

# New York Agricultural Experiment Station.

PETER COLLIER, DIRECTOR.

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BULLETIN No. 64—NEW SERIES.

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- I. SOME EXPERIENCES WITH STRAWBERRIES.
  - II. STRAWBERRY CROSSES.
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GENEVA, N. Y.

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\*Connected with Fertilizer Control.

## BULLETIN NO. 64 —NEW SERIES.

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### I. SOME EXPERIENCES IN TESTING STRAWBERRIES.

For several years this Station has conducted tests with different varieties of strawberries in order that the numerous inquiries which it receives concerning both old and new sorts might be answered more intelligently than would otherwise be possible, and also that the general demand for information concerning the comparative merits of the newer varieties might be met by publishing annually in the Station's Bulletins or Annual Reports the record of these varieties as grown at this Station. No one understands better than the average strawberry grower that no variety, however meritorious it may be, does equally well in all locations and on all soils. It is therefore hardly necessary to remind those readers for whose benefit this Bulletin is prepared that it is not the purpose of the Station reports issued from time to time to pass final judgment as to the merits of the varieties discussed, but rather to offer a contribution to our knowledge of these varieties by setting forth the merits or demerits developed by the plants as grown on our soil and under the climatic conditions found here.

During the years in which the work of testing strawberry varieties has been prosecuted here, the Station has endeavored to obtain the newer kinds for testing as fast as they were introduced to public notice. Many originators of new varieties, realizing the importance of the impartial tests conducted by this Station, have sent plants of new varieties to the Station for testing two or three years before they were placed on the market.

The strawberries tested here are grown on a fertile clay loam, well tile drained and sloping gently towards the south. Some varieties seem well adapted to this location and have given excellent results; other kinds have not succeeded as well here as they have done in other localities. The notes presented in the follow-

ing pages are based simply on the record of the various varieties as grown on the Station grounds.

Nearly one hundred and thirty named varieties of Strawberries were fruited at this Station in 1893, and also nearly four hundred and thirty Station seedlings. About thirty new varieties received for testing during the spring of 1893, are expected to fruit here for the first time in 1894. Many new Station seedlings will also fruit for the first time in 1894.

#### NOTES ON VARIETIES.

The varieties which fruited at the Station for the first time in 1893 are described below. The blooming season of pistillate plants in each case is compared with the blooming season of some well known staminate variety which may be used for fertilizing their blossoms. When the productiveness of a variety is not mentioned its yield may be compared with that of other kinds by consulting table IV, p. 16, which gives the rank of the thirty berries most productive here in 1893.

In the following descriptions the quality of the fruit is designated as poor, fair, good, very good or best, as the case may be. The expression "good stems" is used to designate stems of average length and strength; short, long or prostrate stems are specially mentioned. Synonyms and unnamed seedlings are given in italics. The staminate varieties (having perfect flowers) are marked "S" and the pistillate varieties (having imperfect flowers) are marked "P."

**Accomack, S.** (*From A. J. McMath, Onley, Va., and Slaymaker & Son, Dover, Del.*) Plants vigorous; foliage good; runners few, consequently unproductive in matted row. Fruit medium to large, borne on good stems, soft, good in flavor and quality. Fruiting season rather late and short.

**Advancer, S.** (*From R. S. Cole, Harmons, Md.*) Season early and short. Fruit medium size, borne on good stems, dark color, firm, very good in quality. Foliage good. Runners moderately abundant, consequently the yield is low for matted rows.

**Alabama, S.** (*From Prof. E. S. Goff, Madison, Wis.*) Foliage perfect; runners abundant; stems good. Fruit mid-season, medium size, fair quality, good flavor, firm. Not enough plants were obtained to secure reliable data as to yield.

*Allen's No. 1., P.* (From *W. S. Allen, Salisbury, Md.*) Blossoms with Manchester. Foliage burned in the very hot, dry weather at the beginning of the fruiting season. Runners moderately abundant; stems good; fruit medium to large, of fair quality, firm. Season medium early, and lasted about ten days.

*Allen's No. 3, S.* (From *W. F. Allen, Salisbury, Md.*) Foliage burned as with Allen's No. 1. Forms runners in great abundance; stems good; fruit medium to large, dark crimson, moderately firm, good quality; productive.

*Anna Forest, S.* (From *D. Brandt, Bremen, O.*) This variety was introduced several years ago. On our soil it forms runners very slowly and consequently is unproductive in matted row. Fruit mid-season, medium to large, fair quality, firm. Fruiting season lasts about a week.

*Arkansaw Traveller, P.* (From *T. G. Michel, Judsonia, Ark.*) Blossoms with Manchester. Foliage first class; runners very abundant; fruit mid-season, moderately firm, medium to large, borne on long prostrate stems, quality fair to good. Fruiting season about ten days long. Moderately productive on our soil.

*Belle, S.* (From *Cleveland Nursery Co., Rio Vista, Va.*) Foliage good; runners moderately abundant; stem good; fruit late, firm, medium to very large in size, holds its size well till late in the season, not uniform in shape, often elongated wedge shape, sometimes with large core and unripe tip; quality good. Needs to be tested further before deciding as to its merits on our soil.

*Beverly, S.* (From *Benj. W. Smith, Beverly, Mass.*) Commenced ripening its fruit early and fruiting season lasted about eighteen days. Plants had good foliage, were moderately productive and formed new plants in matted row rather slowly. Fruit medium size, good and firm.

*Cameronian, S.* (From *L. J. Farmer, Pulaski, N. Y.*) Moderately vigorous; does not form runners abundantly; stem short. Fruit mid-season, medium to large, good quality, firm.

*Chair's Favorite, S.* Fruiting season lasted from June 19 to July 7. Foliage good; runners formed abundantly; stems good; plants not so productive as Haverland but nearly equal to Middlefield. Fruit medium to large, soft, good quality.

*Cheyenne, P.* (From *Stayman & Black, Leavenworth, Kans.*)

Blossoms with Sharpless. Has not done well on our soil. Season late; foliage good; stems short; few runners. Fruit has a prominent neck and is not uniform in shape, medium to large, very good in quality, firm.

**Clark's Early**, *Early Idaho*, S. (*From Slaymaker & Son, Dover, Del., and D. Brandt, Bremen, Ohio.*) Foliage good; runners moderately abundant; stem short. Fruit mid-season, medium or above, symmetrical and uniform, dark color, firm, very good quality. As grown here it ranked with Crescent in productiveness but fell below Sharpless or Jucunda.

**Clyde**, *Cycloma*, S. (*From Stayman & Black, Leavenworth, Kans.*) Season late; fruit medium to large, good quality, moderately firm. Foliage good, runners few on our soil. Productiveness cannot be given this season.

**Crosby's No. 10**. (*From Phineas Crosby, Clinton, Wis.*) Foliage good; runners abundant; stems long. Fruiting season lasted three weeks. Fruit mid-season to late, medium size, good quality, firm. Berry has a tendency to ripen unevenly. More productive than Sharpless as grown here.

**Crosby**, *Crosby's No. 27*, S. (*From Phineas Crosby, Clinton, Wis.*) Season same as Crosby's No. 10, plants more productive, runners equally abundant and foliage somewhat better than with that variety. Fruit medium size, good quality, firm.

**Crosby's No. 91**, S. Season about the same as Crosby's No. 10, runners equally abundant and foliage as good as Crosby's No. 27. In yield it ranks between Crosby's No. 10 and Crosby's No. 27. Stems good. Fruit medium to large, good quality, firm.

*Cycloma*, see **Clyde**.

**Curtis No. 15**, P. (*From B. O. Curtis, Paris, Ills., 1892.*) Stems not very long, runners abundant, foliage good. Fruit medium to large, good quality, firm. Slightly more productive than Crescent here.

**Curtis No. 154**, S. (*From B. O. Curtis, Paris, Ills., 1892.*) Stems long; foliage slightly burned in the hot, dry weather at the beginning of the fruiting season; runners abundant. Fruit medium to large, good quality, firm. More productive than Crescent but less productive than Sharpless here.

**Custer S.** (*From S. E. Hall, Cherry Valley, Ills., 1892.*) Stems

not very long, runners not abundant, foliage good. Fruit medium size, regular, good quality, firm. Slightly more productive than Crescent.

**Dayton Early**, S. (*From Sam'l Kinsey & Co., Kinsey, Ohio.*) Medium early; fruiting season lasted about two weeks. Fruit symmetrical, of good scarlet color, medium to large, moderately firm, very good in quality with slight Alpine flavor. Stem short; foliage good; runners but moderately abundant and hence the variety is not very productive on our soil.

**D and D**, S. (*From Prof. E. S. Goff, Madison, Wis.*) Mid-season; medium to large; fair quality; firm. Foliage burned quite badly in the very hot, dry weather at the opening of the fruiting season. Runners but moderately abundant on our soil and hence the variety is unproductive in matted row.

**Dew**, S. (*From D. Brandt, Bremen, Ohio.*) Mid-season to late; fruiting season lasted nearly three weeks. Foliage first class; fruit large, often irregular in form, of fair quality and soft. Runners moderately abundant much the same as with Sharpless but the yield is somewhat better than with that variety on our soil.

*Dow's Seedling*, *Yankee Doodle*, P. Blossoms with Manchester. Fruit mid-season, medium size, good quality, soft. Foliage slightly burned in the hot, dry weather at the beginning of the fruiting season; stems good; runners moderately abundant on our soil, not filling two-thirds of the space allotted to the matted row.

*Early Idaho*, see *Clark's Early*.

**Edwards' Favorite**, S. (*From R. S. Edwards, Highlands, Colo.*) Mid-season to late; foliage fair to good; runners abundant; stems good; fruit medium to large, good scarlet color, soft. Plants moderately productive on our soil, giving better yield than either Sharpless or Manchester. Judging from this its first season of fruiting at this station Edwards' Favorite seems to be worthy of extended trial as an amateur fruit of late season. The fruit was in excellent condition at the time of its last picking, July 14. It is not firm enough to ship to distant markets.

*Engles*, No. 1, S. (*From T. T. Lyon, South Haven, Mich.*) Mid-season to late; foliage good; runners not very abundant; stems good; fruit medium to large, good quality, soft. On our

soil the yield is somewhat better than with Wilson but not so good as that of Crescent.

**E. P. Roe, S.** (*From T. J. Dwyer, Cornwall, N. Y.*) Planted in spring of 1892, but has not made runners enough to justify a description of fruit and foliage.

**Everbearing, S.** (*From Chas. S. Lindley, Emporia, Va.*) Fruit mid-season (June 19 to July 5), medium size, symmetrical, uniform shape, good color, good to very good in quality, soft. Stem short; foliage not very vigorous and runners not very abundant. Slightly more productive than Sharpless.

**Gandy Belle, S.** (*From S. B. Cole, Bridgeton, N. J.*) Mid-season; foliage good; runners very abundant; stems long and prostrate; fruit medium to large, good, firm, dark crimson. More productive than Crescent but drops below Sharpless in yield as grown here.

**Galerson, S.** (*From Ellwanger & Barry, Rochester, N. Y.*) Mid-season to late, medium size, symmetrical, poor quality, firm, fine color. Stems and foliage good; runners not very abundant. In productiveness, as grown here, it ranks about with Manchester.

**General Putnam, P.** (*From G. H. and J. H. Hale, South Glastonbury, Conn.*) Blossoms about with Beder Wood. Mid-season, medium to large, light crimson, very soft, good quality, unproductive in matted row. Foliage moderately vigorous, badly burned in the very hot, dry weather at the beginning of the fruiting season. Stems good. Runners not abundant.

**Glenfield, S.** (*From Stayman & Black, Leavenworth, Kans.*) Planted in the spring of 1892 but has not yet made plants enough to justify a description of the variety.

**Hall's Seedling, P.** (*From S. E. Hall, Cherry Valley, Ills.*) Blossoms about with Manchester and Sharpless. Foliage very good; runners moderately abundant; stems good. Fruit mid-season, medium size, fair quality, firm. As grown here it is less productive than Sharpless but more so than Crescent.

**Holcomb's Seedling, S.** (*From W. C. Holcomb, Mecca, Ohio.*) Foliage moderately vigorous; runners abundant; stems good. Fruit medium to large, good, firm, mid-season to late. As grown here it ranks with Manchester in productiveness.

**Herbert, S.** (*From B. L. Carr, Saratoga Springs, N. Y.*) Mid-season, small to medium, fair quality, firm. Foliage good;



runners not abundant, filling no more than half the space allotted to the matted row ; stem short, plants very unproductive.

**Kincks, S.** (*From Clark Hewett, Waupun, Wis.*) Mid-season to late. Foliage good, stems good, runners not abundant enough to fill half the space allotted to the matted row. Fruit medium to large, good, soft. In productiveness it ranked between Sharpless and Crescent.

**Latest of All.** (*From Ellwanger & Barry, Rochester, N. Y.*) Set in the spring of 1892 but has not made plants enough to justify a description of the variety.

**Laxton's Captain, S.** (*From Ellwanger & Barry, Rochester, N. Y.*) Set in spring of 1892 but has not made plants enough to justify a description of the variety.

**Magnate, P.** (*From Stayman & Black, Leavenworth, Kans.*) Blossoms with Wilson. Fruit mid-season, medium to large, elongated and flattened, good, soft. Foliage good, stems good, runners not very abundant. In productiveness it ranks between Sharpless and Crescent.

**Meek's Early, Advance, S.** (*From Slaymaker & Son, Dover, Del.*) Fruit of medium size, borne on good stems. Foliage good, runners few, consequently the matted row is comparatively unproductive. Length of fruiting season about two weeks.

**Muskingum, S.** (*From S. R. Moore, Zanesville, Ohio.*) Mid-season to late, medium size, fair quality. Foliage not very vigorous, runners few, stem good. Falls below Crescent in productiveness.

**Oregon Everbearing, S.** Imperfectly staminate. (*From D. Brandt, Bremen, O.*) Mid-season, medium size, poor quality, soft. Foliage fair to good, runners not very abundant, stems good. Slightly more productive than Sharpless. Quite distinct from the Everbearing mentioned above, being superior to it in size but much inferior in quality.

**Pawnee, S.** (*From Stayman & Black, Leavenworth, Kans.*) Foliage fair to good, slightly burned in the hot, dry weather at the beginning of the fruiting season ; stems good. Fruit medium size, very good, soft. Season early to late, lasting over three weeks. In productiveness it ranks between Sharpless and Crescent. Runners fairly abundant.

**Princeton Chief, P.** (*From F. W. Poscharsky & Son, Prince-*

*ton, Ills.*) Blossoms about with Manchester. Foliage good ; runners abundant ; stems long ; fruit mid-season to late, medium size, moderately firm, good quality and of good color, although rather dark when fully ripe. Among the strawberries fruited at this Station for the first time in 1893 the Princeton Chief ranks fifth in productiveness. It was much more productive on our soil than Bubach and will probably ship as well as that variety.

**Princess, P.** (*From R. Johnston, Shortsville, N. Y.*) Blossoms about with Manchester. Medium early. Fruiting season lasted about two weeks. Foliage fair to good ; stems good ; runners abundant ; fruit medium size, good, soft. About equal to Sharpless in productiveness as grown here.

**Primate, S.** (*From Stayman & Black, Leavenworth, Kans.*) Mid-season, medium to large, good, soft. Foliage good ; stems good ; runners moderately abundant. In productiveness it ranks between Sharpless and Crescent.

**Rio, Thompson's No. 9.** (*From Cleveland Nursery Co., Rio Vista, Va.*) Seedling of Sharpless. Foliage good ; runners abundant ; stem good ; fruit medium size, good quality, firm, mid-season ; unproductive on our soil.

**Sandoval, S.** (*From R. D. McGeehon, Atlantic, Iowa.*) Mid-season to late, medium size, symmetrical, dark crimson, good quality, firm. Foliage fair to good, stems good, runners not abundant. Unproductive on our soil.

**Smith, P.** (*From Coe & Converse, Ft. Atkinson, Wis.*) Blossoms with Manchester. Foliage fair to good, burned somewhat in the hot, dry weather at the beginning of the fruiting season. Runners abundant ; stems good ; fruit medium size, fair quality, firm. On our soil this variety is not so productive as Middlefield but exceeds Manchester in yield.

**Southard, Southard's Early, S.** (*From G. H. & J. H. Hale, South Glastonbury, Conn.*) Mid-season, medium to large, good quality, soft. In productiveness it ranked between Sharpless and Crescent. Foliage moderately vigorous ; runners not very abundant ; stems good.

**Stayman's No. 3, S.** (*From Stayman & Black, Leavenworth, Kans.*) Mid-season ; medium to large, elongated, quite uniform in size ; quality very good ; firm. Foliage good ; runners few ; plant unproductive here.

**Sunny Side, P.** (*From Chas. S. Pratt, Reading, Mass.*) Blossoms about with Sharpless. Season late, lasting about two weeks. Fruit medium to large, fair quality, firm, bright scarlet color. Foliage first class; runners abundant; stem long. In productiveness Sunny Side heads the list of the varieties fruited at the Station this season.\* The merits of no berry can be properly estimated from one season's trial, and the Sunny Side must be tested further and compared with standard sorts before we can decide definitely as to its merits in this locality. The indications are that it may prove worthy of introduction as a late market berry.

**Swindle, P.** (*From G. H. and J. H. Hale, South Glastonbury, Conn.*) Blossoms about with Manchester. Mid-season to late; foliage burned in the hot, dry weather at the beginning of the fruiting season; runners few; stems good. Fruit medium to large, often irregular in shape, fair quality, firm, unproductive on our soil.

**Thompson's No. 60, P.** (*From Cleveland Nursery Co., Rio Vista, Va.*) Blossoms with Manchester. Mid-season, medium size, good, moderately firm. Foliage very good; runners very abundant; stems long. The indications are that it may prove valuable for a home and local market berry. In productiveness it stands third on the list at this station in 1893.

**Townsend's No. 2, S.** (*From T. T. Lyon, South Haven, Mich.*) Mid-season, medium to large or occasionally very large, symmetrical, rather dark color, very good quality. Foliage good; strong, upright stems; runners moderately abundant. Ranked with Haverland in productiveness.

**Townsend's No. 3, P.** (*From T. T. Lyon, South Haven, Mich.*) Blossoms with Manchester. Mid-season, medium to large, poor quality. Foliage good, stems short, runners abundant. Slightly more productive than the Sharpless this season.

**Townsend's No. 9, P.** (*From T. T. Lyon, South Haven, Mich.*) Blossoms with Manchester. Early to late, medium size, moderately firm, good quality. Foliage good; stems medium to long and prostrate; runners very abundant. In productiveness this season it ranked above Middlefield and below Haverland.

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\* Those varieties marked with a \* in Table I are not given rank as to yield in 1893.

*Townsend's No. 20, P.* (From Geo. Townsend, Gordon, Ohio, and T. T. Lyon, South Haven, Mich.) Blossoms about with Sharpless. Fruit mid-season to late, medium to large, good color, good shape, good quality, firm. Foliage healthy and vigorous, runners very abundant, stem strong. Not quite so productive this season as Townsend's No. 9.

**West Lawn, P.** (From C. B. Bauer, Judsonia, Ark.) Blossoms with Manchester. Fruit mid season, medium size, good, firm. Foliage good; runners very abundant; stems long. In productiveness it ranked about with Manchester.

**Wilton, S.** From B. L. Carr, Saratoga, Springs, N. Y.) Mid-season, small to medium, quite uniform in size, good quality, firm. Foliage not very vigorous; runners moderately abundant; stem short. Unproductive on our soil.

**Yankee Doodle,** see *Dow's Seedling*.

#### EARLY VARIETIES AND LATE VARIETIES.

Some strawberry growers find it to their advantage to raise early varieties and frequently we are asked to name the varieties which have given the best yield at this Station early in the season. This demand for very early sorts seems to come chiefly from growers who are supplying a local market and who find that the high prices received early in the season permit very early kinds to be grown with profit even when they are not so productive as later sorts.

By consulting the following table, p. 13, a comparison may be made of the thirty varieties of strawberries which gave the highest yields at this Station in 1893 and their season of ripening may be noted. For convenience of reference the names are arranged alphabetically. In the first column is given the rank of the variety according to its yield at this Station in 1893. The third column shows what per cent of its total yield was picked prior to June 21, 1893. The fourth column shows what per cent. of the crop was picked after July 1, 1893.

**Table I. Showing relative yield of thirty most productive varieties fruited at this Station in 1893; also per cent of early yield and per cent of late yield.**

Rank as to yield, 1893.	Name of variety.	Per cent of crop picked before June 21, 1893.	Per cent of crop picked after July 1, 1893.
26	Allen's No. 3, S.....	21	0
29	Beder Wood ( <i>Racster</i> ), S.....	32	6
*	Bowman,† S.....	14	0
—	<i>Burt</i> —see Capt. Jack.....	—	—
17	Captain Jack ( <i>Burt</i> ), S.....	16	15
16	Chair's Favorite, S.....	9	8
25	Crosby, S.....	6	8
30	Crosby's No. 91, S.....	0	10
*	Eclipse ( <i>Barton's</i> ),† P.....	16	0
2	Edgar Queen, P.....	0	35
18	Eureka, P.....	0	20
9	Feicht's No. 2,† S.....	55	0
4	Feicht's No. 3,† P.....	6	2
27	Gandy, S.....	0	25
*	Gov. Hoard,† S.....	18	0
*	Great Pacific,† P.....	0	1
22	Greenville, P.....	12	2
8	Haverland, P.....	7	11
17	Hazleton's No. 4,† P.....	0	14
28	Hulburt, S.....	36	0
*	Laxton's Noble,† S.....	16	0
23	Martha,† P.....	0	0
13	May King, S.....	7	4
21	Michel's Early, S.....	74	0
14	Middlefield, P.....	9	14
15	Ohio Centennial, S.....	0	23
19	Oliver, S.....	0	15
6	Phillip's Seedling, S.....	13	0
5	Princeton Chief, P.....	0	27
*	Sadie,† P.....	5	0
20	Seedling from M. Crawford, P.....	0	8
24	Stayman's No. 1,† P.....	0	8
1	Sunny Side, P.....	0	24
3	Thompson's No. 60, P.....	0	7
7	Townsend's No. 2, S.....	0	66
10	Townsend's No. 9, P.....	26	12
12	Townsend's No. 20, P.....	2	11
*	Waldon,† P.....	0	0
*	Walton,† P.....	0	6
*	Warfield,† P.....	0	0
*	Yale,† S.....	0	21

\* Varieties marked with star cannot be given rank as to productiveness. After the fruiting season was over it was discovered that the tile drains which passed under the plat where these varieties were located had undoubtedly received an unusual supply of water from the slope above and thus their roots received a supply of moisture during portions of the dry season which the other varieties under test did not.

† Beds fruited for the second time in 1893.

As a rule the very early varieties do not give so high a yield as later sorts. It will be seen by consulting the table below, that the most productive variety classed as early, ranks ninth in total yield for 1893. The Michel's Early up to June 21 had ripened a larger amount of fruit than any other variety tested, yet it ranks twenty-first as to the total yield for the season. Beder Wood ripened nearly one-third of its crop prior to June 21, but this season it dropped to twenty-ninth in rank as to total yield; in 1891 it stood second and in 1892 it stood first as to total yield for the season.

The above table shows that but five varieties gave more than one fifth of their yield prior to June 21, 1893. This fact is sufficient reply to the oft repeated remark that there is practically no difference between the time of ripening of "early" and "late" strawberries. We see that there is a marked difference with different varieties as to their season of ripening.

Ranked according to their yield up to June 21, 1893, these five varieties stand:

**Table II—Early varieties ranked according to yield prior to June 21, 1893.**

Name.	Date of first picking.	Ounces yielded before June 21.	Total yield.	Rank as to yield. 1893.
Michel's Early, S.....	June 15.....	176	210	21
Feicht's No. 2, S.....	" 15.....	154	280	9
Townsend's No. 9, P.....	" 15.....	73	275	10
Hulburt, S.....	" 17.....	72	197	28
Beder Wood, S.....	" 15.....	64	196	29

Michel's Early gave the largest early yield and yielded no fruit after June 29. Feicht's No. 2 and Hulburt yielded no fruit after July 1. Greenville gave two per cent of its crop after July 1. For long season berries Townsend's No. 9 and Beder Wood took the lead. The latter gave six per cent, and the former twelve per cent of its yield after July 1.

Consulting table I (p. 13) with reference to the late varieties, but seven kinds are found that gave more than one fifth of their total yield after July 1. Ranked according to the amount of their crop picked after July 1 they stand:

**Table III—Late varieties ranked according to yield after July 1, 1893.**

Name.	Date of last picking.	Ounces yielded after July 1.	Total yield.	Rank as to yield. 1893.
Townsend's No. 2, S.....	July 3.....	192	288	7
Edgar Queen, P .....	" 10 .....	126	363	2
Princeton Chief, P.....	" 11.....	97	345	5
Sunny Side .....	" 10.....	96	400	1
Ohio Centennial, S.....	" 14.....	51	241	15
Gandy, S.....	" 7.....	50	197	27

Townsend's No. 2 gave the largest yield late in the season, and its fruiting season was very short. Two-thirds of its crop was picked between July 1 and July 4. Both Edgar Queen and Princeton Chief gave a higher total yield here this season than did Townsend's No. 2, and yielded fruit for a week after its fruiting season had closed. Their fruit is but moderately firm and not equal in quality to that of Townsend's No. 2.

The most productive berries at this Station in 1893 are ranked according to their productiveness in the following table. Those varieties marked in table I with a star are not included in this list.

**Table IV. List of thirty most productive varieties\* fruited at this Station in 1893, arranged in the order of their productiveness; the rank at this Station for three preceding years is also given.**

NOTE.—Names of varieties fruited at this Station for the first time in 1893 are in italics.

Rank, 1893.	Name of variety.	Rank, 1892.	Rank, 1891.	Rank, 1890.
1	<i>Sunny Side</i> .....			
2	Edgar Queen.....		24	
3	<i>Thompson's No. 60</i> .....			
4	Feicht's No. 3†.....			
5	<i>Princeton Chief</i> .....			
6	Phillip's Seedling.....	14	5	
7	<i>Townsend's No. 2</i> .....			
8	Haverland.....	16	13	8
9	Feicht's No. 2†.....			
10	<i>Townsend's No. 9</i> .....			
11	Capt. Jack ( <i>Burt</i> ).....	3	1	1
12	<i>Townsend's No. 20</i> .....			
13	Mav King.....			
14	Middlefield.....	9		2
15	Ohio Centennial.....			
16	<i>Chair's Favorite</i> .....			
17	Hazleton's No. 4†.....			
18	Eureka.....	13		
19	Oliver.....			
20	Seedling from M. Crawford.....			
21	Michel's Early.....			
22	Greenville.....	2	3	
23	Martha.....			
24	Stayman's No. 1.....		19	4
25	<i>Crosby</i> .....			
26	<i>Allen's No. 3</i> .....			
27	Gandy.....			
28	Hulburt.....	11	17	
29	Beder Wood.....	1	2	
30	<i>Crosby's No. 91</i> .....			

\* Excepting those varieties marked with \* in Table I.

† Beds fruited the second year in 1893.

#### SUMMARY.

1. Michel's Early and Feicht's No. 2 took high rank in 1893 as early strawberries. See p. 14.

2. Townsend No. 2, p. 11, Edgar Queen, Princeton Chief, p. 9, and Sunny Side, p. 11, took high rank in 1893 as late berries. See p. 15.

3. Of the newer varieties tested in 1893, Sunny Side, p. 11, made the best record. See table on this page.



FIG. 1.—*Flower, foliage and fruit of No. 208 Station. A cross of Johnson's Late by Sharpless.*





FIG. 2.—*Johnson's Late.*

## II. STRAWBERRY CROSSES.



208 STATION.  
A cross of Johnson's Late x Sharpless.

SHARPLESS.

JOHNSON'S LATE.

*Illustration of foliage of Johnson's Late, Sharpless and No. 208, a cross of those two varieties.*

Crossing strawberries for the purpose of originating improved varieties has received some attention at this Station during the past few years. Brief accounts of the progress of this work have been given from time to time in its Bulletins and Annual Reports. In 1885 Prof. Goff reported\* that seedlings of Manchester and Bidwell had come into bearing and that the former were notably more vigorous and productive than the latter. Seed of Monarch of the West planted in 1882 gave seedlings which in 1885 yielded more, better and larger fruit than did an adjacent row of Wilson set at the same time.

One thousand seedlings fruited in 1888-9 are mentioned by Mr. Hunn in the Eighth Annual Report, p. 307, with the statement that but twenty had showed indications of being superior to the parent varieties which included Chas. Downing, Crescent, Cumberland, Daniel Boone, Golden Defiance, James Vick, Legal Tender, Lennig's White, Manchester, Mrs. Garfield, Old Iron-clad, Sharpless and Wilson.†

\* Fourth Annual Report, pp. 226-7.

† In the same article these varieties are compared with each other with reference to the proportion of staminate and pistillate plants found in their seedlings.

In 1890\* but fifteen of the twenty seedlings just noted were retained for further testing, and of seven hundred additional seedlings which had come into bearing but fifty were kept for further trial. The last one of all these seedlings was finally discarded this season (1893). Such a record appears, at first, rather discouraging. It should not be inferred, however, that among these hundreds of seedlings no valuable ones were found. On the contrary, valuable ones were found, but since they did not prove superior to the best varieties already introduced into cultivation they were discarded.

During the winter of 1889-90 Mr. Hunn made several crosses of strawberries in the greenhouse which resulted in the production of many apparently excellent seedlings. In testing these seedlings, and those resulting from his later crosses, the same rule has been followed as formerly and none has been retained for further testing unless in some important point it gave promise of superiority to the best cultivated varieties of its class or season. The object of this work is not to introduce new varieties that are simply "good," but to secure, if possible, something superior to the kinds already cultivated.

Over four hundred seedlings of Mr. Hunn's crosses were fruited this season (1893) and sixty-one of them have been reserved for further testing. Several of these are too delicate in color or too soft in flesh for market purposes and are being tested simply for home use. No doubt many and perhaps all of them may prove no more desirable than the best kinds already in cultivation and therefore will be discarded.

During the progress of this work of endeavoring to originate improved kinds of strawberries from seedlings of known parentage it has become evident that some of the cultivated varieties that have been used for parents are more desirable than others for this purpose. The differences observed in this regard will be discussed more fully below.

It is well known that cultivated strawberries are reproduced by means of runners† and they do not reproduce varieties true from seed any more than do cultivated apples or pears. For example,

\* Ninth Annual Report, pp. 274-5.

† Except some European varieties which are propagated by division of roots.

strawberry plants raised from Crescent seed do not produce Crescent strawberries. So far as our experience goes they do not produce so good fruit as the Crescent. Whenever new varieties arise, therefore, they must be obtained from seed. Possibly they may originate as sports from cultivated varieties but no instance of this kind is known to the writer.

At present but little is known as to the comparative ability of the named varieties of strawberries to produce seedlings of merit. In the history of gardening enough has been accomplished in the improvement of flowers and vegetables by selection of parents and by judicious crossing, to demonstrate that careful breeding secures as remarkable results with plants as with animals. When we reflect that of the hundreds of varieties of strawberries that have been introduced into cultivation, the parentage of but very few varieties is known, the improvement of cultivated strawberries does not seem beyond the realm of possibilities. If so great a number of good strawberries as we now have came into cultivation as chance seedlings is it too much to expect that further improvement will reward systematic breeding?

Reference has been made on a previous page to the demand among a large class of strawberry growers for a late market berry. Some of the results thus far secured at this Station encourage the belief that late market berries more desirable than any now cultivated may eventually be originated. Fig. 1, from a photograph, illustrates the fruit of one of the Station seedlings which combines with late fruiting season many other desirable features. It has not yet been tested sufficiently to warrant its introduction. It is a cross of Johnson's Late by Sharpless and is of interest in this connection, because it combines in itself some of the most valuable characters of each of its parents, thus indicating the possibilities of improvement by systematic breeding. Sharpless, the male parent, is well known as a vigorous grower with large, dark green, coarsely serrated leaves, large, bright scarlet fruit, rather variable in form, sometimes with unripe tips. The flesh is firm, light red, and of good quality. Fruit ripens mid-season to late.

The other parent, Johnson's Late, a variety not commonly known, is, in some respects, a remarkable strawberry. It is a chance seedling sent here in 1885 by R. Johnson, of Shortsville,

N. Y. Its fruiting season is one of the very latest among the hundreds of varieties grown here during the last few years. The following table shows the dates at which it has ripened its first fruits for the past eight years, and also the dates at which Crescent, Manchester and Sharpless have ripened first fruits during the same period of years.

Table V.

Year.	First fruit ripe.			
	Manchester.	Sharpless.	Crescent.	Johnson's Late.
1886.....	June 10	June 11	June 4	June 24
1887.....	11	14	9	24
1888.....	25	25	*—	July 2
1889.....	13	8	4	June 27
1890.....	19	17	16	28
1891.....	11	13	5	20
1892.....	18	19	13	July 2
In Marketable Condition.				
1893.....	20	21	19	June 30
Average for eight years...	June 16	June 16	June 10	June 27

\* Date not recorded.

By consulting this table it is seen that on the average during the last eight years Johnson's Late has ripened its first fruits eleven days later than either Manchester or Sharpless, and seventeen days later than Crescent. Its blooming season is correspondingly late and since its flowers are imperfect this fact suggests a reason for its rather unsatisfactory yield. Possibly, if it were set near some staminate variety blossoming at the same late season, its yield would be much increased.

Another remarkable feature about Johnson's Late is its very dark, leathery leaves of medium size and leaflets strongly marked by veins, suggesting that it may be derived, in part, at least, from *Fragaria elatior*, the hautbois strawberry of Europe. Fig. 2, from a photograph, is an excellent illustration of the foliage and fruit of this strawberry. The fruit is medium to large, pale scarlet with white flesh of very good quality. An idea of the comparative size of the leaves on Johnson's Late, Sharpless and No. 208

is given by the cut on p. 17. The smallest leaf is from Johnson's Late, the next larger from Sharpless and the largest from No. 208, a cross of Johnson's Late by Sharpless. Average sized leaves of each variety represented were selected for this illustration.

Nearly all of the seedlings of Johnson's Late produced at this Station are easily recognized as distinct from ordinary cultivated strawberries because of their dark, leathery foliage which in color-markings and texture bears a strong resemblance to that of Johnson's Late. Many of them also resemble Johnson's Late in the lateness of their blossoming and fruiting seasons and in the excellent quality of the fruit produced. Several of the seedlings obtained from crossing Johnson's Late by Sharpless, so far as tested here, combine the vigorous foliage and large fruit of Sharpless with the dark, leathery leaves and late fruiting season of Johnson's Late.

As stated on a previous page, p. 18, it is quite possible that every one of these promising seedlings, after more extended trial, may develop some serious defect or may show no superiority over varieties now in cultivation and may consequently be discarded. Whether this fate awaits them or not, enough has been accomplished to show that the most rapid advance in the improvement of strawberries is to be expected in the direction of systematic breeding.

As noted above, some varieties used as parents of the crosses originated at this Station, have given a much higher per cent of good seedlings than have others. This will become evident on examining the following table, VI, which indicates to some extent the comparative ability of the strawberries therein named to produce seedlings of merit.

**Table VI, Showing the parentage of the various crosses; the number of seedlings of each cross tested in 1893; the number of these discarded in 1893; the per cent discarded in each case, and the ratio of the whole number tested to the number kept for further testing in each case.**

[In giving the parentage the female parent, as usual, is named first.]

Parentage.	Number of seedlings tested in 1893.	Number discarded, 1893.	Per cent discarded, 1893.	Ratio of whole number tested 1893 to number kept for further testing.
Crescent X Bomba.....	22	18	81.8	5.5 to 1
Crescent X Dawley.....	22	17	77.3	4.4 to 1
Crescent X Jessie.....	4	3	75.	4 to 1
Crescent X Lennig's White.....	100	93	93.	14.3 to 1
Crescent X Old Ironclad.....	70	68	97.1	35. to 1
Crescent X Sharpless.....	59	46	77.9	4.5 to 1
Daisy X Lennig's White.....	5	5	100.	5. to 0
Haverland X Jessie.....	7	7	100.	7. to 0
Haverland X Sharpless.....	1	0	0.	1. to 1
Johnson's Late X Dawley.....	3	2	66.6	3. to 1
Johnson's Late X Lennig's White.....	41	37	90.2	10.2 to 1
Johnson's Late X Sharpless.....	18	12	66.6	3. to 1
Lida X Dawley.....	5	4	80.	5. to 1
Lida X Lennig's White.....	9	6	66.6	3. to 1
Michel's Early X Lennig's White.....	8	7	87.5	8. to 1
Stayman's No. 1 X Bomba.....	30	26	86.6	7.5 to 1
Stayman's No. 1 X Jessie.....	4	3	75.	4. to 1
Stayman's No. 1 X Sharpless.....	5	2	40.	1.7 to 1
Summit X Bomba.....	10	6	60.	2 5 to 1

#### MALE PARENTS.

**Bomba** with mother plants from three different varieties gave sixty-two seedlings, twelve of which, 19 per cent, were thought worthy of further trial. Of its crosses with Crescent an average of four and a half seedlings, were discarded to one retained; of its crosses with Stayman's No. 1, six and a half were discarded to one retained, and of its crosses with Summit one and a half were discarded to one retained.

**Dawley** with mother plants from three different varieties gave thirty seedlings nearly one-fourth of which, 23 per cent, are to be kept for further testing. As a male parent it has given uniformly good results. Of its crosses with Lida, four were discarded on the average to each one retained; of its crosses with Crescent but three and four-tenths were discarded to one retained and of its crosses with Johnson's Late, but two were discarded to one retained.

**Lennig's White** with mother plants from five different varieties produced one hundred and sixty-three seedlings, nearly one-



tenth of which, nine per cent., were kept for further trial ; many of these, however, are to be tested simply for home use. Lennig's White was found to be very prepotent in transmitting to its progeny the color and shape of its fruit and the color and flavor of its flesh. The ripe fruits of its seedlings showed all shades of color from white to crimson. With some kinds the flavor was very poor while others of its seedlings produced fruit of fine quality with excellent flavor, equalling or surpassing the parent in this respect. Unfortunately some of the largest fruits of beautiful creamy pink color ranked very low in quality and flavor.

Of its crosses with Lida but two seedlings on the average were discarded to each one retained ; of its crosses with Michel's Early seven were discarded to one retained ; of its crosses with Johnson's Late nine and two-tenths were discarded to one retained ; of its crosses with Crescent thirteen and three-tenths were discarded to one retained, and of its crosses with Daisy every plant was discarded.

Old Ironclad with Crescent for mother plant gave seventy seedlings, but two of which, 3 per cent, were kept for further test.

Sharpless as a male parent is remarkable for the general high character of its seedlings as shown by the relatively large number of them reserved for further trial with each of the four varieties on which it was crossed. Out of a total of eighty-three seedlings more than one-fourth, twenty-eight per cent, were kept for another season's test. Varieties of Sharpless parentage are particularly noticeable for the beautiful scarlet color and good quality of their fruit and for the vigor and productiveness of the plants. The crosses of Johnson's Late by Sharpless contain some seedlings of especial merit that may prove valuable for late market purposes.

Of its crosses with Crescent but three and a half seedlings, on the average, were discarded to each one retained for further testing. This is the best record made by any variety thus far crossed on Crescent. Of its crosses with Johnson's Late but two were discarded for each one retained. Of its crosses with Stayman's No. 1 but seven-tenths of one was discarded for each one retained and of its crosses with Haverland none was discarded.

#### FEMALE PARENTS.

Crescent showed great variability with different male parents as to the per cent of good seedlings produced, thus indicating lack of prepotency so far as its desirable features are concerned. Out of a total of two hundred and seventy-seven seedlings a little more than one-tenth, eleven and five-tenths per cent, were kept for further testing. Of its crosses with Jessie three seedlings on the average were discarded to each one retained ; of its crosses with Dawley three and four-tenths were discarded to one retained ; of its crosses with Sharpless three and a half were discarded to one retained ; of its crosses with Bomba four and a half were discarded to one retained ; of its crosses with Lennig's White thirteen and

three-tenths were discarded to one retained, and of its crosses with Old Ironclad thirty-four were discarded to one retained.

**Johnson's Late** crossed with three different varieties gave a total of sixty-two seedlings of which more than one-sixth, eighteen per cent, were reserved for further testing. Of its crosses with Dawley two were discarded to every one retained; of its crosses with Sharpless two were discarded to every one retained; of its crosses with Lennig's White nine and two-tenths were discarded to one retained.

The prepotency of Johnson's Late in transmitting to its seedlings desirable characters of fruit, foliage and fruiting season have been discussed on a previous page, p. 21.

**Lida** crossed with two different varieties gave a total of fourteen seedlings of which more than one-fourth, twenty-eight per cent, were reserved for further testing. Of its crosses with Lennig's White two were discarded to every one retained; of its crosses with Dawley four were discarded to every one retained.

**Stayman's No. 1** crossed with three different varieties gave a total of thirty-nine seedlings of which nearly one-fifth, twenty and five-tenths per cent, were kept for further testing. Of its crosses with Sharpless seven tenths of one seedling on the average was discarded for every one retained; of its crosses with Jessie three were discarded for every one retained, and of its crosses with Bomba six and a half were discarded to one retained.

The other mother plants being represented by but few seedlings need not be considered further in this connection.

About fifty of these crosses were exhibited fruiting in pots at the World's Fair, Chicago, last summer, and the exhibit received many words of commendation. Those who were interested in that exhibit will appreciate the high standard of merit adopted in testing these seedlings when it is stated that nearly all the varieties thus exhibited were afterwards discarded as unworthy of introduction.

#### SUMMARY.

I. Systematic breeding may be expected to give more rapid improvement of cultivated strawberries than will the introduction of chance seedlings.

II. **Johnson's Late**, appears to be a desirable parent for use in breeding late varieties of strawberries.

III. **Lennig's White** was found to be very prepotent in transmitting the color, flavor and shape of its fruit to its seedlings. Its seedlings generally appear to be undesirable except possibly for home use.

IV. **Dawley** seedlings gave a large proportion of excellent varieties.

V. **Sharpless** seedlings gave a large proportion of excellent varieties which were noticeable on account of the vigor and productiveness of the plants and the good scarlet color and good quality of the fruits.