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## Preliminary Evaluation and Description of Domestic and Introduced Fruit Plants

S. A. McCrory

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NORTH CENTRAL REGIONAL PUBLICATION NO. 90

**PRELIMINARY EVALUATION AND DESCRIPTIONS  
OF DOMESTIC AND INTRODUCED**

# fruit plants



Agricultural Experiment Stations of  
Alaska Missouri  
Illinois Nebraska  
Indiana North Dakota  
Iowa Ohio  
Kansas South Dakota  
Michigan Wisconsin  
Minnesota  
U. S. Department of Agriculture

**HORTICULTURE-FORESTRY DEPARTMENT**

**AGRICULTURAL EXPERIMENT STATION**

**SOUTH DAKOTA STATE COLLEGE ❖ BROOKINGS**

**Technical Committee for North Central Region  
Project NC-7**

The Introduction, Testing, Multiplication and Preservation of New and Useful Plants of Potential Value for Industrial and Other Uses and for the Preservation of Valuable Germ Plasm of Economic Plants.

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# Preliminary Evaluation and Description of Domestic and Introduced FRUIT PLANTS

By S. A. McCRORY<sup>1</sup>

## Introduction

The apple, cultivated for more than 2,000 years in Europe, was brought to North America by early settlers. Before their introduction into North America, many varieties had been selected and were under cultivation in Europe. Seed of these European varieties and, in some cases, grafted trees, were introduced into America during the colonization period. This cultivated apple probably had its remote origin in western Asia, in distribution ranges of the wild *Malus sylvestris* and *M. pumila* species. Great forests consisting primarily of fruit trees, to the east of the Caspian Sea, probably provided the ancestors of our early American apples.

From these early plantings, apples were disseminated by pioneers, Indians, missionaries, and traders, with the westward development of America. The failure of the apple to survive winter conditions, when they were planted in what is now North-Central United States, became noticeable to early settlers. The area troubled most includes roughly the northern half of the United States with the exception of the area protected by coastal influ-

ences, the Great Lakes area, and other small areas having physical geographic features affording protection. In this area the extremes of both winter and summer were severe, while rainfall was frequently inadequate. Large areas were subject to polar air masses in winter with extremes of cold. In summer, the dry atmosphere of the Plains was frequently accompanied by drought of extreme severity.

The frequency of these extremes was great enough to be hazardous for a plant with a 25 to 30 year life span.

These climatic conditions continue to limit fruit growing in the area, with the exception of rainfall which has been partially overcome by irrigation. The inability of a plant to tolerate climatic conditions in this area is not peculiar to the apple. The same is true for the apricot, peach, plum, pear, and cherry. Iowa, Wisconsin, Minnesota, North Dakota, South Dakota, Northern Illinois, and Northern Nebraska produce only 2% of the total apple crop of the United States. (4)

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Pioneer fruit breeders in the Great Plains area recognized the winter hardiness in the Siberian crabapple, *M. baccata*, a species native to eastern Asia. In 1882, Joseph L. Budd introduced the Siberian crabapple for use on the prairies of the Northwest. He made collections from the colder climate of Russia for use at the Iowa Agriculture Experiment Station. Peter M. Gideon, Superintendent of the Minnesota State Experimental Fruit Farm, in 1887 gave much credit to the Siberian crabapple as a parent for breed-

ing work (2). L. H. Bailey expressed the opinion that new and improved varieties might be expected to come from a mixing of the Siberian crabapple, the native crabapple, and the eastern apples (1). N. E. Hansen believed that, in order to develop a hardy variety, it would be essential to start with hardy parent material (3).

Thus, it appears that early fruit breeders recognized the necessity of finding fruit plants with hardiness not possessed in the early plant introductions.

## How the Material Was Assembled

In 1895, N. E. Hansen started fruit breeding at the South Dakota Agricultural Experiment Station. Much of his work for the next 50 years was devoted to collecting plants of the most hardy sort from all over the world. He assembled a large collection of hardy varieties, many of Russian origin, including Siberian crabapples, and selected some native material showing great winter hardiness. The native crabapple, *M. ioensis*, made up a part of this collection. Shortly after his retirement, an effort was made to consolidate as many of these plants as possible for preservation and evaluation. The first were propagated in 1942 and planted in a permanent location 2 years later. In 1947, the South Dakota Experiment Station was granted financial assistance under the Research and Marketing Act of 1946, Regional Project NC-7.

This aid was helpful in the assembling and evaluation work.

Plants in the collection are from domestic and foreign sources and include apples, crabapples, apricots, pears, plums, and sandcherries. In addition to the original material, many seedlings which Hansen produced by crossing selections and varieties have been retained for evaluation.

Since collecting was a continuous operation, it is not possible, in all cases, to tell from available records the time or place a collection was made. This is especially true of the native material. Sandcherries, *Prunus besseyi*; and native plum, *P. americana*, were obtained from native sources. Native crabapples, *M. ioensis*, were collected from the northern part of Minnesota. Foreign material was collected on trips to Russia, Siberia, and North China.

In 1897, a 10-month 2,000 mile trip was made by Hansen. He traveled from St. Petersburg to southern Russia, to Omsk in Siberia and Kulja in West China. This trip was sponsored by the United States Department of Agriculture for the purpose of collecting fodder plants. Later, collections of fruit plants were made from parts of the area covered on this trip.

In 1906, a 6-month trip to England, Denmark, Norway, Sweden, Lapland, Finland, Russia, and Manchuria was made. This trip was also a United States Department of Agriculture sponsored trip for the purpose of collecting alfalfa and clover. Limited collections could be made of any other plants. A similar trip in 1908 was made to continue a search for forage plants.

In 1913, South Dakota financed a 5-month trip to Eastern Siberia. Forage plants were collected, as well as a few other plants. However, these trips located many areas where fruit plants were grown and could be obtained later.

In 1924, the first trip was made with the specific purpose of collecting fruit plants. This was a 3-month trip financed by South Dakota. Hansen had observed pears growing in North China, Manchuria, North Korea, Siberia, and East Siberia that were free of fire blight. He found the western limit of pears to be a little east of Harbin. Great winter hardiness would be required for survival there. From those producing the best fruit, he selected seed which were the parent stock of the collection of pears maintained

here. Also, from this area many crabapples, apricots, and other fruits were collected.

In 1934, the last collecting trip was made at the invitation of Soviet Russia. From this trip some 20 varieties of the best apples grown in Russia were collected and introduced as scion wood.

While these foreign collecting trips were being made, domestic collections were also in progress. Many were incorporated into a breeding program and seedlings resulting from such crosses were saved for evaluation or further breeding work. As a result, conditions became crowded. Plants of this type occupy a lot of space and require years to evaluate.

Near the end of Dr. Hansen's active work at South Dakota State College, the task of assembling this material in one planting, where it could be preserved for evaluation, began. This report present information collected to date. It is hoped that the information presented may suggest uses for the material. Those for which no use can be found must be eliminated.

### Systems of Naming

In most plant improvement work, varietal names are not given to selections until their worth has been proven. However, in this work, names were given in most cases upon introduction which was for trial rather than for commercial or home use. This may have caused confusion as it was not the intent that most of this material would be used for such purposes. Varietal



names are therefore used in this report.

The descriptions given are based upon direct observations and information supplied by others who have made use of the material. It is appreciated that much information has, no doubt, been overlooked as it is not possible to know all the potential uses. It is the intent to describe these plants in a way that will be helpful to those engaged in a fruit improvement program.

### **Blossom Dates**

Most of the plants under observation have reached a bearing age. Blossom date records have been kept for 1953, 1954, 1955, and 1957. The data are summarized in table 1, and give the number of years from which information was collected. The date given is the average for the number of years observed. Since blossom date is so closely associated with weather conditions and has varied as much as a few weeks from year to year, it is more accurate to make comparisons with known varieties, which are included. The comparisons are for the same years; that is, those observed for 4 years are all for the same years.

### **Disease Observations**

Fire blight and apple scab have been troublesome in this orchard. No attempt has been made to measure disease resistance under controlled conditions. Location or the element of chance must therefore be

considered. Chemical control measures were not applied prior to 1952 in order to make better field evaluations.

Apple scab became so severe in 1951 that a spraying program had to be adopted to prevent loss of trees. This program has been similar to that applied as a good orchard practice. While the spraying program has reduced the presence of scab and prevented defoliation, scab is still present. This has been a basis for rating scab susceptibility. Evaluation studies made when control measures were not applied may be more valid. In 1951, Dr. J. R. Shay made a field evaluation study of this material and observed the presence of scab in mid-July (5). The lack of control measures and favorable conditions for scab development had resulted in a severe scab epidemic. Varieties found to be free from scab that year were Cathay, Elk River, Kola, Red Tip, Jonsib, Tipi, and Zapta (5). A few varieties were not available for evaluation at that time. Therefore, it is likely that the evaluation made in 1951 may be more accurate than that expressed in table 2. Scab was observed on Cathay in 1957.

Fire blight has been an annual problem. Some varieties have been so severely infected as to cause loss of the trees. This has been especially true with some pear varieties. The absence of blight from others does not prove their resistance. Severe injury suggests a high degree of susceptibility.



Table 2. Disease Rating of Apples and Crabapples

Variety	Fire Blight*	Scab*	Variety	Fire Blight*	Scab*
Alexis .....	0	1	Manchu .....	0	1
Almata .....	0	3	Mecata .....	0	1
Amsib .....	0	1	Mercer .....	0	1
Amur .....	0	1	Mitchurin .....	0	1
Anoka .....	1	4	Missouri Crab .....	0	2
Antonovka Shafran .....	0	2	Mortuff .....	0	0
Antonovka Polterarar..	0	1	Nebo .....	0	1
Antonovka Monasir .....	0	0	Nevis .....	0	1
Arkad Zimenee .....	0	0	New Duchess .....	0	2
Beauty .....	0	1	Olga .....	0	1
Bellefleur Kitaika .....	0	3	Oxbo .....	1	3
Bellefleur Kranov .....	0	1	Paradiska x Mitchurin		
Bellefleur Rekord .....	0	0	No. 1 .....	1	3
Bessemianka .....	0	0	Red Bellefleur .....	0	1
Bismer .....	0	0	Red Flesh .....	0	2
Bison .....	0	1	Red Silver .....	1	0
Cal Trio .....	0	0	Red Soviet .....	0	1
Cappy .....	3	4	Red Standard .....	0	1
Caramel .....	0	1	Red Tip Crab .....	1	0
Cathay .....	0	2	Red Wild Crab .....	0	0
Chance .....	0	2	Red & Yellow Siberian	0	0
Dolgo .....	0	0	Sasha .....	0	1
Dwarf .....	0	1	S. D. Ben .....	0	1
Eda Crab .....	0	2	S. D. Bison .....	0	0
Elk River .....	0	0	S. D. Bona .....	1	1
Florence .....	0	2	S. D. Eda .....	1	1
Forest King .....	0	1	S. D. Golden .....	0	1
Giant Crab .....	0	4	S. D. Waldo .....	0	0
Goldo .....	0	1	S. D. Winter .....	1	2
Good Crab .....	0	1	Semla .....	0	1
Hopa .....	0	2	Shoko .....	1	1
Ivan Crab .....	0	0	Soulard Crab .....	0	0
Izo Crab .....	0	1	Sugar Crab .....	0	1
Joe Trio .....	0	1	Tipi .....	0	0
Jonsib .....	0	0	Tolmo .....	0	2
Kitaika Shafran .....	0	0	Tolstene .....	0	1
Kensib Crab .....	0	1	Volga .....	0	1
Keo Crab .....	0	1	Wakaga Crab .....	0	0
Ketik Cherenkoe .....	1	0	Wamdesa .....	0	0
Ketyr Shafran .....	0	1	Wamblee .....	0	0
Kitai Kut-34 .....	0	1	Waziya Crab .....	0	0
Kitaika Zolotoi .....	0	0	Wecota .....	0	1
Kola Crab .....	0	1	Wetonka .....	0	1
Komosomoletz .....	0	1	Wisantowoye .....	0	3
Kulon Kitaika .....	0	1	Yakhontowoye .....	0	3
Lemon Apple .....	0	1	Yellow Siberian .....	0	1
Lina .....	0	1	Yellow Sweet .....	0	1
Linda Sweet .....	0	1	Zapta .....	1	1
McIntosh .....	0	3	Zelma .....	0	1
Maga .....	1	2			

\*0—None observed 1—Light 2—Moderate 3—Heavy 4—Severe

Table 3. Earliness, Size, and Color of the Fruit of Apples and Crabapples

Variety	Date Mature	Size in Inches	Color
Alexis .....	9-10	1¼	Red over all
Almata .....	9-10	1½	Red over all
Amsib .....	9-15	1½	Red over green
Amur .....	9-10	1	Red over all
Antonovka Shafran .....	9-17	2	Red over yellow
Antonovka Polterarar .....	8-30	2	Yellow over all
Antonovka Monastirsk .....	9- 1	3	Yellow over all
Arkad Zimenee .....	9-10	2½	Dull Red over Green
Beauty .....	9-15	1	Bright Red
Bellefleur Kitaika .....	9-10	3	Red Stripes over Yellow
Bellefleur Kranov .....	8-30	2¼	Red over Green
Bessemianka .....	9-15	1½	Green with Red Cheek
Bismer .....	9-25	2	Yellow with Reddish-Brown Stripes
Bison .....	9-20	1½	Purplish-red
Cal Trio .....	9-15	¾	Polished Bright Red
Caramel .....	9-20	2	Red over Green
Cathay Crab .....	9-15	1	Yellow with Blush
Chance .....	9-15	3	Red over Green
Dolgo .....	9-15	1¼	Red over all
Dwarf Tree .....	9-15	1½	Red with Heavy Bloom
Eda Crab .....	9-20	2	Solid Red
Elk River .....	9-30	¾	Green
Florence .....	9-15	1½	Red Blush over Green
Forest King .....	9-25	2½	Greenish Yellow
Giant Crab .....	9-20	3	Green
Goldo .....	9-15	3	Yellow
Good Crab .....	9-15	1¼	Red over Yellow Green
Hopa .....	9-25	⅘	Rose
Ivan Crab .....	9-15	1½	Red over Yellow
Izo Crab .....	9-25	2	Blush over Green
Joe Trio .....	9-25	1½	Yellow with Red Stripes
Jonsib .....	9-15	2	Red over Yellow
Kitaika Shafran .....	9-10	1¾	Red over Green
Kensib .....	9-15	2	Red over Green
Keo .....	9-30	1½	Red over Green
Ketik Cherenkoe .....	9-20	2	Green with Blush
Kitaika Kut .....	9-15	2	Greenish Yellow
Kola Crab .....	9-30	2	Green
Komsomoletz .....	9-30	1¾	Dull Red
Kulon Kitaika .....	9-15	3	Red Stripes over Green
Lemon Apple .....	9-10	3	Yellow
Lina .....	9-20	2½	Yellow
Linda Sweet .....	9-30	1½	Yellow
McIntosh .....	9-15	2¾	Red over Green
Maga .....	9-10	3	Red to Striped
Manchu .....	9-15	¾	Red over Green

Continued on next page

Table 3. (Continued)

Variety	Date Mature	Size in Inches	Color
Macata	9-15	1	Red over Green
Mercer	9-20	2¼	Greenish Yellow
Mercer Unguarded	9-20	2½	Greenish Yellow
Missouri Crab	9-15	1¾	Green
Nebo	9-15	3	Red over Green
Nevis	9-30	1½	Green
New Duchess	8-30	3	Red Stripes over Green
Olga	8-30	1½	Red over all
Oxbo	9-15	3	Yellow
Paradiska Mitchurin #1	9-15	1	Yellow
Redflesh	9-15	1½	Red over all
Red Silver	9-25	5/8	Red over all
Red Soviet	8-22	2½	Yellow with faint Blush
Red Standard	9- 5	2	Red over all
Red Tip Crab	9-10	2	Green with Blush
Red Wild Crab	9-30	1	Red and Yellow
Red and Yellow Siberian	9-15	1	Red over Yellow
Sasha	9- 2	2½	Green with Red Stripes
S. D. Ben	9-25	1¾	Dull Red
S. D. Bison	9-15	2	Dull Red over Green
S. D. Bona	9-25	1¼	Red over Green
S. D. Eda	9-25	2	Solid Red
S. D. Golden	9-10	3	Yellow
S. D. Waldo	9-15	1	Red over Yellow
S. D. Winter	9-30	1½	Red over Green
Selma	9-10	3½	Dull Red over Yellow
Shoko	9-30	2	Green
Soulard Crab	9-25	1¾	Green
Sprout from Maga	9-30	2½	Yellow
Sugar Crab	9- 1	1½	Greenish Yellow
Tipi	9-30	1½	Green
Tolmo	9-10	3	Red Stripes over Yellow
Tolstene	9-30	2½	Red Stripes over Green
Volga	9-25	2½	Red over Yellow
Wakaga Crab	9-30	2	Green
Wakpala	9-15	2	Red over Yellow
Wamdesa	9-25	2	Red over all
Wamblee	9-30	2	Greenish Yellow
Waziya Crab	9-25	2¼	Green
Wecota	9-30	2	Green
Wetonka Crab	9-30	1½	Red over Yellow
Yakhontowoye	9-15	2¼	Dull Red
Yellow Siberian	9-10	¾	Yellow with Red Blush
Yellow Sweet	9-25	2	Yellow
Zapta	9-25	1	Green
Zelma	9-30	1½	Green with Red Cheek

## Description of Varieties

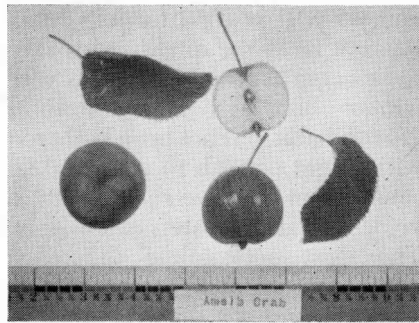
Most of the crabapples in this collection were collected from Siberia, North China, and Russia. Some were obtained from the northern part of the United States and Canada where winter conditions are severe. The establishment of the planting covered a period of several years so that plants differ in age. The older plants have reached a bearing age, but some have not fruited in their present location. In addition to the material originally collected, many hybrids are also included in the planting. In attempting to evaluate this material, such characteristics have been noted as may be of value to the plant breeder or propagator.

### Crabapples

#### Alexis crabapple— *M. baccata cerasifera*

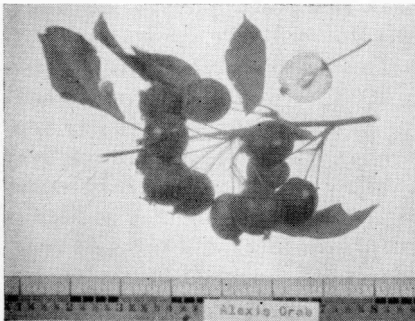
Seeds were collected near Leningrad, Russia, in 1897 by N. E. Hansen and introduced in 1919. This lot of seed produced Alexis and Dolgo which are quite similar. The plants maintained were grafted from the original tree. Alexis ripens in early September at Brookings. Fruit

drops badly when fully mature. Alternate bearing is common. Color is an intense red with a yellow flesh. The fruit is tart, firm, and juicy and is good for jelly making. The oblong fruit is 1 inch in diameter and inclined to cluster. The tree is a vigorous grower and of large size. It has shown extreme winter hardiness. It has been resistant to blight and scab. Alexis has ornamental value when its snow white clusters of blossoms are open and also in the late summer when the red fruit is ripe. It is used as a root stock by commercial nurseries.



#### Amsib crabapple—*M. ioensis* x *M. baccata*

This name is condensed from the names America and Siberia. The native species was a crab from Iowa crossed with a Siberian crab introduced from Moscow, Russia, in 1906. The fruit matures in mid-September, is 1½ inches in diameter; skin, green with dull red blush; flesh, a greenish white. The quality is very poor. This fruit keeps well in storage. It is a heavy bearer, clusters, and is inclined to drop. The tree is small and has some ornamental



value. It shows resistance to both blight and scab. This plant might have value in a breeding program where production, resistance to disease, and winter hardiness are wanted.

**Amur crab—*M. baccata cerasifera***

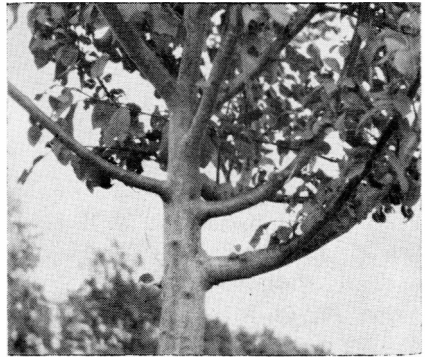
This crabapple came from the same lot of seedlings that produced Alexis and Dolgo. Seed were collected from Leningrad, Russia, in 1919. The plant has been maintained, but has not shown any outstanding characteristics. Amur ripens in early September. The fruit is bright red and 1 inch in diameter and has flesh that is very tart, firm, and juicy. It is good for jelly making, but lacks the quality necessary to be eaten as fruit. The tree is very winter hardy, has an upright growth habit, has not been bothered with blight or scab to any troublesome extent, and has shown a lot of vigor. The fruit clusters extensively. The most outstanding difference noted in Amur and Alexis or Dolgo is in the upright growth habit of Amur.

**Beauty crab—*M. baccata cerasifera***

Seed from which this crab was produced were obtained from the Imperial Botanical Gardens, Petrograd, Russia, in 1919. Perhaps no name more appropriate could have been selected for this crab. The fruit, as well as the plant, is very attractive and matures in late September. The fruit is a brilliant red color. The flesh is white, firm, and juicy. The fruit remains firm and in good condition in ordinary storage until mid-winter. It is winter hardy,



has excellent branching habits, and has shown resistance to blight and scab. In addition to being a very ornamental plant, Beauty is one of the better crabs for jelly making. The tree form, growth habits, and the keeping quality of the fruit might hold some promise for breeding purposes.

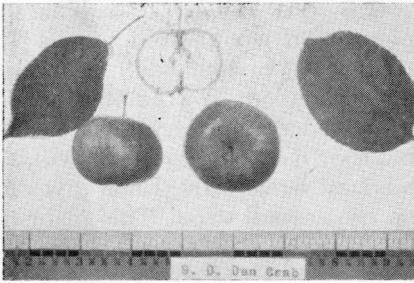


Beauty has good distribution of branches.

**S. D. Ben crabapple—*M. baccata* x (*McMahon White* x *Jonathan*)**

This seedling cross was selected in 1938 for possible use in a breeding program. It matures in late September. The fruit is a dull red over a yellow ground color. It is 1¾ inches in diameter and oblate. The flesh is crisp, firm, and has a pleasant taste. The fruit is inclined to cluster, but produces a crop every year. It keeps

until mid-winter in common storage. The tree has shown good branching habits and is winter hardy. Blight and scab have not been troublesome. This crabapple may have some value in a breeding program.



**Bismer**—Bismark x Mercer

It matures late in September. It is 2 inches in diameter, the quality is fair to poor, and is yellow with reddish brown striping. The tree is hardy and a good producer of small size fruit, which may be due to heavy production.

**S. D. Bison**—Jonathan x (*M. baccata* x Yellow Transparent)

This seedling was named in 1933 and has shown no particular promise. It matures in late September. The fruit is 2 inches in diameter, and is a dull red over green ground color. The fruit is of only fair quality and lacks attractiveness. It is a heavy bearer and tends to produce its fruit in clusters. Other than hardness, S. D. Bison has little to recommend it.

**S. D. Bona**—Jonathan x (*M. baccata* x Yellow Transparent)

This seedling was named in 1938

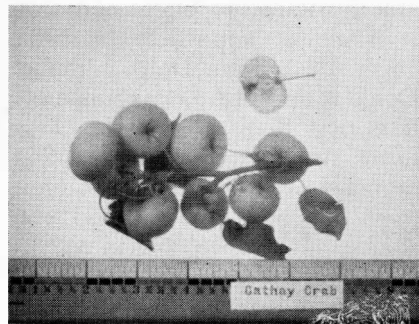
and has been maintained as a possible parent. It matures in late September. The fruit is 1½ inches in diameter; color a greenish yellow changing to red when fully mature; flesh, yellow, sub-acid, and of poor quality. The fruit is inclined to crack when mature. This weakness has appeared every year the plant has been observed. One feature observed is that the color change from green to red is very sudden. This characteristic may be of value. Otherwise, the plant seems to have little to recommend it.

**Cal Trio**—Mercer x Sweet Russet

It matures in mid-September, is ¾ inch in diameter, firm, juicy and acid. The fruit is produced in clusters and ropes.

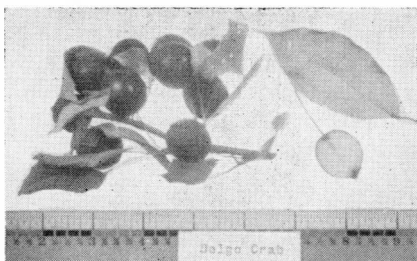
**Cathay Crab**—*M. prunifolia*

This plant was selected from the original importation from Russia by Professor J. L. Budd. The fruit ripens in mid-September, is 1 inch in diameter, yellow with an orange blush. It is not edible. The tree is a small flat-topped tree with some ornamental value. The branches are willowy-like in growth habit. The tree has shown much winter hardi-





ness. This plant has shown resistance to blight and until the summer of 1957 had never shown scab. Even though a spraying program was conducted, the leaves of Cathay showed scab infection in a year when the disease was not generally troublesome.



#### Dolgo—*M. baccata*

From the same source as Alexis, Dolgo was introduced in 1917. It has been one of the most winter hardy in this collection. The fruit is long conic, about 1 inch in diameter. The skin is a brilliant red and the fruit-laden tree is attractive in the fall. It is one of the best crabs for jelly making. The fruit ripens in early September and drops freely. Alternate bearing is very noticeable. Trees begin to bear at a very young age and have shown remarkable resistance to blight and scab. It is almost impossible to distinguish Alexis from Dolgo although Dolgo is listed by more commercial nurseries than is Alexis. Dolgo forms strong, well spaced scaffold branches and is a very vigorous tree. Seedlings make good root stocks, but the wood is very hard making grafting a problem. In addition to serving as a source of fruit,

it is an ornamental plant. It may have a place as a parent for a breeding program.

#### Dwarf Tree—Parents unknown

Originally selected as a dwarf tree, it has grown to average size. The fruit matures mid-September, and is very oblong resembling a plum more than an apple. It is black-red in color with a heavy purplish bloom. The quality is poor. The tree has vigor, is attractive, and has shown no blight. The fruit clusters and hangs well which gives it an ornamental value. This plant is a novelty because of fruit shape.

#### S. D. Eda—Jonathan x (*M. baccata* x McMahan White)

This seedling has been maintained for possible use in a breeding program. It matures in late September, and has a solid red fruit 2 inches in diameter. The quality of the fruit is fair to good, being somewhat like the Jonathan in color and taste. The plant has been hardy since 1938 and has produced a fair crop of fruit every year. The tree has shown excellent bearing habits. Its fruit is mostly produced singly. Blight and scab have not been a problem. In addition to having merits of its own, this would seem to offer considerable promise as a parent for breeding purposes.

#### Elk River—*M. ioensis*

This tree was propagated from a native plant growing near Elk River, Minnesota. It was introduced in 1930. The fruit from this native crab is typical of the species, and is not edible. The tree is larger

than most plants of this species, growing to a height of 8 or 10 feet. All crabs of this species have been very subject to drought and drop their leaves prematurely. Elk River has shown much winter hardiness. The pink blossoms are attractive, which may suggest a use for this selection.

**Forest King**—Wild native crab. *M. ioensis*

A wild crab was found near Winnebago, Illinois, in 1904. There is evidence of *M. ioensis* so it may be a hybrid. It matures in late September. The fruit is large,  $2\frac{1}{2}$  inches in diameter, green, and not edible. The tree is hardy and productive.

**Giant Wild Crab**—Native wild crab of unknown ancestry

This fruit was found near Sherard, Illinois, in 1911. Grafted trees have been maintained since that time. This very large crab will frequently develop fruit 3 inches in diameter. It is a firm acid fruit that has no value for eating. The trees have been very vigorous and productive. The most outstanding characteristic of this crab is the large fruit it bears.

**Good crab**—*M. baccata*

It shows *M. baccata* characteristics. Ancestry is unknown. It is maintained in the present plantings because of its high quality fruit. It matures September 1. The fruit is 1 inch in diameter and is red over yellow ground color. The quality for eating fresh is excellent—mild with a pleasant taste. It is hardy and pro-

ductive. The dwarfish nature of the tree may be due to the heavy crops it produces. This crab may have possibilities for breeding work since it is one of the few crabs showing *M. baccata* ancestry with quality fruit.

**Hopa crab**—*M. Niedzwetzkyana* x *M. baccata*

Introduced in 1920, it has been maintained for its ornamental value. It is one of the more generally planted flowering crabs. Blossoms are a deep red showing some blue before the petals fall. The fruit is  $\frac{1}{2}$  inch in diameter and not edible. It is inclined to alternate bearing. Seedlings show a general appearance of the mother plant. The foliage and bark show a red coloring all through the growing season. It has been free from blight and has shown but little scab.

**Ivan crab**—*M. baccata*

Introduced in 1916, it has been maintained because it has the largest fruit of any of these plants that appear to be pure *M. baccata*. It matures in mid-September. The fruit is  $1\frac{3}{4}$  inches in diameter. The fruit is roundish oblate with noticeable stripes of red over orange color. Water-core is always noticeable. The trees are small, attractive, and have shown winter hardiness.

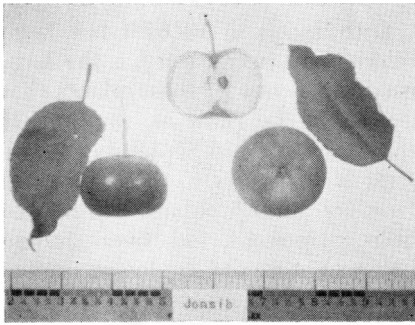
**Izo crabs**—Fluke #10 x Yellow Transparent

Introduced in 1918, this fruit matures in late September. The fruit is 2 inches in diameter with green ground color and light red stripes.

It has a mild sub-acid flavor, inclined to russet and of poor quality. Fruit is inclined to cluster but hangs to the tree well. The tree is hardy and productive with much vigor. It shows an open habit of growth and has been free of blight and has had but little scab.

**Jonsib**—Jonathan x *M. baccata*

Introduced in 1938, this Jonathan-*baccata* cross is maintained for further breeding. It matures September 15. An oblate apple, 2 inches in diameter, shows characteristics of its Jonathan parent. The fruit is a bright red over yellow ground color. The quality is fair and it keeps well in storage. The tree has been hardy with no scab, but has shown some blight. Its fruiting habit is good but with some clustering. The fruit hangs well to full maturity. It may have value for further breeding work.

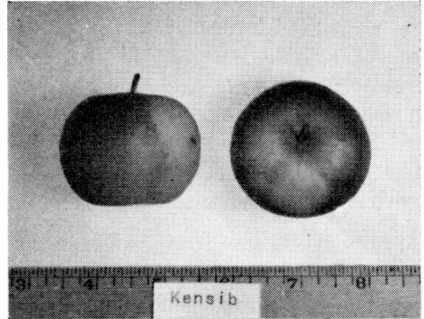


**Kola crab**—*M. ioensis* (Elk River) x Sweet Russet.

It is maintained for further possible work because of the ancestry. The fruit is 2 inches in diameter, green, oblate, and not edible. The tree is vigorous and winter hardy.

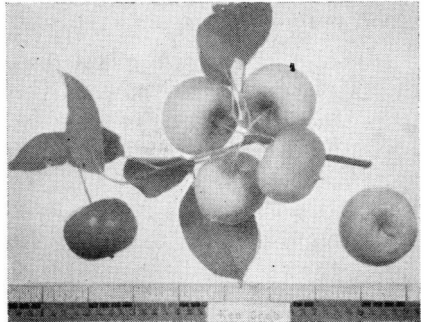
**Kensib**—Kentucky Mammoth crab x Dolgo

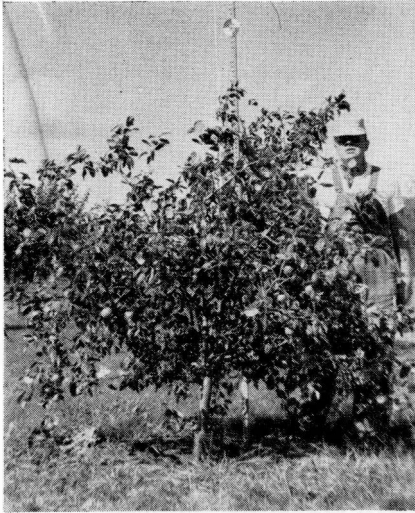
This is a dwarf and one of the most promising for breeding. Fruit matures in late September, is 2 inches in diameter, red, slightly oblate, and of fair quality. The fruit hangs on until the leaves drop, is borne singly, and the tree appears to be an annual bearer. The tree is hardy and has shown no blight and little scab injury. It is a well shaped tree that, to date, has shown nothing but desirable characteristics.



**Keo crab**

This is an open-pollinated seedling of Amur that matures in late September. The fruit is 1½ inches in diameter, bright red, and very attractive. The quality is good. It has been very productive and hardy.





Kensib is a dwarf tree with good bearing habits.

**Linda Sweet crabapple**—Malinda x Sweet Russet

Introduced in 1922, this is a late crab maturing the last of September. The fruit is 1½ inches in diameter and is oblong conic. It is yellow with much russeting. The flesh is mild, sub-acid, and sweet. The fruit hangs exceptionally well. The tree is hardy, inclined to overbear, and produces fruit in clusters. Its use will probably be limited.

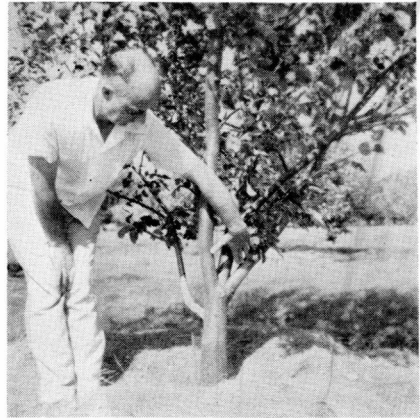
**Manchu crabapple** — *M. baccata* Mandshurica

It is grown from seed collected from a forested mountain area near Harbin, Manchuria. The fruit is of no value, being no larger than the garden pea. The plant is strong and vigorous with an open growth habit. Scaffold branches form at wide angles. It has been free of both fire blight and scab. It blossoms

well in advance of any other crab or apple in the planting. Seedlings have shown a remarkable uniformity and offer much promise as root stocks. The root stocks exercise a semi-dwarfing influence on most varieties. The branching habit is also modified. The wood is very hard which makes grafting a little difficult. The root system is a mass of lateral roots suggesting a characteristic desired. Further testing is needed to evaluate this root stock but it appears to have some merits. It does not appear to be congenial with all varieties.

**Mecata**—McIntosh x *M. baccata*

Mecata matures in mid-September, is 1 inch in diameter, oblong, with a bright red color. The flesh is white and sub-acid. It drops early when mature. The tree is hardy with an upright growth habit.



Wedge on Manchu root stock, left, and on Yellow Siberian, right.

### Mercer crabapple

It was found growing wild about 1900 in Mercer County, Illinois. This crabapple has been maintained because of the well shaped tree and desirable plant characteristics. The fruit is of apple size, 2½ inches in diameter, yellow, oblate, and is very productive. It has been a very vigorous grower. The tree has an excellent branching habit, suggesting its possible use as a frame for topworking. It may be a hybrid of *M. ioensis*.

### Missouri crab

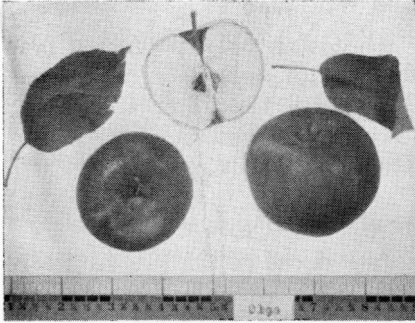
It was named by J. C. Evans about 1900, having come from Jackson County, Missouri. The fruit ripens in mid-September, is roundish, truncated, regular, and greenish yellow in color. It shows some of the native American crab characteristics but much less acidity. It has been hardy over a 30-year period in Brookings. Its possible use might be for topworking.

### Nevis crabapple—*M. ioensis*

Collected in the vicinity of Nevis, Minnesota, in 1930, Nevis has been maintained because of the small size of the native crab. The fruit is roundish, oblate, 1½ inches in diameter, green, very hard, and not edible. The tree is a true dwarf, seldom exceeding 6 feet in height. It has shown evidence of suffering from drought most years and is very subject to scab. A combination of disease and drought will generally defoliate the tree by mid-August. It has ornamental value where a native dwarf crabapple is desired.

### Olga crabapple—Duchess x *M. baccata Mandshurica*

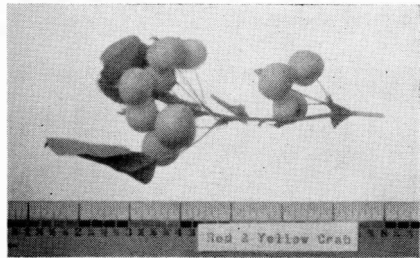
Olga has been retained because of the excellent plant characteristics and its ancestral background. This combination has a pedigree of the Russia apple and the Siberian crabapple. The fruit matures in August and is 1½ inches in diameter. The color is a solid bright red and



**Red and Yellow crabapple—  
*M. baccata***

Selected from among a group of *M. baccata* seedlings that were introduced from Siberia, its origin is not known. In plant characteristics it appears to be a pure *M. baccata*. The fruit is  $\frac{1}{2}$  inch in diameter with a red blush over yellow ground color. It has made a very good root stock but its full value has not been determined.

with a crisp yellowish flesh that is juicy and of good quality. In addition to being an excellent jelly crab, it is quite ornamental. The tree is vigorous, with good bearing habits and an excellent leaf covering. Blight and scab have not been troublesome. This high quality crab might well replace many that are now used for fruit. It has a further potential for breeding work.

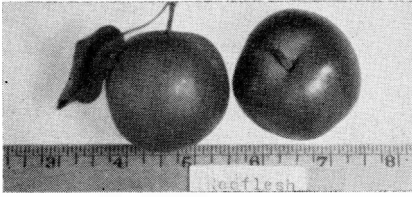


Ten-year old Whitney crab on Yellow Siberian root stock, left, and 10-year-old Whitney crab on Manchu root stock, right. Notice difference in branch growth.



**Redflesh crabapple**—*M. Niedzwetzkyana* x *M. ioensis* var. Elk River

Redflesh was introduced in 1928 and is maintained as a novelty. The fruit ripens early in September. It is a very dark solid red color with red flesh of poor quality. The fruit is  $1\frac{1}{2}$  inches in diameter, oblong, and conic in shape. The tree has been a vigorous grower but has shown some winter injury. The wood is very hard and shows the red color that is characteristic of fruit and foliage. The blossoms are an attractive red which suggests ornamental value.

**Red Silver crab**

This is an open pollinated seedling maintained for its ornamental value. Blossoms are red, suggesting *M. Niedzwetzkyana*. In addition to the red foliage coloring, it has a silver-like color on the leaves from which it gets the name.

**Red Tip crab**—*M. ioensis* x *M. Niedzwetzkyana*

Introduced in 1919, it is maintained for ornamental use. The fruit is a small cherry size with red flesh. The foliage of the young growth has a reddish color. The plant shows some characteristics of both parents. New growth has shown some tip killing but winter damage has never been severe.

**Red Wild crab**

This is an open pollinated crab that matures in late September. The fruit is 1 inch in diameter, red over yellow, and of poor quality. The tree is hardy.

**Soulard crabapple**—*M. ioensis*

Introduced in 1911, its fruit is of little value,  $\frac{1}{2}$  inch in diameter, and green in color. The plant is a dwarf with a spreading growth habit. It has a much heavier foliage than Nevis and retains the foliage better throughout the summer. The light pink blossoms suggest some ornamental value.

**Shoko**—*M. ioensis* var. Elk River x Alexander

Introduced in 1922, it is maintained because of ancestry. The fruit is 2 inches in diameter, green, acid, and of poor quality. The tree is very productive.

**Sugar crab**—Antonovka seedling

Introduced in 1919, its fruit is  $1\frac{1}{2}$  inches in diameter and ripens in early September. This sweet apple has a very pleasant taste but does not retain its quality more than a few days. The tree is a strong upright grower. The fruit is borne in clusters. Alternate bearing is common. It has little promise.

**Tipi crab**—*M. ioensis* x Duchess

It matures in late September and is maintained because of its hardiness and ancestry. The fruit is 2 inches in diameter, green oblate, waxy, but not edible. The tree is very productive with an excellent

branching habit. Blight or scab infection have not been observed but it is very subject to cedar apple rust. Blossoms have shown a tolerance to frost. This may suggest a possible use where greater frost tolerance is needed.

**Wakaga**—*M. ioensis* (Nevis) x Wolf River

Wakaga fruit matures in late September, is 2 inches in diameter, green, firm, and not edible. The fruit keeps well all winter. The tree is hardy and vigorous.

**South Dakota Waldo**—Fluke No. 10 x Duchess

Introduced in 1938 it is maintained since it is one of the few with *M. ioensis* parentage that is edible. The fruit ripens in mid-September and is 1½ inches in diameter. The color is red over a yellow ground color with yellow flesh. The shape is roundish oblate. The fruit hangs to the tree exceptionally well. The tree is vigorous, very productive, and the branches assume a long willowy growth habit. The tree has shown no evidence of blight or scab infection.

**Wamblee**—(Elk River x Bismark) x Wolf River

Wamblee fruit matures late in September, is 2 inches in diameter, oblate, and greenish-yellow with red stripes covering most of the fruit. The tree is hardy and upright in growth habit. It may have value for the plant breeder.

**Wamdesa crab**—*M. ioensis* var. Elk River x Jonathan

Introduced in 1938, it is main-

tained for possible use in breeding work. The fruit is red, round, and 2 inches in diameter. The flesh is firm, acid, and juicy. The quality is poor. The tree is small or semi-dwarf and inclined to over produce and alternate bearing. Good keeping quality is its most outstanding characteristic.

**Waziya crab**—*M. ioensis* var. Nevis x Northwestern Greening

The fruit is 2¼ inches in diameter, greenish yellow, and an excellent keeper in common storage. This is one of the better Nevis hybrids.

**Wecota**—*M. ioensis* var. Nevis x Northwestern Greening

Introduced in 1929, its fruit is a greenish yellow, very acid with firm flesh, and is not edible. The tree has shown great hardiness and frost tolerance. It has shown some scab infection.

**Wetonka crabapple**—*M. ioensis* var. Nevis x Wolf River

Wetonka was introduced in 1929. The fruit is 2 inches in diameter and green ground color with bright red stripes. The flesh is acid, very firm, and not edible. This tree is productive and very hardy.

**S. D. Winter crab**—Red Vein x *M. ioensis* var. Elk River

Greenish yellow fruit ripens in late September, is 1½ inches in diameter, and oblate with a long stem. The flesh is white, firm, juicy, and slightly acid. The tree is vigorous and hardy with attractive foliage.



**Wotanda**—*M. ioensis* var. Nevis x Northwestern Greening

Wotanda is very similar to Wecota.

**Yellow Siberian**—*M. baccata*

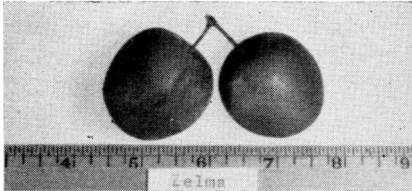
A seedling selection whose ancestry is not known, it appears to have the characteristic of a pure *M. baccata*. The fruit is  $\frac{1}{2}$  inch in diameter, yellow, and not edible. Trees grafted on this stock are large and vigorous. Most varieties assume an upright growth habit on this stock. It is promising as a root stock.

**Zepta crabapple**—*M. ioensis* x Bismark

Introduced in 1922, its fruit is 2 inches in diameter, green, firm, and not edible. It has shown great hardiness and vigor.

**Zelma crab**—*M. ioensis* x *M. baccata*

The fruit is 1 inch in diameter with red flesh, firm, juicy, and of little value. Its blossoms are pink, giving it some ornamental value.



## Apples

The apple varieties maintained in this collection were obtained from various sources and over a long period of time. Some are a result of breeding work and may have some value. Most of them are not available from commercial sources and

would be difficult to obtain elsewhere. With few exceptions, they do not have the quality necessary to make them valuable in a fruit planting, but they may have value for breeding purposes, root stocks, and ornamental use.

**Almata apple**—(Beautiful Arcade x Fluke #38) x Redflesh

This has been classed as an apple because of its size. It matures in early September and is 2 inches in diameter. The Calyx is inclined to show green color with skin and flesh both red. The quality is poor and fruit drops badly. Almata may have some value where a red-fleshed apple is desired. The red blossoms are attractive, giving it some ornamental value.

**Caramel**—Parents unknown

Caramel matures in mid-September, is 2 inches in diameter, and is a solid red color. It is crisp and juicy with fair quality. The bearing habit is good. The fruit hangs well after maturity, and always shows good coloring. Its productiveness and great hardiness may give it some value as a parent to be crossed with higher quality.



**Lemon**—Imported from Russia

Lemon was introduced in 1922 from Russia where it was called Linonoe. It matures in early September and is 3 inches in diameter. The color is greenish yellow with a bronze blush. The flesh is white, mild, sub-acid, and of fair quality. Some seasons water core is common. The tree is vigorous and hardy. The fruit holds to the tree after maturity and is well distributed. It may have some value for breeding purposes where a hardy yellow apple is desired.

**Lina**—A seedling of Malinda

Lina matures mid-September and is 2½ inches in diameter with a yellow tough skin. The quality is fair. It keeps well in common storage. The fruit is inclined to cluster and alternate bearing. The tree is hardy with an upright growth habit.

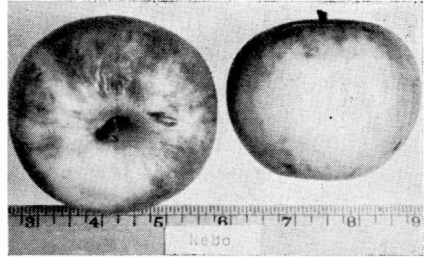
**Maga**—McIntosh x Virginia crab

Introduced in 1933, this was originally introduced as a crabapple. It matures in early September, is 3 inches in diameter, and is greenish yellow with dull red stripes. The quality is poor. The tree is hardy and productive, which seems to be about its only virtue.

**Nebo**—Alexander x Mercer crab-apple

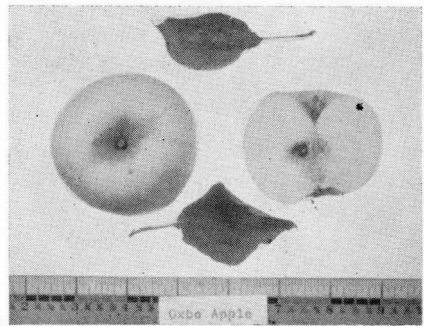
Nebo is a large apple 3 inches in diameter and is a dull red color with some striping. In shape, size, and attractiveness, it resembles Stayman. The quality is fair but it does not keep well in common stor-

age. The plant is hardy, vigorous, and productive. It may have value as a parent to combine with quality where size and hardiness are desired.



**Oxbo**—Roxbury Russet x Duchess

Oxbo matures September 15. The fruit is an attractive yellow, 3 inches in diameter. An apple of coarse texture, this variety has enough quality to give it some value of its own. It has not been a heavy producer, but the fruit is generally borne singly with fruit well distributed. The plant has been hardy with good growth habits. It may have value as a hardy parent.



**Russian White apple**

Introduced in 1924, it matures in late August. It is a yellow apple with red stripes. The flesh is clear white, tart, and juicy. Its chief value

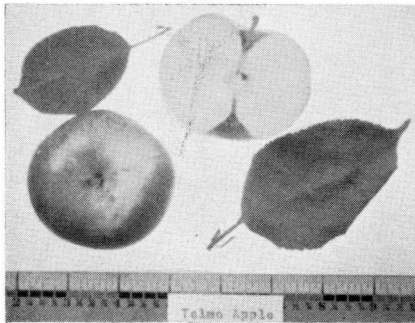
is for sauce. The true name of this Russian variety was never obtained. The tree is hardy and very productive.

**Sasha**—Hibernal x Gravenstein

Introduced in 1919, it matures in early September, is 2½ inches in diameter, yellow, oblate, and of fair quality. The tree is hardy and vigorous. Blight has been present most years and frequently is severe.

**Tolmo**—Tolman Sweet x Duchess

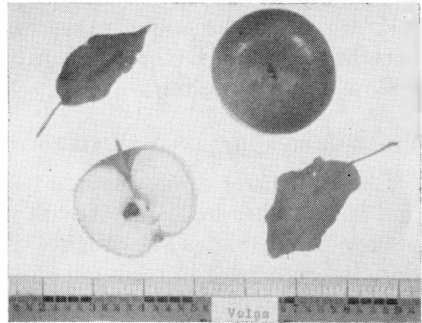
Tolmo matures mid-September. The fruit is 3 inches in diameter with red stripe over yellow. It is an excellent dessert apple for this season. The fruit is not attractive but it deceives its looks in quality. The tree has an open habit of growth and is a fair producer. It has shown great hardiness but is subject to scab. Blight has not been troublesome. This fruit should be tested in other areas where an apple of this season is desired. It is a good dessert apple for late summer use.



**Volga**—Anisim x Virginia crab

Introduced in 1933, Volga has a 2½ inch red apple with a round conic shape. The flesh is firm and juicy

with a pleasant taste. The flesh may show some red coloring near the core line. The quality is fair. It is a heavy producer but inclined to cluster. The tree is vigorous with heavy foliage. It has shown little scab or blight injury and may have value in breeding work where hardiness, productiveness, and a fair degree of quality are desired.



**Wakapala**—Mercer x Tolman Sweet

Wakapala was introduced in 1928. The fruit is yellow with red stripe, is 2 inches in diameter, and ripens in mid-September. The fruit quality is fair but inclined to develop water core. The tree has good bearing characteristics and has shown great hardiness.

**Yellow Sweet**

An old Russian variety introduced in 1924, its fruit is very similar to Yellow Transparent in season of maturity, taste, and general appearance. The tree is inclined to alternate bearing and shows much variation in fruit size. It also has shown signs of being winter tender.

## **Russian Apple Collection**

### **Antonovka Shafran**

This was obtained in 1934 from Russia by N. E. Hansen. Scion wood was collected and grafted at Brookings. The fruit matures in late September, is 2 inches in diameter, yellow ground color overlaid with red, and is of poor quality. The fruit is inclined to cluster. It is a vigorous grower with wide angle branching. In general, it is a good looking tree and appears hardy. Some scab infection is generally present but no fire blight has been observed.

### **Antonovka Polterarar**

Obtained in 1934, it matures in late August, is 2 inches in diameter, greenish yellow with a red blush, sweet, and of fair quality. It is very productive but drops when mature. The tree is vigorous and hardy. Scab and blight have not been troublesome. It may have some value in a home fruit planting.

### **Antonovka Monastirsk**

This was introduced in 1934. The fruit matures in early September and is large, up to 3 inches in diameter. The color is greenish-yellow and the fruit of fair to good quality. The tree is hardy and vigorous with a fair growth habit. Little scab and blight infection have been observed. Perhaps it is the most promising in the Russian collection because of fruit quality.

### **Arkad Ziminee**

Scion wood was introduced from Russia in 1934. It matures September 10. The fruit is greenish-yellow

ground color with dull red stripes, similar to the color of Duchess. The flavor is mild sub-acid and with fair to poor quality. The tree is vigorous and hardy with an excellent branching habit. Scab and blight have been noticed some years. It may have some promise for topworking because of its branching habit.

### **Bellefleur Kitaika**

Scion wood was introduced from Russia in 1934. The fruit matures in early September, is 3 inches in diameter, with dull red stripes over yellow ground color and with fair quality. The tree is hardy but small and is well shaped. Scab infection is frequently severe. Because of the small size tree, it may have some value.

### **Bellefleur Kranov**

Introduced in 1934, it matures in late August, and is  $2\frac{3}{4}$  inches in diameter with rose red color over green. It has a mild sweet flavor quite pleasant to taste, but it has produced little fruit to date. The tree is an open type with wide angle branches. It is winter hardy but not vigorous. Neither scab nor blight have been troublesome.

### **Bellefleur x Rekord**

Obtained in 1934, this variety is very similar to Bellefleur Kranov and may have been confused. It has not fruited to date.

### **Bessemianka**

Obtained in 1934, it matures in mid-September, is  $1\frac{1}{2}$  inches in diameter, green with dull red over

part of fruit, and fair to poor quality. The tree is hardy and a rank grower. It has large, thick leaves; a good branching habit; and has been free from scab and blight. It may have some value as a parent where hardiness and vigor are desired.

#### **Kitaika Cherenkoe**

Scion wood was introduced from Russia in 1934. It matures in late September, with fruit 2 inches in diameter, and is green with red blush. The quality is fair to poor. This tree has shown some winter damage to new growth but the branching habit of the tree is good. Both scab and blight have been observed. This variety does not look promising.

#### **Kitaika Shafran**

Obtained in 1934, its fruit matures in early September, is 1½ inches in diameter, red color, and of poor quality. The fruit is inclined to drop freely. The bearing habit and branch distribution on the tree are excellent. This tree has a spreading growth habit with wide angle scaffold branches which gives the tree a low growing appearance. Scab and blight have not been noticed. It may have value for topworking.

#### **Kitaika**

Scion wood was obtained from Russia in 1934. It matures after mid-September, is 2 inches in diameter, greenish color, and of fair quality but drops badly. The tree is a dwarfish grower but hardy and with an open habit of growth. It is a

heavy producer but the fruit clusters. Some scab is present most years. It may have some value because of its small size.

#### **Kitaika Zolotaia**

Introduced in 1934, this tree has not produced fruit to date. The tree is hardy and vigorous with an excellent branching habit. Neither scab or blight have been observed on this variety. It may have value for topworking.

#### **Komosomoletz**

Obtained in 1934, it matures in late September, is 1¾ inches in diameter, is a dull solid red color, bears oblong conic fruit, and has greenish white flesh. It drops badly and the quality is poor. It is a tall leggy tree with willowy growth habit. The small leaves give the tree the appearance of an open growth habit. The bark and wood are red. Scab is generally present.

#### **Kulon Kitaika**

Obtained in 1934, it matures in mid-September. Fruit is 3 inches in diameter, round, and green with dull red stripes. The quality is fair. The fruit is mostly produced singly. Both fruit and tree have the appearance of coarseness. Leaves are large with heavy pubescence on lower surface.

#### **Mitchurin #3**

Obtained in 1934, it has not fruited to date. The tree is hardy and makes a vigorous growth. Growth habit is open with few branches. It is a large tree with poor

branching habit. Scab infection has been severe but no blight has been observed.

#### **Paradiska x Mitchurin #1**

Obtained in 1934, its fruit resembles Florence crab and matures at about the same date. In size it is larger than Florence, 1½ inches in diameter, but of poor quality. The tree is hardy with excessive branching. Scab has been common on the leaves but no blight has been observed.

#### **Red Bellefleur**

Obtained in 1934, this tree has not produced fruit to date. It resembles others of the Bellefleur group. The wide angle branches form an open growth habit. Some scab has been observed on this variety.

#### **Red Soviet**

Scion wood was introduced from Russia in 1934. The fruit matures in late August. It is yellow with a light red blush. Russetting is common at the basal end. The fruit is 2½ inches in diameter, roundish, slightly acid, but pleasant to taste and of good flavor. The tree is hardy and vigorous with good branching habits. The leaves are large and leathery. Neither scab or blight have been observed. It is a promising Russian apple.

#### **Red Standard**

Obtained in 1934, the name Red Standard was given this variety by Hansen as the original name is not known. The fruit matures in early

September, is a dull red color, 1½ inches in diameter, and of poor quality. The tree is well shaped and hardy. It appears to be a small type tree. Both bark and wood have a red coloring.

#### **Tolstene**

Obtained in 1934, it matures in late September, is a pleasant sweet tasting apple, is 2½ inches in diameter, very firm, and holds to the tree well. It is yellow with red stripes. The fruit stores during the fall season. The tree has excellent branching habit, and is hardy and vigorous. Tolstene is subject to scab but no blight has been observed. It is a fairly good fall apple.

#### **Wisantowoye**

Obtained in 1934, it has not produced fruit to date. The trees have been difficult to maintain because of fire blight. It was so severely damaged in 1957 that the variety may be lost. Scab has also been a problem. It may have value for disease study.

#### **Yakhontowoye**

Introduced in 1934, its fruit matures in mid-September. It is a solid dull red color, 2 inches in diameter, oblong conic, and poor in quality. The tree is hardy with very open growth habit. The branches have a willowy, droopy habit of growth. The fruit is borne in clusters and ropes on the branches. Scab infection was very bad in 1957 but no blight was present. It may have value as a parent when red color is desired.

## Pears

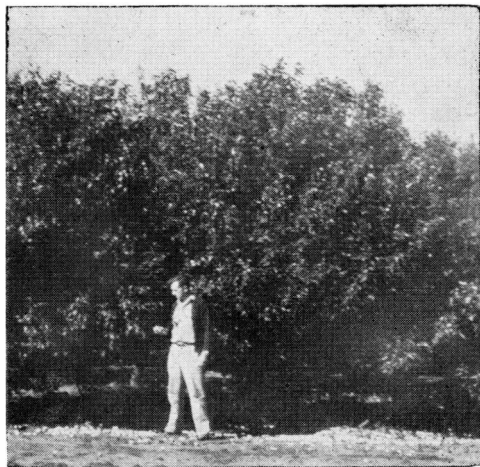
Few of the pears have produced fruit in their present location. Much of the information collected about pears is from earlier reports published or from notes collected by the late N. E. Hansen. Many are the result of crosses made by him and given a varietal name.<sup>2</sup>

**Finsib**—Finland Early Yellow from Finland x Saponsky from Siberia (*Pyrus ussuriensis*)

Fruit matures early in September, is 2 inches in diameter, yellow, globular, and acute pyriform. The quality is fair to good. The tree is a small semi-dwarf which may be due to heavy annual bearing. It is hardy and has shown no fire blight. It may have value as a variety for home use where winter hardiness is required.

**Finsib Sister**—Same parents as Finsib

*Pyrus ussuriensis*, 15 years old, in a shelterbelt near Watertown, S. Dak.



Fruit matures at the same time as Finsib and is similar to Finsib but smaller. The tree is more vigorous than Finsib. No blight has been observed on this variety.

**Hansen Seedless Pear**—*P. sinensis* (from Russia) x Margueritte

It matures in late August, is small, 1 inch in diameter, and of good quality. The fruit is frequently seedless. The tree may lack winter hardiness as black heart is common. It is very subject to blight and is difficult to maintain in the planting because of disease.

**Harbin pear**—*Pyrus ussuriensis*

Imported as seed in 1908 from Eastern Siberia, its fruit is not edible. It has grown under crowded conditions and has not produced well. The tree is very hardy and has never shown blight. It has been used extensively as root stock for pears in experimental work. Because of the dense growth and shade tolerance, it has been planted in protective shelterbelt plantings. The tree is well shaped and is very ornamental. This suggests a three-fold use—root stocks, forest plantings, and ornamental purposes.

**Krylov**—Soponsky (from Eastern Siberia) x Lincoln

This variety matures in early September. The fruit is 2 inches in diameter and of fair quality. The tree is hardy and blight free. It is a well shaped tree with ornamental value.

<sup>2</sup>Additional information is given in S. D. Agricultural Experiment Station Bulletins 224, 309, and 339.

**Ming**—*P. ovoidea* x Louise Bonne de Jersey

Ming matures in mid-September with pyriform, yellow fruit, 2 inches in diameter. Stone cells are abundant and the quality is poor. The tree is very hardy and vigorous. The original tree is 25 feet tall and ornamental. The leaves generally show fall coloring. Because of its hardiness and vigor this may have value for breeding purposes.

**Nikto**—Marillot x *P. ovoidea* (from North China)

The fruit matures in early September, is 1½ inches in diameter, yellow, and obtuse pyriform. The quality is poor. The tree is hardy and well shaped but blight is present almost every year.

**Okolo**—Open pollinated seedling of *P. ovoidea*

Okolo matures late in September and is 2 inches in diameter, and obtuse pyriform with long stem. The flesh is clear white, firm, and juicy with fair to poor quality. The tree is very hardy and productive. No blight has been observed on this variety.

**Russian Sand Pear**—*P. sinensis*

This was obtained from Arnold Arboretum of Boston. Fruit matures late in August, is 1½ inches in diameter, yellow, nearly round, and has many stone cells. It is a heavy producer of poor quality fruit. The tree is very winter hardy with an open growth habit. Seedling from this are vigorous and have been used here as root stocks with suc-

cess. No fire blight has been observed on this variety.

**Sodak**—*P. sinensis* (from Russia) x Margueritte

It matures early in September, is 2 inches in diameter, yellow, oblong pyriform with long stem, and of fair quality. The tree has a tall upright growth habit, is hardy, and has not shown blight infection.

**Sungari**—Vinnaja Selenaja x *P. ovoidea*

Sungari matures early in September, is 2 inches in diameter, and is oblong pyriform with yellow flesh. The quality is fair to good. The tree has a strong upright growth habit and is hardy and free from blight.

**Tanya**—Ideal x *P. ussuriensis* (from east Siberia)

Tanya matures in late September, is 1¼ inches in diameter, and has a dark red color over green and white flesh. It produces heavy crops that store well. The tree is hardy and vigorous with no blight present.

**R. K. Ussuri**—*P. sinensis*

Imported from Russia as seed about 1920, it matures in early September. The fruit is small and of poor quality. The tree is hardy and may have some value as root stocks or forest planting.

**Uma**—Pedigree unknown

No fruit has been observed to date. The tree is hardy and blight-free with an upright growth habit.

**Yermark**—Seckel x *P. ussuriensis* (from east Siberia)

It matures late in September, is 1 inch in diameter, and has fair to good quality. No fire blight has been observed.



## Sandcherries

*Prunus besseyi*, or sandcherry, is native to the Great Plains area, especially the western part. Native plants seldom exceed 3 feet in height and have a spread about equal to height. They survive under extremes of cold, high summer temperature, and drought. Under more humid conditions foliage diseases are troublesome. The original stock used in the improvement work was collected from North and South Dakota, Northwestern Minnesota, Manitoba, and Saskatchewan, about 1900. The plan of work was to plant open pollinated seed from plants selected for quality fruit. Records are not clear as to the exact number of generations from which selections have been made but the best estimate is from 18 to 20. Since yields generally do not exceed 5 or 6 pounds of fruit per plant, vegetative propagation is not practical. Sexual propagation was planned as a way to avoid this cost. Seed from all the 12 selections that are maintained will produce plants similar to the parent plant in fruit and plant characteristics.

### Uses of the Sandcherry

The fruit from these selected sandcherries has considerable merit for areas where other fruit cannot be grown well. Perhaps its greatest value is as a parent for hybridizing with other stone fruits. More than 25 hybrids have been released from the South Dakota Station with the

sandcherry as one parent. Perhaps the best known are the Sapa and Opata.

Another possible use is as a root stock for other stone fruits. Tests show it has a dwarfing influence on apricot and plum and is congenial with both. The only peach tested on the sandcherry roots was an ornamental peach and this was congenial. As a "laboratory plant," its small size makes it well suited for greenhouse studies.

Stone fruit virus diseases have not reduced its vigor or productiveness. To what extent it may be resistant is not known. However, it has survived and grown well in a planting where plums were killed by virus diseases.

### Selections

#### Amber

Amber is the earliest to ripen (July 26). This variety was named because of the color of the fruit.

#### Sandcherry plant—small but productive.



When well mature, the fruit is greenish-yellow and  $\frac{3}{8}$  inch in diameter. The flavor is very mild and pleasant to taste. The skin is very tender and harvested fruit does not keep well enough to permit handling. The quality of cooked fruit is good but lacks the color of other varieties. The seeds are large but separate easily from the flesh. This variety is a vigorous growing plant with a spreading growth habit. Foliage and fruit are frequently severely damaged by disease unless protected with a fungicide. Seedlings from this variety have been quite similar to the parent plant in fruit characteristics.

### **Teepee**

This variety was a seedling from Sioux, introduced in 1937. Since that date it has been maintained as a vegetatively propagated plant and has not had as many generations of mass selection as have some other selections. The fruit matures two days later than Amber, is nearly black when mature, and is  $\frac{3}{8}$  inch in diameter. The quality is fair and it is a high yielding plant with good vigor. The pits are of medium size. The fruit is inclined to drop if left to mature.

### **Ruby**

This variety ripens two days after Amber or about August 1 at Brookings. It differs from other selections in that the flesh is red. The skin color is a dark purple to black when fully mature. The fruit is  $\frac{3}{8}$  inch in diameter with a minimum of the astringency associated with the na-

tive plants. The seeds are of medium size and separate easily from the flesh. The plant has an upright growth habit with medium vigor. Seedlings from this variety give a high percentage with red flesh.

### **Wampum**

This is an early maturing variety (August 1). It has produced heavy crops almost every year. The fruit color is reddish-green changing to a dull reddish-purple when fully mature. Its fruit is  $\frac{3}{8}$  inch in diameter, with flesh green. The plant is an upright grower and larger than most varieties.

### **38-291**

Similar to Wampum, it is 4 to 5 days later in maturing. The plant is smaller with a spreading growth habit. Pits are of average size.

### **CP-64**

This selection matures its fruit at a medium early season. The fruit is large,  $\frac{3}{8}$  inch in diameter, quality is good, flesh is green, and skin is a purplish black color. Plants are of average size and vigor.

### **Oahe**

Oahe is a mid-season maturing variety (August 6). The fruit is small ( $\frac{1}{8}$  inch in diameter), quality good, flesh green, skin black. The very small pits of this variety are perhaps the most outstanding characteristic it has. The plant is small with a low, almost prostrate growth habit.

### **CP-128**

This mid-season selection is typical of most sandcherries with green

flesh and black skin and with plant growth habits typical of most sandcherries. The fruit is semi-freestone which was the basis for its selection.

### **Checkpa**

This is the latest variety to mature its fruit. The fruit is medium-small, green flesh with black skin. Its lateness in maturing was the reason for its selection.

Selections 42-225, 42-226, and CP-158 are carried in the collection because of quality of fruit. No outstanding plant characteristics have been observed.

All of these selections are a great improvement over the native plants. Since the sandcherry was one of the parents used extensively in the hybridization work at this station many years ago, it would seem that these improved selections might be better parental material than those used earlier.

## **Apricots**

Commercially grown apricots, like peaches, do not survive the winters at Brookings. However, the apricots maintained in this collection have never shown winter injury to the vegetative part of the plant. Like all apricots, they blossom in early season, before the leaves open. A continuous search for a late flowering selection has not been successful to date. Apparent injury to dormant fruit buds has frequently occurred when a period of warm weather in mid or late winter has been experienced. This condition and unfavorable weather at blos-

om time have been the most common cause of crop failure. In addition to great winter hardiness, these apricots have shown a great tolerance to drought and high temperature.

The apricots of this collection were obtained in 1924 from North Manchuria, East Siberia, and North China. There is a very distinct difference between the Manchurian and Siberian apricot as represented in this collection. From printed reports and personal conversation, the following information was collected concerning these introductions.

The Manchurian apricot is native to the region between Harbin and the Amur river. This is the northernmost part of China where minimum winter temperatures of 50° below zero are common. Seeds from the largest fruit available were collected by Hansen and many of the trees from these seeds are still maintained. Twelve of these seedlings were named in 1936 and are described in *South Dakota Agricultural Experiment Station Bulletin No. 309*. Of these, perhaps Manchu and Ninguta are the largest and best.

Attempts to cross these Manchurian apricots with pollen of standard varieties have given disappointing results. To what extent the reciprocal cross would take has not been determined. Open pollinated seed from these have resulted in vigorous seedlings that are productive, but with no improvement in fruit over the parent plant. They grow to a height of 20 feet with spreading habit and have orna-

mental value, especially when in blossom. The foliage frequently shows fall coloring but drops early. Seedlings have been used as root stocks but make a weak union with plum. No propagating has been done with the peach. It would therefore appear that the Manchurian apricot offers limited possibilities as a fruit plant or for breeding purposes.

The Siberian apricot was introduced the same year as the Manchurian. Plants were brought from the Great Kingan Mountains of Northwest Manchuria. A selection from this introduction was named Mendo Siberian apricot. From Shilka, East Siberia, another collection was made and a selection was named Shilka. It is not possible to tell from which of these two introductions the present plant came.

The Siberian apricot has shown winter hardiness equal to that of the Manchurian apricot. It could be classed as a large shrub or small tree as it grows to a height of 10 to 12 feet. The small fruit is not edible and is almond-like in some respects. Seedlings show considerable uniformity, being small plants and with fruit much the same as the parent tree. Because of the low spreading growth habit, and early pink flowers, this plant has considerable possibility as an ornamental lawn tree.

The Siberian apricots cross with standard apricot varieties and may be the source of hardy, high quality apricots. The one plant maintained in the collection is a seedling from the original introductions. This should perhaps suggest a root stock for peaches and apricots.

## Summary

The first fruit plantings made in the Great Plains Area proved the need for varieties adapted to climatic conditions. Experiment station workers observed the need for greater winter hardiness and started looking for such material to use in a breeding program. At the South Dakota Agriculture Experiment Station, N. E. Hansen assembled much plant material which he found growing in Siberia, Russia, and North China. This he introduced over a period of nearly 50 years and used much of it in breeding work. At his retirement, as much of this material as possible was re-propagated and planted as an orchard at one location. Also, some native material which had proven hardy was included. It consists of apples, crabapples, pears, apricots, and sandcherries.

Most of these fruit plants came from areas not presently available to plant collectors. The countries from which they came have great variations in climatic conditions. Therefore, plants collected from different locations may possess quite

different characteristics. In as far as possible, the exact place of origin is given.

This preliminary report attempts to evaluate in as much detail as possible what value this fruit collection may have. Attempts to determine the value of plant material for breeding stock are based on opinions. This report describes the characteristics of the plants to the extent they have been observed. Plant and fruit characteristics are reported, disease susceptibility noted as well as any special feature observed. Any special uses and characteristics, such as root stock, dwarfing habit, date of flowering, and other special features noted have been recorded. This evaluation was designed to aid in a more thorough evaluation by those who may have a specific need for such plants in an improvement program.

In order that a better understanding may be had of these fruit plants, weather data are presented for the period when these plants were growing (tables 4, 5, and 6).

**Table 4. Dates for Occurrence of 32° F. or Lower at Brookings**

Year	Last Spring	First Fall	Days Between
1942	May 15	September 24	132
1943	May 27	September 20	116
1944	May 6	October 8	155
1945	May 17	September 29	135
1946	May 16	September 29	136
1947	May 29	September 22	116
1948	May 6	October 9	156
1949	May 24	September 1	100
1950	May 10	October 3	146
1951	May 11	September 22	134
1952	May 29	September 19	113
1953	May 13	September 21	131
1954	May 19	September 22	126
1955	May 10	September 11	124
1956	May 4	September 6	125
1957	May 11	September 13	125
Average May 17-September 21			127 days

**Table 5. Temperature at Brookings from 1931 to 1952**

Month	1	2	3	4	5	6	7	8	9	10	11	12
Maxi- mum	61	58	85	88	106	105	109	106	102	90	76	68
Mini- mum	-32	-38	-23	4	18	33	42	34	19	6	-16	-25
Mean Maxi- mum	24.4	28.7	39.9	57.2	70.3	79.7	87.0	84.4	75.4	63.0	42.1	28.7
Mean Minimum	3.9	7.3	19.9	33.5	45.3	55.4	60.5	58.4	48.3	36.4	21.3	10.4
Mean	14.1	18.0	29.9	45.4	57.9	67.6	73.8	71.4	61.9	49.7	31.7	19.6

**Table 6. Precipitation by Months at Brookings 1942-57**

Year	Total	1	2	3	4	5	6	7	8	9	10	11	12
1942	24.32	.02	.010	2.36	1.69	7.78	4.88	3.02	.78	2.96	.42	.14	.17
1943	26.29	.76	.61	1.07	.57	1.99	6.02	3.70	6.10	1.43	3.15	.89	T
1944	28.65	1.05	.72	.66	2.04	6.46	4.34	3.32	6.81	1.36	.40	1.47	.02
1945	21.62	.34	.89	.81	1.48	3.19	5.64	2.49	2.06	2.21	.45	.75	1.31
1946	28.84	.08	.62	2.32	.81	2.22	7.09	2.13	.52	7.30	4.53	.97	.25
1947	20.39	.40	.15	.86	3.39	1.22	4.80	.73	1.12	3.27	1.72	2.40	.33
1948	18.57	.01	1.16	.21	1.79	2.06	4.72	3.43	2.43	.63	1.55	.56	.02
1949	16.88	.51	T	1.43	.41	2.28	2.82	2.04	1.07	2.90	1.69	1.02	.71
1950	17.70	.28	.12	1.47	1.63	4.99	1.42	3.13	.98	—	2.71	.46	.31
1951	27.60	.25	.59	1.79	1.46	3.35	4.96	2.27	8.29	1.68	1.31	.28	1.37
1952	17.05	1.44	.62	.62	1.37	1.91	4.46	2.21	3.25	.94	—	.07	.16
1953	26.74	.46	1.40	1.14	3.51	3.58	6.40	3.24	3.85	.28	.79	1.16	.93
1954	17.20	.06	.60	1.63	1.21	2.66	3.28	.57	2.08	3.35	1.51	.10	.15
1955	15.38	.16	.53	.14	2.88	.95	3.02	1.33	4.47	.79	.14	.18	.79
1956	21.48	.27	.17	.70	1.22	2.74	4.06	6.03	3.77	.40	1.21	.72	.19
1957	17.19	.06	.38	.35	1.11	4.52	4.00	.97	1.90	1.35	1.21	1.07	.27
<b>Long Time Mean 20.23</b>		<b>.42</b>	<b>.45</b>	<b>.73</b>	<b>2.08</b>	<b>2.97</b>	<b>3.88</b>	<b>2.58</b>	<b>2.58</b>	<b>2.07</b>	<b>1.37</b>	<b>.63</b>	<b>.47</b>

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