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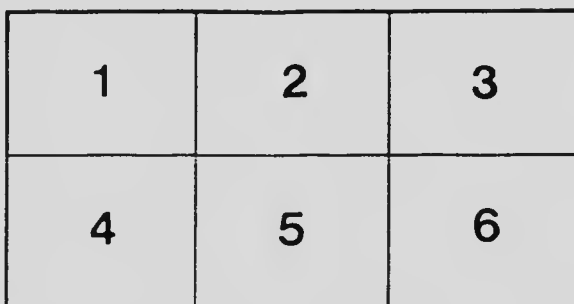
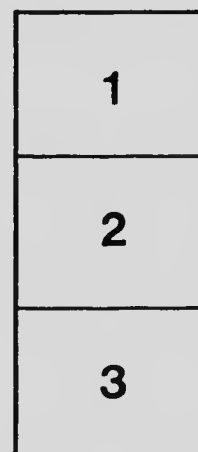
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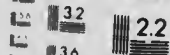
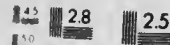
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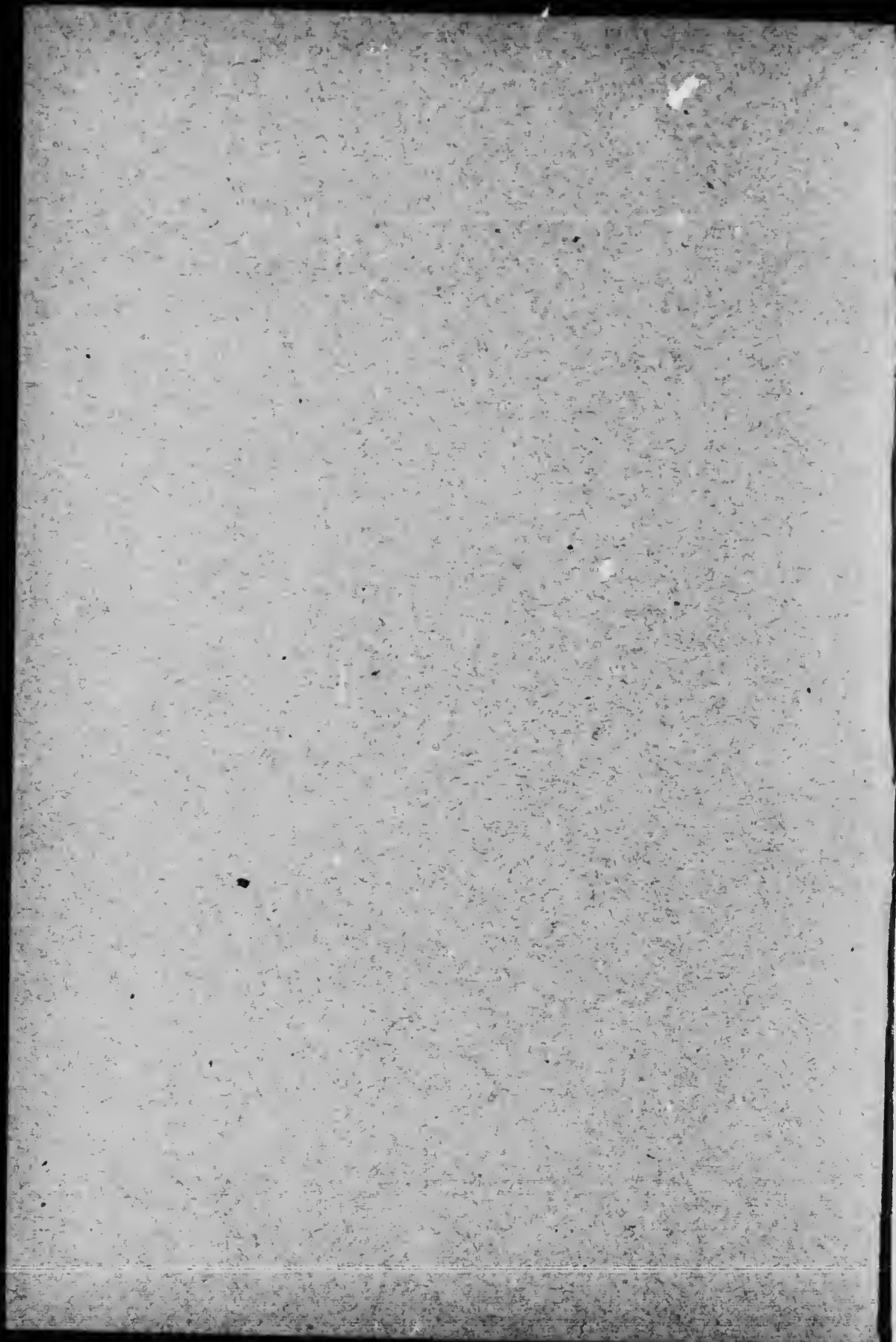
PROGRESS IN THE BREEDING
OF
HARDY APPLES
FOR THE
CANADIAN NORTHWEST

BY
WM. SAUNDERS, C.M.G., LL.D., F.R.S.C.,
Director of Experimental Farms

BULLETIN No. 68

MARCH, 1911

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.



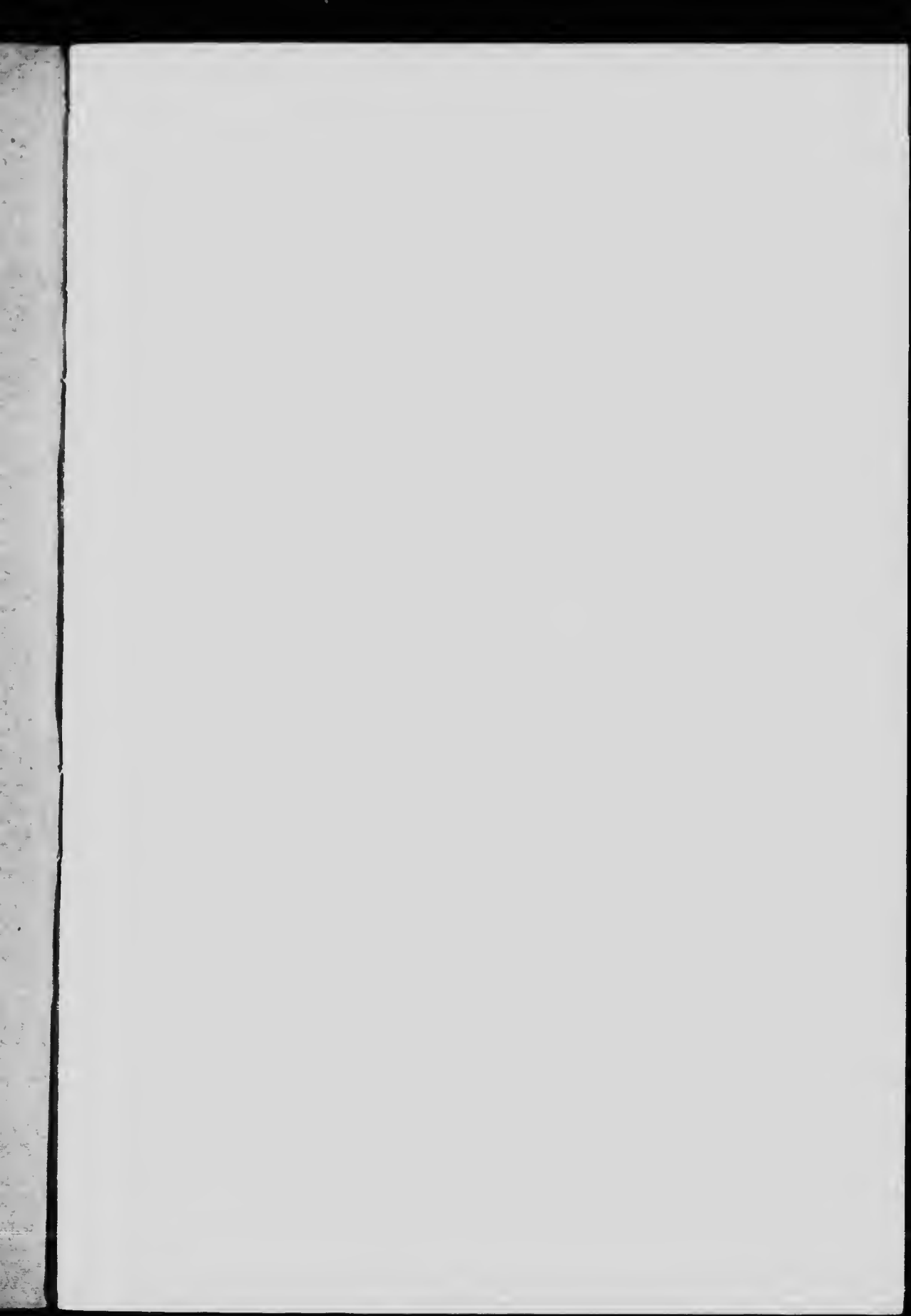


PLATE I.



LISGAR.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
CENTRAL EXPERIMENTAL FARM
OTTAWA, CANADA.

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247—1



To the Honourable

The Minister of Agriculture.

Sir.—I have the honour to submit, for your approval, Bulletin No. 68 of the Experimental Farm series, prepared by myself. In this bulletin the 'Progress in the Breeding of Hardy Apples for the Canadian Northwest' is treated of, and, within its pages the history and present condition of this important branch of experimental work is dealt with—a work which has claimed the writer's attention for the past twenty-four years.

The endeavour is here made to place the work before the reader in such a way as to indicate its general and extensive scope. Already many useful varieties of cross-bred apples have been produced, and the indications are that improvements in the size and quality of the fruit will be more rapid in the future than they have been in the past. The large number of second crosses now under trial will, it is expected, furnish material among which suitable sorts may be found which will prove of commercial value in most of the colder parts of Canada.

I have the honour to be,

Your obedient servant,

WM. SAUNDERS,

Director, Dominion Experimental Farms.

OTTAWA, March 23, 1911.

PROGRESS IN THE BREEDING OF HARDY APPLES FOR THE CANADIAN NORTHWEST.

Shortly after the first Dominion Experimental Farms were established experiments were begun, both with large and small fruits, with the object of finding out what varieties, if any, could be successfully grown, especially in the colder districts in the Northwest Provinces. The apple, on account of its relative importance, naturally claimed special attention. During the first eight or ten years more than two hundred of the hardiest sorts of cultivated apple trees obtainable in northern Europe and other northern countries were thoroughly tested, especially at the experimental farms at Brandon, Manitoba, and at Indian Head, Saskatchewan. These trees were planted in considerable numbers, often from twenty to fifty trees of a kind, some in shelter more or less dense, others without shelter, but in no case were any fruits produced. New varieties, originated since then, considered to be of especial merit and hardiness, have been subjected to similar trials.

In 1887, the year during which work on the experimental farms was begun, seed was obtained from the Imperial Botanic Gardens, St. Petersburg, Russia, of a small, wild Siberian crab-apple, known as the 'Berried Crab,' *Pyrus baccata*. This crab grows in abundance about the shores of the Baikal Sea and in many parts of Northern Siberia. Young trees were raised from seed of this crab, and, as soon as the specimens were large enough for transplanting, some were sent to Brandon, Man., and others to Indian Head, Sask., and in both places they were found to be entirely hardy. During a trial of about twenty years the Berried Crab has never been injured by winter and the trees have started from the terminal buds on the branches every season. These trees have fruited abundantly for many years, but the fruit of most of them is small—not much larger than a cherry—and is also astringent and acid and in some cases bitter. The fruit of *Pyrus baccata* makes excellent jelly, however, and hence, in its unimproved form, has been found useful. It is also highly ornamental in the spring, when in blossom, or when adorned with fruit in the autumn. The trees are rather dwarf in habit, low-branched and strongly built, with the fruit firmly attached to the tree. From its general habit of growth, it is well adapted to resist the high winds to which trees are often exposed on the northwestern prairies.

Commencement of the Work of Cross-Breeding.

After four or five years' experience had thoroughly established the character of the berried crab for extreme hardiness, efforts were made to improve the size and quality of the fruit by cross-fertilizing the flowers of *Pyrus baccata* with pollen from many of the hardiest and best sorts of apples grown in Ontario. This work was begun in 1894, and has since been continued along several different lines. The seeds obtained from the first crosses were sown in the autumn of that year and germinated in the following spring, producing, in all, about 160 young trees. These were planted in the spring of 1896, when many grew rapidly and soon made shapely specimens. These, and other young trees, resulting from similar subsequent experiments, have been planted from year to year in orchards at Ottawa, Brandon, Indian Head and other Northwestern stations. In 1899, thirty-six of the cross-bred apples first produced and grown at Ottawa fruited, and five of them were of such size and quality as to justify their being propagated for more general test. The fact that so many of these fruited on the fourth year from the sowing of the seed indicates a very early fruit-bearing habit. Since then several hundred more of these cross-bred apples have borne fruit, and the number of varieties worthy of extended cultivation has been considerably increased.

Root-grafts of some of the more promising sorts were early made and these have been tested for eight or ten years past at each of the northwestern farms and have shown very slight inclination towards tenderness, even when planted in exposed situations. The cross-bred sorts grafted on roots of seedlings of *Pyrus baccata* have produced trees which, so far as they have been tried, seem to be quite as hardy as the wild form of *baccata*. There seems every reason to expect that they will prove generally hardy throughout the northwestern country.

In all cases of crosses mentioned in this bulletin the first parent named is the female, the second the male.

Experiments with *Pyrus prunifolia* and *Pyrus malus*.

In 1896 a series of crosses was begun on another sort of wild crab, known as *Pyrus prunifolia*. This is regarded by some botanists as a distinct species; others believe it to be a hybrid between *P. malus*, the wild crab of Europe, and *P. baccata*. Seeds of this form were also obtained from the Royal Botanic Gardens, St. Petersburg, Russia. The fruit of *P. prunifolia* is usually larger than that of *baccata*, and will average nearly twice the size. Its hardiness in the Northwest has also been established by a test covering a number of years on both of the experimental farms at Brandon and Indian Head. The first crosses with this species were made in 1896, and since then many new sorts have thus been originated.

Another line of work in producing new apples was begun in 1902, in crossing *Pyrus malus*, the wild apple of Europe, with some of the best Canadian sorts. This fruit is about an inch in diameter to start with, and of fair quality. A hardy form of this tree has been secured which has stood several winters at Brandon and Indian Head without injury, and with this additional crosses have been made.

Many of the best of the crosses produced on *P. baccata* and *P. prunifolia* have been re-crossed, thus introducing a second quota of the blood of the larger apple with the hope of obtaining fruits of larger size and higher quality. Regarding these there is as yet not much proof that they are sufficiently hardy to endure the climate of the Northwest; this can only be fully determined by further experiment. Two varieties of these crosses of Ontario and Spy have been tested for several years at Indian Head, but have not yet fruited. Thus far they have been fairly hardy. The first one-year-old trees produced by this method were planted in the orchard at Ottawa in the spring of 1904, and a full list of those now growing in these orchards is submitted in this bulletin.

Apples from which Pollen has been Used.

In the first crosses made on *Pyrus baccata*, in 1904, pollen was used from the Tetofsky, Duchess and Wealthy apples, but since then pollen has been obtained from many other varieties and used on *P. baccata*, *P. prunifolia* and *P. malus*, among them Anis, Beautiful Arcade, Broad Green, Excelsior, Famense, Golden Russet, Haas, Herren, Krimske, McIntosh Red, McMahon White, Osimoe, Pewaukee, Red Astrachan, Rib-ton Pippin, Scott's Winter, Simbirsk No. 9, Swayzie Pomme Gris, Talman Sweet, Winter St. Lawrence and Yellow Transparent. The number and variety of the crosses have thus been very much increased. Many hundreds of these cross-bred varieties of *baccata* origin have been produced and most of them have fruited. While a large number have proved of inferior quality, there have been originated, up to the present time, about sixteen varieties in all, most of which, from their superior size and quality, may be regarded as useful for domestic purposes and deserving more extended trial.

Crosses of *P. baccata* with Some of the Best Cultivated Apples.

On Plate II there are shown figures of *Pyrus baccata* and eight of the new cross-bred sorts, all of natural size. The *baccata*, as will be seen, is very small, and the

relative increase in size resulting from the crossing is manifest. On weighing good, average specimens we find the larger of these new cross-bred sorts are from twelve to fourteen times heavier than *baccata*. The orchards of crosses with *P. baccata* were mostly planted between the years 1894 and 1904, although some were planted later. Of these crosses, numbering in all about eight hundred, the larger number have fruited and were found inferior. All such have been discarded. The following were believed to be of sufficient value to warrant their more general distribution for trial, and have been sent out under the names given:—

No. 2. **Alberta.** (Plate II, fig. 2.) *Pyrus baccata* with Haas.—Tree, a strong grower and an abundant bearer. Fruit, 1.6 inches across, 1.4 inches deep; round, somewhat flattened and slightly ribbed. Calyx persistent. Stem, about half an inch long. Colour, greenish yellow, with a bright red cheek. Flesh, nearly white, juicy, slightly astringent, astringency scarcely perceptible when the fruit is ripe. Quality, fair to good. Season, last week in September to middle of October. Thus far free from blight.

No. 3. **Bow.** *Pyrus baccata* and Pewaukee.—Tree, a strong grower and a fair bearer. Fruit, size, $1\frac{3}{8}$ inches across, $1\frac{3}{8}$ deep. Colour, yellow with a faint tinge of red. Flesh, yellowish white, crisp, juicy, mildly subacid, not astringent, of good flavour. One of the mildest of the *baccata* crosses. Season, middle of September to the middle of October. Practically free from blight.

No. 4. **Charles.** *P. baccata* with Tetofsky.—Tree, a very upright and strong grower, with large leathery leaves, and a medium bearer. Fruit, size, 1.6 inches across and 1.5 inches deep; nearly round, slightly ribbed. Calyx, persistent. Stem, rather long. Colour, yellow. Flesh, yellowish, solid, crisp, juicy, with a pleasant flavour, mildly acid and slightly astringent. Season, early in September. This variety, although promising, proved very subject to blight at Ottawa and Brandon, though it has not yet blighted at Indian Head; on account of this tendency, it is not recommended.

No. 5. **Columbia.** (Plate II, fig. 5.) *P. baccata* with Broad Green.—Tree, a very strong grower and a fair bearer. Fruit, size, 1.8 inches across and 1.6 inches deep; nearly conical, distinctly ribbed. Calyx, protruding and persistent. Stem, of medium length. Colour, red, with stripes and dots of a deeper shade. Flesh, yellowish, lightly streaked with red, juicy, subacid, with a pleasant flavour; slightly astringent. Quality, fair to good. Season, late September and October. Thus far free from blight.

No. 6. **Elsa.** (Plate II, fig. 6.) *P. baccata* with Yellow Transparent.—Tree, a strong grower and a heavy bearer. Fruit, size, 1.4 inches across and 1.3 inches deep; nearly round, slightly ribbed. Calyx, persistent on a slightly raised eminence, ribbed. Stem, about one inch long, slender but strong. Colour, bright yellow. Flesh, fine-grained, tender, juicy, rather acid, but of pleasant flavour. Quality, good. Season, latter part of August and early in September. Thus far free from blight.

No. 7. **Jewel.** (Plate II, fig. 8.) *P. baccata* with Yellow Transparent.—Tree, a strong grower and a heavy bearer. Fruit, size, 1.4 inches across and 1.3 inches deep; nearly round. Calyx, persistent. Stem, about $1\frac{1}{2}$ inches long. Colour, yellowish, with a pale red cheek; very pretty. Flesh, moderately firm, crisp, juicy, of good flavour, subacid, with very little astringency. Quality, good, one of the best. Season, last week in August to middle of September. Thus far quite free from blight.

No. 8. **Kent.** *P. baccata* with McIntosh Red.—Tree, a good grower and productive. Fruit, 1.6 inches across and 1.4 inches deep; nearly round, ribbed about the calyx. Calyx, persistent and slightly projecting. Stem, $\frac{3}{4}$ to 1 inch long. Colour, dull, dark red, with an orange-coloured shade, deeper in tint on the sunny side. Flesh, yellowish-white, juicy, crisp, mildly subacid, slightly astringent and of fairly good flavour. Season, end of September to middle of November. Has not yet shown any tendency to blight.

No. 9. **Mecca.** *P. baccata* with Simbirsk No. 9.—Tree, a fair grower and a good bearer. Fruit, size, 1.5 inches across and 1.4 inches deep; nearly round. Colour, orange, streaked with red, with a crimson cheek. Flesh, mildly subacid, rather astringent. Quality, good. Has not yet blighted.

No. 10. **Norman.** *P. baccata* with McIntosh Red.—Tree, a fair grower and a good bearer. Fruit, size, 1½ inches across and the same in depth; round. Colour, bright red. Flesh, yellowish-white, crisp, juicy, with a sprightly, pleasant flavour and a slight trace of astringency. Quality, good. Season, October. Has been slightly affected by blight.

No. 11. **Osman.** *P. baccata* with Osimoe.—Tree, a fair grower and a good bearer. Fruit, above medium size; a little smaller than Transcendent. Colour, pale yellow, well washed with crimson. Flesh, tender, breaking. Flavour, acid but pleasant, only slightly astringent. Season, latter half of August.

No. 12. **Otto.** *P. baccata* with McMahon White.—Tree, a good grower and a fair bearer. Fruit, width 1½ inches, depth 1½ inches. Colour, yellow, suffused and faintly streaked with red; red when ripe. Flavour, juicy, sprightly, astringent. Of fair quality. Season, October. No indication of blight.

No. 13. **Pioneer.** *P. baccata* with Tetofsky.—Tree, a strong grower and a heavy bearer. Fruit, size, 1½ inches across and 1.3 inches deep; nearly round, slightly ribbed. Calyx, persistent. Stem, rather long. Colour, yellow, with a pink cheek. Flesh, white, fine-grained, firm, crisp, subacid, slightly astringent, moderately juicy, with a pleasant flavour. Season, latter part of September and October. Has been considerably affected by blight during the last two or three years.

No. 14. **Prince.** (Plate II, fig. 7.) *P. baccata* and Tetofsky.—Tree, a strong and upright grower and very productive. Fruit, 1.6 inches across and 1.3 inches deep; nearly round. Calyx drops in 50% of the specimens. Stem, 1 to 1½ inches in length. Colour, bright red, of a deep shade on the side exposed to the sun, with a few paler dots and streaks. Flesh, nearly white, juicy, subacid, somewhat astringent; astringency lessens as the fruit ripens. Of a pleasant flavour. Ripe early in September. Has proven quite liable to blight and on this account cannot be recommended.

No. 15. **Robin.** (Plate II, fig. 9.) *P. baccata* with Simbirsk No. 9.—Tree, a good grower and a medium bearer. Fruit, size, 1.5 inches across and 1.4 inches deep; nearly round, strongly ribbed. Calyx, large, persistent and projecting. Stem, about one inch long. Colour, yellow and red. Flesh, very firm, juicy, subacid, with a slight astringency and a pleasant flavour. Quality, good, one of the best. Season, latter part of August to end of September. Thus far has been free from blight.

No. 16. **Romney.** *P. baccata* with Broad Green.—Tree, a medium grower and a fair bearer. Fruit, size, 1½ inches across and 1½ inches deep. Calyx, persistent. Stem, one inch long. Colour, rather dull, deep red. Flesh, moderately firm, moderately juicy; quality above the average. Season, last week in August and first half of September. Has not yet shown any tendency to blight.

No. 17. **Silvia.** (Plate II, fig. 3.) *P. baccata* with York Transparent.—Tree, a strong and upright grower and a fair bearer. Fruit, size, 1.5 inches across and 1.5 inches deep; form somewhat pointed and ribbed. Calyx, persistent. Stem, ¾ to 1 inch long. Colour, pale yellow. Flesh, of pleasant flavour, subacid, no astringency. Quality, good. Ripe, August 9th or 10th, but does not keep long; one of the earliest to ripen of the cross-bred apples which have yet fruited. Has, thus far, not shown any tendency to blight.

No. 18. **Tony.** (Plate II, fig. 4.) *P. baccata* with McMahon White.—Tree, a strong and spreading grower and a heavy bearer. Fruit, size, 1.6 inches across and 1.4 inches deep; form round, somewhat flattened. Calyx, persistent. Stem, about 1.8 inches long. Colour, greenish-yellow, streaked and splashed with bright red and with many yellowish dots. Flesh, yellowish-white, juicy, sprightly, subacid, slightly astringent.



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1.—PYRUS BACCATA.
2.—ALBERTA.
3.—SILVIA.

4. TONY.
5. COLUMBIA.
6. —ELSA.

7. PRINCE.
8.—JEWEL.
9.—ROBIN.

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FIG. 1. RUTH.



FIG. 2. MARGERY.



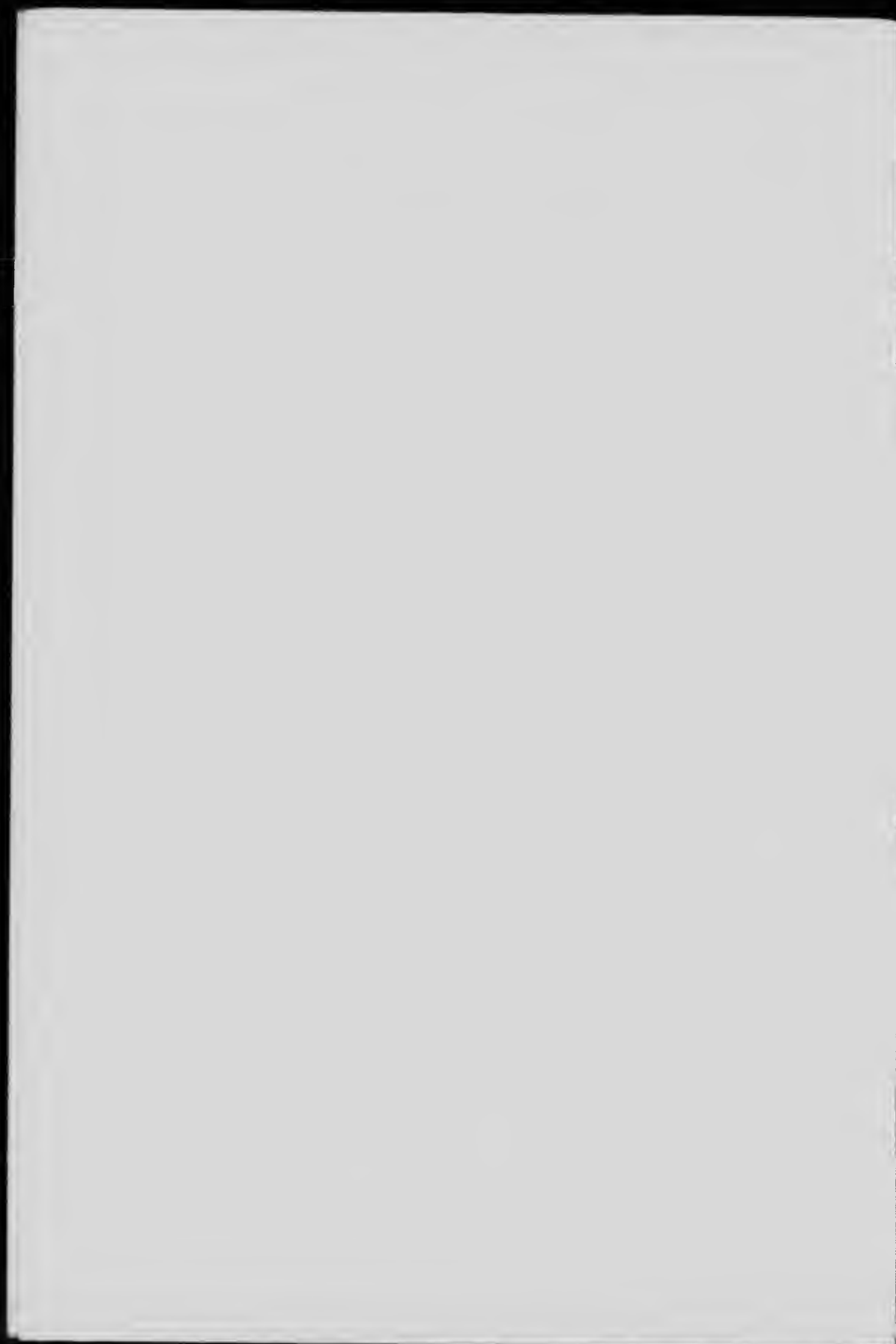
FIG. 3. MARTIN.



FIG. 4. JOSIE.



FIG. 5. JAMES.



gent, with a pleasant flavour. Quality, medium. Season, late September and October. Thus far free from blight.

Additional and Less Desirable Crosses with *P. baccata*.

The following additional crosses with *P. baccata* were among the earlier sorts produced. These have been distributed more or less, and have also been tested at the branch farms, but on account of their comparatively small size and somewhat inferior quality, their propagation has not been continued, as they are not considered equal to some of the newer sorts, and hence are not recommended for general cultivation. Some of them are still under trial, however, at several different points.

No. 1. **Aurora.** *P. baccata* with Tetofsky.—Tree, of a spreading habit and an abundant bearer. Fruit, size, $1\frac{1}{8}$ inches across, $1\frac{1}{8}$ inches deep; ribbed. Calyx, persistent. Colour, bright red, almost all over. Flesh, crisp, juicy, acid, of fair flavour, slightly astringent. Season, beginning to end of September. This variety has blighted badly, and hence cannot be recommended.

No. 2. **Carleton.** *P. baccata* with Wealthy.—Tree, a strong grower and a heavy bearer. Very ornamental when in bloom; flowers deep red in bud and very large and pinkish-white when open. Fruit, size, $1\frac{1}{8}$ inches across and $\frac{3}{4}$ of an inch deep. Calyx, persistent. Stem, $1\frac{1}{4}$ inches long. Colour, chiefly red with some orange; deep red in parts. Flesh, firm, crisp, juicy, moderately acid, distinctly astringent; of fair flavour. Season, latter part of September and October. This was one of the earliest to fruit, and has borne regular crops for many years without showing any tendency to blight; valuable as an ornamental variety.

No. 3. **Dean.** *P. baccata* with Wealthy.—Tree, a fairly strong grower and a free bearer. Fruit, too small to be of value.

No. 4. **Derby.** *P. baccata* with Transcendent.—Tree, a strong grower and a free bearer. Fruit, size, $1\frac{1}{4}$ inches across, $1\frac{1}{4}$ inches deep. Calyx, small. Stem, about $1\frac{1}{2}$ inches long. Colour, a handsome bright red. Flesh, firm, crisp, juicy, rather acid, slightly astringent. Flavour, fair. Although inferior in size and quality, its colour is very attractive. As the fruit is very juicy, it would no doubt make good jelly, and the tree, when laden with fruit, is very ornamental. Season, middle of September to December.

No. 5. **Eve.** *P. baccata* with Simbirsk No. 9.—Tree, a rather slow grower and a fair bearer. Fruit, size, $1\frac{1}{2}$ inches across and $1\frac{1}{4}$ inches deep; ribbed. Calyx, prominent, without basin, persistent. Colour, bright red, brightest and deepest on the sunny side. Stem, $\frac{3}{4}$ to 1 inch long. Flesh, yellowish, fairly juicy, of pleasant flavour. Quality, good. Season, September. Thus far free from blight.

No. 6. **Hunter.** *P. baccata* with Red Anis.—Fruit, small, of good quality for jelly. Too small to be of general value.

No. 7. **Lizzie.** *P. baccata* with Herren.—Tree, a medium grower. Size of fruit, $1\frac{1}{8}$ inches across and $1\frac{1}{4}$ inches deep. Stem, 1 inch long. Calyx, persistent. Colour, rather deep red. Quality, medium. Ripe about the middle of September. This is too small and astringent to be of value.

No. 8. **Manitou.** *P. baccata* with McMahon White.—Tree, a good grower and a heavy bearer. Fruit, size, $1\frac{1}{2}$ inches across, $1\frac{1}{2}$ inches deep; nearly round; ribbed. Calyx, prominent, ribbed. Stem, 1 to $1\frac{1}{4}$ inches long. Colour, yellow, striped with red over almost the entire surface, becoming deep red where exposed to the sun. Flesh, nearly white, juicy, sprightly, with a rather pleasant flavour. Of fair quality. Season, latter part of September and October. This variety is subject to blight, and since it is of inferior quality it is not recommended for cultivation.

No. 9. **Northern Queen.** *P. baccata* with Hyslop Crab.—Tree, a medium grower, rather pendulous in habit. Fruit, small but abundant. Quality fairly good but rather astringent. Ripens early. Season, last week in August and September. Too small to be of value. Thus far free from blight.

No. 10. **Prairie Gem.** *P. baccata* with Tetofsky.—A slow and somewhat slender grower, but a good bearer. Very subject to blight, and hence is not recommended. Fruit, red, but too small to be of value.

No. 11. **Progress.** *P. baccata* with Wealthy.—Tree, a vigorous and upright grower and a good bearer. Fruit, size, 1.4 inches across and 1.2 inches deep. Calyx, persistent. Stem, long and slender. Colour, red with some yellow, and a dark red cheek. Flesh, very firm, crisp, subacid, juicy, very slightly astringent and of fair flavour. Season, middle of September to middle of October. Has blighted a little.

No. 12. **Ruby.** *P. baccata* with Wealthy.—Tree, a strong grower and a rather light bearer. Fruit, small in size. No indications of blight. Ripe early in September. Too small to compare favourably with some other sorts, and of inferior quality.

No. 13. **Stork.** *P. baccata* with Duchess.—Tree, small, of compact habit; a good bearer. Fruit, size, 1½ inches across, depth 1¼ inches. Calyx, closed, persistent, with flat basin. Stem, about 1 inch long, slender. Colour, red, deeper in shade on the sunny side. Flesh, yellowish, firm, not very juicy, rather astringent. Quality, medium. Season, late in August and September.

Crosses of *P. baccata conocarpa* and *P. B. sanguinea*.

Within recent years crosses have been made with these varieties of *baccata*, using them as female and the following varieties as male:—Simbirsk No. 9, Yellow Transparent and Wealthy.

Of crosses of *P. B. conocarpa*, there are six with Simbirsk No. 9, five with Yellow Transparent and one with Wealthy.

Of the crosses of *P. B. sanguinea*, there are one with Simbirsk No. 9, one with Wealthy and four with Yellow Transparent, making eighteen crosses in all belonging to this group. These have not yet fruited.

Crosses of *Pyrus prunifolia* with some of the Best Cultivated Apples.

Of these, ten have shown sufficient points of merit to justify a more extended test.

No. 1. **Dawn.** *Pyrus prunifolia* with Simbirsk No. 9.—Tree, a good grower and productive. Fruit, size, 1½ inches across and 1½ inches deep. Stem, about one half inch long. Colour, red, brighter and deeper on the sunny side. Flesh, white, juicy, crisp, distinctly subacid, of pleasant flavour. Quality, good. One of the largest and best from this parentage. Ripe about September 20th. Has blighted a little in some instances.

No. 2. **Frank.** *P. prunifolia* with McMahon White.—Fruit, size, 2½ inches across, 1¼ inches deep; nearly round, slightly pyramidal. Calyx, small, closed, rather shallow. Stem, medium to long, in a fairly deep basin. Skin, yellowish-white with sometimes a faint reddish blush. Flesh, white, juicy, crisp, fine-grained, subacid, with a slight astringency.

No. 3. **Golden.** *P. prunifolia* with Golden Russet.—Tree, a fair grower and quite productive. Fruit, size, 1½ inches across, 1¾ inches deep; round, somewhat flattened at the ends. Calyx, persistent in a shallow basin. Stem, ½ inch long, rather stout. Colour, bright yellow. Flesh, fairly juicy, rather sweet, very slightly astringent. Quality, good. Season, last week in August to the end of September.

No. 4. **Gordon.** *P. prunifolia* with Golden Russet.—Tree, a fair grower and medium bearer. Fruit, size, $1\frac{1}{2}$ inches across by $1\frac{1}{2}$ inches deep. Colour, russet-yellow. Skin, rather thick. Flesh, yellowish-white, fine-grained, juicy, pleasantly subacid with a mere trace of astringency. Quality, good. Ripe September 20th. Has so far been free from blight.

No. 5 **Josie.** (Plate III, fig. 4.) *P. prunifolia* with Simbirsk No. 9.—Tree, a fair grower and productive. Fruit, size, $1\frac{1}{2}$ to 2 inches across and $1\frac{1}{2}$ inches deep. Stem, of medium length. Colour, greenish-yellow, almost covered with bright red in streaks and patches; a handsome looking apple. Flesh, white, fairly juicy and of a pleasant flavour, with very slight astringency. Quality, good. Season, middle of September to middle of October. Has so far been free from blight.

No. 6. **Lisgar.** *P. prunifolia* with McMahon White.—Tree, a good grower and productive. Fruit, size, 2 inches across and $1\frac{1}{2}$ inches in depth. Colour, yellow and bright red. Flesh, yellowish-white, juicy, with a pleasant flavour; rather astringent. Promising for size, but rather inferior in quality. Season, October. Much of the fruit in bunches of from 5 to 10, hanging from the ends of the branches. A cluster of these apples is shown on Plate I, where the fruit is represented of natural size.

No. 7. **Madge.** *P. prunifolia* with Golden Russet.—Tree, a fair grower and a heavy bearer. Fruit, size, $1\frac{1}{2}$ inches across and $1\frac{1}{2}$ inches deep. Stem, $\frac{1}{2}$ inch long. Colour, deep red. Flavour, mildly acid, pleasant though peculiar; slightly astringent. Quality, above medium. Ripe about the middle of September. No indication yet of blight.

No. 8. **Magnus.** *P. prunifolia* with Simbirsk No. 9.—Tree, a strong grower and a fair bearer. Fruit, size, 1.8 inches across and 1.7 inches deep; nearly round. Calyx, persistent. Stem, about $\frac{1}{2}$ inch long. Colour, orange and scarlet. Flesh, firm, rather juicy, fairly crisp, subacid. Flavour, aromatic, very slightly astringent. Quality, very good. One of the largest yet fruited of the *P. prunifolia* crosses. Ripe, September 20th to 30th. No indications of blight so far.

No. 9. **Ruth.** (Plate III, fig. 1.) *P. prunifolia* with Pewaukee.—Planted in orchard in spring of 1900.—Tree, a fair grower and has borne well for several years. Has so far shown no signs of blight. Fruit, $1\frac{1}{2}$ inches across, $1\frac{1}{2}$ inches deep; nearly round. Calyx, open, ribbed. Stem, $1\frac{1}{2}$ inches long, slender. Colour, deep crimson, with dots, moderately numerous, white, distant. Flesh, fine-grained, yellow stained with red, breaking. Flavour, pleasant, subacid, with no astringency. Season, October to November. A handsome cross-bred apple of good appearance and quality. Promising on account of lateness and size.

No. 10. **Teddy.** *P. prunifolia* with Golden Russet.—Tree, a fair grower and a medium bearer. Fruit, size, $1\frac{1}{2}$ to 2 inches across and $1\frac{1}{2}$ inches deep. Calyx, persistent. Stem, about half an inch long. Colour, dull red with streaks and spots of a brighter shade, covered with dots of a paler hue. Flesh, yellowish, crisp, fairly juicy with a pleasant flavour. Skin, thin; fairly free from astringency. Season, latter half of September and early in October.

Methods of Distribution of these Cross-Bred Fruits for Further Test.

Supplies of all these different sorts were sent first to the Experimental Farms at Brandon and Indian Head, where orchards of considerable size have been established. These fruits are also being tested at many different points in Manitoba and the Northwest Territories, and at a few places in northern Ontario. To determine their hardiness on the Northwest plains it is essential that they be tried in many localities from the eastern boundaries of the plains, where the altitude is comparatively low, to the foothills of the Rocky Mountains, where the elevation above sea-level is much greater. The question of altitude has a most important bearing on the hardiness of fruit trees.

For several years a list was in course of preparation, on which were entered from time to time the names of settlers who took a special interest in the growing of trees and shrubs. From this list a number of names were chosen, distributed over a wide area, seldom taking more than one or two in each district. In this way about 200 locations were selected, the extreme points of variation in elevation ranging from 740 to 4,200 feet. Having corresponded with these parties and received assurance that any young trees sent them would be carefully looked after, the first distribution was made in 1902, when four one-year old trees (one tree each of four different sorts) were sent to each person. In the spring of 1903 a second package was sent to the same individuals containing two additional varieties of cross-bred apples, so that at each of these points six of these young trees have been received. Reports have come in from many who have received the trees, and in almost every instance they are reported as entirely hardy, having stood the winters to which they have been exposed without injury, and in some instances borne fruit.

Crosses with *Pyrus prunifolia intermedia*.

This variety of *P. prunifolia* has been crossed with McIntosh Red, of which cross there are now thirteen trees, and also with McMahon White; four trees of the latter are now living. Only one tree of this group has so far fruited, a cross with McIntosh Red. Four specimens were gathered from the tree on September 22, 1910. Their description is as follows:—

James (Plate II, fig. 5.) Size, $1\frac{1}{2}$ inches wide, $1\frac{3}{4}$ inches deep; nearly round. Colour, deep red with streaks of dull yellowish. Faintly ribbed. Calyx, open, basin shallow, ribbed. Stem in a shallow cavity and about $\frac{1}{2}$ inch long. Flesh, nearly white, close-grained, rather acid, with a pleasant flavour; slightly astringent.

Crosses with *Pyrus malus*.

Three trees of a cross of *Pyrus malus* with Simbirsk No. 9 are now growing, but none of them has yet fruited.

Second Crosses.

Many of the best of the crosses produced on *Pyrus baccata* and *Pyrus prunifolia* and their related forms have been re-crossed, thus introducing a second portion of the characteristics of the larger apple, with the hope of obtaining fruit of larger size and higher quality. From these second crosses, which were made in 1904 and following years, there are now 407 trees growing in the orchards at Ottawa, several of which fruited for the first time in 1910. The following descriptions relate to two of the most promising of these which have fruited:—

Margery. (Plate III, fig. 2.) Pioneer with Spy.—Fruit gathered September 22, 1910; fifteen specimens in all, growing in clusters, mostly of three together; size, $1\frac{1}{2}$ inches wide, $1\frac{1}{2}$ inches deep. Colour, yellow, with an occasional faint tinge of reddish. Flesh, greenish-white, close-grained, juicy, and fairly pleasant, but not yet ripe. When tested again in February, flesh quite matured, pleasant, subacid, fine-grained, with a sprightly flavour. Calyx, shallow, ribbed. Stem, thin, about $\frac{3}{4}$ of an inch long, in a regular cavity. Season, October to February.

Martin. (Plate III, fig. 3.) Pioneer with Ontario. Cross of 1902, planted as yearling in orchard, spring of 1904.—Tree, a strong grower and an abundant bearer. Gathered fruit from one small tree, September 21, 1910, about $\frac{3}{4}$ of a bushel. Fruit, borne in clusters, $2\frac{1}{4}$ inches across and $1\frac{1}{4}$ inches deep; nearly round. Calyx, closed with shallow basin. Stem, slender, placed in a medium, regular cavity, from $\frac{1}{2}$ to $\frac{3}{4}$ inches long. Colour, warm orange-yellow with an orange-red cheek. Flesh, white, pleasantly subacid, fine-grained, easily breaking, with an agreeable, sprightly flavour. Season, October to February.

LIST OF SECOND CROSSES NOW IN THE ORCHARDS ON THE
CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

No. of Trees.	First Cross.	Second Cross With.
3	Alberta	McIntosh Red.
1	Carlton	Baldwin.
1	"	Cranberry Pippin.
2	"	Duchess.
2	"	Northern Spy.
15	"	October.
2	"	Scott's Winter.
3	"	Simbirsk No. 9.
3	"	Tetofsky.
3	Charles	McIntosh Red.
3	"	Simbirsk No. 9.
10	"	Tetofsky.
2	"	Yellow Transparent.
7	Dean	McIntosh Red.
9	"	Ontario.
13	Jewel	Duchess.
16	"	Gideon.
14	"	October.
8	"	Rideau.
9	"	Simbirsk No. 9.
14	"	Tetofsky.
19	"	Yellow Transparent.
1	Manitou	Haas.
8	Norman	Yellow Transparent.
5	Northern Queen	August.
3	"	Cranberry Pippin.
5	"	Ida.
10	"	Simbirsk No. 9.
16	"	Tetofsky.
5	"	Walter.
1	"	Wealthy.
8	Pioneer	August.
16	"	Cranberry Pippin.
16	"	McIntosh Red.
20	"	Ontario.
3	"	Simbirsk No. 9.
49	"	Spy.
1	Prince	August.
21	"	Haas.
17	"	McIntosh Red.
9	"	McMahon White.
6	"	Simbirsk No. 9.
7	"	Tetofsky.
6	"	Yellow Transparent.
3	Stork	Walter.
5	Tony	Ontario.
7	"	Simbirsk No. 9.
Total	407	

Miscellaneous Crosses.

Several promising seedlings have been produced by crossing some hardy Russian and other varieties in the hope of obtaining sorts hardy enough to endure the climate of the Canadian Northwest. Three of these, known by the following names, are worthy of notice as, after a limited trial, they give promise of unusual hardiness:—

No. 1. **Rideau.** Wealthy with Duchess.—Fruit, form, roundish, angular; size, medium to large. Cavity, deep, open. Calyx, open or partly open. Colour, pale yellow, well splashed and washed with bright crimson, especially on the sunny side; dots small, indistinct, numerous. Skin, moderately thick, tender. Flesh, juicy, yellowish, firm. Flavour, pleasant, not high, sprightly, subacid. Quality, good. Season, late September to February.

No. 2. **Fairfield.** Hyslop Crab with Duchess.—Fruit, size, 2 inches across, 1½ inches deep; form, oblong. Colour, yellow, splashed and streaked with bright red. Calyx, persistent in a basin of medium depth. Stem, about half an inch long. Flesh, nearly white, fine-grained, juicy, tender. Flavour, pleasant, very mild, subacid. Quality, above medium. Season, September.

No. 3. **Samson.** Duchess and Auis.—Fruit, size, medium to large. Flesh, crisp, moderately juicy, subacid. Flavour, sprightly, pleasant. Season, middle to end of September. Quality, above medium.

Since the first seeds of *Pyrus baccata* were obtained from the Royal Botanic Gardens, St. Petersburg, Russia, in 1887, twenty-four years have passed. As shown by the facts submitted in this bulletin, during this time a large number of experiments have been carried on with varying success, and the indications are that, by persevering along the lines laid down, in a very few years a number of varieties of apples will be available, possessing that hardiness, size and quality which will commend them to the settlers in all those portions of the northern country where ordinary apples under average conditions cannot be grown. The success thus far achieved is most encouraging, and doubtless greater triumphs in the future will reward persistent efforts.



