planting purely for ornamental purposes. These crab apples will probably be hardy far north into Manitoba and will keep well into spring in an ordinary cellar. In the standard fruit lists for the northern limits of apple culture in the prairie Northwest it must be admitted that there are only summer and fall varieties, with no real winter apples that will keep into spring in an ordinary cellar.

A hint of the possibilities of the native American apple may be seen in the Giant, Mercer and Missouri, all found growing wild. Several more are in the collections but not introduced. At present all these are more for ornaments on the lawn than for fruit.

#### Improvement of the Apple

The following synopsis is a classification of the varieties described in this bulletin. In conformity with the rule now well established in literature of plant breeding, the seed or female parent is mentioned first, the pollen or male parent second.

#### Cultivated apple (*Pyrus Malus*) seedlings:

Caramel (Mixed seedling, sweet, of Fameuse type)  
Chance (Mixed seedling of northern varieties)  
Elta (Seedling of Wealthy top grafted on Hibernial)  
Oxbo (Seedling of Roxbury Russet topgrafted on Oldenburg)  
Goldo (Seedling of Grimes Golden topgrafted on Oldenburg)  
Sereda (Seedling of Harry Kaump topgrafted on Oldenburg)  
Sugar (Seedling of Antonovka apple)

#### Imported Russian Apples:

Adno; Lemon; New Duchess; Russian White; Yellow Sweet;  
Zeleba

#### Various Apple crosses:

Hibkee (Graft-hybrid Hibernial x Milwaukee)  
Sasha (Hibernial x Gravenstein)

#### Apple x Siberian Crab Hybrids:

Hopa Red-flower (*Pyrus Malus Niedzwetzkyana* x *Pyrus baccata*)

Linda Sweet (Seedling of Malinda topgrafted on Sweet Russet Crab)  
Maga (Seedling of McIntosh apple topgrafted on Virginia Crab)  
Olga (Duchess of Oldenburg apple x *Pyrus baccata cerasifera*)  
Sapinia (Seedling of Winesap topgrafted on Virginia Crab)

#### Siberian Crab seedlings:

Alexis; Amur; Dolgo; Ivan; Beauty; Nocalyx

#### Manchurian Crab seedlings:

Manchurian Crabapple seedlings (Harbin region, 1924)

#### Native Wild Crab seedlings:

Mercer; Missouri; Giant

**Apple x Wild Crab Hybrids:**

- Bismer (Bismarck apple x Mercer Wild Crab)
- Izo (Yellow Transparent apple x Fluke No. 10 Mercer Hybrid)
- Chinook (Baldwin apple x Elk River, Minn., wild crab)

**Wild Crab x Apple Hybrids:**

- Anoka (Seedling of Mercer topgrafted on Oldenburg)

**Wild Crab Apple Hybrids:**

- Kola; Tipi; (Elk River, Minn. x Oldenburg)
- Shoko (Elk River, Minn. x Alexander)
- Zapta (Elk River, Minn. x Bismarck)
- Red Tip (Elk River, Minn. x Niedzwetzkyana)

**Chinese Apple Seedlings:**

- Cathay (Seedling of *P. prunifolia* Rinki)

**Toringo Crab Seedlings:**

- Seedlings of *Pyrus Sieboldii*, Regel

**Catalog of Apples and Crabapples**

**Adno Apple.**—Introduced 1916. Very handsome, large, red, subacid, productive, late fall apple, received from Russia. Adno, the Russian for “one” is a provisional name until the true name can be determined.

**Alexis Crabapple.**—Introduced 1919. Alexis is a Russian man's name. Thousands of seedlings of Siberian Crab Apples have been grown with the hope of obtaining varieties free from blight. The Alexis was raised from seed obtained from the old Imperial Botanic Gardens at St. Petersburg, now Leningrad, Russia. Fruit much like the Dolgo crab, long conical, polished, brilliant, dark solid cherry crab with attractive blue bloom. Flesh yellow, acid. Tree very productive, free from blight so far.

**Amur Crabapple.**—Introduced 1912. Raised from seed of the selected Siberian crab known as *Pyrus baccata cerasifera*. *Cerasifera* means cherry-bearing, referring to the bright cherry-like color of the fruit. The word Amur refers to the Amur River region, the original home of the pure Siberian crab, *Pyrus baccata*, in eastern Siberia.

There is a great demand on the market for a medium sized crab apple, not too large in size, free from blight, and equal in color to the Transcendent. The Amur is the first attempt in this line after raising thousands of crab apple seedlings. This is offered as an improvement of the Transcendent crab, not in size but in color. It is intense bright red with a light bloom, a beautiful fruit. The jelly of the Amur is a bright ruby red, while that of the Transcendent is light pink; the Transcendent sauce cooks yellow, that of the Amur a pleasing bright red. The Amur is very upright in growth.

If the tree proves as productive and free from blight elsewhere as at this station, Amur will be worthy of trial. The upright habit of the tree and the bright glowing color of the abundant fruit makes the tree



very pleasing from an ornamental standpoint, even though the fruit should be ranked too small to compete with the larger crabs.

The bright red color of the Amur crab makes it desirable for culinary use. The fruit is one and one-half inches in diameter. The tree has been free from blight.

**Anoka Apple.**—This bids fair to become the most popular of all the new apples. It was introduced in 1918 before fruiting as South Dakota No. 2. In 1920 it was named Anoka, a Sioux Indian word meaning "on both sides". It is a seedling of Mercer (Fluke) wild crab top-grafted on Duchess. This tree has borne heavily in 1918 and 1919. The fruit is two and one-half inches in diameter, round, Duchess type of coloring. Flesh white, good subacid. Season September. It is early and heavy bearing under propagation. It bears even on young nursery trees.

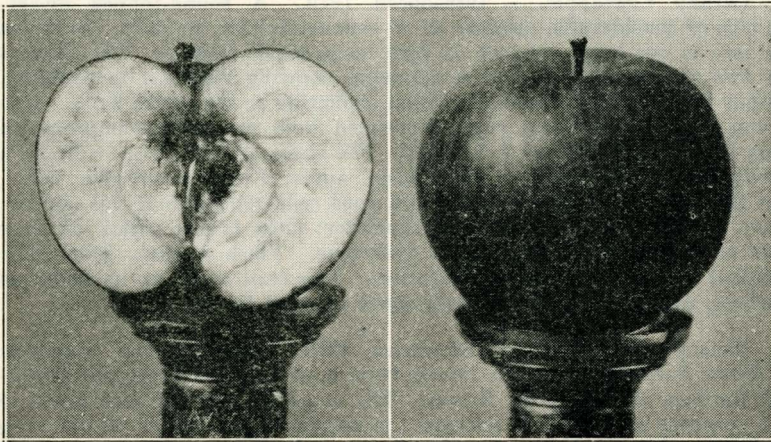


Fig. 1.—ANOKA APPLE

The fruit is two and one-half inches in diameter. It is an early apple and heavy bearing.

In the spring of 1920, four trees of Anoka apple, one year buds on seedlings of Red Siberian Crab, were sent to the Experiment Station at Fargo, North Dakota. Under date of December 2, 1922, Professor A. F. Yeager, Agricultural College, Fargo, North Dakota, reports on these trees as follows: "This spring two of the four trees blossomed and one produced 23 apples, the other 26. Practically all the fruit was set from lateral buds. Upon examination this fall it seems that all four of the Anoka apple trees have a lot of lateral fruit buds showing. The trees are not yet as high as one's head and were scarcely four feet high last spring. They begin ripening about the 15th of August. The apples are medium to above medium in size, but somewhat larger than Duchess. They are oblong in character. Our specimens showed very little color.

The flavor seemed to be very similar to Duchess. If the variety continues to flourish as it has so far it should be a big addition to our fruit list."

Other reports have been received of the very early bearing of the Anoka. At the South Dakota State Fair at Huron in 1925, John Robertson of Hot Springs, S. D., showed a plate of Anoka, part of a 60 pound crop on one young tree about seven feet in height.

**Caramel Apple.** — Introduced in 1919. One of the seedlings from mixed seed of choice standard Northern apples. Fully medium size, two and three-fourths inches in diameter. Late yellow mostly covered with red stripes. Evidently of the Fameuse type. Flesh snow white, sweet, excellent. Of promise as a winter sweet apple of highest quality, but probably should go south rather than north. The name Caramel is given to it because it is a sweet apple.

**Cathay Crabapple.** — Introduced 1919. A round-topped dwarfish tree of considerable promise as an ornamental for the lawn. In bloom the tree is one huge bouquet of very large white flowers. The flowers are two and one-half inches in diameter, showing tendency to doubling. Cathay is the ancient name for China, referring to its native home. One of the seedlings of *Pyrus ringo* descended from the original importation from Russia by Professor J. L. Budd. The name as now given in Bailey's *Cyclopedia of Horticulture* is Chinese apple, *Pyrus prunifolia*, Willd., var. *Rinki*, Bailey. This seedling is a good representative of this species. Fruit, one and one-half inches in diameter; clear bright yellow all over with some orange blush. Calyx deciduous. Flesh a clear, juicy acid. Original tree has been very productive. The fruit cooks up as easily as Duchess, making light yellow acid sauce of good flavor.

**Beauty Crabapple.** — Introduced 1919. One of our seedlings of *Pyrus baccata cerasifera* raised from seed received from the Botanical Gardens at Petrograd, Russia. The name Beauty has been given to this seedling because it is perhaps the brightest in color of all our crab seedlings. It is a brilliant solid cherry, red all over with orange red underneath, especially on the shaded side. Size is about one and one-fourth inches in diameter. Dots distinct, few, white. Basin deep, irregular. Calyx deciduous with russet scar, and no opening into the core. Flesh white, firm, very juicy, acid. This is of the Cherry crab type. Tree is a very heavy bearer. It is of special promise owing to its tendency to late keeping. The fruit makes a bright red sauce like the Hyslop crab but the flesh has not the astringency of the Hyslop. The fruit has kept into January in a rather warm cellar. Tree is a very stocky, and vigorous grower of wide and strong forks and strongly resistant to blight. This tree should be of special value at the far North as it may mean the beginning of the development of the Siberian crab as a late keeper.

**Bismar Apple.** — Introduced 1927. Pedigree: Bismarck apple crossed with Mercer wild crab. The name is made up from these two names. It is the second of a series of hybrids of the standard apples with the wild crab in which the wild crab is the pollen parent. Round-



ish oblate, two and one-quarter inches in diameter; yellow striped and mixed with brown-red; flesh, yellow, pleasant; good subacid; sweet. An early bearer; season, probably winter.

**Chance Apple.** — Introduced in 1919. One of the chance seedlings from mixed seed of northern grown apples. Original tree productive. Fruit oblate, regular, of full commercial size, red-striped all over with attractive blue bloom. Flesh white, pleasant subacid. Season probably January or later.

**Chinook Apple.**—Introduced 1924. The first of a series of hybrids of the standard apples with the wild crab in which the wild crab is the pollen parent. In this case, the seed parent is the Baldwin apple, and the pollen parent is the wild crab of Elk River, about forty miles north of Minneapolis, Minnesota. Of promise for the far North. The first fruits of the Chinook apple are only two inches in diameter but this will probably increase somewhat on older trees. Fruit oblate, of a fine dark red, subacid, season probably all winter. Named after an Indian tribe.

**Dolgo Crabapple.** — Introduced 1917. A new red-jellied Siberian crab. At the annual exhibits of this Department at the South Dakota State Fair, many have asked about the remarkably long conical, intensely bright red crabs. This is one brought over from Russia in 1897. A vigorous productive tree and thus far free from blight. Fruit full of juice, jells easily, makes a rich, ruby-red jelly of beautiful color and excellent flavor.

The one-year-old trees in the nursery are of strong growth with wide spreading forks and strongly shouldered limbs, indicating that they will not split down easily. The Dolgo is winning favor over a wide area for its freedom from blight and for its early and heavy bearing qualities.

**Elta Apple.**—Introduced 1927. An excellent sweet apple. Seedling of Wealthy topworked on Hibernial. Fruit, two and three-eighths inches in diameter; round conical; rich light orange-yellow, red striped. Season, late fall. Name condensed from Wealthy and Hibernial.

**Giant Wild Crabapple.**—Introduced 1917. Probably the largest wild crab found thus far. Good specimens of the fruit run three inches in diameter and weigh four ounces. A brief note by W. H. Shroyer, of Sherrard, Illinois, calling attention to a large-fruited wild crab, appeared in the *Fruit Grower* (St. Joseph, Mo., Nov., 1911, page 32). The article was illustrated with a cut of a specimen of the fruit. Early in December, 1911, scions were obtained from the original tree near Sherrard, Illinois. The original tree was cut down in clearing out the brush some time in the winter of 1912-13, so it is fortunate that these scions were saved. As near as could be determined, the original tree of the Mercer (Fluke) wild crab was within about four miles of this place, but it had been grubbed out of the open pasture of native timber where it was found. In color and quality, the fruit of the Giant is much like the other large wild crabs, such as Soulard and Mercer, and will be useful mainly for jelly, or for adding a quince-like flavor to common apple sauce.

**Goldo Apple.** — Introduced 1922. A seedling of Grimes Golden topgrafted on Duchess of Oldenburg apple. The name is condensed from these two varieties. Goldo is distinguished by the smooth, hardy, vigorous growth of the original tree. The fruit is much like Grimes Golden in general appearance and has an excellent flavor. If the trees prove

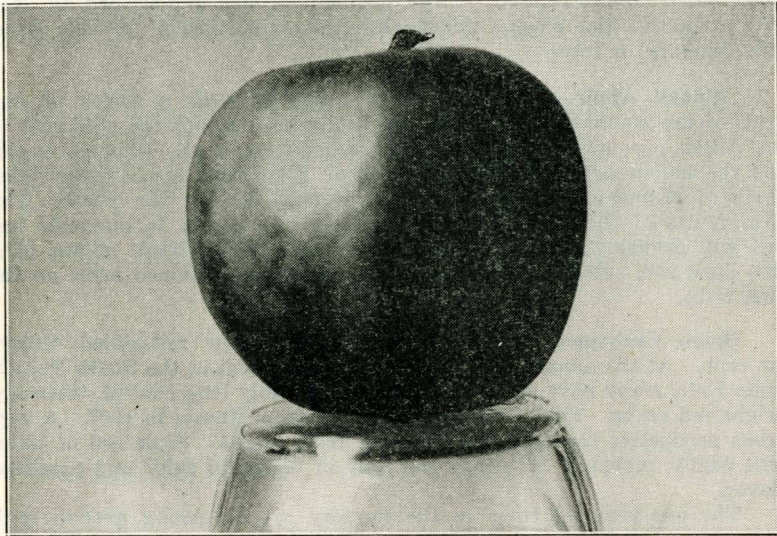


Fig. 2.—GOLDO APPLE

This is a cross between Grimes Golden and Duchess of Oldenburg. The fruit is much like the Grimes Golden in appearance.

hardy under propagation it will be a decided acquisition as a variety combining the hardiness of Duchess with the season and high quality of Grimes Golden. The flesh cooks quickly into light yellow sauce of excellent flavor. The fruit is larger than Grimes Golden.

**Hibkee Apple.** — Introduced 1916. This variety is a puzzle. A graft-hybrid of Hibernial and Milwaukee; the fruits so far show the flesh and core of Milwaukee and the surface coloring of Hibernial. For the method of grafting these split buds, see Bulletin 88, plate 13. Such hybrids are now called periclinal chimeras. It is desirable to ascertain whether this proves stable under propagation. The name Hibkee is made up from the names of these two varieties.

**Hopa Red-Flower Crabapple.** — Introduced 1920. Hopa is the Sioux Indian word for "beautiful." A promising addition to the list of ornamental trees for the lawn owing to its wealth of beautiful deep rose crimson blossoms. A striking sight when in bloom. The fruit is too small to be of value for eating, being less than one inch in diameter; but its bright red color will light up the tree in autumn, and the small size is an advantage as the tree is less apt to be stripped for fruit when standing on the lawn. Female parent, *Pyrus Malus Niedzwetzky-*



ana, a small red-fleshed apple from Turkestan in the high mountains between Turkestan and China; male parent, *Pyrus baccata*. This was not a hand cross, but it is almost certain that the *baccata* was the pollen parent. Trees of strong growth in nursery.

**Into Crabapple.** — Introduced 1924. This name is now canceled as the tree is really the Maga, introduced 1922, and this was overlooked in checking up the list.

**Irkutsk Siberian Crab Seedlings.** — Introduced 1910. The pure Siberian crab (*Pyrus baccata*) grown from seed obtained from trees growing wild near Irkutsk, Lake Baikal region, Eastern Siberia. An extremely hardy ornamental tree with fruit the size of a pea; flowers, pink and white. Worthy of growing for ornament, but the fruit is too small for profit. In Russia, seedlings of this tree are used in the nurseries as hardy stocks for the cultivated apple to prevent root-killing.

**Ivan Crabapple.** — Introduced 1916. One of our many seedling crabs. Noteworthy for the calyx segments being absent in the ripe fruit, the same as in the pure Siberian crab (*Pyrus baccata*). Fully one and three-fourths inches in diameter, roundish oblate, good color, marbled with stripes and orange red, acid.

**Izo Crabapple.** — Introduced 1919. Male parent Yellow Transparent apple. Female parent, Fluke No. 10, which is a seedling of Mercer Wild crab with some standard apple. This makes this pedigree one-half Russian apple, one-fourth West European apple, and one-fourth wild crab from Mercer County, Illinois. Izo is the Sioux Indian word for peninsula. Regular, oblate. Yellow with bronze cheek. Russet dots and firm subacid flesh. The compact entire carpels of the core show influence of the wild crab. Flesh is clear acid. Appears promising as a crab that will keep well into winter.

**Kola Wild Crabapple.** — Introduced 1922. A hybrid of the wild native crab apple from Elk River, Minnesota, with pollen of Duchess of Oldenburg apple. The fruit is flat, green, full two inches in diameter on the original tree fruiting in greatly crowded nursery rows of seedlings. The skin is oily like the wild crab. The fruit cooks up into an acceptable sauce. Trees have strong forks and appear immune to blight and winter killing. Kola is the Sioux Indian name for "friend". The heaviest specimen of Kola in 1919 weighed three ounces; the largest was two and one-half inches in diameter. This was the first year of fruiting.

**Lemon Apple.** — Limonoe (R. & K. 159) Apple. A large apple, fully three inches in diameter; color, clear greenish yellow with bronze blush. Flesh white, mild subacid, of good quality. Show some evidence of keeping capacity. Although not the first time the Lemon apple has been imported, this is our own importation from Russia. Worthy of a trial in the North. From the 1922 list.

**Linda Sweet Crabapple.** — Introduced 1922. A seedling of Malinda apple topgrafted on Sweet Russet Crab apple. A large crab apple with skin much russeted. Flesh mild subacid sweet. Apparently

a late winter crab. The influence of the Sweet Russet pollen is evident from the sweet flesh and russet skin. Linda is derived from the word Malinda.

**Maga Crabapple.** — Introduced 1922. A seedling of McIntosh Red apple top-grafted on Virginia crab. Fruit large for a crab, flattened, with bright red stripes. The McIntosh evidently contributed its high flavor as the flesh is of the same type. Season evidently late. This tree looks like a good cross of the McIntosh apple and the Virginia crab, and if it proves hardy under propagation will be something decidedly worth while. The original tree bore a heavy crop in 1919.

**Manchurian Crabapple Seedlings.** — Introduced 1926. These are seedlings of *Pyrus baccata*, var., *Mandshurica*, Maxim, a form of Siberian crab grown from seed gathered by Prof. N. E. Hansen in 1924, in the mountain region, about fifty miles east of Harbin, Manchuria. The small fruit varies in size; tree is of somewhat stronger growth than the ordinary Siberian wild crab and for that reason is worthy of testing as a stock. The tree is quite ornamental, heavily branched in the open but grows taller when crowded by other trees in the forest.

**Mercer Wild Crabapple.** — Found growing wild near Sherrard, Mercer County, Illinois, about 35 years ago, by the late N. K. Fluke of Davenport, Iowa. Fruit yellow, oblate, and up to two and five-eighths inches in diameter. Weight three ounces. This tree has been especially productive here at this station when top grafted on Hibernial apple. Flavor acid and acerb, so it is useful mainly for jelly or for adding a quince-like flavor to apple sauce. The tree is really beautiful when in bloom. From the 1923 list.

**Missouri Wild Crabapple.** — Found some 40 years ago near Kansas City, Missouri, by the late Col. J. C. Evans of Kansas City, Missouri. This fruit was named and introduced by Colonel Evans. Fruit roundish, two and one-half inches in diameter, truncated, regular, rich golden yellow all over. Its native acerbity is considerable toned down but it is still a wild crab. Worthy of preservation as a curiosity and perhaps as a basis for further work. From the 1919 list.

Specimens of the Missouri wild crab grown at this Station on French Paradise stock were two and seven-eighths inches in diameter and weighed four and one-half ounces.

**Nertchinsk Siberian Crab Seedlings.** — Introduced 1924. For the far North, it may prove best in the long run to improve the Siberian crab by straight selection through several generations rather than by hybridization with the standard apples. The Siberian crabs vary considerably in hardiness. The one from Nertchinsk, eastern Siberia, near the headwaters of the Amur river, appears to be the hardiest one now available and will go farther north. They are very productive. The fruits make a beautiful sight on the tree and make as fine show as the common European Mountain Ash which is not entirely hardy here, often winter-killing after heavy fruiting. Fruits mostly small, for ornament only, and for stocks.



**New Duchess Apple.** — Introduced 1924. This is the name under which this variety was imported some years ago from Russia. The trees are productive and the fruit appears to be much the same as the Duchess of Oldenburg. Perhaps the basin is less corrugated and the size is extra large.

**Nocalyx Crabapple.** — Introduced 1920. A seedling of Spitzenberg crab. This is probably the largest apple with a deciduous calyx produced to date. Fruit round, two inches in diameter, yellow with red stripes. Sprightly subacid, with sweet after-taste. A very productive tree. Season September. This fruit has no calyx segments and no calyx tube open into the core. However, in the Nocalyx, Ivan, Amur, and other crabs, the calyx segments are not wholly deciduous, occasional specimens retaining their segments.

**Olga Crabapple.** — Introduced 1919. Pedigree: Female parent, Duchess of Oldenburg apple. Male parent, *Pyrus baccata cerasifera*, which is much like the old Cherry crab. This combines the Russian apple with the Siberian crab. Fruit is regular, oblate, fully one and one-half inches in diameter on the seedling tree. Color, solid bright cherry red all over with blue bloom; dots distinct, white, many large; basin quite shallow, smooth; cavity wide, obtuse with considerable russet. Calyx mostly deciduous. Flesh is yellowish white, crisp, juicy, acid, of good quality. Red core outline in flesh. Very good to eat raw as it mellows. The fruit cooks up very quickly, as easily as the Duchess apple itself, and the sauce is of an attractive deep salmon red. Under propagation, the trees may increase slightly in size of fruit. The tree is a vigorous, stocky grower with strong forks and is extremely productive.

**Oxbo Apple.** — Introduced 1922. A seedling of Roxbury Russet apple top-grafted on Duchess of Oldenburg apple. The name is condensed from the names of these two varieties. Fruit of fair size, up to two and five-eighths inches in diameter; white juicy, subacid. Season probably late fall, but not fully determined. A stock grower in the nursery.

**Red Tip Crabapple.** — Introduced 1919. Female parent, a wild crab from Elk River, Minnesota. Male parent, *Pyrus Malus Niedzwetzkyana*, a small red-fleshed apple from Turkestan in the high mountains between Turkestan and China. The pedigree does not indicate any promise as a table fruit, but the red-tipped young leaves make it an interesting tree from the ornamental standpoint. The fruit is small.

**Russian White Apple.** — Introduced 1924. Noteworthy for its snow-white color and a favorite at State Fair Exhibits. A good summer apple, flesh snow-white, juicy, sprightly subacid. This tree is growing in the old Russian apple orchard at State College and the name Russian White, is given until the real name can be determined.

**Sapinia Crabapple.** — Introduced 1920. This is a seedling of Winesap top-grafted on Virginia crab. The name is made up from these two names. One of the forerunners of a new race of hybrid apples, in

which the cultivated apple instead of the Siberian crab is the female parent. Fruit thinly washed with dull red, almost two inches in diameter. Flavor subacid. Evidently a long winter keeper.

**Sasha Apple.** — Introduced 1919. A seedling of the Hibernial pollinated with Gravenstein pollen. The fruit is a fine yellow, oblate and excellent quality sweet apple of full commercial size; the tree is of strong, stocky growth, has blighted a little but not more than some of the standard varieties. The pedigree indicates it should combine hardiness and quality. Sasha is a Russian man's name. The Sasha is a fine quality fruit, but the tree blights so much that it has been discarded here at Brookings.

**Sereda Apple.** — Introduced 1916. From seed of the Harry Kaump top grafted on Oldenburg (Duchess) apple. Resembles Yellow Transparent and is similar in maturing very early, but is more regular in form. Yellow, juicy sprightly subacid. Sereda is the Russian word for Wednesday.

**Shoko Wild Crabapple.** — Introduced 1922. A hybrid of the wild crab of Elk River, Minnesota, with pollen of Alexander apple, one of the largest Russian apples. Fruit nearly two inches in diameter, green, acid, but cooking into an acceptable sauce. The size of the fruit will probably increase, as the original tree is much crowded in nursery rows. Shoko is the Sioux Indian for "seven".

**Sugar Crabapple.** — Introduced 1919. A large flavored winter sweet crab. One of our seedlings of Antonovka. Fruit two inches in diameter, round oblate, yellow with bronze blush. Flesh a rich sweet. This has fruited several times and has increased considerably in size since it first fruited. The fruit cooks up easily into a dark yellow sweet sauce that is very good. This tree has been free from blight so far. Its really excellent flavor should commend it to those who like sweet apples.

**Tipi Wild Crabapple.**—Introduced 1922. Also a hybrid of the wild crab of Elk River, Minnesota, with pollen of the Duchess of Oldenburg apple and much the same in tree and fruit as Kola. Tipi is the Teton Indian for "tent".

**Toringo Crabapple.** — From the 1917 list. *Pyrus Toringo* Crabapple. A dwarf crab native of Japan. Fruit the size of a pea, flowers white and bluish. Grown mostly for ornament, but promising as a dwarf stock. Descended from the original stock imported by Prof. J. L. Budd from Russia. Not entirely hardy but worthy of further study. *Pyrus Toringo*, Sieb., is now listed in Bailey's *Cyclopedia of Horticulture* as *Pyrus Sieboldii*, Regel.

**Yellow Sweet Apple.**—This old Russian apple has borne abundant fruit for many years in the Russian apple orchard of this Department. It is one of the earliest apples; round, yellow, juicy, sweet. This variety should find a place in every family orchard. From the 1924 list.

**Zapta Wild Crabapple.** — Introduced 1922. A hybrid of the wild native crab apple from Elk River, Minnesota, with pollen of the Bismarck apple, a large variety from New Zealand resembling the Alex-

ander. Fruit two and one-eighth inches in diameter, green, acid and acerb, but cooks up well into sauce. The original tree is closely crowded in our seedling nursery so the size of the fruit will probably increase under propagation. Zapta is the Sioux word for "five."

**Zeleba Apple.** — Introduced 1922. An importation from Russia. The full name, Krimskaja Zeleba, indicates that Crimea, in southern Russia, is the place of origin. As fruited here, it is a very large, round, red apple, size about three and one-half inches in diameter and very heavy, flesh white, pleasant subacid. The fruit cooks up well. An apple of very attractive color, really a beautiful fruit. Season about December to midwinter. Zeleba has shown some tendency to blight.

### Progress With Plums and Sand Cherries

Fully 10,000 native plum seedlings have been grown at this Station in an endeavor to improve the fruit in size and quality. A record of the early plum work was made in South Dakota Bulletin No. 92, "Plums in South Dakota." These select native plums were given South Dakota numbers for propagation. Some pure native plums should be included in every plum orchard to insure abundant pollination.

South Dakota Numbers 8-22, inclusive.—From the 1907 list. New native plums. South Dakota Numbers 8-22, inclusive. About 6,000 native plum seedlings have been fruited and some trees of fifteen of the best varieties have been propagated and are now ready for limited trial elsewhere. All bear fruit large to very large in size, and good quality; trees productive and with good foliage.

South Dakota Numbers 23-45, inclusive.—From the 1908 list. Choice pure native plums. All bear fruit, large to very large in size and good to very good in quality; trees productive and with good foliage.

There were some really fine native plums among these South Dakota numbers but there was very little or no call for them after the new hybrid plums appeared. Out of all of these native plum seedlings the following have been named: Wastesa, Yuteca, Zekanta, Huya and Topa. The general experience with all these pure native plums favors the Wastesa as being the outstanding one for superiority in quality. Yuteca is extra large.

A considerable number of seedlings have been grown from the pure native plums collected from various parts of South Dakota. The only one named so far is the Teton. The lack of available land has prevented much further work with the pure native plums but the work is still under way. There are many choice plums at various points in the state, the trees of which should be marked and brought into cultivation. We need especially some more yellow plums. Many select native South Dakota plum seedlings have been planted in the State Orchards at Watertown and Eureka.

### Progress With the Native Sand Cherry

The western Sand Cherry, *Prunus Besseyi*, is a native of South Dakota, especially in the western half of the state. A detailed report of the experiments in taming this native fruit is given in South Dakota Bulletin 87, "The Western Sand Cherry", June, 1904. In the present



Bulletin are noted the Sioux, Tomahawk and South Dakota No. 5 Sand Cherries. Many thousands of Sand Cherry seedlings have been grown in the course of this work of taming this, one of the favorite fruits of the Sioux Indians of South Dakota. The second generation of Sand Cherries at this station consisted of 5,000 plants and the third generation of 25,000 plants. In the course of ten trips in five years the Sand Cherry trail has been followed into North Dakota, northwest Minnesota and north into Manitoba and Saskatchewan.

The work is still under way, Sand Cherries being selected at every opportunity with the seventh and eighth generations now under trial. A large number of seedlings have been selected and are propagated for further work under numbers by budding on native plum roots. The effort is to improve the fruit in size and quality and decrease the size of pit. These select Sand Cherries can be propagated by layering. The budded plants are rather expensive for the amount of fruit obtained, some years up to about three pounds per plant, so an effort is being made to breed this improved type true to seed. The Sand Cherry hybrids, such as Opata and Sapa, are much more popular than any of the named Sand Cherries owing to their great superiority in size and quality of fruit.

Wherever the Sand Cherry hybrids are grown, it will be well to have a few pure Sand Cherry seedlings and pure native plums near by to provide abundant pollination. Every garden in the state could use to advantage some of these seedling Sand Cherries as they are very productive and the fruit is useful for sauce or preserves.

All the sand cherry hybrids such as Opata, Sapa, Sansota, Cheresoto, and Wachampa should be kept in bush form with many stems close to the ground. As they bear heavily on one year old wood, try to have an abundance of this wood coming on by pruning back the shoots that have borne several years. The sand cherry hybrids should not be trimmed up with a high stem as some practice with ordinary plums.

All the sand cherry hybrids fruit very freely on one-year-old budded trees in nursery row. All plums and sand cherry hybrids do best in mixed orchards of several varieties. This mixed planting insures perfect pollination of the blossoms. Plums blossom earlier than sand cherries and the hybrids are usually in between. The best plums for pollination are usually the pure native plums. Wastesa is one of the best pure native plums. If pure wild plums are close by, they will furnish abundant pollen. For late blooming plums or sand cherry hybrids, it would be well to plant some pure sand cherries also to insure perfect pollination. In addition, if there are no bees in the neighborhood it would be well to keep bees as they help in the pollination.

#### Progress With Manitoba Native Plums

In the fall of 1895, a lot of pits of wild plums (*Prunus nigra*) were obtained from Thomas Frankland, Stonewall, Manitoba, who gathered them from wild plum trees in the vicinity of Stonewall, a few miles north of Winnipeg. The pits were planted at Brookings, and out of many seedlings, two were selected and propagated under the names Winnipeg and Assiniboin as noted in Bulletin 130. These have been tested at various places in the North, especially in their native region, and have won favor. Here at Brookings the Manitoba plums are characterized by

small size of tree, but extremely early season of fruit. In fact, they are the earliest of all native plums, but are not needed for the main market here since at Brookings larger and better plums can be raised owing to our later season.

In an endeavor to improve the fruit in size and quality a number of hybrids of the Manitoba wild plum with choice plums from California have been made. None of these hybrids are as large as Waneta so will probably be planted mainly in the North. The trees are productive and the large red fruit is of excellent quality. The names are all of Indian tribes at the far North, especially Manitoba. The three named so far are the Cree, Pembina and Ojibwa.

#### Progress With the Sand Plum

Many seedlings of the Sand Plum of Kansas, (*Prunus Watsoni*), have been raised. They are interesting trees of dwarf habit bearing profusely of good fruit which varies greatly in size and quality. The Kaw and the Kiowa, two of the hybrids with the Wolf plum, are worthy of trial in the south since they ripen after all other plums are gone but early enough to escape frost year after year. These new plums should probably not go much north of Brookings as they may not ripen; but for the southern part of the state, they are worthy of trial as a distinct new departure in plums. The names are given in honor of old Indian tribes in the Sand plum region.

#### Improvement of the Plum and Sand Cherry

The following synopsis is a classification of the varieties described in this bulletin. The seed or female parent is mentioned first, the pollen, or male parent, second.

Select Native Plums (*Prunus Americana*): Wastesa; Yuteca; Huya; Topa; Zekanta; Teton.

Select Manitoba Plums (*Prunus Nigra*): Assiniboin; Winnipeg.

Hybrid Japanese Plum x Native Plum: Tecumseh (Shiro x Surprise).

Japanese Plum x Native Plum: Waneta; Kahinta; Tawena (Apple plum x Terry plum); Oziya (Red June plum x DeSoto plum).

Native Plum x Chinese Apricot Plum: Hanska; Inkpa; Kaga; Toka (seedling native plum x *Prunus Simoni*).

Chinese Apricot x Native Plum: Tokata (*Prunus Simoni* x De Soto plum).

Sand Plum x Native Plum: Kaw; Kiowa (Sand Plum, *Prunus Watsoni* x Wolf plum).

Manitoba Native Plum x Hybrid Japanese Plum: Cree (Manitoba native plum x Combination plum); Pembina (Manitoba native plum x Red June plum).

Japanese Hybrid Plum x Manitoba Native Plum: Ojibwa (Shiro x Manitoba Native plum).

Select South Dakota Sand Cherries (*Prunus Besseyi*): Sioux; Tomahawk; No. 5; and several other numbers.

#### Sand Cherry Hybrids

Sand Cherry x Japanese Plum: Sapa; Wachampa; Etopa; Eyami; Enopa; Ezaptan (Sand Cherry x Burbank's Sultan plum); Tom Thumb (True to Seed No. 2), (seedling of Ezaptan); Opata; Owanka; Okiya;

Cikana (Sand Cherry x Gold plum); Skuya; Wohanka; Wakapa (probably Sand Cherry x unknown Japanese plum).

Sand Cherry x Native Plum: Cheresoto; Sansoto (Sand Cherry x DeSoto plum).

Sand Cherry x Plum: Champa (Sand Cherry hybrid, a seedling of Sioux) open pollinated; Oka (seedling of Champa) open pollinated, probably with Japanese plum.

Sand Cherry x Purple-leaf Persian Plum: Stanapa (purple-leaved semi-dwarf; Cistena (purple-leaved) dwarf; Purple C., not named.

Sand Cherry x European Apricot: Yuksa (Sand Cherry x New Large Apricot).

Sand Cherry x Peach: Kamdesa (Sand Cherry x Opulent Peach).

Sand Cherry x European Sweet Cherry: Seedlings not named, all short-lived.

Sand Cherry x Chinese Apricot Plum: Tokeya (Sand Cherry x Prunus Simoni).

#### Catalog of Native and Hybrid Plums and Sand Cherries

**Assiniboin Plum:** Introduced 1908. A very early variety grown from native pits (*Prunus nigra*) received from Stonewall near Winnipeg, Manitoba. A favorite in Manitoba for general cultivation. A annual bearer of good fruit. The early blooming is characteristic.

**Champa Sand Cherry Hybrid:** Introduced 1912. Champa is the Sioux Indian name for "cherry". A seedling of the Sioux, one of the pure sand cherry seedlings. The bush is of strong upright growth for a sand cherry, the original plant is about 5 feet.

In quality for table or culinary use, the Sioux seems to be the best out of many thousands of sand cherry seedlings grown at this Station. But the Champa exceeds the Sioux somewhat in size and appears to be the largest sand cherry to date. Color, glossy black; pit small; long rather than round. These pure sand cherries should be gotten on own roots as soon as possible by layering, as budding is expensive. Some of those who have the Sioux and Tomahawk sand cherries are doing this. A unique method, which was introduced by C. W. Gurney of Yankton, S. D., is by "high buds"; that is, budding two or three feet from the ground on native plum stock, thus giving a neat round-headed plant, very fruitful and ornamental for the home garden.

These plants should be set a little deeper than they stood in the nursery, making it easier to make layers.

Sand cherries are for dry climates and dry soils; in moist soils and climates they mildew and are unproductive. The drier the soil the better the sand cherry seems to like it and the more the sand cherry is at home Hence, it deserves a place in the small fruit garden of the western settler. Champa has proven productive in many places. It makes a low bushy tree. I consider this of value for ornamental planting, owing to the great abundance of flowers in spring. The flowers are white with pink tinge.

**Cheresoto Sand Cherry Hybrid:** Introduced 1910. Sand Cherry x De Soto plum pollen. In the fall of 1907 thirteen seedlings of this pedigree were under propagation in the station nursery. All these trees made strong growth in the nursery, some five feet in height, stocky,



well branched and formed abundant fruit buds the first year. These seedlings have borne heavily the past season (1910) and some of them combined the bad qualities of both parents in quality of fruit and large size of pit. However, others show promise of value as a late market plum as they fruited heavily here this year when native plums were almost a total failure. The fruit is longish with a minute bristle or prickle at apex which it no doubt inherits from the sand cherry. The size is about one and three-eighths inches in diameter; color black when fully ripe, with blue bloom; flesh cling, yellowish green, sprightly, pleasant; skin thin and free from acidity. The fruit is a perfect mingling of the sand cherry and DeSoto in looks and flavor, having the size of the DeSoto and the color of the sand cherry. The habit is that of a vigorous plum tree.

**Cikana Sand Cherry Hybrid:** Introduced 1912. Cikana is the Sioux Indian name for "small". Of the same pedigree as Opata but much later in season. This pedigree is: Female parent, the Dakota sand cherry (*Prunus Besseyi*); male parent, the Gold plum. The Gold is a very large hybrid Japanese plum originated by Luther Burbank and for which three thousand dollars was paid when first introduced.

Fruit a glossy black, round, one inch in diameter; skin very thin, free from acidity; flesh green, slightly red at pit, very pleasant; quality very good for the table. The Cikana would make a good substitute for the black California sweet cherry when cooked. When cooked with pits in, it cooks soft in about half an hour and the black skin gives the sauce a beautiful rich red color. The flavor is milder than that of Ezaptan.

**Cistena Purple-leaf Sand Cherry Hybrid:** Introduced spring 1909 as Purple A. Female parent, Dakota Sand Cherry; male parent, the Purple-leaved plum of Persia, *Prunus Pissardi*. A beautiful shrub, following the Sand Cherry in stature of plant and glossiness of leaf, but the foliage has the rich purple-red color which gives its Persian size such wide popularity.

**Cree Plum:** Introduced 1917. Pedigree: Manitoba wild plum x Combination plum pollen. In 1901 when the Combination was introduced by Luther Burbank, it was considered the best in quality of 25,000 seedlings.

**Enopa Sand Cherry Hybrid:** Of the same pedigree as Sapa. Enopa is Sioux Indian for "second". Size one and one-sixteenth inches in diameter, round, dark red with green flesh; skin thin, free from acidity, flavor pleasant. Enopa is inferior to the sister variety, Sapa, both in size and quality. Fruit round, dark red with blue bloom, with very minute prickle at apex.

**Etopa Sand Cherry Hybrid:** Introduced 1908. Of the same pedigree as Sapa. Etopa is Sioux Indian for "fourth". First sent out in the spring of 1908 as one-year-old trees. These bore freely in 1909 in several places. Of the same pedigree as Sapa and much like it in color of skin and flesh. Like Sapa, the fruit is excellent in quality and remarkable for the intense black, purple red color of skin, flesh and juice. Skin thin, free from acidity. Mr. A. P. Stevenson of Dunston, Manitoba, wrote in 1909: "Etopa ripened some very fine fruit on September 12, 1909. I think a lot of this variety, it is the best yet fruited here."

**Eyami Sand Cherry Hybrid:** Introduced 1908. Of the same pedigree as Sapa. Fruit round, one and three-sixteenths by one and five-sixteenths inches in diameter; dark red with semi-transparent skin; skin thin; flesh green, pleasant; pit large; inferior both to Sapa and Opata. Tree productive.

**Ezaptan Sand Cherry Hybrid:** Introduced 1911. A number of seedlings of the same pedigree as the Sapa, with much the same character of fruit, but differing somewhat in tree, have been developed. Perhaps several are needed for better pollination in mixed orchards. One of them, the Ezaptan (Sioux Indian for "fifth"), is remarkable for its earliness and heavy bearing. Color of fruit in 1909 of a dark purple and with less grayish overcast than that of Sapa; perhaps averages smaller than Sapa but this will be better determined with further experience. Quality delicious, color black purple-red from skin to pit the same as Sapa.

**Hanska Plum:** Introduced 1908. Hanska is the Sioux word for "tall". The name is given in allusion to the extraordinarily rapid growth in nursery, three-year-old trees attaining a height of twelve feet; two-year-old trees are too heavy to ship well. The female parent is a seedling of the wild northwestern plum (*Prunus Americana*); the male parent is the very large, firm-fleshed, fragrant apricot plum of China (*Prunus Simoni*), and popular in the orchards of California. The Hanska fruited first in 1906 and 1907 on two and three year old trees in nursery row. In fruit, the Hanska closely resembles its Chinese parent in form, color, fragrance, quality and firmness of flesh; the size, however, is smaller, being only one and one-half inches in diameter so far but will probably increase as this was from two and three year old trees in nursery row. The pit is very small.

As exhibited at the South Dakota State Fair three years in succession, the fruit of this variety has been much admired for its beautiful color, which is bright red with heavy blue bloom, firm yellow flesh, good quality and rich fragrance; fruit in 1909 was one and one-half to one and nine-sixteenths inches in diameter. When cooked, the strong apricot flavor is brought out to perfection, entirely unlike any native plum. The flat shape also distinguishes it from all the other hardy plums grown in the Northwest.

**Huya Plum:** Introduced 1908. Huya is the Sioux Indian for "eagle". This is State Fair No. 36 noted in Bulletin 93. A large, very productive wild plum.

**Inkpa Plum:** Introduced 1909. Inkpa is the Sioux Indian for "apex" or "acme"). Of the same pedigree as Hanska. These varieties are much alike in fruit and rapidity of growth, but further trial is needed to determine which is the best one out of the many seedlings of this parentage.

**Kaga Plum:** Introduced 1909. Kaga is the Sioux Indian for "pitch a tent." Of same pedigree as the Hanska. These varieties are much alike in fruit and rapidity of growth, but further trial is needed to determine which is the best one out of the many seedlings of this parentage. Many prefer the Kaga as a better annual bearer than Hanska.

**Kahinta Plum:** Introduced 1912. Kahinta is the Sioux Indian name for "sweep". Female parent: the Apple plum, a Japanese variety originated by Luther Burbank of California; male parent, the Terry, a native plum (*Prunus Americana*), originated by the late H. A. Terry of Crescent, Iowa.

Three seedlings of this pedigree, all have fruit of excellent quality, approximating that of the peach in excellence. Fruit one and one-half inches in diameter, dark red, roundish, slightly oval, very heavy; the heaviest plum on the ground the very dry season of 1911, weight being about one ounce. Fruit freestone, skin thin, no acidity; flesh firm yellow, sweet. Later reports show the size larger. The three sister varieties, Waneta, Kahinta and Tawena, are all remarkable for large sized fruit.

**Kamdesa Sand Cherry Hybrid:** Introduced 1908. This is a hybrid of the western Sand Cherry with pollen of the Opulent peach. Kamdesa is the Sioux Indian name for "Daybreak". This plant is practically sterile; instead of having one pistil it usually has from two to three and as high as six pistils, so it is an ornamental bush and has no value for fruit. Evidently, this is not the way to get a hardy peach since the resulting hybrid of the Sand Cherry and peach is sterile.

**Kaw Plum:** Introduced 1917. Pedigree: *Prunus Watsoni* x Wolf plum pollen. The color is a pleasing bright dark red with firm skin with fine white dots and white bloom and peculiar crisp texture of yellow flesh. The quality is pleasing to all who have tried it.

**Kiowa Plum:** Introduced 1917. Pedigree: *Prunus Watsoni* x Wolf plum pollen. Much like the Kaw. Perhaps only one will be needed.

**Ojibwa Plum:** Introduced 1917. Pedigree: Shiro x Manitoba wild plum (*Prunus nigra*) pollen. Since the Shiro, one of Luther Burbank's plums, is a complex hybrid of four species, the Ojibwa will be a mixture of five different species of *Prunus*: *Nigra*, *Angustifolia*, *Cerasifera*, *Triflora*, *Simoni*. Flesh yellow, of good flavor; skin thin and free from acidity. This tree seems to be especially worthy of a trial at the North. The Ojibwa is not nearly as large as the Waneta but should go considerably farther north. The original tree has been very productive. At first sight, the pointed shape would make it look like a select pure native Manitoba plum, but the skin is too thin to be a pure Manitoba.

F. L. Skinner, Dropmore, Manitoba, Canada, writes under date of January 19, 1922: "I had a splendid crop from your Ojibwa plum this year."

**Oka Sand Cherry Hybrid:** Introduced 1924. This is not really a cherry but is a good substitute for a cherry. It is a Sand Cherry hybrid, a seedling of Champa. Black red flesh, rounder than Sapa and color brighter on outside. The original one-year seedling tree bore fruit in 1923, the year after planting, and again in 1924. Plant of bushy habit but taller than the Tom Thumb Cherry. I received a letter from a Canadian friend asking that I develop a cherry that would dry up and stay on the bush until the farmers found time to pick them. I thought this was a tall order for one day, but shortly after I went out into the seedling nursery and found the plant, which I have named the Oka Cherry. The fruit dried into a sweet prune-like fruit and later can be



cooked up into excellent sweet sauce. So after all I find this Oka Cherry filling the demand of my Canadian friend, although I would not recommend leaving the fruit on the trees too long as they are too tempting.

**Okiya Sand Cherry Hybrid:** Introduced 1908. Of the same pedigree as Opata. Fruit dark red, roundish; flesh green, excellent quality; fruit much like Opata but averages smaller.

**Opata Sand Cherry Hybrid:** Introduced 1908. Opata is the Sioux for "bouquet". One-year-old trees from buds sent out in spring of 1908 bore freely the following year in many places. The excellent quality of the Opata makes it worthy of wide popularity for table and culinary use. Female parent, the Dakota Sand Cherry (*Prunus Besseyi*); male parent, the Gold plum, a very large hybrid Japanese variety originated by Luther Burbank and for which three thousand dollars was paid when first introduced. Opata is a plum tree in habit of vigorous growth and forms fruit buds freely on one-year-old shoots in nursery; foliage large and glossy. Fruit, one and three-sixteenths inches in diameter, dark purplish-red with blue bloom; weight one-half ounce; flesh green, firm; flavor very pleasant, combining the sprightly acid of the sand cherry with the rich sweetness of the Gold plum. Excellent for eating out of hand. The thin skin can be chewed and eaten, as it is entirely free from acerbity. Pit very small; season extremely early. Our best Opata fruits in 1909 were one and five-eighths inches in diameter. A very strong grower in nursery and orchard and an early and heavy bearer. At this station in 1909, Opata was fully ripe when the Manitoba No. 1 plum, although dull red, was not ripe enough to eat. Opata is now widely grown in many states from Oklahoma north into Canada.

**Owanka Sand Cherry Hybrid:** Introduced 1908. Of the same pedigree as Opata. A few trees of Owanka were sent out in the spring of 1908, under restrictions as to propagation. These bore for the first time in 1909, the original tree having been used up in propagation. Fruit dark red, one and three-eighths inches in diameter with blue bloom; flesh yellow. In common with most of the other varieties of this pedigree, the apex is terminated by a minute prickle. The flesh is not so bad, but the bitter skin caused me to discard this variety at once and to recall the few specimens sent out. However, some growers report the bitter flavor is not objectionable in the jelly or sauce. The tree is a strong grower in nursery, forms fruit buds the first year, and is hardy and productive.

**Oziya Sand Cherry Hybrid:** Introduced 1912. Oziya is the Sioux Indian name for "to refresh". Female parent, Red June, a large early Japanese plum; male parent, DeSoto, a well known native plum from southwestern Wisconsin. Oziya was the earliest large plum in 1911, remarkable for its large size and very bright red color; flesh light yellow and of excellent quality. The original tree and the few trees propagated from it bore heavily the past season, the best specimens measured one and five-eighths inches in diameter. This plum should be of value for market as an extra early plum. Oziya plum jam is really remarkable for its bright cherry color and superb flavor; the skin cooks soft and disappears entirely and there is no trace of the native plum acerbity.

**Pembina Plum:** Introduced 1917. Pedigree: Manitoba wild plum x Red June plum pollen. The Red June is one of the earliest and best Japanese plums, imported many years ago from Japan. Many favorable reports have been received as to size and quality of fruit and early productiveness of tree of the Pembina.

**Sansoto Sand Cherry Hybrid:** Introduced 1910. Female parent, Sand Cherry (*Prunus Besseyi*); male parent, DeSoto, a well known standard variety of native plum (*Prunus Americana*) from southwestern Wisconsin. In the fall of 1907 thirteen of the seedlings of this pedigree were under propagation in the station nursery. All these trees made strong growth in the nursery, some five feet in height, stocky, well branched

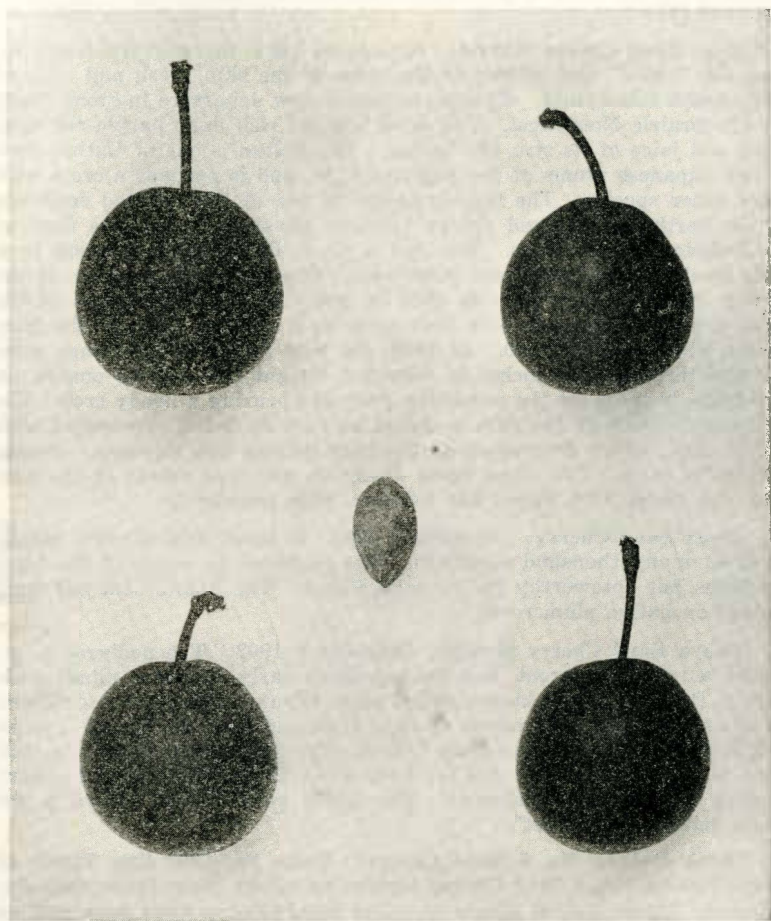


Fig. 3.—SAPA SAND CHERRY HYBRID

The fruit has a rich dark purple-red skin. It is an early season fruit.

and formed abundant fruit buds the first year. These seedlings have borne heavily the past season (1910) and some of them combined the bad qualities of both parents in quality of fruit and large size of pit. However, others show promise of value as a late market plum as they fruited heavily here this year when native plums were almost a total failure. The fruit is round. The size is about one and three-eighths inches in diameter; color black when fully ripe with blue bloom; flesh cling, yellowish green, sprightly, pleasant; skin thin and free from acidity. The fruit is a perfect mingling of the sand cherry and De Soto in looks and flavor, having the size of the De Soto and the color of the sand cherry. The habit is that of a vigorous plum tree. These sand cherry hybrids appear to be all later in bloom than the plum, which is characteristic of the sand cherry.

**Sapa Sand Cherry Hybrid:** Introduced 1908. Sapa is the Sioux Indian for "black", and alludes to the color of the skin, flesh and juice of this remarkable hybrid. This represents a new departure in stone fruits for the prairie Northwest. The fruit has the rich dark purple-red skin, flesh and juice of its sire, the Sultan. The Sultan is one of Luther Burbank's Japanese plums of the Satsuma type, and is perhaps a cross with some other species. The female parent is one of the selected seedlings of the northwestern sand cherry (*Prunus Besseyi*), a favorite fruit of the Dakota Sioux Indians. The tree is plum-like in habit, forming fruit buds freely on one-year trees in nursery. One-year trees sent out in the spring of 1908 bore freely in 1909 in many places. Specimens of the Sapa grow in Minnesota took first prize as a seedling plum at the Minnesota State Fair in 1909. In 1909, the best Sapas at Brookings were one and three-eighths inches in diameter, weight five-eighths ounces, on one-year-old trees set the preceding year and bearing a heavy crop. The rich purple color of the skin is dulled at first by being overspread with a thin gray, which disappears as the fruit attains full ripeness. Season extremely early. The Sapa bears freely on one-year shoots in the nursery and along with Opata has attained wide popularity.

**Sioux Sand Cherry:** Introduced 1902. A large Sand Cherry selected from many thousand seedlings. Not as large as some of the later seedlings but noteworthy for its mild flavor. The plants sent out were budded on native plum roots.

**Skuya Sand Cherry Hybrid:** Introduced 1908. The pedigree is recorded as: female parent, Red June, a large early Japanese plum; male parent, De Soto, a well known native plum (*Prunus Americana*) originated in southwestern Wisconsin. But in fruit and leaf, the Skuya is more of a Sand Cherry-Japanese plum hybrid. The Skuya first fruited in 1907 upon a tree very severely cut for budsticks. Fruit dark red and yellow. Quality excellent and delicious. The pit is very small. Skuya is the Sioux Indian for "sweet".

**South Dakota No. 5 Sand Cherry:** From the 1907 list: Plants of South Dakota No. 5 Sand Cherry budded on native plum roots were distributed. These budded plants of select Sand Cherry have done well on high upland at the Experiment Station at Mandan, North Dakota. Some years the average crop per plant is about three pounds. A large Sand Cherry of good quality.



**Stanapa Purple-leaf Sand Cherry Hybrid:** Introduced 1909. Sand Cherry x Purple-leaved Persian plum pollen. An event for landscape gardeners. By crossing the Dakota sand cherry with pollen of the Purple-leaved plum of Persia (*Prunus Pissardi*), we have a number of beautiful shrubs following the sand cherry in stature and glossiness of leaf, but with the rich purple-red color of foliage which gives the Persian sire such wide popularity. In the spring of 1909, three of these seedlings were first introduced as Purple A, Purple B, and Purple C. Last year (1910) Purple A was named Cistena (Sioux Indian name for "baby"). Further experience shows that Purple B is also worthy a name since the color is as bright and the growth equal if not superior. The name now given to Purple B is Stanapa, which is made up from two Sioux Indian words meaning "purple leaf". These purple-leaved sand cherries will probably win great favor for single specimens or groups on the lawn or for dwarf ornamental hedges, owing to their brilliant coloring.

**Tawena Plum:** Introduced 1924. Pedigree: Apple plum, a Japanese variety, crossed with pollen of the Terry, the largest native *Prunus Americana* plum. A full sister to the Waneta and Kahinta, and originated at the same time. Not quite as large as Waneta, fruit more round, an immense bearer. This has been much admired at our State Fair exhibits and the introduction has been urged. The name is an anagram (rearrangement) of the name Waneta. Carl A. Hansen, Brookings, reports Tawena as a model tree the first year in nursery, branching better than either Waneta or Kahinta.

**Tecumseh Plum:** Introduced 1918. A fine extra large plum. We have several of this pedigree, which is Shiro crossed with pollen of Surprise. As Shiro is one of Burbank's hybrid Japan plums combining four species, Surprise pollen makes this an amalgamation of five species. It should go south rather than north. The season is very early.

**Teton Plum:** Introduced 1912. For many years pits and scions of pure wild plums have been collected in various parts of South Dakota, both by correspondence and personal field work. The best success in this line was in 1904 in exploring along the Missouri near Campbell, in Campbell county. This tree was found in a small plum thicket a short distance from the Missouri river. The fruit was one and three-eighths inches in diameter, color a good clear red; flesh of good quality. Later in the season scions were cut from three of the trees in this thicket. The trees bore heavily the past season. One of them has been named Teton in honor of the Indian tribe living in that vicinity. This plum is practically a freestone; the skin is thick but cooks readily. It is the best representative of the pure native plum of this state found up to date.

**Toka Plum:** Introduced 1911. Some 15 varieties of the same pedigree as Hanska, Inkpa and Kaga have been developed, all of which bore a heavy crop in 1909, when native plums were almost a total failure. They are all very much alike in character of fruit but differ somewhat in tree. In observing these seedlings closely in the nursery and orchard, one cannot help noticing that some are spreading, while others are very upright in habit, much like the *Prunus Simoni* itself. One is

of such erect strong, stocky growth, really a model nursery tree, that it seems worthy of trial. Field notes state: "Simoni habit in nursery. The nicest looking tree in nursery and orchard." Toka is the Sioux Indian for "adversary". An early and heavy bearer.

**Tokata Plum:** Introduced 1912. Tokata is the Sioux Indian for "go forward". Female parent is the large, firm-fleshed, fragrant apricot plum of China (*Prunus Simoni*), popular in the orchards of California; male parent, DeSoto, a well known native plum (*Prunus Americana*) from southwestern Wisconsin.

The four varieties sent out from this Department: Hanska, Inkpa, Kaga, Toka, show that the firm flesh and rich fragrance of the apricot of China can be combined successfully with the native northwestern plum (*Prunus Americana*). A reciprocal hybrid of these four is the Tokata, since the native plum in this case is the male instead of the female parent.

The fruit is regular in form, roundish, slightly oval, with apex flat. In 1911 the size was one and three-eighths x one and seven-sixteenths inches in diameter. The skin is of a rich dark orange red, slightly mottled with numerous orange dots suffused in the skin covered with light lilac bloom. The flesh is of a rich orange red color, very firm and with the rich Simoni flavor when fresh from the tree. Pit free. When cooked a few minutes in sugar syrup the sauce has the rich Chinese apricot flavor, which is superior to any of the native plums and to the ordinary California plums as received in this market. Tree of good upright habit.

As to how far north this variety can be grown remains to be determined by experiment, but it can scarcely be expected to go outside of the natural successful range of the DeSoto plum.

**Tokeya Sand Cherry Hybrid:** Introduced 1907. The female parent is one of the select second generation seedlings of the Western Sand Cherry (*Prunus Besseyi*), a favorite bush fruit of the Dakota Sioux Indians. The male parent is *Prunus Simoni*, a peculiar fruit tree from China, allied to the apricots and plums; grown in California; fruit very large, fragrant, firm fleshed, sometimes marketed as a California plum. Fruited first in 1906 on trees one year old in nursery row, size one and one-fourth inches in diameter. Fruit in 1908 one and three-eighths inches in diameter, dark red, flesh green, of good quality; pit very small. Fruit in 1909 one and one-eighths x one and one-fourth inches in diameter; weight seven-sixteenths ounce; skin dark brownish red, skin is thin, bitter, improving with maturity; flesh green, pleasant acid.

**Tomahawk Sand Cherry:** Introduced 1902. A large Sand Cherry selected from many thousand seedlings. Not as large as some of the later seedlings but noteworthy for its mild flavor. The plants sent out were budded on native plum roots.

**Tom Thumb Sand Cherry Hybrid:** From the 1916 list. The first step in a project of breeding plums true to seed to avoid the necessity of budding and grafting. True to Seed No. 1 is a seedling of Opata. True to Seed No. 2 is a seedling of Ezaptan which is of the same pedigree as Sapa. This plan may not be desirable as the trees would need to be isolated when in bloom, either by tenting the trees or planting them

far from other trees. Some of them will no doubt revert, others will come true. To complete this work, seedlings should be raised and only those saved that come true.

From the 1921 list: Trees of this series have not been sent out since. True to Seed No. 2 has been watched closely the past five years. It is practically a Sapa in fruit, but the plant is a low bush, having much the same habit as its granddam, the native Sand Cherry. Bears freely on one-year shoots in nursery, from the ground up, and annually thereafter. Probably the plant should be propagated by layers to save the expense of budding. What has been done in this seedling is really to reduce the choice black-purple flesh plum-sand cherry hybrid to the stature of a small fruit. They can be planted close together like currant bushes. What more can be done, the future must disclose.

In the 1922 list the name Tom Thumb cherry was given to the True to Seed No. 2. The Tom Thumb has won popularity in Manitoba and Saskatchewan for its early and continuous bearing, and for resistance of the blossoms to frost in the spring.

**Topa Plum:** Introduced 1908. Fruit large, handsome; tree low. A good native plum. Topa is the Sioux Indian for "four".

**Wachampa Sand Cherry Hybrid:** Introduced 1910. Of the same pedigree as Sapa. Fruit one to one and one-fourth inches in diameter; much like the Sapa in every respect. It averages larger and more vigorous in tree than Sapa; one of the strongest growing trees of the Sand Cherry hybrids. Trees one year old from bud planted in 1903 bore a heavy crop in 1909. The fruit keeps well on the table after picking.

From the 1910 list: The union of the Dakota Sand Cherry and the Sultan plum gives us Sapa, Etopa and several others which with their rich flesh and juice and cherry-like pit will compare favorably with the purple red-fleshed sweet cherries from California. But they run too large to be rated as cherries. Shall they be called cherries or plums? Another desirable seedling of the same pedigree as Sapa and much like it, but a stronger grower and with smaller fruit, about one inch in diameter, has proven a very heavy bearer the past season on three-year-old trees transplanted at one year of age. It has been named Wachampa (Sioux Indian for "blood cherry").

**Wakapa Sand Cherry Hybrid:** Introduced 1908. The recorded pedigree is Red June, a large early Japanese plum x DeSoto, a well known native plum, *Prunus Americana*. However, the botanical characters are those of Sandcherry hybrids. The Wakapa is a sister to the Skuya and Wohanka.

**Waneta Plum:** Introduced 1913. This variety appears to combine the best points of the native and the Japanese plum. It is probably the largest of over 10,000 seedlings. The size here at Brookings in 1912 was two inches in diameter; weight two ounces. Good red color, skin free from acerbity, flavor delicious. The female parent is the Apple plum, a large Japanese variety originated by Luther Burbank of California; the male parent is Terry, the largest native (*Prunus Americana*) plum, originated by the late H. A. Terry of Iowa. The Waneta plum was exhibited at the South Dakota State Fair at Huron in September, 1912, by the Horticultural Department of this Station.



The Waneta is the largest of all the Hansen Hybrid plums. The tree is a very strong grower in nursery and an early and persistent annual bearer of delicious plums of large size. The Waneta combines in large measure the most desirable points of the native and the Japanese plums. At the 1920 Iowa State Fair at Des Moines the Waneta and the sister variety, Kahinta, were by far the largest plums on exhibition.

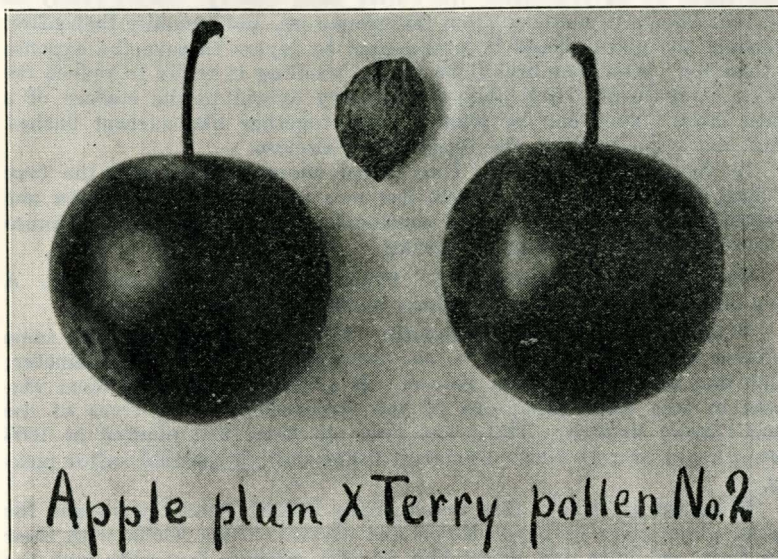


Fig. 4.—WANETA PLUM

This variety appears to combine the best points of the native and Japanese plum.

**Wastesa Plum:** Introduced 1908. Wastesa (Sioux Indian name for "delicious"). This is State Fair No. 16 mentioned in Bulletin No. 93. Large, almost free stone, excellent. It is the best of the State Fair seedlings mentioned in Bulletin No. 93 and is considered the best in quality of all the pure native seedlings in this lot of 10,000 seedlings. The characteristic ragged leaf indicates that Wastesa is a seedling of Wyant, one of the best native plums of northern Iowa.

**Winnipeg Plum:** Introduced 1908. A very early variety grown from native pits (*Prunus nigra*) received from Stonewall near Winnipeg, Manitoba. A favorite in Manitoba for general cultivation. An annual bearer of good fruit. The early blooming is characteristic. A sister variety to the Assiniboin but the Assiniboin appears to have become more prominent in Manitoba gardens.

**Wohanka Sand Cherry Hybrid:** Introduced 1909. Of the same pedigree as Skuya; fruit one inch in diameter, round, dark red; flesh green, red at pit, pleasant, sprightly subacid; pit small, round, nearly free; skin very thin, free from acerbity. In tree both Skuya and Wohanka are more like some of the sand cherry hybrids and we are rais-

ing some seedlings to determine this. In either event, the size will not make Wokanka as promising as the Opata or Sapa. Very strong, vigorous, stocky, spreading.

**Yuksa Sandcherry Hybrid:** Introduced 1908. This is a hybrid of western Sand Cherry with pollen of the New Large Apricot of Europe. This hybrid of the South Dakota Sand Cherry with a European Apricot produces an abundance of flowers, but is sterile. Evidently, this is not the way to originate a hardy apricot.

**Yuteca Plum:** Introduced 1908. Yuteca (Sioux Indian for "to refresh"): First sent out spring 1907 as South Dakota No. 8. Size very large, quality good. A choice early and productive native plum.

**Zekanta Plum:** Introduced 1908. Zekanta is the Sioux Indian for "yellow plum". A large yellow native plum, of good quality. Some seasons it reddens somewhat with full maturity.

### Improvement of the Cherry

The sweet cherries of Europe so extensively raised in our eastern states and on the Pacific Coast are not hardy in the prairie Northwest. The sour cherries of Europe are much hardier but not sufficiently hardy to recommend for general planting in South Dakota. The Early Richmond and allied varieties are grown to a small extent in the extreme southern part of the state.

Neither sweet or sour cherries combine well with any of our native cherries. From Russian seed, the Moscow has been grown at this Station.

At this writing, the chief limiting factor in hardy cherries in the North are the tender Mahaleb and Mazzard stocks used in commercial propagation. Chief among the objections to the northern Pincherry (*Prunus Pennsylvania*) as a commercial cherry stock are the numerous root-sprouts. This suckering habit makes it difficult to control. The Moscow probably will not be hardy as far north as the Sand Cherry hybrids. But even if none of the true cherries prove sufficiently hardy in the North, some very good quality substitutes can be found among the numerous Sand Cherry hybrids already originated.

**Moscow Cherry:** From the 1917 list. A new hardy cherry for the North. The prairie Northwest greatly needs a hardy cherry. In the course of five tours to Russia I became greatly interested in the cherry grown in the Vladimir region of Russia just east of Moscow. The fruit comes to the markets of Moscow in immense quantities. Near Moscow, on the Sparrow Hills where Napoleon stood in 1812, there are some interesting orchards of these cherries which I visited in 1894 and 1897. These cherries are grown mostly from root sprouts and seeds. The type, however, is not as constant as was thought at first, but varies considerably. Out of a lot of my imported seedlings I have selected one and named it Moscow which is now offered for the first time as budded trees, as it would take too many years to work up a stock of the cherry on its own roots. The trees are one-year buds on Mahaleb roots. This means that at the North they must be mulched carefully to prevent root-killing. As soon as possible, the Northern native Pin cherry

should be tested as budding stock. Out of a large number of cherries tested at this Station, Moscow is the only one that has borne fruit in satisfactory quantities. The tree is productive and perfectly hardy. The fruit is of medium size, bright red with light colored juice of good quality.

### Improvement of the Pear

From the 1919 list: The experiments in breeding pears immune or resistant to fire blight are described in Bulletin 159 of this Station. In the spring of 1915, scions of 39 varieties were distributed to 24 men in four different states. The later developments of this work are noted in the Minnesota Horticulturist for August, 1916, and in the 13th report of the S. D. State Horticultural Society. Since the publication of Bulletin 159, the tree called *Pyrus sinensis* or *Pyrus Simonii* has been separated from the other Chinese pears by Alfred Rehder into a new species and is now called *Pyrus ovoidea*. The seasons since 1914 have been marked by the most severe invasion of blight in the history of the Station. No attempt was made to cut out the affected pear, apple and crab apple trees so these resistant pear seedlings have had every opportunity to blight standing as they are in the same row with the blighted trees.

These new hybrid pears were sent out before fruiting. The fruit cannot be expected to be smaller than that of *Pyrus ovoidea* itself which, although only one and five-eighths inches in diameter, is sweet, juicy and of fair quality.

From the 1919 list: In the spring of 1921 I visited some of the best collections of cultivated pears in Arkansas, Missouri, Iowa and Illinois, to obtain pollen for use in originating hardy blight-proof pears of large size and good quality by mating the choicest pears of Europe, the largest pears in the world, with the small-fruited but hardy and blight-proof pears of Siberia. In the Fruit-breeding Greenhouses at South Dakota State College, much work of this kind has been done. Many hybrids have already been originated and at least three of these hybrids are of full commercial size and appear worthy of propagation. More are coming on.

### CATALOG OF PEARS

The pedigrees of the 39 hybrid varieties distributed spring of 1895 as N. E. H. Nos. 1-38, inclusive, are as follows:

#### GROUP A.

Female parent Birch-leaved pear, *Pyrus betulifolia*.

Male parent. Cultivated pear, *Pyrus communis*.

1. *Pyrus betulifolia* X German pear pollen (label lost).
2. *Pyrus betulifolia* X German pear pollen.
3. *Pyrus betulifolia* X German pear pollen.

#### GROUP B.

Female parent. Cultivated pear, *Pyrus communis*;

Male parent, Birch-leaved pear, *Pyrus betulifolia*.

4. Marie Louise X *Pyrus betulifolia* pollen.
5. Marie Louise X *Pyrus betulifolia* pollen.
6. Marie Louise X *Pyrus betulifolia* pollen.
7. Parrot X *Pyrus betulifolia* pollen.
8. Conference X *Pyrus betulifolia* pollen.
9. Parrot X *Pyrus betulifolia* pollen.
10. Parrot X *Pyrus betulifolia* pollen.
11. Marie Louise X *Pyrus betulifolia* pollen.
12. Marie Louise X *Pyrus betulifolia* pollen.
13. Parrot X *Pyrus betulifolia* pollen.



## GROUP C.

Female parent, Chinese Sand Pear, *Pyrus Sinensis*;  
Male parent, Cultivated pear, *Pyrus communis*.

14. *Pyrus Sinensis* X Russian No. 553 pollen.
15. *Pyrus Sinensis* X Russian No. 553 pollen.
16. *Pyrus Sinensis* X Louise Bonne de Jersey pollen.
17. *Pyrus Sinensis* X Russian No. 553 pollen.
18. *Pyrus Sinensis* X Russian No. 553 pollen.
19. *Pyrus Sinensis* X Russian No. 553 pollen.
20. *Pyrus Sinensis* X Russian No. 553 pollen.
21. *Pyrus Sinensis* X Russian No. 553 pollen.
22. *Pyrus Sinensis* X Marguerite Marillat pear pollen.
23. *Pyrus Sinensis* X Russian No. 553 pollen.
24. *Pyrus Sinensis* X Marguerite Marillat pollen.
25. *Pyrus Sinensis* X Louise Bonne de Jersey pollen.

## GROUP D.

Female parent, Cultivated pear, *Pyrus communis*;

Male parent, Chinese Sand Pear, *Pyrus Sinensis*.

26. Parrot X *Pyrus Sinensis* pollen.
27. Louise Bonne de Jersey X *Pyrus Sinensis* pollen.
28. Koenig Karl von Wurttemberg X *Pyrus Sinensis* pollen.
29. Diel (Diel's Butterbirne) X *Pyrus Sinensis* pollen.
30. Russian No. 553 X *Pyrus Sinensis* pollen.
31. Fondante d' Automne X *Pyrus Sinensis* pollen.
32. Koenig Karl von Wurttemberg X *Pyrus Sinensis* pollen.
33. Koenig Karl von Wurttemberg X *Pyrus Sinensis* pollen.
34. Clapp Favorite X *Pyrus Sinensis* pollen.
35. Koenig Karl von Wurttemberg X *Pyrus Sinensis* pollen.
36. Conference X *Pyrus Sinensis* pollen.
37. Conference X *Pyrus Sinensis* pollen.
38. Geheimrat Dr. Thiel X *Pyrus Sinensis* pollen.
39. Louise Bonne de Jersey X *Pyrus Sinensis* pollen.

Of these seedlings three have been named: the Gogol, Puskin and Tolstoy. The fruit of many of these has proven too small for market. The trees as a class are hardy. At least three of them are reported to bear fruit of commercial size. The experiments are not yet completed. Later, the original *Pyrus betulifolia* trees were killed by fire blight as they attained maturity. Meanwhile, the original trees or *Pyrus Ovoidea* suffered from blight but made strong recovery. A study of the seedlings indicated that it would save fifty years or more time by going directly to the native home of *Pyrus Ussuriensis* and secure seed from the north-western limits of this species.

Rev. John B. Katzner of Collegeville, Minnesota, reports in the Northwest Farmstead, December 15, 1923, on Nos. 3, 10, 18, 24 and 38 as follows:

"These pear trees I have in bearing. While the pears of Nos. 3, 10, and 18 are not what they should be, Nos. 24 and 38 had some fine pears and I think No. 38, a medium to large pear, is a promising variety."

**Gogol Pear.**—From the 1919 list. N. E. H. 26. Pedigree: Parrot Pear x *Pyrus Ovoidea* pear pollen. Two plants resulted from this combination. The Parrot pear was received from England. This one was selected and numbered N. E. H. 26. It has been free from blight, except one small twig blighted in 1918. It was injured by rabbits in the winter of 1916-1917. This seedling is named after Gogol, a Russian poet. The Gogol did not prove resistant to blight in inoculation experiments at Talent, Oregon, by F. C. Reimer. (Bul. 214, p. 96.)

**Ming Pear.**—Named in 1927. Flavor delicious, melting; really a first class dessert pear. Fruit pyriform, yellow, one and five-eighths x two inches in diameter; with minute russet dots. First distributed 1917 by scions as N. E. H. No. 25. The original tree has proven very

resistant to fire blight, although many other pear trees adjacent to it died from fire blight. Have not tried artificial inoculation. The original tree bore freely the past season, 1926. Pedigree: *Pyrus Simonii* (now called *Pyrus Ovoidea*) x Louise Bonne de Jersey pear pollen. The hardiness and blight-resistance are evidently from the Chinese pear, and the high flavor of the flesh from the French pear. Probably the fruit on budded trees will be somewhat larger.

**Pushkin Pear.** — From the 1919 list. Pedigree: *Pyrus Ovoidea* x R&K 553 pear pollen. Seventy-one trees resulted from this cross. R&K 553 is a pear received under this number from Russia. Some of the seedlings have blighted, others not. One of the best appears to be the one we numbered N. E. H. 18, and now named after Pushkin, a Russian author.

**Tolstoy Pear.** — From the 1919 list. Pedigree: Clapp's Favorite pear x *Pyrus Ovoidea* pollen. This is a seedling of Clapp's Favorite pear crossed with pollen of *Pyrus ovoidea*. The original tree is a beautiful tree of strong upright growth. It has shown no blight up to date, even after the severe blight invasion from 1914 to 1918, inclusive. The tree has proven hardy so far showing that it must be a true hybrid. The tree has not fruited but the size of the fruit will no doubt be intermediate between that of the two parents. Clapp's Favorite is one of the largest and best of American pears. This was the only tree resulting from this hybridization. Introduced spring 1917 as N. E. H. 34; see S. D. Bulletin 159.

F. C. Reimer, Superintendent of the Southern Oregon Experiment Station at Talent, Oregon, has been working with pear stocks for a long time. In the Monthly Bulletin of the State Commission of Horticulture, Sacramento, California, May, 1916, Professor Reimer reports that the Southern Oregon Experiment Station has perhaps the largest collection of species of *Pyrus* in the world. An extensive series of inoculations for pear blight is being carried on at Talent since pear blight is the limiting factor in pear culture at the present time and it is highly important to obtain blight-resistant stocks for the pear for Oregon and the whole Pacific Coast. In June, 1925, Professor Reimer reports:

"With us the Tolstoy is a vigorous upright grower, with desirable habit of growth, and it has shown a very high degree of resistance to Pear Blight. During our five years of inoculation work with it all of the inoculations on the trunk and most of those on the larger branches have failed. Only two small superficial cankers have developed on branches an inch or more in diameter and in these the disease made comparatively little headway, never reaching the sap-wood. In the young succulent branches the inoculations often failed. In some cases the shoots were killed back a distance of twelve to twenty-four inches, but the infection never extended into wood more than one-half inch in diameter. These trees have been very severely pruned, thoroughly cultivated, on rich soil and are growing among other trees seriously affected by the disease. The tree makes a slow growth in the nursery but becomes vigorous as it grows older in the orchard. No top-working has been done on this hybrid, but judging from its high resistance to blight and its

clean, vigorous growth, resembling *P. communis* in some respects, it will probably become valuable as a stock for top-working. We shall thoroughly test it for this purpose in the near future. The fruit produced by this hybrid is very poor in quality."

—Station Bulletin 214, pp. 95-6, June, 1925, Oregon Agricultural College "Blight Resistance in Pears and Characteristics of Pear Species and Stocks," by F. C. Reimer, Corvallis, Oregon.

**Pyrus Ussuriensis.** — From the 1917 list. A wild pear from the Pacific coast section of Siberia. This tree has proven perfectly hardy and very strongly resistant to blight. The stock offered is some secured from a 1908 tour to Russia. This will probably be the hardy, blight-proof stock of the future so an orchard should be established as quickly as possible for raising seed from which to raise seedlings.

In the 1921 spring list is noted the planting of 15 pounds of seed of *Pyrus Ussuriensis*. This imported seed made a good germination and the seedlings a strong growth. Further investigations showed that the seed really came from Liaoyong, Manchuria. The blight resistance of this stock is the main claim for it.

The next year another lot of seed was secured from the same source. Both lots of seedlings winter-killed badly so this ended the experiments with pear seed from this source.

**S. D. Usuri Pear.** — From the 1919 list. This is *Pyrus ussuriensis* from an importation from Russia in the fall of 1907. The abbreviation S. D. for South Dakota has been attached so as to distinguish this importation from all others. They have proven practically immune to blight; of fine, vigorous upright habit, and very hardy, although standing in a crowded and unfavorable place.

*Ussuriensis* refers to the Usuri river in its native home on the Pacific coast section of eastern Siberia. Here this pear is native of vast forests of that region. *Pyrus ussuriensis* and its near relative *Pyrus ovoidea*, from north China, combine the necessary qualities of winter hardiness and blight resistance.

These trees should be carefully mulched over winter to prevent root-killing of the Japan pear seedling stocks upon which they are budded.

**Saponsky Pear.** — From the 1924 list. This is S. P. I. 20336 brought from Saponsky, Eastern Siberia, in 1906 by Frank Meyer as Agricultural Explorer for the U. S. Department of Agriculture. The name Saponsky is given to indicate its origin. This form of *Pyrus Ussuriensis* has proven very hardy, productive and free from blight. The rounded leaves are characteristic. The fruit is valuable only for the hardy seedlings to grow nursery stocks and for hybridizing.

**Pyrus Ovoidea Pear.** — As described in Bulletin 159 of this Station, this is the new name of *Pyrus Simoni*, a Chinese wild pear, received from the Arnold Arboretum, Boston. Further investigations in the Arboretum has divided the species so that this tree is now called *Pyrus Ovoidea*. The bright red of the leaves in autumn is attractive. The fruit is one and five-eighths inches in diameter, sweet, juicy and of fair quality. Spring 1922 list.



**Russian Sand Pear.** — From the spring 1922 list. In noting the behavior of the many pears imported from Northern Europe and Asia and other countries, special attention is attracted to *Pyrus Sinensis* as received from Russia under the name of *Pyrus Sinensis* R&K 453. These trees have proven hardy and have borne abundant fruit. Good seedlings were raised from them. The trees have been very resistant to fire blight. The fruit is small but good for cooking. These seedlings are worthy of planting for those who wish to breed hardy pears and the fruit is valuable for the seed from which to raise hardy seedlings for budding or grafting.

**Chang Pear.** — Introduced 1926. This seedling was grown from fruit grown on trees of *Pyrus Simoni*, a Chinese wild pear received many years ago from the Arnold Arboretum, Boston, Massachusetts. The original tree bore fruit in 1923 and 1924. Fruit, clear yellow, oblong pyriform; flesh, white, firm, juicy. As described in South Dakota Bulletin 159, further investigations by Alfred Rehder at the Arnold Arboretum divide the species so that the tree is now called *Pyrus Ovoidea*. The bright red leaves in autumn are attractive. The first fruits of this select seedling pear, Chang, are one and three-fourths x two and one-fourth inches in diameter and of fair quality. Chang is a Chinese name.

**Harbin Pear.** — Introduced 1926. *Pyrus Ussuriensis* is the pear of northern Korea and Manchuria and also the Pacific Coast of Siberia, approximately from Vladivostock to the Amur River. It varies much from seed. In my 1924 tour to North China I gathered seed from many thousand pounds of the fresh fruit, gathered in the mountains of North China, in a region approximately fifty miles east of Harbin which is very near the western limit of this species. In this region the temperature ranges to about 47 degrees below zero F. The fruit of the largest pears is two and one-half inches in cross diameter and two inches in long diameter. The fruit varies in shape but is mostly rounded, tapering toward the stem. The foliage becomes ornamental in fall, owing to the bright red and yellow coloring. The term, Harbin Pear, is now given to this importation to distinguish it from importations of uncertain or more southern origin. This new material should be utilized in three ways:

1. Seedlings should be planted out for fruiting to provide hardy blight-resistant nursery stocks for the new hybrids which are coming on.

2. The fruit may be improved in size and quality by seedling selection through several plant generations.

3. As rapidly as possible these pears should be hybridized with the large, fancy-flavored pears from west Europe.

There is much room for improvement in the flesh in flavor but it furnishes the best starting point that I know of for hardy pears strongly resistant to blight and hardy far north. As soon as possible we should combine the winter hardiness and blight resistance of this Siberian pear with the large size and fine quality pears of west Europe. This would make it possible for many northern states to grow pears where it is not possible at the present time. This pear is much used for food by the native Manchu Chinese. The flesh is white, juicy, with much grit. The fruit ripens late and keeps well, at any rate until late in the fall.

#### Search for Hardy Pear

The modern standard pear, *Pyrus communis*, is a native of temperate Europe and western Asia. In ancient Greece we find the first records of the pear as a cultivated plant. The main development of this species we owe to Belgium, in which country Van Mons stands out as the most prominent worker. Van Mons was born in 1765 and died in 1842. His theory was to grow as many seedlings as possible under cultivation and select the best as the parents for the next generation. He carried the pear through about five generations and at one time had 80,000 seedlings in his nursery. Van Mons distributed some 400 varieties, of which about 40 are still under cultivation.

However, this great work of Van Mons will not help us directly because the species is very susceptible to fire blight. Fire blight is a bacterial disease native of North America but not found in Europe or Asia. The work of Van Mons and other pear breeders can help us only through hybridization of their best pears with pears of other species resistant to blight which are found mainly in northeastern Asia. These choice west European pears suffer also from winter-killing here in the prairie Northwest. These are raised on a large commercial scale on the Pacific Coast, but the greatest danger always is fire blight, which sometimes wipes out whole orchards in a short time. Some of the Russian pears are hardy against winter killing but suffer from the blight.

On former five trips to Russia in 1894, 1897, 1906, 1908-09, and 1913, I looked into the pear question carefully. In parts of North China, especially Manchuria and North Korea, Siberia and East Siberia we find *Pyrus ussuriensis* which is very hardy against winter-killing and offers much strong resistance to pear blight. Farther south in China there are other species of pears which are resistant to pear blight but not against winter-killing. Specimen trees from these various trips and also some brought over by Frank N. Meyer, Agricultural Explorer for the U. S. Department of Agriculture, all gave promise. Professor F. C. Reimer of the Oregon Agricultural College made two tours to China to gather pear seed for the Pacific Coast. But the plan was to go much farther north and west of all these places to trace the northwest limit of the pear if possible. The element of winter hardiness is not so much of a factor on the Pacific Coast as it is here in the prairie Northwest. I thought I could save at least fifty years time by going where I could study these variations in pears. These pears of western Asia have been studied in the Arnold Arboretum of Boston, Massachusetts, by Alfred Rehder, including material brought over from Korea by Dr. E. H. Wilson, Assistant Director of the Arboretum. My 1924 tour is the first attempt to find the real northwestern limit of the pears, from the climatic standpoint. In 1921 at Brookings I spent \$150 and \$80 the next winter in importing *Pyrus ussuriensis* seed through commercial sources. This seed came from Liaoyang, southern Manchuria, where the climate is much milder. It was thought this came from Korea, but really it was from southern Manchuria farther southwest toward Peking. I have tested pear seedlings from France, Japan and other regions but none proved hardy.

I left Brookings July 26, 1924, on my sixth tour to foreign lands in search of new seeds and plants, and returned October 17, 1924. The tour was from Seattle to Japan and through Japan to Korea, southern Manchuria via Mukden, and north to Harbin on the Siberian Railway where I made my headquarters. From Harbin I went east and west on the Chinese Eastern Railway which forms a part of the Siberian line for nearly a thousand miles. I found the western limit of the pear a few miles east of Harbin. I went from village to village in the mountains and got the Chinese to bring in the pears as they ripened. The main work was in the region about fifty miles east of Harbin. The Chinese cut down other timber in the mountains but leave the pear trees as they furnish an annual supply of food. From many thousand pounds of pears I picked the best for special selection work. I hope to carry these pears through several generations, as was done at the time of Van Mons but utilizing the latest improvements both in theory and technique.

I went west to the Soviet boundary at the station Manchuli, also called Manchuria. This is where the Russian and Chinese custom houses are located on the boundary and is in a very sandy region. It is practically an arm of the Gobi Desert extending across the Siberian Railway. Here there are no pears. But a few miles farther east in the Great Khingan Mountains I made a rough mountain climbing tour and gathered some wild relatives of the peach and almond which I hope will be useful for experimental work.

The entire tour in the mountains along the Siberian Railway was in a region infested with Hung Huitsi, or Chinese bandits. The Chinese War broke out very soon after I arrived and many thousands of soldiers were sent farther south, toward Peking. From Mukden to Peking the railway was taken over so I could not return via Peking. The only way was to go back the same way I came, through Korea and Japan.—N. E. Hansen (in Spring list, January 27, 1926).

**Mugden Pear.**—Introduced 1926. This name is given to seedlings of a small, early, yellow pear about one and one-half inches in diameter which I found on my 1924 trip shipped in large quantities from further south into Harbin, Manchuria. The trees, it was said, are very early in bearing. This will probably not be hardy far north but is more for the latitude of Nebraska and Iowa. It was impossible at the time to determine the exact origin of these pears. The fruit ripens much earlier than the local pears of the Harbin region. The fruit, while small, is juicy and of pleasant flavor, although as far as I know, none of these oriental pears have the high spice of the best pears of west Europe.

**Simola Pear.** — Introduced 1926. Fruit yellow, acute pyriform with a long stem; the first fruits are two inches by two and one-half inches in diameter. The original tree is of tall upright habit and fruited in 1923 and 1924. Pedigree: *Pyrus Simoni* x *Marguerite Marillat* pear pollen. The name Simola is made up of these two names. The original *Pyrus Simoni* trees were received from the Arnold Arboretum, Boston, Massachusetts, many years ago. The juicy, pleasant flavored fruit is somewhat larger than the typical *Simoni*.

### Hardy Grapes

From the 1924 list: The Concord Grape first fruited in 1849 and was grown from seed of the wild Fox grape, *Vitis Labrusca*, by E. W. Bull of Concord, Massachusetts.

The vine is marked by a permanent tablet. It seems eminently fitting that this Mother vine is so honored when we reflect that 75 per cent of all the grapes raised in eastern America come from this famous Concord vine and its pure breeds and cross-breeds. But the Concord grape and its offspring, great as they are, will not help South Dakota and the prairie Northwest since even with careful winter protection they are not sufficiently hardy.

For many years past I have worked on this problem and have grown a lot of seedlings of the wild grape of the Dakotas, but this was very slow work as this wild grape type is not equal to the wild Fox grape of Massachusetts in size in its original condition. So I began crossing the wild grape of the Dakotas with some of the choice tame grapes. The work was a success. I now offer for the first time thirty-two of these seedlings. All are hardy at Brookings without winter protection of any kind. This marks the beginning of a new era in grape culture for the prairie Northwest. These original vines were planted first on land that was too low and wet and had to be moved on to higher land. Otherwise, these grapes would have come out several years ago.

A display of these varieties has been the past three years at the South Dakota State Fair and they have been greatly admired.



## Catalog of 32 New Grapes

**Note on Pedigrees:** In the following list the pistillate or seed parent is named first and the pollen parent second. By S. D. wild is meant the wild grape collected at Fort Pierre, South Dakota. By N. D. wild is meant the wild grape collected at Bismarck, North Dakota. The names of these grapes are all taken from the Sioux Indian language. All these 32 varieties were introduced in 1925.

**Arikara Grape.** — Pedigree: Lady x N. D. wild. A fine white, sweet, very productive grape with large berries in long bunches. Berries five-eighths inch in diameter; seeds separate easily from the pulp. Exhibited at South Dakota State Fair three years in succession.

**Atkan Grape.** — Pedigree: Lady x N. D. wild. Sweet, medium size; white with pink tinge. Long bunch.

**Azita Grape.**—Pedigree: Beta x N. D. wild. Sweet, medium, five-eighths inch in diameter; flavor rather wild; strong growth, fair crop.

**Caddo Grape.** — Pedigree: Beta x Agawam. Large, black, sweet grape of good flavor; size nine-sixteenths inch in diameter. Seeds separate easily from the rather firm flesh.

**Chonkee Grape.**—Pedigree: Lady x N. D. wild. A yellow white grape of good size and quality. Vine, a strong grower and productive.

**Chontay Grape.**—Pedigree: Massasoit x Beta. Strong grower; fruit very large, bluish purple; very good flavor. Seeds separate readily from the flesh.

**Edapa Grape.** — Pedigree: Merrimac x Beta. Large, black, good quality. Seeds separate easily.

**Emana Grape.** — Pedigree: Beta x Agawam. Our largest grape in 1924. Rich, purple, black, fully as large as Concord, borne in close compact clusters, about three-fourths inch in diameter. Flavor good intermediate between the wild flavor of Beta and the high class rich, sweet, aromatic flavor of Agawam.

**Eona Grape.** — Pedigree: Lady Washington x Beta. A fine white, sweet, very productive grape. Berries about one-half inch in diameter. The ripest berries have a tinge of pink.

**Lachala Grape.** — Pedigree: Lady x N. D. wild. A white grape of good size and quality; strong grower and very productive.

**Luza Grape.** — Pedigree: Merrimac x Beta. A fine sweet, meaty, red grape, somewhat larger than Beta.

**Mandan Grape.**—Pedigree: Wilder x N. D. wild. An early and very heavy bearer, the first of all of these hybrids to bear. Fruit black, one-half inch in diameter; good flavor. Seeds separate very readily from the flesh.

**Manota Grape.** — Pedigree: Merrimac x Beta. Our largest grape in 1922. Fruit as large as Concord, being three-fourths inch in diameter; color, black with bloom. The quality is between the fancy quality of Merrimac, its seed parent, and the sprightly wild flavor of Beta, the pollen parent. Seeds separate easily from the pulp. This will probably be very popular. The flavor is really very good.

**Napka Grape.** — Pedigree: Salem x Beta. A strong grower and very heavy bearer; fruit black, small about Beta size; good flavor; bunches compact.

**Nompah Grape.** — Pedigree: Lindley x S. D. wild. A large, black grape; good flavor; size eleven-sixteenths inch in diameter.

**Oglala Grape.** — Pedigree: Merrimac x Beta. Vine productive, fruit large, five-eighths inch in diameter. Fruit black, of good flavor; seeds separate very readily from the flesh.

**Onaka Grape.** — Pedigree: Beta x Salem. A fine productive, large, sweet, white grape, turning to pink as it ripens. Berry about nine-sixteenth inch in diameter. Seeds separate easily.

**Osbu Grape.** — Pedigree: Beta x Agawam. Fruit black, a trifle larger than Beta and of Agawam flavor.

**Pontigo Grape.** — Pedigree: Lady x N. D. wild. Fruit very large, five-eighths inch in diameter; color, white turning to light red with white bloom; seeds separate readily from the sweet flesh.

**Ree Grape.**—Lady x N. D. wild. A very heavy bearer; fruit of large size, three-fourths inch in diameter; green with white bloom. Seeds come out easily. Season late.

**Santee Grape.**—Pedigree: Merrimac x Beta. Vine a very heavy bearer of large black grapes borne in large bunches. The largest of all the seedlings in 1922, the berry being three-fourths inch in diameter, nearly Concord size. The fruit is meaty, rather sour but of good clear flavor; seeds separate easily from the pulp.

**Shakoka Grape.** — Pedigree: Lady x N. D. wild. Fruit very large, round, nearly black, nearly Concord size. Good quality. Seeds separate readily from the pulp. Vine, a very strong grower and very heavy bearer.

**Siposka Grape.** — Pedigree: Lady x N. D. wild. Large, black grape; five-eighths inch in diameter.

**Sonona Grape.** — Pedigree: Lady x N. D. wild. A very heavy bearer of large white grapes with light pink tinge turning to light red with white bloom as they ripen. Berries five-eighths inch in diameter; seeds separate readily from the pulp. Flavor, sweet with a trace of the wild grape, but sweet and good when ripe

**Tahama Grape.** — Pedigree: Lady x N. D. wild. Fruit, large, black, sweet. Seeds part readily. Vine, a strong grower and heavy bearer. Berries nine-sixteenths inch in diameter.

**Teopa Grape.** — Pedigree: Lindley x S. D. wild. A fancy sweet, good grape; golden green with white bloom; eleven-sixteenths inch in diameter.

**Toscha Grape.** — Pedigree: Lady x N. D. wild. Fruit large, white, five-eighths inch in diameter. Flesh sweet, somewhat firm and meaty. Bunch compact; seeds separate easily.

**Wachepa Grape.** — Pedigree: Lady Washington x Beta. A large creamy white grape, good flavor; seeds separate easily.

**Wakpala Grape.** — Pedigree: Merrimac x Beta. Fruit very large, black, good flavor. Bunch long.

**Wecota Grape.**—Pedigree: Lady Washington x Beta. Sweet, meaty, yellow with bloom. Bunch small, compact; berry about nine-sixteenths inch in diameter.

**Wetonka Grape.** — Beta x Salem. Large, black grape; strong grower, heavy cropper. Fruit five-eighths inch in diameter, flavor rather wild; seeds separate easily from flesh.

**Yasota Grape.** — Pedigree: Merrimac x Beta. Fruit large, black, eleven-sixteenths inch in diameter; flavor wild; compact bunch.

**Sungari Grape.** — Introduced 1926. This is *Vitis amurensis* Rupr., a wild grape found in great profusion in the mountains, beginning a few miles east of Harbin, North China, on the Siberian railway and extending east to the Pacific Ocean. The wild-flavored berries are somewhat larger than our wild grapes. Some of the berries are five-eighths inch in diameter; color, purple black. In autumn the foliage becomes very ornamental with purple and red tints, so that this grape should be well adapted for arbors. These plants are one-year seedlings grown from seed collected by N. E. Hansen a few miles east of Harbin, North China, in 1924. Harbin is located on the Sungari River, the chief river of this region.

### Progress With Hardy Red Raspberries

The raspberries from eastern and southern states are not hardy enough for the northwestern prairies. Many years ago the work of growing thousands of seedlings of the red raspberry of South Dakota, North Dakota, Minnesota, Manitoba and Saskatchewan, was begun. It is still going on, although greatly hampered in recent years for lack of land. With ten acres now available for next spring we hope to do more in this line in the future. By hybridizing with the standard cultivated varieties of raspberry a number of promising seedlings have appeared. The Sunbeam was the best in the first seven thousand seedlings, and the Ohta the best in the next six thousand. Both have become prominent over a large area. The object of this work is to develop red raspberries that will be hardy without winter protection. In 1923, six varieties more were offered with the same idea in mind. Therefore, they are not intended to compete with the larger fruited varieties that



need to be protected by laying down the canes and covering with earth over winter. It may be that our future ideal hardy red raspberry will be derived exclusively from the pure native wild raspberry of the Northwest, but my experience with many thousands of seedlings indicates that this will be a slow process. Meanwhile, these varieties will be useful.

#### Catalog of Red Raspberries

**Fewthorn Raspberry.** — Introduced 1922. A hybrid of the Minnetonka Ironclad red raspberry with the pollen of a wild red raspberry from the Black Hills near Rapid City, South Dakota. Canes almost thornless, except for a few weak bristles near the ground. Fruit of good size, five-eighths to three-fourths inch in diameter. Color is dark red. The main point about this variety is that the berries keep well. They are firm and shrivel rather than rot.

**Moonbeam Raspberry:** — Introduced 1922. A hybrid of the wild red raspberry from Cavalier, North Dakota, with pollen of one of our hybrids of the wild red raspberry from the Black Hills at Rapid City, South Dakota, with pollen of Shaffer, a purple cane raspberry from New York. This plant has a few thorns, although not as many as some of the other seedlings. Berries large, late and firm. Plant dwarf in habit but stocky.

**Ohta Raspberry.** — Introduced 1912. Ohta is the Sioux Indian for "much" or "many". This was first noted in 1906 in our plantation of 6,000 hybrid seedling raspberries. The female parent, a wild red raspberry from Cavalier county in northeastern North Dakota. The male parent is the Minnetonka Ironclad, a red raspberry originated by F. J. Empenger, Maple Plain, Minn., who writes under date of June 25, 1907: "The origin of the Minnetonka Ironclad is that Turner, Cuthbert and wild raspberries were planted together and when in full bloom I used a branch of the wild on Turner and Cuthbert; and then I used the Turner on the wild and Cuthbert and then the Cuthbert on Turner and wild. I used seed from all three and mixed it. From this seed I produced the Minnetonka Ironclad. This was about 1890."

The Ohta raspberry is hardy and very productive. Fruit a beautiful red, fairly firm, of good quality. The canes have red-tinted leaves at the tips. As fruited here the Ohta appears sufficiently large for commercial purposes and the bright red color makes the fruit very attractive. The berries run about sixteen to the ounce, with only fair cultivation on open exposed upland prairie. The plants are hardy without winter protection. The Ohta is fifty per cent larger in fruit than Sunbeam and has found favor even far South into Missouri where lately it has been propagated as the "Flaming Giant" owing to the large size and bright color of the fruit.

**Smooth Cane Raspberry.** — Introduced 1922. A hybrid of the wild red raspberry from the Black Hills at Rapid City, South Dakota, with pollen of the Minnetonka Ironclad red raspberry. Fruit round, three-fourths of an inch in diameter, quite firm. Plant strong and stocky; second in its resistance to cane rust (anthracnose). The cane is thornless, the leaf stalks are slightly bristly.

**Spineless Raspberry.** — Introduced 1922. A hybrid of the wild red raspberry from Cavalier, North Dakota, with pollen of Loudon red raspberry. Remarkable for its thornless canes. Fruit is about three-fourths of an inch in diameter of extra good flavor. The canes have a blue bloom with some red toward the tips. In our experiments in breeding raspberries free from cane rust (anthracnose), this is one of the most immune although not quite free.

**Starlight Raspberry.**—Introduced 1922. Of the same pedigree as Ohta, a hybrid of the wild red raspberry from Cavalier, North Dakota, with the pollen of Minnetonka Ironclad red raspberry. Canes with some thorns, but very little anthracnose. One of our very largest fruited seedlings in 1920, averaging somewhat larger than Ohta, and equally bright in color.

**Sunbeam Raspberry.** — Introduced 1906 as South Dakota No. 6. This appeared as a sunbeam when the outlook for hardy raspberries was dark. The first of our thousands of raspberry seedlings to be named. A hybrid of Shaffer's Colossal with a wild red raspberry from Cavalier County, North Dakota, near the Manitoba line. Plant vigorous, productive, purple-caned, but sprouts freely; foliage distinct; fruit on style of Shaffer but smaller; worthy of trial where raspberries winter-kill, as it has endured 41 degrees below zero without protection. This has found favor at Bismarck, North Dakota, and far north into Canada. As with other red raspberries the canes should be kept in narrow hedge rows about one foot wide, and good cultivation should be given between the rows. The Ohta and Sunbeam if taken up as one-year-old canes in early spring and reset carefully will bear fruit for a long time the same season.

**Twilight Raspberry.**—Introduced 1922. Grown from select mixed fruit from our large seedling plantation of the wild raspberry of South Dakota, North Dakota, Northern Minnesota, Manitoba and Saskatchewan, and their hybrids with standard cultivated varieties. Nearly all these seedlings were discarded but this one was saved, owing to the strong cane. The fruit averages larger than the King as fruited here; color, a good light red; quality good.

### Progress With Gooseberries

The largest gooseberries in the world are those grown in western Europe. These all winter-kill in the prairie Northwest. A few years ago some of these giant gooseberries were imported from Europe and were kept alive long enough to hybridize them with the wild Sioux Valley gooseberry (*Ribes gracile*), from Lake Oakwood and Gary, South Dakota. This work was done in the Fruit-breeding Greenhouse at South Dakota State College. The European gooseberries did not live long even with special care, but long enough to make a cross. In the spring of 1924, the Sunset Gooseberry was offered for the first time as the first result of this work. Ten other varieties were introduced in 1925; these names are taken from the Sioux Indian language, and are not difficult to pronounce if the accent is given on the penult (next to the last) syllable.

**Sunset Gooseberry.** — Introduced 1924. A cross of the giant gooseberries of western Europe with the wild South Dakota gooseberry. The pollen parent is a fifth generation seedling of the wild Sioux Valley gooseberry from Lake Oakwood and Gary, South Dakota. The fruit is seven-eighths by three-fourths inches in diameter and the bush is very fruitful. The name is given in allusion to the fine red color of the fruit.

**Kabu Gooseberry.** — Introduced 1925. Bush of strong growth and heavy producer of large red fruit. The original plant bore four pounds, seven ounces in 1923 in a crowded plantation.

**Kaduza Gooseberry.** — Introduced 1925. Round, oval, seven-eighths x five-eighths inch in diameter; dark red, excellent table quality. Very productive; largest in 1922.

**Kana Gooseberry.** — Introduced 1925. Bush of strong growth and very productive. Fruit large, dark red.

**Kanega Gooseberry.** — Introduced 1925. Bush of vigorous growth, very productive. Fruit green, with transparent skin; size thirteen-sixteenths x eleven-sixteenths inch in diameter. The original plant bore four pounds, four ounces of fruit in 1923 in crowded plantation.

**Kapoza Gooseberry.** — Introduced 1925. Very productive. Fruit large, fine dark red, oval; seven-eighths x five-eighths inch in diameter, and runs about eight to the ounce.

**Kataga Gooseberry.** — Introduced 1925. Berry large, light red, smooth; thirteen-sixteenths x three-fourths inch in diameter. Bush strong, upright growth, productive.

**Kawanka Gooseberry.** — Introduced 1925. Fruit green with transparent skin. Size large, thirteen-sixteenths x eleven-sixteenths inch in diameter. Bush of upright habit, very productive.

**Kazonta Gooseberry.** — Introduced 1925. A large, fine, round, smooth red gooseberry, seven-eighths x three-fourths inch in diameter. Bush a good grower and productive.

**Keza Gooseberry.** — Introduced 1925. A fine round, red gooseberry; three-fourths inch in diameter. Bush strong, upright, productive.

**Kopa Gooseberry.**—Introduced 1925. Bush very productive. Fruit large, green; size, three-fourths x five-eighths inch in diameter.

**Wild South Dakota Gooseberries.**—Introduced 1921. The native gooseberry of the Sioux Valley of South Dakota (*Ribes gracile*) has been carried through seven plant generations. The original stock was from Lake Oakwood, about 18 miles northwest of Brookings, and from Gary. The eighth generation is now coming on. Many thousands of seedlings have been discarded. These are pure native seedlings; bushes very vigorous and productive; thorny; fruit large, up to or even exceeding an half-inch in diameter, black, smooth; makes an excellent red sauce.



### Progress With Wild Black Currants

The wild black currant (*Ribes floridum*) is abundant throughout the state. Many thousand seedlings of this species have been grown through several plant generations. But in 1923 there was a decided break and a number of plants appeared with fruit of remarkable size and so productive that they appear worthy of propagation and introduction, although the ideal berry in quality has not yet arrived.

The wild black currant is a good ornamental shrub with large yellowish white flowers in drooping racemes and smooth black fruit.

One advantage of the wild black currant as a low shrub is that they endure more partial shade than many other shrubs. In European gardens this American species is considered worthy of a place in the ornamental shrub collection and it should receive equal consideration here at home. The foliage turns to a handsome brown red color in the fall.

**Tonah Currant.** — Introduced 1925. Large plant, bearing heavy crop of fruit, weight of ten berries, twelve grams; total weight, 335.7 grams.

**Atta Currant.**—Introduced 1925. Plant large, round, nine-sixteenths inch in diameter. Weight of ten berries, 13.2 grams; weight of total crop, 286.7 grams.

**Mato Currant.** — Introduced 1925. Large plant, heavy cropper. Fruit large, berries nine-sixteenths inch or a trifle more in diameter. Weight of 10 berries, 12.6 grams.

**Wanka Currant.** — Introduced 1925. A very large plant bearing good crop of medium size fruit which is red instead of black. Weight of ten berries, 9.3 grams. An interesting variation in color of fruit.

**Siberian Black Currant.** — Introduced 1910. Collected in the Tomsk province of Siberia in 1897. Fruit of good size and plant perfectly hardy when several varieties of Black Currant from England and Germany winter-killed. The ordinary black currant is a native of western Europe where the fruit is highly prized for jelly and jams. But it does not do well in the prairie Northwest. This Siberian black currant may be hardy far north into Northern Manitoba and Saskatchewan, Canada. However, since the coming of the White Pine blister rust, which the European Black Currant harbors, this species is outlawed wherever White Pine and other five-leaved pines are grown.

### Progress With Strawberries

In the prairie Northwest, it happens sometimes that standard varieties of strawberries winter-kill under the mulch. Fully 10,000 strawberry seedlings have been grown at this Station in the effort to obtain hardy varieties of commercial size and plants perfectly hardy without winter protection. In South Dakota Bulletin No. 103, June, 1907, "Breeding Hardy Strawberries," this work is described in detail. The later work has not been published. Comparatively little has been done since

that time as work with other fruits and shortage of land prevented any large extension of this work. Only two varieties have been distributed from this work, South Dakota No. 1 and No. 2.

The 1911 list reports: "Both Nos. 1 and 2 have the habit from their wild parent of setting too many plants, but they are extremely hardy. Fruit one inch in diameter when plants are not allowed to get too thick. It is probably best to fruit the beds only one year."

**South Dakota No. 1 Strawberry.**—Introduced 1907. From the 1907 list: "A new strawberry of good size and quality that apparently needs no winter mulching, as it has endured 40 degrees below zero unmulched and with no snow on the ground."

A hybrid of the Jessie fertilized with pollen of a wild strawberry from Manitoba. Blossoms perfect, so that plants will bear alone. Last fall we plowed under over three acres of seedling strawberries of half wild, half tame ancestry, the best out of over 8,000 seedlings. The best few have been reserved for further field trial. South Dakota No. 1 is our first approach towards the ideal "Farmer's Strawberry" for regions where the standard varieties suffer from the cold winters.

From South Dakota Bulletin No. 103: "South Dakota No. 1 is a seedling of the Jessie fertilized with pollen of a wild strawberry from Manitoba. As fruited at this Station the berry is roundish conical, about an inch in diameter, of excellent quality; the leaves are large and glossy and nearly free from rust; the plants are good plant-makers with strong fruit stalks; the flowers are large with many stamens. In size it will not compete with many standard market varieties, but it may serve a useful purpose until we get something better.

"This variety now is generally known as Dakota and is grown to some extent for home use, especially far north into Manitoba and Saskatchewan."

**South Dakota No. 2 Strawberry.**—Introduced 1907. From South Dakota Bulletin No. 103: "South Dakota No. 2 is a seedling of Glen Mary fertilized with pollen of a wild strawberry from Cavalier county, North Dakota, near the Manitoba line. The flower is perfect with very strong stamens, a strong grower and plant-maker with lightish-colored, glossy foliage, stiff fruit stalks, plant productive. The lightish-colored leaf shows the influence of the wild parent. The fruit is conical, about an inch in diameter, rather acid, season very late. In 1905 this and No. 108 were in bloom where the other varieties were mostly past blooming."

### Progress With Vegetables

**Watermelon, South Dakota No. 1.**—Introduced 1902. In 1897, while searching in Russia for new seeds and plants for Hon. James Wilson, Secretary of Agriculture, the writer secured seed of 287 varieties of muskmelons and watermelons. The result of the trials at Brookings is given in South Dakota Bulletin No. 67 as follows: Of watermelons, in 1898, 35 American and 63 imported varieties were tested; and in 1899, 100 American and 59 imported varieties were tested. Both years No. 23, U. S. Department of Agriculture, proved to be the earliest and of excellent quality. The melons, although extremely early, were not quite uniform at first, so in 1900 and 1901 the endeavor has been made to fix the type for introduction as South Dakota No. 1.

Watermelons are so easily changed by selection that the new varieties are often used as a basis for new selections. Lack of land has prevented further work with this variety, but it appears to be one of the many early Russian varieties which are distinguished by extra earliness and round form and small size, of value for the northern limits of watermelon culture.

**Watermelon, Hansen's Siberian No. 1.**—Introduced 1916. Smooth, round dark green, very early watermelon with red sweet flesh. From near Semipalatinsk, Siberia.

**Watermelon, Hansen's Siberian No. 2.**—Introduced 1916. A fine watermelon from the dry steppe region forty miles southwest of Semipalatinsk, Siberia.

**Watermelon, Hansen's Siberian No. 3.**—Introduced 1918. A smooth, round, dark green, very early watermelon with sweet, red flesh. I found this in cultivation in the dry steppe region of Semipalatinsk, Siberia, in 1913. Seed grown at this station 1917. To get a sure stand from a few seeds, plant one seed each in a pot and transplant with a ball of earth.

**Muskmelon, Hansen's Siberian No. 1.**—Introduced 1916. A large yellow smooth muskmelon with white sweet flesh, quality very good. Found in cultivation in the driest steppes near Semipalatinsk, Siberia. These melons from Semipalatinsk, Siberia are extra early, since they ripened in that northern region of early frosts.

**Muskmelon, Hansen's Siberian No. 2.**—Introduced 1916. Found in cultivation near Semipalatinsk, Siberia. This may prove to be identical with No. 1. More roundish in form.

**Muskmelon, Hansen's Siberian No. 3.**—Introduced 1917. Seed obtained on my 1913 trip to the Semipalatinsk Province, Siberia. The skin yellow, flesh white. A specimen weighing eleven pounds was shown at the South Dakota State Fair at Huron, September, 1916. This melon is very early and productive. As tested on sandy soil in Siberia the quality was delicious. Here on the heavy black soil the quality varies, some being good, others not so good. The quality of a muskmelon depends somewhat on the soil. Those who do not like the flavor should try some sliced and fried in butter.

**Manchurian Muskmelon.**—Introduced 1926. In my 1924 search for pears along the Siberian railway in North China, I secured many small samples of Chinese Muskmelons and other vegetables. In the hands of melon-breeders the muskmelons might be of value from the plant-breeding standpoint as a starting point for new varieties.

**Malakoff Sweet Corn.**—The first seed of this variety was obtained in Russia in 1897. Some of this seed was grown at this Station and seed was widely introduced. It was noted as the sweetest of all the early sweet corns. The Malakoff has been much modified by cultivation and is still offered by seedsmen. It has been used in the development of new varieties.



**Hansen's Turkestan Radish.**—Introduced 1914. Much like a flat turnip in size and form, but with red skin and of remarkably mild flavor. In 1913 I found this as something new, having been brought to Semipalatinsk by the natives of the dry interior of Turkestan about four years previous. A favorite table vegetable when peeled and eaten with butter. A correspondent at Arcola, Manitoba, writes: "The radishes were excellent, of fine flavor. I used six of them at different times and found them to be the best radish for this climate I have found." This variety attains very large size and appears to be an all-season radish and is now in course of further selection by seedsmen.

### Progress With Ornamental Trees

**May Day Tree.**—From the 1922 list. May Day Tree was the name given by Professor J. L. Budd to trees of *Prunus Padus commutata* originally received from the Imperial Botanical Gardens of Russia as a mixture in an importation of *Prunus maackii*. *Prunus Padus commutata* is quite distinct from *Prunus maackii*. The May Day Tree is a bird cherry from eastern Siberia worthy of a place on every lawn in the prairie Northwest. It is remarkable for being the first tree to come into full leaf here on the College grounds. The large green leaves and wealth of white blossoms early in the spring make the tree decidedly ornamental. In fruit the tree is no special improvement over our own native chokecherry, but is decidedly superior in habit because it does not send up sprouts or suckers. I am using these seedlings as a budding stock for the Boughen Manitoba Chokecherry and the Spearfish Yellow Chokecherry because of its vigorous growth and freedom from suckers. These seedlings are all descended from the stock imported from Russia by Professor J. L. Budd, at that time Head of the Department of Horticulture of Iowa State College, Ames.

**Boughen Sweet Chokecherry.**—From the 1923 list: W. J. Boughen, Valley River, Manitoba, found a tree of the native chokecherry on his farm, with fruit so much milder in flavor than usual that it may be fairly called a sweet or chokeless chokecherry. Offered for the first time. Mr. Boughen has the first right to name this fruit so we will await developments.

**Spearfish Yellow Chokecherry.**—Introduced 1924. A yellow-fruited wild chokecherry from Spearfish, South Dakota. An interesting novelty. Of value mainly from the ornamental standpoint but the fruit has some culinary value. The main objection to our native chokecherry is that the trees send up so many suckers or sprouts from the roots. One-year buds on May Day Tree stock were distributed.

**Lake Baikal Siberian Bird Cherry.**—Introduced 1912. This is *Prunus Padus* as found wild in the Lake Baikal region of Eastern Siberia. An interesting ornamental tree with large leaves; the fruit is used very extensively by the peasants for culinary purposes, but is not much of an improvement on our western choke cherry, although less astringent. A few three-year-old seedling trees, once transplanted, grown from fruit, were sent out in 1912.

**Manchu Walnut.**—Introduced 1926. The local Harbin form of the Manchurian Walnut, *Juglans Mandshurica*, Maxim. The nuts are larger than those illustrated in Bailey's Encyclopedia of Horticulture under this species. Grown from native seed obtained at Harbin, China, in 1924 by N. E. Hansen.

**New Ulm Black Walnut.**—From the 1916 list: "The farthest north-western limit of the native black walnut is probably near New Ulm, Minnesota. This lot of trees began to bear at seven years from the seed." Two-year-old trees of the second generation were distributed.

From the 1924 list: "Northern planters should plant this northern form of the Black Walnut, one of our most valuable trees."

**Sorbus aucuparia edulis.**—From the 1910 list: Edible Russian Mountain Ash. While in Russia in 1906 I secured 100 trees of a mountain ash (*Sorbus edulis*) said to bear large edible fruit, used in Russia for culinary purposes. Some of these fruited true to name the past season so it is very probable that they are all true to name. The fruit is much larger than that of the common mountain ash, but must need some special cooking to make it acceptable, although it has much less bitterness than that of the common mountain ash. Certainly an interesting tree and valuable at least for ornament. From the 1917 list: The fruit is sour rather than bitter.

**Tartarian Maple.**—From the 1923 list. *Acer tataricum*. Really a good dwarf round-topped Maple tree that has proven hardy many years at this station. A desirable lawn tree.

**Niobe Weeping Willow.**—This graceful yellow-barked weeping willow is *Salix alba vitellina pendula nova*, which was imported from Europe over twenty years ago. The Niobe Weeping Willow has become very popular in many states. It is hardier on upland where it makes a fair growth than on low rich land where the growth is excessive. In "Standardized Plant Names," 1923, Niobe Weeping Willow is listed as being a hybrid (*alba x fragilis*). The name Niobe was given by N. E. Hansen in the introduction circular sent out by this Department.

**Russian Silver-Leaved Willow.**—Introduced 1921. Brought some years ago from Russia. A silver-leaved willow under the name *Salix regalis*. The botanical status of this tree, according to Bailey, appears to be *Salix alba*, var. *splendens* or *Salix alba*, var. *argentea*, hence a form of the white willow. These trees have made a strong growth, are perfectly hardy, and are noteworthy for the silvery foliage. A rich silver satin on both sides. In "Standardized Plant Names," 1923, this is given the name Royal Willow, but it is not certain that this is the Russian form.

**Siberian Basket Willow.**—Introduced 1921. In the fall of 1913 in the dry steppes region of Semipalatinsk, Siberia, I walked along a small creek which had almost dried up. Stumbling, I seized hold of a willow and found that the branches simply would not break. So I brought home a few cuttings. You may tie bow knots in these pliable shoots, but it appears practically impossible to break them. They ought to be good as a tie willow for nursery work or for basketry.

**Ural Willow.**—Introduced 1906. An ornamental purple-branched basket willow (*Salix Uralensis*) from the Ural Mountains, Siberia. Useful for basket work, and for a very low dense snow-catcher. Also for tying nursery stock, for which it is excellent, especially for small bundles. It makes a dense dwarf hedge eight or ten feet in height of neat habit without pruning, or can be kept at any desired height by pruning; it now appears very promising as an ornamental hedge for the lawn. Some nurseries in Minnesota and elsewhere are now propagating this willow under the name Siberian Hedgewood.

***Salix viminalis* Regelis.**—From South Dakota Bulletin No. 72: Imported from Russia in 1897 for the United States Department of Agriculture. A hardy, strong-growing willow noteworthy for its bright yellow bark in winter. Cuttings were sent out soon after importation.

### Progress With Hardy Roses

The severe losses experienced from winter-killing of most standard roses indicate that the prairie Northwest needs harder varieties. During many years I have labored with the roses of North America, Europe and Asia, hoping to originate double fragrant roses that will be hardy without winter protection and will bloom all summer. Of the thousands of seedlings, only two have been named previous to 1927. These two are Tetonkaha, introduced in 1912, now becoming very popular at the far North, and Tegala, introduced in 1926. The difficulty of propagation and the rush of other work has prevented an earlier introduction of the new roses offered in 1927. These plants are all on own roots. On the difficult question of rose stocks for budding and grafting, I hope to have something new soon to report. In the long run, however, it may be best with these hardy roses to plant them far enough apart so they will sprout freely and thus keep them on their own roots. Then there will be no difficulty which so many people experience when they neglect the wild shoots coming from below the bud. After two or three years the wild sprouts have choked out the budded portion. The question of hardy rose stocks is also under investigation as the Federal Horticultural Board has given notice that the importation of rose stocks will soon be discontinued. A hardy rose stock that will be more suitable for budding than those now in use, is greatly needed.

**Amdo Rose.**—Introduced 1927. Pedigree: Tetonkaha x La Melusine. A heavy bloomer through July and into August. The pink flowers appear seven to ten in a cluster; about 16 petals and 8 petaloids. Its late blooming makes it of interest.

**Ekta Rose.**—Introduced 1927. Pedigree: *Rosa gallica grandiflora* x American Beauty. Of tall upright habit; very hardy and vigorous. Flowers, single, pink; blooming freely throughout June and a few days in July. Since the flowers are single, this plant may not be a hybrid. However, the flowers are pink, while the flowers of the *Rosa gallica* parent are dark crimson. Also, it blooms earlier than *Rosa gallica*. This plant sprouts freely. May be useful for screens, hedges, or as an ornamental shrub. *Rosa gallica* is a native of central Europe extending



east to the Caucasus Mountains, has been cultivated "from time immemorial", and is regarded as one of the parents of the Hybrid Perpetuals. In the Island of Bourbon, France, it is customary to make hedges and palisades with the Bengal rose and *Rosa gallica*.

**Kitana Rose.**—Introduced 1927. Pedigree: Tetonkaha x Rose Apples, a *Rugosa* hybrid from England. A vigorous, hardy, semi-double pink rose, blooming very freely in June and into July. Flowers, 3 inches in diameter; intense fragrance; petals, about 36; petaloids, 25. Red fruit sets freely. Flowers are somewhat globular with little pollen; deep lavender pink.

**Koza Rose.**—Introduced 1927. Pedigree: Seed parent, our seedling of *Rosa rugosa*, Siberian form x La France; pollen parent, La Melusine, a *rugosa* hybrid. Vigorous plant, over 7 feet in height; a profuse bloomer. Flowers semi-double; deep pink; blooms freely through July and into August.

**Minisa Rose.**—Introduced 1927. Pedigree: *Rosa rugosa*, Siberian form x Prince Camille de Rohan, a well known Hybrid Perpetual, one of the darkest red of all roses. Minisa is not very double, having only about 17 petals and petaloids. Color, very deep crimson, rich fragrance; a free bloomer.

**Mrs. Mina Lindell Rose.**—Introduced 1927. A beautiful dwarf semi-double, light pink, wild rose found by Mrs. Mina Lindell in Butte, County, South Dakota. Mrs. Lindell, under date of March 4, 1924, wrote: "These roses grow on the west side of a hill, and have noticed that there was a clump of single roses and then a clump of double ones near them. The roses grow about a mile from the Butte called Castle Rock in Butte County." Mrs. Lindell died in February, 1925. This rose is named in her memory by the surviving family. To find a double wild rose on the prairies of South Dakota is indeed noteworthy. The plant sprouts freely so it will not be necessary to bud, graft, or grow from cuttings.

**Okaga Rose.**—Introduced 1927. Pedigree: *Rosa gallica grandiflora* x Tetonkaha. A very fine semi-double rose. Flowers, deep pink; low bush; blooming very freely in June and first half of July.

**Rosa Rugosa, Siberian Form.**—From the 1907 list: Single Siberian Rose. A beautiful shrub with large, bright crimson, fragrant single flowers; dark green shining, *rugosa* (wrinkled) leaves; and large bright red fruits. Valuable for clumps on the lawn, or in front of larger shrubs. The present stock is grown from seed of plants secured in Russia in 1897-8, and is originally from the importation of St. Petersburg Botanic Gardens from Siberia. This Siberian form of *Rosa rugosa* is superior in every respect to the Japanese form of the species.

From the 1919 list: "Rosa rugosa, Siberian form. The well known beautiful hardy rose with dark crimson single flowers up to four inches in diameter. An attractive ornamental in autumn and early winter, with large bright red fruits, which are used, with seeds removed, for food in its native home."

Dr. M. T. Masters, an eminent botanist, writes: "The *Rosa rugosa* is one of the few roses with esculent fruit, and the best of them all."

This Siberian form of *Rosa rugosa* was used in producing many of the new roses in this list.

**Semi Rose.**—Introduced 1927. A tall growing upright shrub, fully eight feet in height, with hooked prickles in pairs. Flowers, small, white, blooming all summer, followed by bright red fruits. This is *Rosa laxa*, Retz., grown from seed collected in 1913 on the dry steppes of Semipalatinsk, Siberia. The plant may prove useful as a budding stock for other roses or for hedges and screens. An occasional bush has light pink flowers. This interesting wild rose has been described under many synonyms. The present name is given it to distinguish it from other importations. Native of the Altai region. It should not be confused with *Rosa laxa*, Lindl., which is a variety of *Rosa blanda*, Ait. The name, Semi, is an abbreviation of Semipalatinsk, where the seed was collected by N. E. Hansen in 1913.

**Sioux Beauty Rose.**—Introduced 1927. Pedigree: Tetonkaha x American Beauty. A real triumph in rose-breeding. Delightful fragrance; plant hardy; very profuse late bloomer; blooms through July and into August. Flowers bright rose deepening into fine dark crimson in the center petals; very double, with nearly or quite 100 petals and petaloids.

**Tegala Rose.**—Introduced 1926. This attractive deep pink rose blossoms very freely in June, and is semi-double much like the Tetonkaha Rose, but more dwarf in habit. The plants sent out are all sprouts from one original plant. Growth up to about four feet in height without pruning. Pedigree: Tetonkaha x *Rosa gallica grandiflora* pollen. The name Tegala is made up from these two names. The accent is on the second syllable.

**Teton Beauty Rose.**—Introduced 1927. Pedigree: Tetonkaha x American Beauty. A sister variety to Sioux Beauty. Flowers, bright crimson, somewhat cup-shaped. Resembles American Beauty. A heavy bloomer; blooms all season through July and August, with 65 or more petals and petaloids. Delightful fragrance; color ranging from rich deep pink to crimson; foliage of a modified *rugosa*.

**Tetonkaha Rose.**—Introduced 1912. Tetonkaha is the west lake of the chain of lakes known as Lake Oakwood, about eighteen miles northwest of this station. Tetonkaha was an Indian maiden who lost her life many years ago in this vicinity as the penalty for saving her white lover and his people from an Indian massacre. The Tetonkaha Rose is a seedling of the wild prairie rose from the banks of this lake, crossed with pollen of a hybrid of the Siberian *Rosa rugosa*, so that it is a combination of at least three species. In the 100 seedlings obtained from this cross, 74 are double and 26 single. All identical in color, a deep pink, and all fragrant. These plants formed many root sprouts. The blossoms on the 74 double-flowered plants are practically identical and the stock distributed consisted of sprouts from the original seedlings. The flowers are fully three inches in diameter; the bush is perfectly hardy, flowering abundantly in June; about 18 to 25 petals, deep rich pink; very

fragrant; appears desirable for dwarf hedges or as an ornamental shrub. The habit is more upright and the flowers are less concealed by the foliage than in the pure *Rosa rugosa*.

From the 1918 list: Tetonkaha rose proves absolutely hardy and very desirable in many places. It is a very free bloomer. Plants of strong growth and as they sprout freely it should not be necessary to propagate on tender commercial stocks or from cuttings.

**Yanka Rose.**—Introduced 1927. Pedigree: Tetonkaha x *Le Melusine*, a *rugosa* hybrid. Plant, three to four feet; flowers, semi-double, pink, blooming in clusters; blooming freely through July and into August.

**Yatkan Rose.**—Introduced 1927. Pedigree: Somewhat uncertain but very likely Gruss an Teplitz x *La Melusine*. Flowers semi-double, two and one-half inches across; color, pure pink; blooms through July.

**Yuhla Rose.**—Introduced 1927. Pedigree: Wild rose from Lake Oakwood. South Dakota x General Jacqueminot. Flowers semi-double, crimson, blooming through July and August; leaves of *rugosa* type. About 20 petals and 26 petaloids.

**Zani Rose.**—Introduced 1927. Pedigree: Seed parent, *Rosa rugosa*, Siberian form x *Anna de Diesbach*; pollen parent, Tetonkaha. Of this pedigree we have a number of hardy, strong growing seedlings, six to eight feet in height, blooming very freely from June until the middle of July. Flowers, semi-double; color, a fine dark crimson with a white streak through the center petals. This is a very marked characteristic.

**Zika Rose.**—Introduced 1927. Pedigree: Seed parent, *Rosa rugosa*, Siberian form x *Anna de Diesbach*; pollen parent, Tetonkaha. Flowers, semi-double; color, fine shell pink; fragrant.

**Roses for Mass Planting in Parks.**—From the 1922 list. In the work of crossing the wild roses of Siberia and the prairie Northwest with the choicest cultivated varieties thousands of seedlings have been grown from which I have selected the best with double or semi-double flowers for further work. The remainder are strong bushes, nearly all from three to six feet in height, with fragrant single red or pink flowers. They will be valuable for mass planting in parks.

### Progress With Ornamental Shrubs

**Siberian Almond.**—Introduced 1916. *Amygdalus nana* L. A beautiful lawn shrub destined to great popularity. All visitors to the college grounds in early spring are attracted by the remarkable color display of this beautiful shrub, which should be planted in every garden in the Northwest and far north into Canada. A dwarf ornamental with abundant, bright rose pink flowers, the very first of all shrubs to bloom in the spring. Splendid to plant in front of other shrubs on the lawn. Brought from the dry steppes of the Semipalatinsk region of Siberia, where the temperature ranges from 50 degrees below zero in winter to 106 degrees above in summer, and only eight inches of total annual rainfall, including snow.



**Siberian Buckthorn.**—From the 1922 list. Brought in 1913 from the dry steppe Semipalatinsk region of Siberia. The plant is hardier than the common Buckthorn; the foliage is of a brighter green and appears earlier. The Siberian Buckthorn will, I believe, supersede the common Buckthorn as soon as it can be propagated in quantity. The glowing green foliage and neat habit makes this a very attractive ornamental shrub for the lawn, either for hedges or as single specimens. Flowers, small, white; berries, black. Botanical name undetermined.

**Caragana.**—*Caragana arborescens*, also called the Siberian Pea Tree, is the best plant for hedges, low windbreaks and snow-catchers for the entire prairie Northwest, extending far north into Canada. It is also one of the best ornamentals for the lawn. In 1897, as Agricultural Explorer for the United States Department of Agriculture, Washington, D. C., I imported about 350 pounds of *Caragana* seed from Russia. This was not the first importation but perhaps the largest ever made. At any rate this seed served a good purpose in introducing the plant very extensively.

Norman M. Ross, Chief of the Government Tree Station at Indian Head, Saskatchewan, writes under date of April 6, 1922, as follows: "Without doubt the *Caragana arborescens* is one of the most generally useful plants for hedge purposes and low windbreaks that can be used on the prairies. So far as I know this shrub was first introduced into Western Canada by the Mennonites who settled in Manitoba in the early eighties. It is hardy in every section of the prairie regions. There is nothing which can beat the *Caragana* for a hedge or low windbreak to protect vegetable gardens. It is particularly useful as a trimmed hedge and can be kept at any height from four feet up."

**Littleleaf Pea Shrub.**—This is *Caragana microphylla*, a shrub four to six feet in height, with small leaves and yellow flowers. The grayish green leaves are divided into 12 to 18 leaflets and the yellow flowers make this a desirable ornamental shrub. It is a native of Siberia and China. A few plants grown from imported plants were distributed some twenty years ago. In 1924 I gathered seed of this species on sandy soil near the station Manchuli on the Siberian Russo-Manchurian boundary on the Siberian railway in Northwest Manchuria.

**Manitoba Hazelnut.**—From the 1916 list: Ornamental as well as useful. The need is apparent of a nut-bearing shrub for the open prairie. We now have the wild native hazelnut of Manitoba in the third generation under cultivation. These were the plants distributed.

From the 1923 list: Visitors to the college grounds have been pleased with the heavy bearing of these hazel hedges. The plants vary greatly in size of fruit and in time will no doubt approximate that of the filberts of England and France.

**Nevis, Minnesota, Hazelnut.**—From the 1922 list: Grown from wild hazelnuts picked near Nevis, northwestern Minnesota. These wild hazelnuts are interesting wild ornamental plants and the fruit is worthy of consideration although not as large as the tame filbert.

**Russian Artemisia.**—The genus *Artemisia* contains about 150 distinct species, mostly natives of the Northern Hemisphere. The genus includes the Sage Brush of the western plains of the United States. The common wormwood or Old Man is a native in South Europe and is a favorite in old English gardens and in West Europe for the sweet aromatic odor and finely divided leaves. A strong growing variety is the Russian *Artemisia*, six to eight feet, which was introduced many years ago. If kept trimmed closely it makes a neat appearance but not if left untrimmed. Brother Bernard Hinderhofer of the St. Francis Mission in the Rosebud Reservation at St. Francis, in southwestern South Dakota, writes (June 28, 1923): "About 18 years ago I received through your kindness some Russian *Artemisia*, "Old Man". These have been thriving from the beginning and I have given some to hundreds of families in the neighborhood."

The Russian *Artemisia* may be *Artemisia Abrotanum tobolskianum* (*Tobolskianum*) mentioned in Nicholson's Dictionary of Gardening. This is a much more vigorous growing variety than the typical Old Man.

**Siberian Sandthorn.**—From the 1908 list. This is *Hippophae rhamnoides* as found native at Irkutsk, Siberia. The French form of the species winter-kills at St. Petersburg. As found native in Lapland and Siberia, the orange yellow very acid fruit is used by the natives for culinary purposes, but here their use will most probably be wholly ornamental. A hedge plant attaining height of twelve feet, closely related to our native Buffaloberry but with considerably larger fruit and with the same sprouting tendency if cultivated too closely. Siberian Buffaloberry might be a better name for this plant which sets fruit freely at this station every year in spite of heavy frosts when in bloom. Plants either male or female as in the Buffaloberry. Seed needs stratifying and freezing over winter and to be shaded at first much like evergreen seed, hence is for the skilled nurseryman and not the amateur.

**Semipalatinsk Bush Honeysuckle.**—Note in the 1921 list: In 1913 on the dry steppes at Semipalatinsk, Siberia, I found a choice Bush Honeysuckle of tall growth with yellow or red berries. This will be hardy far north. Good for hedges, screens, or as single specimens.

**Honeysuckle Hedges.**—From the 1923 list. From seed of our large imported collection of Honeysuckles, especially select varieties of the Tartarian Bush Honeysuckles. We have grown some nice stocky plants. They will vary somewhat in color of blossom and will be desirable for hedges, screens and single specimens on the lawn. Perfectly hardy far north.

### Progress With Perennials

**Siberian Larkspur.**—From the 1907 list. (*Delphinium grandiflorum Sibericum*). A hardy perennial with beautiful intensely blue flowers which appear in large numbers. This promises to be a decided acquisition to Dakota flower gardens. Imported from Russia.

**Blue Larkspur from Semipalatinsk, Siberia.**—From the 1914 list. A hardy perennial, *Delphinium* sp. Height up to seven feet, with beautiful dark blue flowers. Seed collected by N. E. Hansen in 1913 from plants growing on the dry steppes at Semipalatinsk, Siberia.

**Lathyrus tuberosus, Siberian Form.**—Introduced 1914. Siberian Perennial Pea (*Lathyrus tuberosus*), is a perennial climber native of Europe, west Asia and North Africa. In 1913 this was found growing wild in the Semipalatinsk region of Siberia. The flowers are rose pink. The tubers are somewhat cylindrical. The original stock has persisted in the perennial bed and taken up for individual transplanting in the fall of 1925 with a view to further introduction, also to separate it from the bright yellow flowered form that was mixed in with this original stock which also forms a tuber. Both these perennial peas with pink and yellow flowers are interesting climbers worthy of a place in the South Dakota flower garden. The genus, *Lathyrus* contains about one hundred species. The yellow flowered form may be *Lathyrus pratensis* mentioned in Nicholson's Dictionary of Gardening as being native of Europe.

**Lavatera Thuringiaca.**—Introduced 1914. A tall growing perennial flower brought by N. E. Hansen in 1913 from the dry steppes of Semipalatinsk, Siberia. Height, six to seven feet. Branching habit. Flowers, large, pink, somewhat like single Mallows or Hollyhock. F. L. Skinner at Dropmore in northwestern Manitoba reports this hardy and that it blooms all season.

### Some New Alfalfas

The three main species of alfalfa are *Medicago sativa*, the common blue flower variety; *Medicago falcata*, with yellow flowers; *Medicago media*, with variegated flowers, hybrid of the yellow-flower *Medicago falcata* and the blue-flower *Medicago sativa* alfalfa, also called Sand Lucern.

In the course of three trips to Siberia as Agricultural Explorer for the United States Department of Agriculture (1897-98, 1906, 1908-09), I endeavored to find the northern limit of alfalfa in Asia, the native home of the standard blue-flowered alfalfa. Both the yellow and blue-flowered alfalfa are cultivated in India. The northern limits of the blue-flowered alfalfa are between Taskhent, northern Turkestan, and Semipalatinsk, Siberia. The yellow-flowered alfalfa extends some 5,000 miles northeast of Taskhent to the Aldan River, north of Yakutsk, with a winter temperature approximately -85 degrees Fahrenheit.

I found that the northern limits of the blue-flowered alfalfa are between Taskhent, northern Turkestan, and Semipalatinsk, Siberia. The last place noted for the blue-flowered alfalfa was Kopal, south of Sergiopol. The trail of the blue-flowered alfalfa faded out under the snow at Kopal, south of Sergiopol. This I learned in 1897 in the course of an overland tour of 1300 miles by wagon (tarantass) and 700 miles by sleigh from Taskhent, Turkestan, via Kuldja, Ili province, western China, to Omsk on the Siberian railway.

I worked at this problem again in 1913 for the State of South Dakota. On my 1924 tour, I learned that it extended to Vekoyansk, the north pole of cold, with a record of -91 degrees Fahrenheit. Vekoyansk at a rough estimate is 1,900 miles north and 3,700 miles east of Taskhent. My report, "The Wild Alfalfas and Clovers of Siberia, with a Perspective View of the Alfalfas of the World", was published May 28, 1909, as Bulletin 150, Bureau of Plant Industry, United States Department of



Agriculture. In 1906 I brought the Siberian form of *Medicago falcata* from Siberia to America for the first time. My estimate still holds that this Siberian alfalfa will extend the alfalfa belt on this continent to the Arctic Circle whenever that becomes necessary. Several varieties of the pure yellow-flowered alfalfa, *Medicago falcata*, have been distributed. The strongest in growth is the one from Semipalatinsk (1908 and 1913). All these yellow-flowered varieties shell their seed through a long season, which is Nature's way of securing a stand in its native country with only eight inches total annual rainfall. To improve the seeding habit from the standpoint of raising seed, let the plants stand uncut and select seed from the plants that hold their seed the longest. Some will hold the seed until frost and later. This work is not yet completed.

**Transplanting Alfalfa.**—My machine method of transplanting alfalfa was first noted in South Dakota Bulletin 141, January, 1913, and later in South Dakota Bulletin 159, April 1915, and Bulletin 167, June, 1916. It is a special method for the quick production of seed of new varieties but has never been recommended for field culture. It is interesting to note that, aside from small lots, the first large lot, one thousand pounds of Cossack alfalfa seed, was raised in 1913 by machine transplanting. By transplanting, one pound of seed is sufficient for twenty acres, instead of the old method of twenty pounds for one acre. When fully standardized and perfected, I believe it will be the means of reclaiming millions of acres of dry western uplands where present varieties and methods have been found unequal to the task because the plants dry up before the roots get down to permanent moisture.

**Hybrid Alfalfas.**—From South Dakota Bulletin 141, January, 1913: In Asia and southern Europe wherever the common blue-flowered alfalfa and the yellow-flowered alfalfa grow near together, the pollen is carried from one to the other by bees and other insects so that hybridization takes place freely. These hybrid alfalfas are sometimes called Sand Lucerns. Their number is legion and they consist of all sorts of mixtures in varying proportions of the yellow and blue alfalfas.

From the 1911 list: "*Medicago falcata* ranges much further north in Asia while *Medicago media* is a natural hybrid which occurs where the ranges of the yellow and blue-flowered alfalfas overlap. The crossing occurs freely where the two are grown together. These hybrid or mule alfalfas are distinguished by wonderful vigor of growth, and their quick recovery after cutting; also the seed does not shatter prematurely. *Medicago falcata* ranges much further north in Asia and is no doubt hardier, but the seed is inclined to shatter too early; this, however, will no doubt soon be bred out by selection. The plants vary greatly in habit, some being as tall and erect in habit as any plants of the common blue-flowered alfalfa *Medicago sativa*; while others are of low semi-trailing habit. The latter may prove valuable for steep slopes and mountain pastures, while those of erect habit will, of course, be best for mowing. Russian experience shows that *Medicago falcata* as found native in eastern Russia and Siberia stands grazing much better than the common alfalfa; in my opinion, this Siberian type of *Medicago falcata* will be a valuable addition to our native ranges."

Since *Medicago falcata* is very widely distributed in Europe and Asia, ranging in Asia from India north to above the Arctic Circle in Northeast Siberia, the plant varies greatly in its ability to resist cold, hence it follows that hardiness of this hybrid alfalfa must depend largely on the region from which it comes. Coming from the mild region of Southern Europe it could not be expected to be as hardy as if it came from drier and more severe climates. Hence while nature has indicated in the Sand Lucerns a method of increasing the vigor of alfalfa by hybridization, we do not know that this combination is the best one that it is possible to make.

These hybrid alfalfas as a class are superior to either parent in vigor and productiveness. I have originated many varieties by alternate machine transplanting of one-year-old plants of two varieties as first noted in South Dakota Bulletin 159, April, 1915. But the pressure of other work has prevented their further development and propagation. South Dakota No. 1 and South Dakota No. 2 are the only two distributed of this series of hybrids. The chief trouble is that the variable variegation in the color of the flowers makes it impossible to identify them, so their sale is entirely a matter of good faith. This need of a definite trademark led me to work for a white-flowered alfalfa.

**Cossack Alfalfa.**—Introduced 1910. This is my No. 194 of my 1906 trip (S. P. I. No. 20714). A Sand Lucern (*Medicago media*), a hybrid alfalfa from Voronezh province of the Don river region of southeastern Russia. This spontaneous or natural hybrid of *M. falcata* and *M. sativa* will sometimes have blue flowers on one branch, yellow on another, sometimes both colors on the same branch; a heavy seeder here the past three years. This stock descended originally from a single plant growing wild and in my opinion this hybrid condition should be continued and the colors not isolated by selection as it appears to add extra vigor.

The strongest and best of these hybrid alfalfas is the one I brought from Russia in 1906 and named the Cossack, noted in South Dakota Bulletins 159 and 167. The Chernob Alfalfa, sister plant of the Cossack, has been consolidated with the Cossack as it is not possible to distinguish them. The small spoonful of seed which I brought home from Russia in 1906 and named Cossack has been developed in the hands of many farmers so that the 1916 crop in the western part of South Dakota was fully one thousand bushels, now much more. The Cossack acreage has steadily increased to many thousands of acres.

From the 1911 list: At this Station, "One plant of the Cossack bore 41,430 seeds in 1911. Here it is decidedly stronger in growth than the Turkestan, and appears hardier, although it will probably not go far north as the pure yellow-flowered Siberian alfalfas.

"I believe that the Cossack and Chernob will be two of the best hay alfalfas for South Dakota. In color of flower they vary greatly, scarcely any two plants alike, ranging from the deepest violet purple through red purple, old rose, lilac, green, tan, deep yellow, light yellow, even into clear white. The prevailing colors are as already described."

Since some South Dakota farmers have received as high as \$5,000 for one year's crop of Cossack alfalfa seed, it is evident that this variety has won a place in the list of desirable commercial varieties.

**Cherno Alfalfa.**—From the 1910 list. This is my No. 196 of the 1906 trip (S. P. I. 20716). A Sand Lucern or hybrid alfalfa (*Medicago media*) descended originally from a single plant found wild on the steppes of the Voronezh province, southeastern Russia, land of the Don Cossacks. The flowers are called black-green, but are really a very dark purple, changing to a rich green with dark purple veins; plant of strong, very upright growth, a heavy seeder here the past two years. In my opinion this hybrid condition of the plant should be continued and the colors not isolated by selection as it appears to add extra vigor. Cherno refers to the dark-colored flowers, being the Russian word for "black".

Later the Cherno was consolidated with the sister plant, Cossack, as it was not possible to distinguish between them.

**Hansen's Hybrid Alfalfa No. 1.**—Introduced 1917. This variety was produced by transplanting the Semipalatinsk alternately with my Select Turkestan S. P. I. 20711. The latter is characterized by wonderfully tall erect habit of growth. The seed was saved of the Semipalatinsk plants and instead of producing yellow flowers, I find that the work of hybridizing is practically finished, as fully 86 per cent of the plants come strongly variegated in many colors. Only 14 per cent come with yellow flowers which is the normal color of the Semipalatinsk. The original seed was sown in 1915 at the rate of four pounds per acre in 18-inch drills which we found was much too thick. The crop of 1916 was 7,200 pounds of hay on 1.4 acres, or at the rate of 2.57 tons per acre in one cutting. The yield was really heavier but the frequent rains prevented getting all the crop.

**Hansen's Hybrid Alfalfa No. 2.**—Introduced 1917. This originated from a single plant of the yellow-flowered alfalfa, *Medicago falcata*, from Samara, Russia, S. P. I. 20721, with the typical sickle-shaped pod of the *Medicago falcata* but with blue flowers instead of the typical yellow flowers. Seed of this one plant was saved and the plants showed most wonderful variegation in colors of blossom. These plants proved proof against killing frost June 9, 1915, when common alfalfa was badly hurt.

**Hansen's White-Flowered Alfalfa.**—Introduced 1917. While the hybrid alfalfas with the variegated flowers have shown wonderful hardiness and productiveness, it would be an advantage if they could be bred with a definite outstanding characteristic by which they could be readily recognized. For example, an alfalfa with white flowers would have in this color a distinctive trade mark that would protect against misbranding and substitution in the sale of seed. This would be much the same as the Hereford cattle breeders putting a white face on their breed to serve as a trade mark. Holstein cattle are known by the black and white color; Hampshire hogs are known by the white belt. Many other cases might be mentioned. In the case of alfalfa it would be difficult to keep this seed pure, even after the type is fixed, since the flowers cross-fertilize so readily. But it could be done by suitable care as to the location of seed plantations. The Cossack alfalfa exhibits strong tendency to light-colored variegation and even to pure white flowers. For several years I have been endeavoring to select a white flowered alfalfa



that would also be as hardy and productive as any of the others. Some of my correspondents report white flowers in the new alfalfas but that the colors do not come true. It is evident that careful selection must be practiced.

The variety here offered distinguishes itself by strong upright growth and productiveness both as to forage and seed. It is a beginning only. From last spring's experience we find that the seed comes fully 70 per cent true to the white color, but the work may easily be completed. Owing to lack of room the seed is now offered to experimenters elsewhere. The seed may be sown in rows and the plants transplanted after one year's growth as described in my Bulletin 167. The plants that do not come true as to white color of flowers should be removed as soon as they show the off color. This variety originated as a seedling of the yellow-flowered alfalfa, *Medicago falcata*, from Omsk, Siberia, grown closely adjacent to the Cossack.

**Hansen Whiteseed Alfalfa.**—Introduced 1926. In my spring list for 1917 Hansen's Whiteflowered Alfalfa was first introduced. It soon became evident that some of these had white seeds also. In 1921 my white-seeded and white-flowered alfalfa was announced, but was not ready for distribution. Since then many inquiries have been received for seed. In the beginning I had over 40,000 white-flowered alfalfa plants, but how to breed this color true, both as to flower and seed, has been a problem. This would be desirable as the farmers would know before sowing what they are getting. So far as I know this is the first alfalfa with a definite trademark, an easily distinguished characteristic for the protection of the purchaser. Both seed and flower are white. The pedigree indicates hardiness sufficient for all practical purposes, even far to the North and for dry uplands. But this must be determined by actual comparative field trials with other varieties. The work of selection is not yet completed. I now have 396 plants in the field, all with white flowers and white seed and all grown from seed of plants bearing white flowers and white seeds. These individual plants are all of strong and vigorous growth and productive of seed and forage. They are all descended from the yellow-flowered Siberian alfalfa, which I brought from Omsk, Siberia, in 1906, grown closely adjacent to the Cossack. The Cossack alfalfa started with a half teaspoonful of seed which I brought from Russia in 1906. It is now grown by the thousands of acres in western South Dakota and other states. It is well known that a field of Cossack is well marked by its light colored variegation, from blue clear through to yellow and even to clear white; in fact, a field of Cossack shows many white-flowered plants.

**Gobi Desert Alfalfa.**—Introduced 1910. This *Medicago ruthenica* gathered in my 1908 trip (S. P. I. 24451) from the Gobi desert of Northern Mongolia. It should be tried by experiment stations only until better known. Worthy of trial where the most extreme cold (when mercury freezes) comes during long periods in winter without any snow on the ground, and with very hot, dry summers.

This species, native of dry sand dunes, proved to be too slender in growth. It was one of the main wild plants for horses, camels, cattle and fat-rumped sheep in parts of Mongolia where the winter temperature ranges to 50 degrees below zero, often with no snow on the ground, and with hot dry summers.

**North Sweden Alfalfa.**—Introduced 1910. This is my No. 51 of the 1906 trip. (Seed and plant introduction No. 20571). From twenty-year old fields near Ultuna, about sixty degrees north latitude Sweden. A Sand Lucern or hybrid alfalfa (*Medicago media*), a natural hybrid of the blue-flowered *M. sativa* and the yellow-flowered *M. falcata*, bearing yellow and blue flowers; plant of a vigorous upright habit, a heavy seeder here the past two years. Judging from its origin it will probably do best in moist cold regions and be resistant to cold rather than to drouth. The rainfall here has been above normal the past two seasons (1908-9).

**Obb Siberia Alfalfa.**—Introduced 1910. This is a *Medicago falcata* gathered in my 1908 trip (S. P. I. 24452) on the open steppes near Obb on the Obi river of the Tomsk province, central Siberia. In hardiness and general characters it is much like the Omsk Siberia strain.

**Omsk Siberia Alfalfa.**—Introduced 1910. This is my No. 199 of the 1906 trip (S. P. I. 20719) and is (*Medicago falcata*) descended from seed picked from wild plants near Omsk, Akmolinsk province of Western Siberia, late in the fall of 1906. The plants hold their own perfectly with other native plants in the compact prairie or steppe sod. Omsk is in the latitude of fifty-five degrees. A plant of vigorous habit with bright yellow flowers. The plant varies somewhat in erectness of habit so that there is room for improvement by selection.

**Orenburg Alfalfa.**—Introduced 1912. This is my No. 261 of my third tour to Siberia, 1908. This is *Medicago falcata*, grown from seed gathered from plants growing wild in the dry steppe region at Orenburg province, on the extreme eastern border of Europe. The heat 98 degrees above, and winter cold of 33 below, are not uncommon. The annual rainfall is less than 16 inches; in this region the yield of hay from yellow-flowered alfalfa is reported at 300 Russian "pood" which equals two tons per acre, and the yield of seed 26 bushels of seed, or 348 pounds per acre. The people are interested in this variety because of its habit of sprouting from the roots at some distance from the original crown.

**Samara Alfalfa.**—Introduced 1910. This is my No. 201 of the 1906 trip (S. P. I. 20721); of tall erect growth with beautiful yellow flowers (*M. falcata*). From the dry steppes of Samara province in the Volga river region of eastern Russia. This may range further south than the Omsk and Obb Siberia strains, but should be found drouth-resistant and sufficiently hardy for South Dakota.

**Hansen's Select Turkestan Alfalfa.**—Introduced 1912. This is *Medicago sativa Turkestanica*, No. 191 of my 1906 trip (S. P. I. 20711), originally developed from seed of a single plant found at Taskhent, the capital of Russian Turkestan. This plant is remarkable for its erect and vigorous growth. At Moscow it was found very hardy and productive, a beautiful plant, where the French lucern, by which is meant the ordinary cultivated alfalfa of southern Europe, winter-killed. This variety will be appreciated wherever the Turkestan alfalfa is found fully hardy.

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### Sweet Clovers

**Hansen Siberian White Sweet Clover.**—Introduced 1914. This is *Melilotus alba* raised from seed found growing wild on the dry steppes of Semipalatinsk, Siberia, in 1913, by Prof. N. E. Hansen while traveling as Agricultural Explorer for the State of South Dakota. *Melilotus alba* is the common white sweet clover which is native in Europe, North Africa and Middle Asia. In Europe it is found as far north as latitude 15 degrees, 16 seconds in Norway. As found under cultivation, the exact origin of common Sweet Clover is not known. It will be of interest to ascertain the comparative value of this strain of the plant from this 8-inch rainfall climate at Semipalatinsk, Siberia, with temperature ranging from 50 below zero Fahrenheit in winter to 106 degrees above in summer. At the University of Saskatchewan, Saskatoon, Saskatchewan, Canada, this Siberian Sweet Clover has been found to be of great promise as the hardiest, earliest and best of all strains of White Sweet Clover. It may have a great bearing on the problem of adding humus to summer fallowed land.

Arctic Sweet Clover is the name that has been given to this variety in Saskatchewan, Canada. But the name Hansen Clover or Hansen Siberian White Sweet Clover should be retained as it has priority and the plant is not really arctic in its range. In the early beginnings of this work it was found that the transplanted plants in cultivated rows seed very freely the first season, much better than when crowded in ordinary field culture.

***Melilotus officinalis*, Siberian form.**—Introduced 1924. This is the Siberian form of the ordinary yellow sweet clover found in Siberia. Hansen on the dry plains of Semipalatinsk, Siberia.

***Melilotus dentatus*, Siberian form.**—From the dry steppes of Semipalatinsk, Siberia. Hansen in 1913. Seeds very large, stems red. It was tested in feeding tests at the Imperial Agricultural College and the results indicate that cattle prefer it to the common sweet clover.

**Daghestan Yellow Sweet Clover.**—From the 1917 list: *officinalis* from Daghestan Province, Transcaucasia, bordering on the Caspian Sea. "Considered as a very good fodder plant." This is S. P. I. 20682 from my 1906 tour to Russia. Good abundant foliage and a free seeder.

### A Table Cereal

**Hansen White Siberian Proso.**—Introduced 1914. Proso is a good catch crop cereal, especially for low land that dries off too late for corn or any other crop. Proso is a grain millet (*Panicum miliaceum*) found in many colors and varieties in the dry regions of Asia. It may be cut for hay also but the grain crop is the main item. In my five trips to Russia I have brought over some 32 varieties of Proso. Of all these I have chosen one from Semipalatinsk, Siberia, for further selection as a table cereal. I found this large white seeded grain millet among the Kirghiz Tartars near Semipalatinsk, Siberia, in 1913, who grew it extensively as a grain for themselves and their livestock. It is the corner stone of their agriculture in this eight-inch rainfall climate, a sure crop

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**Melilotus officinalis, Siberian form.**—Introduced 1924. This is the Siberian form of the ordinary yellow sweet clover found by N. E. Hansen on the dry plains of Semipalatinsk, Siberia, in 1913.

**Melilotus dentatus, Siberian form.**—From the 1914 list: A tall yellow-flowered sweet clover from the Semipalatinsk region, Siberia, by N. E. Hansen in 1913. Seeds very large, stems red tinted. Preliminary feeding tests at the Imperial Agricultural College at Moscow, Russia, indicate that cattle prefer it to the common sweet clover.

**Daghestan Yellow Sweet Clover.**—From the 1917 list: *Melilotus officinalis* from Daghestan Province, Transcaucasia, bordering on the Caspian Sea. "Considered as a very good fodder plant." This is S. P. I. 20682 from my 1906 tour to Russia. Good abundant foliage and a free seeder.

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in the driest years. For table recipes, see Bulletin 158 of this Station. A minister in Wyoming writes that the ladies of his parish tried with good results eight of these recipes, including pancakes, muffins, sour milk bread, griddle cakes, rolls and Boston brown bread. Proso is a grain that will ripen in 60 days and furnish good nutritious food for the family and all the livestock in the driest years on the driest uplands of all our western states. Proso weighs 60 pounds to the bushel. Some have raised 300 pounds from one pound in 60 days. Nations change their food habits slowly. But when the far western uplands now in grass come into cultivation, Proso will receive more attention as a table

**Hulling Proso.**—In August, 1917, the first Proso huller in America was received by the South Dakota State College from Russia. I ordered it from Russia, but owing to the submarine campaign it had to be sent via Siberia and Japan, so it was one year and seven months on the way. This machine was exhibited at the South Dakota State Fair at Huron September, 1917. If necessary this machine may easily be duplicated, as it is not elaborately constructed as seen by the cuts shown in our spring list for 1918. Meanwhile, for home use one can get along without the huller by using an old coffee mill or small hand grist mill. In such cases the grain may be cleaned by sifting and pouring on a sheet in a current of air.

### Other Agricultural Seeds

Many hundreds of lots of wheat and other cereals, grasses, soy beans, kaoliang, millets and other farm seeds were obtained in my six tours of Eastern Siberia and Northern Eurasia. Most of these are noted in the Plant Introduction Lists Nos. 1 and 2, of the United States Department of Agriculture. The seeds included in the 1924 tour remain to be tested. In Eastern Siberia, one point noted was the great commercial production of wheat and kaoliang. Kaoliang is not planted far from the corn, but much closer together. The Japanese are rapidly developing the more southern type of kaoliang to a high degree of perfection, but the more northern types are still in the early stages of development.

**Chee Grass.**—Introduced 1914. *Lasiogrostis splendens*. "Chee" is the native Kirghiz Tartar name. Chee Grass is a giant grass growing up to 16 feet or more on pure alkali soils on the dry steppes at Semipalatinsk. I brought this from my fourth expedition to Siberia on the dry, open steppes near Semipalatinsk, Southern Siberia. This is a region with a total annual precipitation of eight inches, including both rain and snow, and with a temperature range of from 106 degrees in summer to 50 degrees below, Fahrenheit, in winter, often without snow. We have not had good luck with the seeds as they are too small, but the plant propagates freely by division of the old plants. On heavy black soil here at Brookings the plants have not attained as large size as on the white alkali soils of Semipalatinsk. In its native home the Kirghiz use the old stems for matting in the tents, but early in the spring the young grass is eaten freely by all live stock. Some plants sent to the University Station at the University of Saskatchewan, Saskatchewan, Canada, are showing good growth. This plant should be given more attention. Irrigation makes it advisable to re-



in the driest years. For table recipes, see Bulletin 158 of this Station. A minister in Wyoming writes that the ladies of his parish tried with good results eight of these recipes, including pancakes, muffins, sour milk bread, griddle cakes, rolls and Boston brown bread. Proso is a grain that will ripen in 60 days and furnish good nutritious food for the family and all the livestock in the driest years on the driest uplands of all our western states. Proso weighs 60 pounds to the bushel. Some have raised 300 pounds from one pound in 60 days. Nations change their food habits slowly. But when the far western uplands now in grass come into cultivation, Proso will receive more attention as a table

**Hulling Proso.**—In August, 1917, the first Proso huller in America was received by the South Dakota State College from Russia. I ordered it from Russia, but owing to the submarine campaign it had to be sent via Siberia and Japan, so it was one year and seven months on the way. This machine was exhibited at the South Dakota State Fair at Huron September, 1917. If necessary this machine may easily be duplicated, as it is not elaborately constructed as seen by the cuts shown in our spring list for 1918. Meanwhile, for home use one can get along without the huller by using an old coffee mill or small hand grist mill. In such cases the grain may be cleaned by sifting and pouring on a sheet in a current of air.

### Other Agricultural Seeds

Many hundreds of lots of wheat and other cereals, grasses, soy beans, kaoliang, millets and other farm seeds were obtained in my six tours to northern Eurasia. Most of these are noted in the Plant Inventories, especially Nos. 1 and 2, of the United States Department of Agriculture. Many seeds included in the 1924 tour remain to be tested. In 1924, in northern Manchuria, one point noted was the great commercial importance of soy beans and kaoliang. Kaoliang is not planted far apart in hills, as we do corn, but much closer together. The Japanese experiment stations are rapidly developing the more southern type of soy beans to a high degree of perfection, but the more northern types await fuller development.

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**Samara Perennial Clover.**—From the 1912 list. A perennial red clover native of the dry steppes of the Volga region and east European Russia. It is *Trifolium alpestre* Crantz; (S. P. I. 20654) from my 1906 tour. Fine plant but we find difficulty in getting even germination of seed. Freezing or sulphuric acid treatment of seed will probably solve the problem.

**Siberian Esparsette.**—Introduced 1914. A good forage plant brought by Prof. N. E. Hansen in 1913 from the dry steppes near Semipalatinsk, Siberia. This Siberian form of esparsette or sanfoin, an erect-growing legume, should be tested where the French esparsette is not hardy.

**Siberian Red Clover.**—Introduced 1914. Found growing wild by N. E. Hansen along the Irtysh River in the Semipalatinsk Province of Siberia in 1913. The growth indicates that it is only for the far North where the winter-killing is more of a factor than further south where the common red clover, which comes to us from the milder climate of western Europe, is successful.

**Phleum Boehmeri, Siberian form.**—Introduced 1924. The Siberian representative of timothy. Found on the highest and driest hill sides near Semipalatinsk, Siberia. The spikes, when bent, divide into smaller spikes, instead of bending uniformly as in common timothy. This did not germinate, so this is not really an introduction but is for future reference.

**Hansen's Mongolian Wheat.**—Introduced 1914. It was first cultivated by the Kirghiz nomads southwest of Semipalatinsk. Hansen had some good reports from this variety. It failed to grow so badly from being planted near barberry bushes that it was abandoned on the grounds at the time.

**Siberian Vetch, *Vicia* sp.**—Introduced 1914. A tall perennial Vetch found growing by N. E. Hansen on the dry steppes near Semipalatinsk, Siberia, in 1913. This makes a dense mat of leaves with abundant blue flowers. The value of this plant is not yet determined. Seeds of a yellow-flowered Vetch were collected at the same time and place, and sent out in the 1914 list.

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**Hansen's Mongolian Wheat.**—Introduced 1914. Very large kernels, cultivated by the Kirghiz nomads southwest of Semipalatinsk. I have had some good reports from this variety. Here at Brookings, it rusted badly from being planted near barberry bushes which were on the grounds at the time.

**Siberian Vetch, *Vicia* sp.**—Introduced 1914. A tall growing perennial Vetch found growing by N. E. Hansen on the dry steppes at Semipalatinsk, Siberia, in 1913. This makes a dense mat of leaves with abundant blue flowers. The value of this plant is not yet determined. Seeds of a yellow-flowered Vetch were collected at the same time and place, and sent out in the 1914 list.