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Agricultural Experiment Station.

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HORTICULTURAL DIVISION.

DECEMBER, 1892.

REPORT ON SMALL FRUIT. NOTES FROM TRIAL STATIONS.
NOTES ON RENEWING OLD STRAWBERRY BEDS.
SHADING STRAWBERRY BEDS. SEEDLING FRUITS.
ANALYSES OF GRAPES. SPRAYING GRAPE VINES.

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The season of 1892 like that of 1891 has been an excellent one for small fruit crops. It is the object of this bulletin to discuss the merits of new and old varieties of interest that have fruited in this state the past season.

STRAWBERRIES.

Strawberries were a fair crop; prices were higher than for several years, and the abundant rains have put the young plantations in the best of condition for a good crop next year. The leaf blight was very destructive to some varieties, notably the well known Captain Jack, which has been very generally a failure from this disease. Our experience at the experiment station goes to show that while it is possible to keep most varieties healthy by the use of Bordeaux mixture and other fungicides, yet it is much better to plant varieties that resist this disease. It is very certain that only healthy varieties can produce paying crops of fruit, and while the health and productiveness of varieties of the strawberries vary much on different locations, yet some varieties do remarkably well over a large area and in almost any location or soil.

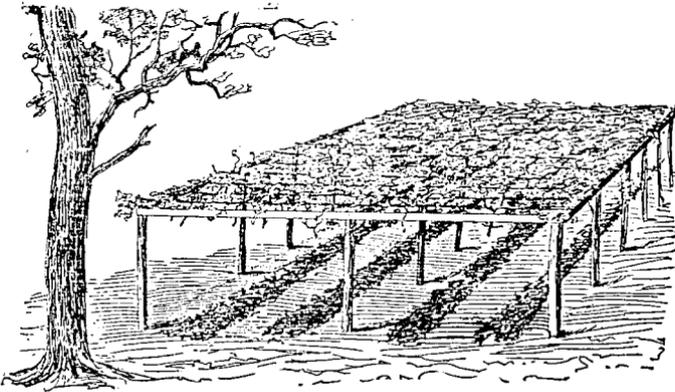
The strawberries at the experiment station are on open clay land having a gentle slope to the south, and are grown in the matted row system. The runners are allowed to root until the row is well filled, and any that start afterwards are cut off. It is our practice to fruit strawberry beds a second time if they are in good condition when the first crop is gathered, and this year most varieties have proved more prolific on old beds than on the new. In renewing old strawberry beds the following plan is pursued:—

RENEWING OLD STRAWBERRY BEDS.

As soon as may be after the crop is gathered the bed is closely mowed and all the weeds and strawberry leaves are

burned. A plow is then run on each side of a matted row and all but about one foot in width of it is turned under. The furrows thus made are filled with fine rotted manure and the cultivator set going*. The plants remaining are then thinned out with a hoe and special pain is taken to cut out all weeds and old or weak plants. This leaves the old bed clean, with plenty of manure close by, in which the old plants can make new roots. The plants soon send up new leaves which are much healthier than they would be were the old foliage allowed to remain, and if we have an ordinary season an abundance of runners will be sent out and by winter the old bed will look nearly as vigorous as a new one. At the time of this writing we have an old bed of various kinds that has borne two crops, which we cleaned up in July for a third, and it is very difficult to find on it a single diseased leaf among the several varieties with which it is planted, and the rows are full of green, vigorous plants and runners.

SHADING STRAWBERRY BEDS.



Showing brush screen used for shading strawberry bed; placed six feet from ground.

Many complaints have reached us of the difficulty of securing a good crop of strawberries in exposed places on the prairies, even when the plants had grown well and both staminate and pistillate kinds were planted. This trouble is

*We sometimes find it necessary to take out all but the two outside cultivator teeth if the mulch is very thick.

probably due to the pollen being too much dissipated by the wind, and further to the drying up of the fruit after it is set by the hot sun and winds. With the object of finding a remedy for this trouble some preliminary experiments have been undertaken, in one of which a part of the strawberry bed, including mostly plants of a late variety, named Parker Earle, was shaded with a brush screen, such as we use for protecting evergreen seedlings, and as shown in the cut herewith. The result was that the plants under the screen matured all the fruit, while on those not thus shaded many berries were sun scalded and many others failed to ripen. In the first case we had a full crop; in the second perhaps one-half. This is confirmatory though not by any means conclusive data on which to recommend this practice to those wishing to grow strawberries in very exposed places. But it would seem, however, a very rational suggestion when we remember that generally the best fruit, and certainly the best late fruit of strawberries is found in the wild state in locations somewhat protected and shaded and that in such places the foliage is seldom affected with fungous diseases. The past season was in point of moisture an exceptional one and not the best in which to make this trial.

A good screen for this purpose is made by setting posts with natural crotches in one end connected together by poles and covered with willow or other brush sufficient to give a play of light and shadow on the bed, but not enough to keep out more than half the sunlight. I think it would be well to have such a bed in a somewhat protected location. Such treatment might not be practicable on a large scale, but it is so very inexpensive and simple that it is well worth trying in a small way in the home garden. We shall report further on the matter when we have more fully investigated it, and make this simply as a report of progress and as a suggestion to fruit growers.

SEEDLING STRAWBERRIES.

For fruiting next year we have a fine lot of about seven

(700)hundred seedling plants that we have kept the runners off, and they are very promising indeed; They are seedlings of Warfield and Haverland, fertilized with Michels' Early.

From seed sown this year we have over two thousand plants pricked out in frames, which we expect will be in excellent condition to plant out next spring. These are the result of carefully made crosses between our most prolific kinds.

*In the table herewith, varieties marked (p) have pistillate flowers. Those marked (b) have bi-sexual or perfect flowers. Varieties mentioned but with columns not filled out are not considered worthy of more than passing notice.

*Especially desirable kinds are starred.

STRAWBERRIES.		REMARKS.									
Origin	Date of Blooming.....	Date of first Picking.....	Diameter first Picking.....	Date of Last Picking	Quality (scale 0-10).....	Firmness (scale 0-10)	Value for Market (scale 0-10)...	Vigor (scale 0-10).....	Productiveness (scale 0-10).....	General appearance (scale 0-10)	Rust (scale 6-10).....
Atlantic (b).....	Ont.	July									Not worthy of notice.
Belmont (b).....	Mass.										1
Beder Wood (b)**.....	Ills.	6-11	7-3	1	7-16	7	7	8	8	8	2 A promising variety.
Bubach (b).....	Ills.	6-11	7-5	1 3/4	7-14	9	8	9	7	10	0 Very large but not very productive.
Boynton (p).....	N. Y.	6-9	7-7	1		7	9	9	10	10	1 Worthy of further trial.
Crescent (p)**.....	Conn.	6-9	7-3	1	7-17	5	10	9	10	10	0 Well known and valuable.
Crawford (b).....	Ohio	6-10	7-5	3/4	7-13	8	9		10	10	2 A handsome fruit but not prolific.
Cloud (p).....	La.	6-14			7-13	8					0 Worthless here.
Captain Jack *.....	Wis.	6-9									Ruined by rust.
Daisy (p).....	Ohio	6-12	7-6	1 1/4	7-20		8	8	6	10	0 Not promising but shall try it another year.
Eureka (p).....	Ohio	6-17	7-9	1		7	8	9	10	8	4 Shall discard it.
Enhance (b).....	Ohio	6-10	7-6	1 1/4	7-16	9	9	9	7	10	1 From August set plants; worthy of further trial.
Farnsworth (b).....	Ohio	6-12	7-7	3/4		9	8	3	8	6	2 Not promising.
Great Pacific (p).....	Ills.	6-12	7-7	1 1/4	7-17	7	8	8	9	8	2 Berries very small after first picking.
Gov. Hoard (b).....	Wis.	6-11	7-7	1 1/4		7	8	7	8	8	2 Not productive enough.
Gandy.....	N. J.	6-16	7-12	1 1/4		8	8	8	8	8	Valued for its lateness.
Haverland (p) **.....		6-9	7-3	1 1/4	7-16	10	7	10	8	10	0 A valuable variety for home or market.
Jessie (b).....	Wis.				7-13						Too uncertain; a failure this year.
Lady Rusk (p).....	Ills.										Worthless from rust.
Louden's 15 (b).....	Wis.	6-10	7-6		7-16	5	7	9	8	8	1 Worthy of trial.
Lovett's Early (b).....	Ken.	6-12	7-10	3/4		7	8	7	7	8	2 Not promising.
Middlefield (p).....	6-13	7-7	3/4	7-16	8	9	4	7	8	8	0 A weak grower, not very productive.
Michel's Early (p).....	Ark.	6-9	7-1	1	7-13	10	10	10	10	6	0 Valuable as a pollinizer.
Martha (p).....	Minn.	6-14	7-13	1 1/4							Not valuable here.
Mammoth (b).....	6-12	7-13	1 1/2		8	8	7	9	6	8	2 Produces a few large berries.
Seedling No. 17 (p).....	Ky.	6-13	7-5	1 1/2		8	8	8	10	9	1 Worthy of a name.

	Origin.....	Date of Blooming.....	Date of First Picking.....	Diameter, First Picking.....	Date of Last Picking.....	Quantity (scale 0-10)	Firmness (scale 0-10)	Value for Market (scale 0-10) ..	Vigor (scale 0-10)	Productiveness (scale 0-10).....	General Appearance (scale 0-10)	Rust (scale 0-10).....	REMARKS.
ST WBERRIES.													
Great American (p).....	Ont.	6-13	7-7	1 3/4	7-17	5	8	6	8	5	10	1	Not productive enough.
Little's Seedling No. 37 (p)	Ont.	6-13	7-8	1 3/4	.....	.....	.....	.....	.....	.....	.....	2	Resembles the Warfield.
Little's Seedling No. 7 (b).....	Ont.	6-12	7-7	1 3/4	.....	.....	.....	.....	.....	.....	.....	1/2	Very distinct; dark foliage.
Little's Seedling No. 9 (p).....	Ont.	6-11	7-9	1 3/4	.....	.....	.....	.....	.....	.....	.....	0	A very promising seedling.
Mrs. Cleveland.....	Ohio	6-12	7-13	1 1/4	.....	.....	.....	.....	.....	.....	.....	.....	A promising variety.
Oliver (p).....	Ills.	.....	7-7	.....	.....	.....	.....	.....	.....	.....	.....	1	Worthless; almost barren.
Osaola (p).....	Ark.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Same as Michael's Early.
Oregon Everbearing[b].....	Ore.	6-10	7-5	3/4	7-16	9	8	8	.....	4	8	0	Not everbearing, at all.
Park beauty (p).....	.....	6-11	7-7	.....	7-15	9	7	8	10	6	9	2	Not reliable; inclined to rust.
Parker Earl, (shaded) (b).....	Tex.	6-12	7-11	1 1/8	7-25	9	9	.....	10	7	10	0	Worthy of general trial.
Pearl (b).....	N. J.	6-9	7-4	1 1/4	7-20	9	8	8	7	8	10	1	A promising kind.
Princess (p).....	Minn.	6-13	7-6	1 1/4	7-16	10	7	10	7	7	9	.....	Valuable for near market.
Saunders (b).....	Ont.	6-16	7-6	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not productive.
Schuster's Gem (p).....	N. J.	6-12	7-6	1 1/2	7-17	9	6	7	9	8	9	2	A large productive kind.
Tippecanoe (b).....	Ind.	6-13	7-7	3/4	7-19	9	8	0	9	1	1	2	Ruined by rust.
Van Deman (b).....	Ark.	6-11	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	Seriously injured by rust.
Wolverton (b).....	Ont.	6-18	7-6	3/4	.....	.....	.....	.....	.....	.....	.....	.....	Ruined by rust.
Wilson (b).....	N. Y.	6-11	7-7	1	.....	8	10	8	6	6	9	1	Well know.
Warfield (b)**.....	Ills.	6-12	7-2	1	7-16	7	9	10	10	10	.....	0	One of the best.
Yale (b).....	Conn.	6-14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not worthy of mention.

†Varieties especially desirable are marked by *, ** or ***, according to their value for general planting.

NOTES ON VARIETIES.

Especially desirable kinds are starred.

Beder Wood. (b)** A very promising new berry that has done remarkably well with us this season. It is bi-sexual, has lots of pollen and I think it well worth trying as a pollinizer and for market. Its foliage is only slightly affected with rust.

Bubach. (p) Gave us a few magnificent berries but not enough to make a profitable crop.

Boynton. (p) Is a red berry of about the size and with much the appearance of the Crescent, but apparently no better.

Crescent. (p)** This old standard variety has done very well this season. In our old bed it produced a far larger crop than in the new bed, but it did not do nearly as well as the Warfield, which I think is generally superseding it.

Captain Jack. (b)* Was nearly ruined by rust.

Great Pacific. (b) I am somewhat disappointed in this variety. Some of the fruit is large, but much of it is small and irregular in shape and rather inclined to rust.

Haverland. (p)**** Has done much better than last year, and was in many ways our best berry. The foliage is healthy and the berries are elegant. It produced rather more fruit this year than the Warfield.

Jessie. (b) Was nearly a failure with us this year, as well as at some of our trial stations. I regard it as a very uncertain kind and think there is a weakness in the blossoms that makes it peculiarly susceptible to injury from winds, frosts and heavy rains.

Michel's Early. (b)* I think well of this variety as a pollen producer, but it does not produce much fruit and has not been as productive this year as last. Yet the fruit this

year was rather larger and better in quality than last. I mean to continue using it as a pollen producer. It is a vigorous grower and free from rust.

Little's No. 7. (b) From John Little, Granton, Ont. Is one of the most striking in foliage and fruit of any that has come to my notice for several years. The foliage is tall, dark green and very healthy. The fruit is long, large and firm, on long peduncles. Very productive and a promising late fruit.

Little's No. 9. (p) Also from John Little. Is a very productive and promising variety of large size.

Little's Seedling No. 37. (p) Resembles the Warfield very much but it is not quite as early and is somewhat sweeter. Very productive and promising.

Lovett's Early. (b) Is a berry of good color, form and substance, but not sufficiently productive to be profitable.

Enhance. (b) Has produced some very good fruit on August set plants but needs another season's trial to thoroughly test it. Promising.

Oregon Everbearing. Whatever everbearing qualities it may once have had it does not show them here and I rather doubt that it ever bore over any number of consecutive seasons more than one crop a year. Not desirable.

Parker Earle. (b) Is about ten days behind the Warfield. It has a great lot of green fruit but during the hot weather much of it fails to ripen satisfactorily. This year a part of the space devoted to it was shaded, with the result that the portion so treated produced a fine crop of fruit, while the rest gave a very light crop after the first picking. Plant very healthy and vigorous, but it does not make many runners.

Princess. (p) Seems to be doing better in the hands of its originators and elsewhere than with us. I regard it as generally a profitable berry for the near market. It is of large size and fine color, but rather soft.

The Pearl. (b) A beautiful bright red berry that did poorly with us last year but this year is very productive.

Schuster's Gem. (p) Did remarkably well with us last year but not so well this. It is of good size and worthy of further trial.

Saunders. (b) Did very well with us last year but this season seems much inclined to rust.

Warfield.(p)*** Is the most popular berry grown and is fast supplanting the Crescent in this state. It is a better shipping and selling berry than the Haverland. Our customers especially like it for canning purposes.

List of new varieties planted the spring of 1892:

Accomack	Beverly	Swindle
Edgar Queen	Waldron	Southard
Standard	Putnam	Stevens
Gillespie	Westlawn	Williams
Muskingum	Auburn	Dayton
Noble	E. P. Roe	Mark
Leader	Gem	Waupon
Ona	Oscar	Sandoval

RASPBERRIES.

The raspberry crop has been a very profitable one this season. Almost every variety has given good returns. Many plantations of red raspberries are affected with the disease commonly called "leaf curl," and it is becoming a very serious matter in many places where it is spreading slowly but surely. No remedy is known for the disease, but the best treatment for it seems to be the digging out and burning of all affected plants. In starting a new bed it should be only on new land and great care should be taken to use only healthy plants.

SEEDLING RASPBERRIES.

About five hundred seedlings of Schaffer's Colossal fruited this year for the first time. The fruit resembles very closely that of the parent plant, and a number of seedlings ap-

peared fully as valuable as that of the Schaffer. Fifty of these were selected as being worthy of further trial. It is a point of special interest that the seedlings of this variety, which is generally termed a hybrid should be so uniform and show so much of a fixed type.

NOTES ON SOME OF THE NEW RASPBERRIES.

NATIVE RED RASPBERRIES.—(*Rubus Strigosus*.)

Especially desirable kinds are starred.

Brandywine.** Is very popular in very many trying locations. A valuable shipping sort.

Cuthbert.*** The most popular of the red raspberries. Large, firm, productive and very hardy.

Gladstone. Grows vigorously and produces a little fruit until frost, but what little fruit it does produce is so small and soft as to make it almost worthless either for home use or for market.

Golden Queen.** Continues to be the favorite yellow kind. Its fruit is large and firm. With the exception of color, practically identical with Cuthbert.

Hansell.* A very early kind that is becoming quite a favorite. It is a rather weak grower, except on rich soils, and until well established it needs high cultivation.

Marlboro.** Where this variety gets high cultivation on clay soils it is generally successful. Its large fruit is handsome and though of rather poor quality, brings the highest price in the market.

Turner.* A well known, very popular old variety. Early but very soft; generally prolific and hardy. Not much planted for several years.

RUBUS NEGLECTUS.

Caroline. Quite soft but very prolific and very hardy. It succeeds well when most kinds fail. Yellow.

Schaffer.** Where its color is not objectionable it is a very profitable kind to grow for the near market. Purple in color.

EUROPEAN RED RASPBERRIES.—(*Rubus Ideas.*)

Superlative. A new variety sent out by Ellwanger & Barry of Rochester, New York, at six dollars (\$6) per dozen in 1892. Fruit on spring set plants very large but crumbly and of poor quality. Foliage and cane of the Antwerp type.

Champlain. Similar to the above in foliage and cane, but has not fruited here.

BLACK CAP RASPBERRIES.—(*Rubus Occidentalis.*)

Kansas. A very vigorous and productive variety from Kansas. Fruit large, of fine appearance and very promising.

Lovett, or (\$1000). Will probably prove to be a desirable addition to our list of second early kinds. The fruit is as large as the Gregg and it is several days earlier. Foliage and cane quite distinct.

Mystery. Sent out from Kentucky as an everbearing kind. It bears but one crop here.

Nemaha.^{***} Is without doubt somewhat hardier than the Gregg and so much alike it in fruit as to be practically the same thing for marketing purposes.

Older. We have not fruited this variety, but reports on its behavior elsewhere convince me that it is well worthy of trial by berry growers. Season about with the Ohio.

JAPAN RASPBERRIES.—(*Rubus Japonica.*)

Japan Wineberry. This berry has been greatly misrepresented and is giving very general disappointment where tried. It is interesting to botanists and may be useful in hybridization, but for fruit production it is practically worthless. The berry is small, of poor color and enclosed in a husk like a ground tomato.

Varieties of raspberries planted at experiment station in 1892:

Thompson's Early Prolific		Superlative
	Brackett's Seedling, 101	
Champlain	Older	Ada

NATIVE AMERICAN VARIETIES. (*Rubus Strigosus*.)

INCREASING BY SUCKERS.

RASPBERRIES.	Origin.....	Date of first Pick- ing.....	Size (scale 0-10).....	Quality (scale 0-10).....	Firmness (scale 0-10)	Value for market (scale 0-10).....	Vigor (scale 0-10).....	Productiveness (scale 0-10).....	General Appearance (scale 0-10).....	Color of Berry.....	REMARKS.
Brandywine**.....	N. Y.	7-18	6	6	10	9	10	9	8	red	Is doing finely in many places.
Cuthbert.....**	N. Y.	7-20	10	10	9	10	10	10	10	red	The most popular of the reds.
Golden Queen**.....	N. J.	7-27	10	10	9	10	10	10	10	yellow	The best yellow berry.
Gladstone.....	Ohio	7-25	2	6	5	4	10	5	5	red	Almost worthless.
Hansell*.....	N. J.	7-14	6	7	8	9	2	9	10	red	A fine bright red early kind.
Marlboro**.....	N. Y.	7-16	10	6	10	10	7	10	10	red	In favorable locations very profitable.
Turner*.....	Ills.	7-16	7	10	6	8	10	10	8	red	A robust early kind.

EUROPEAN RASPBERRY. (*Rubus Ideus*.)

Superlative.....	N. J.	.....	.....	.....	.....	.....	.....	.....	.....	.....	(Spring-set plants.) Fruit large, crumbly.
Superb.....	N. J.	.....	.....	.....	.....	.....	.....	.....	.....	.....	Crumbles badly in picking.

RUBUS NEGLECTUS.

Caroline.....	N. Y.	7-9	7	8	5	8	8	9	6	yellow	Very hardy. Succeeds where many kinds fail.
Reliance.....	N. J.	7-13	8	7	9	10	3	9	9	red	Well worthy of trial.
Schaffer**.....	N. Y.	7-19	9	9	7	6	10	10	10	purple	One of the most prolific.

BLACK CAP RASPBERRIES. (*Rubus Occidentalis.*)

NATIVE AMERICAN TIP ROOTING VARIETIES.

RASPBERRIES.	Origin.....	Date of First Pick- ing.....	Size (scale 0-10)	Quality (scale 0-10)	Firmness (scale 0-10)	Value for Market scale 0-10	Vigor (scale 0-10)	Productiveness(scale 0-10)	General Appearance (scale 0-10)	REMARKS.
Cromwell.....	Conn.	7-16	8	9	7	9	9	9	9	A worthy new early variety.
Conrath's Early.....	Mich.	7-16	6	8	9	8	7	8	8	A new early promising kind.
Gregg***.....	Ind.....	7-20	10	9	10	10	10	10	10	Well known and popular.
Hopkins.....	Mo.....	7-16	7	9	9	9	8	8	9	Generally productive.
Kansas.....	Kan.	7-19	9	10	9	9	9	9	10	A new kind of great promise.
Lovett's.....	.....	7-17	9	10	9	10	9	9	10	Distinct foliage, very promising.
Mystery.....	Ky.	7-22	7	8	8	8	9	3	9	Sent out as an everbearing variety.
Nemaha**.....	Neb.	7-21	10	10	9	10	10	10	10	I think it may supplant the Gregg.
Ohio***.....	N. Y.	7-18	6	8	9	8	10	10	10	A well known and valuable second early kind
Progress.....	.....	7-13	..	8	8	8	8	8	9	Similar to Souhegan.
Palmer.....	Ohio	7-15	7	8	8	8	9	9	9	Similar to Souhegan.
Souhegan**.....	N. E.	7-14	6	8	10	10	9	9	8	A popular early kind.
Tyler.....	.....	7-14	6	9	9	9	9	9	8	Practically the same as Souhegan.
Older.....	Ills.	.....	..	..	..	..	..	..	..	Probably valuable as second early.

JAPAN RASPBERRY. (*Japonica Rubus.*)

Japan Wineberry.....	Japan	8-16	4	3	10	0	10	6	4	Of no value for fruit.
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Especially desirable varieties are marked *** or ** according to their value.

BLACKBERRIES AND DEWBERRIES.

The **Ancient Briton** blackberry has done the best of any tried at the Experiment Station, and is generally more satisfactory in this state than any other variety, but some growers are more successful with the Snyder which ripens earlier but is rather more difficult to protect on account of its stiff canes.

The **Stones hardy** is not generally as prolific or as desirable as either of the above.

The **Agawam** has been very productive at the Experiment Station and we regard it as a good berry.

Early Harvest has proven a total failure at the Experiment Station, as we have never been able to winter the canes even when laid down and covered with soil.

Jewett is a new blackberry received from the J. C. Lovett & Co., Little Silver, N. J., in 1890. It killed with us the first year although well protected with soil.

El Dorado is a new blackberry that we received from Greenville, Ohio, in 1891. It was quite prolific this season, of good, large fruit. A promising kind.

DEWBERRIES.

We have grown the Lucretia and the Windom dewberries several years and are certain we have them true to name, but they have proven nearly a total failure. They bloom profusely, have sometimes given us a few good berries, but the fruit almost without exception is imperfect. There may be isolated locations where they can be grown to advantage. They generally do best on sandy soil.

REPORT ON GRAPES.

We have two vineyards at the Experiment Station—one with an easterly and the other with a southerly aspect. The fruit on the south slope is generally ripe about six days earlier than that on the eastern slope. In the table herewith the periods of ripening given are from observations made in the vineyard on the south slope. The ten (10) varieties that have given us the most grapes of good table quality in the past five years, arranged nearly in the order of their value, are: Concord, Worden, Aminia, Hartford, Brighton, Herbert Barry, Lindley, Moor's Early, and Lady. For severe locations the Janesville is very satisfactory on account of its hardiness and reliability, but its quality is very poor.

MULCHING GRAPE VINES.

When I took charge of the horticultural work at the Experiment Station in 1888, I found there a young vineyard of about four hundred (400) vines growing thriftily on the south side of a rather gravelly knoll. The very dry spring of 1889 seriously crippled it and occasionally heavy rains washed it badly. To overcome this difficulty I mulched it the following winter with bedding litter to the depth of about four inches, covering all the land. The result of this was very marked the following year when the vines ripened up their fruit in excellent condition and also made a fine well ripened growth of wood. Last spring the land was well cultivated and again mulched with equally good results which appear at this writing. On the whole I am much pleased with the outcome of this simple experiment. But it should be born in mind that in this trial the soil was light, loose and warm and probably equally good results would not be obtained on cold soils. One effect of the mulch on the soil was to change it in one season from a mineral soil that would easily wash away in heavy rains, to one resembling new timber land.

SPRAYING OF GRAPE VINES.

This season mildew of grapes (*Poronospora viticola*) has been very abundant so that Delaware and other varieties with weak foliage have in many cases been severely injured and the crops a total loss. When vines drop their vines prematurely not only is the crop of fruit for that season ruined but the wood often does not ripen and in consequence the crop of the following year may be a poor one. But this disease may be surely prevented by the use of proper fungicides. However it will not do to wait until the disease shows itself for then it is too late for any application to do much good.

The following letter from a graduate of the Farm School of the University of Minnesota, giving his experience this year in spraying the vineyard of Mrs. Erwin of Excelsior, will probably be read with much interest by grape growers. It should be said in explanation that his neighbors who did not spray their Delaware vines either lost their entire crop of fruit or had it seriously injured by the mildew, while the sprayed vineyard matured a very heavy crop of Delawares, Concords and other kinds.

EXCELSIOR, MINN., OCTOBER 21st, 1892.

PROF. SAMUEL B. GREEN, St. Anthony Park, Minn.

Dear Sir:—At your request I give the following account of my experience in spraying grape vines for mildew the past season.

A close observer by the aid of a microscope might easily have seen mildew on the leaves of the Delawares when they were not larger than a silver dollar. When the leaves were of this size I commenced spraying them and continued doing so at intervals of twelve or fifteen days until the latter part of July—spraying five times in all.

The Concords were sprayed but twice. I used the Bordeaux mixture the first three times on the Delawares and the first time on the Concords. For the other sprayings I used the ammoniacal solution of carbonate of copper. Several other varieties were treated the same as the Concords, but it is my opinion that most of them would have been freer from the brown rot if they had been sprayed oftener.

To prepare the Bordeaux mixture I dissolved six pounds of sulphate of copper in five gallons of water and slacked four or five pounds of lime in enough water to make a thick whitewash. In order to allow the copper sulphate to dissolve and the lime to slack, I did this a few hours before mixing the two. I put the copper solution in a fifty gallon kerosene barrel and

strained the whitewash into it, through a course sack and added enough water to fill the barrel.

I made the ammoniacal solution by dissolving five ounces of carbonate of copper in three pints of ammonia and stirring it into fifty gallons of water.

The Concords and Delawares each took fifty gallons the first time and one hundred gallons each time thereafter.

I used an Excelsior knapsack sprayer which worked very well. It cost \$12.50. The cost of spraying nine hundred Delaware vines five times and twelve hundred Concords twice, is shown below :

On the Delawares I used—

1st time, 6 lbs. copper sulphate @ 7c.....	\$.42
2nd and 3rd times, 24 lbs. copper sulphate @ 7c.....	1.68
4th and 5th times, } 20 oz. carbonate of copper @ 4c.....	.80
} 12 pts. ammonia @ 25c.....	3.00

Total cost of material for Delawares..... \$5.90

These vines yielded 6,800 pounds of grapes or on average of 7.5-9 pounds per vine.

With the Concords the account stood as follows:

1st time, 6 lbs. sulphate of copper @ 7c.....	\$.42
2nd time, } 10 oz. carbonate of copper @ 4c.....	.40
} 6 pts. ammonia @ 25c.....	1.50

Total cost of material for Concords..... \$2.32

Total cost of material for Delawares and Concords..... \$8.22

Total cost of labor 4½ days @ \$1..... 4.50

Total cost of labor and material for spraying..... \$12.72

Yours truly,

F. F. PRATT.

In addition to the above it should be said that this has been an unusually bad season for mildew but had we had very bright, dry weather after the first spraying with Bordeaux mixture the second spraying with it might have been dispensed with without loss, however, it will always be found safer to spray once too often than to lack one spraying of destroying the mildew.

ANALYSES OF GRAPES.

Professor H. Snyder has made the following analyses of grapes grown at the Experiment Station which will be of interest to many.

The total sugar includes both grape and fruit sugar as determined by Felbing's volumetric method. The results of sugar are calculated in terms of the whole grape and not the

juice. The per cent of acid is calculated in terms of the juice as tartaric acid.

Number.	Name of Variety.	Total Sugar as Grape Sugar.	Acid.
450	Hartford	12.9 per cent.	1.20 per cent.
451	Ives Seedling	12.5 "	1.24 "
442	Lady	9.4 "	1.22 "
453	Herbert	11.5 "	Lost.
454	Moor's Early	12.6 "	1.00 "
455	Aminia	9.7 "	1.80 "
456	Delaware	15. "	1.20 "
457	*Catawba	8.8 "	2.00 "
458	Concord	14.4 "	1.82 "
459	Niagara	10.2 "	1.16 "
460	Lady Washington.....	14. "	1.74 "
461	Martha	14.2 "	1.52 "
462	Eumelan	13.8 "	1.57 "
463	Centennial	16. "	1.42 "
464	Brighton	16.6 "	Lost.
465	Northern Muscadine.....	11.4 "	1.25 "
466	Israella	15.4 "	1.60 "
467	Challenge	15.4 "	1.60 "

*Analyzed October 17, but not fully ripe.

NOTES ON VARIETIES OF GRAPES.

Especially desirable kinds are starred.

Agawam. Of strong growth, very hardy and moderately productive. Rather too late to warrant its planting for market:

Aminia.** An early, vigorous, productive black grape of excellent quality and fine appearance. In the experiment station vineyard it is very satisfactory.

Barry.* This variety has been very satisfactory with us. Vine vigorous, hardy and productive; bunch large; berries very large and of good quality; skin thick; flesh sweet but somewhat pulpy.

Brighton.** Vigorous, hardy, healthy and productive. Bunch very large; well shouldered; berry red; medium size; flesh very sweet; sprightly melting, superb; generally satisfactory. Not reliable enough for general marketing, but should be in every home garden. Its quality is rather improved, it ripens more evenly and keeps much longer if bagged;

when over ripe it loses much of its fine, sprightly quality. I know of no grape so much improved by bagging. Its blossoms are somewhat deficient in pollen and it should be planted near some kinds that have an abundance.

Catawba. Hardy and healthy enough and it sets a heavy crop of fruit, but seldom ripens. This season it was not fully ripe Oct. 17, although it was well colored at that date.

Centennial. A very productive white variety of moderate or poor growth. Bunches are of fair size and very compact. The berry is white, small and with very large seeds, of good quality. There are several more satisfactory white varieties. Ripens with concord.

*****Concord.** A little too late for general planting but in good vineyard locations in the south half of the state it is the most productive kind grown. Highly esteemed for general planting.

Cottage. A vigorous, healthy, productive black grape. Bunch large, shouldered; berry large, sweet and good; liable to drop from the stem.

****Delaware.** Generally the most profitable grape to raise for market in this state, but it requires the best of care and the foliage should be sprayed with some fungicide to protect it from the downy mildew. Unless this is done it is extremely unreliable in wet seasons.

Duchess. A white grape of the best quality. Vine rather tender. Bunch, large, compact and shouldered; berry medium. Season later than Concord. Valuable in extra good locations.

Early Victor. One of the earliest kinds and of good quality. Bunches rather small; berry medium in size. Not sufficiently productive to make it profitable.

El Dorado. Of fine quality, but not sufficiently hardy nor productive enough to recommend it to any but amateur planters.

Elvira. A very vigorous and very productive white

grape of poor quality. It sometimes ripens here but is generally too late.

Eumelan. A good variety that, where healthy, is productive and desirable but its foliage is occasionally severely injured by mildew.

Green Mountain. A new grape that we fruited this year for the first time. The vine is vigorous, healthy, apparently hardy enough for our conditions, and I think very prolific. The bunches are of good size; the berry is pale green, medium in size, very sweet and melting, with thin skin. It ripens earlier than any variety of as good quality that we have. It drops from the bunch as soon as well ripened, which, with its green color, will prevent its being largely planted as a market variety. I think highly of it for the home garden in this state and recommend it for trial.

****Hartford.** Drops badly from bunch when over ripe. It has been long and favorably known as a very vigorous, very hardy, very productive, early variety. Bunch large; berries black, large, sweet but pulpy and rather foxy. One of our best early purple kinds. It gives quite general satisfaction as an early grape for the home garden.

Herbert. Very vigorous, hardy, healthy, and productive. Bunch large; berry black, very large; skin thick; quality good. It would seem as if this variety should be more generally planted for market purposes.

Ives. Vigorous, healthy, hardy and productive. Bunch large; berries black and of medium size. This variety colors up very early, but like the Janesville it is not ripe until at least two weeks later. It is very firm and stands shipping well. As an early grape it is of such poor quality that it spoils the market for the better kinds, although it is often very profitable. When ripe there are many better varieties ripe. Except as a wine grape I consider it of little value.

***Janesville.** Very vigorous, healthy, hardy and productive. Bunch of medium size, very compact; berry of medium size, black, pulpy, acid. It colors up very early but

like the Ives it is not ripe until several weeks later. Pre-eminently the grape for severe locations and recommended for general planting in Minnesota.

***Lady.** An early, greenish-white grape. Bunch medium compact; berry large and of excellent quality, but it sometimes cracks badly. Vine healthy and hardy but not a vigorous grower and only moderately productive. A valuable grape for amateurs.

Lady Washington. Vine healthy, hardy and vigorous. Bunch very large and rather loose: berry large, white and of fine quality. We ripened this variety in 1891 and 1892, but these were two exceptional years. Too late in ripening except in best locations.

****Lindley.** Vine healthy, hardy vigorous and productive. Bunches medium in size and loose. Berries very large, red and of extra quality. This is an extra good keeping variety and holds its flavor well. It has frequently been exhibited in good condition at the winter meetings of the State Horticultural Society in January. Valuable for home use but must have pollen from other kinds to get good bunches.

Martha. Vine healthy, hardy and productive. Bunches of medium size; berries of medium size, greenish-white and of a very good quality. I think, however, that the Moor's Diamond or Pocklington are far better for home use or market.

Merrimac. Has done fairly well with us. The bunches are of good size; berries large and of extra quality. A good long keeping variety.

Moor's Diamond. A very distinct new white grape that is very promising. The vine is vigorous, healthy and productive. Bunches compact, shouldered, large; berries large: skin thick; flesh tender, juicy and melting. We have fruited it two years and consider it especially desirable for a standard white grape; Its season is from four to eight days earlier than the Concord.

***Moor's Early.** One of the most popular early grapes.

Not generally a heavy cropper and some seasons the berries drop badly from the bunch as soon as ripe. Generally profitable on account of its being the first grape of good quality to come into the market. It requires rich soil and high cultivation for best results.

Moyer. Vine resembles the Delaware in foliage, growth and hardiness, but its bunch and berry are much smaller; berry sweet and melting. We fruited it this season for the first time. It ripens about a week before the Delaware and this quality will make it desirable if it proves to be sufficiently vigorous and productive.

Pocklington.** A most magnificent fruit. Vine healthy, hardy, vigorous and productive; berry white, very large and covered with beautiful bloom; quality sweet, juicy and extra good, though somewhat foxy. It ripens a little later than the Concord and is a worthy companion to that variety. Desirable only for good locations.

Salem. Quite satisfactory at the experiment station. Vines moderately productive, vigorous and hardy; bunches and berries large; skin thick and firm; flesh tender, juicy and sweet. A good shipping variety and a good keeper.

Wilder. This variety is too uncertain here and it is very liable to lose its leaves before the fruit is matured; with us much worse in this respect than the Delaware, which has never been seriously injured by mildew in the Station vineyard. This year it did not mature its fruit.

Worden.*** It is difficult to say too much in favor of this fine grape. The vine is vigorous healthy and productive; bunch large, compact, often shouldered; berries very large, black, with a heavy bloom; flesh sweet, melting and excellent. I think it is destined to replace the Concord for general planting in Minnesota on account of its being about ten days earlier, much superior to it in quality and nearly if not quite as prolific. Wherever known it commands a higher price than the Concord. Some seasons it seems more inclined to drop its berries than the Concord.

Woodruff Red. A new red grape. Vine vigorous, healthy and hardy; bunches small; berries large, bright red, with a beautiful bloom; flesh foxy, pulpy and sweet. We have fruited it but one season. I think it of too poor quality to pay for planting.

Wyoming Red. Vine vigorous, hardy and healthy but only moderately productive with us; bunches small to medium in size, compact; berries medium size, bright red; flesh sweet, pulpy, quite foxy, but it is very good for such an early variety. It is said to be growing in favor in the east as a very early red grape and is well worthy of trial by vineyardists here.

Varieties planted at the experiment station that have not yet fruited:

Eaton	Dracut Amber	Poughkeepsie Red
Herman Jaeger	Rommel	Peter Wylie
G. W. Campbell	Brilliant	Ebony
Atavite	Red Bird	Monitor
Solin Crup	Theophile	Marie Louise
Illinois City	Bertha	Dr. Warder
Emma	Witt	Nectar
Rockford	Mills	Triumph
Colerain	Early Ohio	Geneva

GRAPES.	Parentage	Quality for table use (scale 0-10)	Hardin's (scale 0-10)	Health of Foliage (scale 0-10)	Vigor of Growth (scale 0-10)	Productiveness (scale 0-10)	Size of Berry (scale 0-10)	Color of Berry	Keeping Quality (scale 0-10)	General Appearance (scale 0-10)	When Ripe in 1892	REMARKS.
Agawam (Rog. 15)**	Lab. x Vin.	8	8	9	6	8	red	10	7	7	Oct. 3	Too late.
Aminia (Rog. 39)	Sab. x Vin.	8	8	9	7	7	black	7	8	8	Sept. 16	A reliable kind.
Bacchus	Reparia	1	10	10	10	4	black	4	6	6	Sept. 24	Good only for wine.
Barry (Rog. 43)*	Lab. x Vin.	8	7	8	7	8	black	8	8	8	Sept. 17	A valuable variety.
Brant	Riparia	4	8	6	6	3	black	3	4	4	Sept. 12	Rejected.
Brighton**	Lab. x Vin.	10	7	8	9	6	red	8	8	7	Sept. 25	Of finest quality.
Catawba	Lab. x Vin.	8	8	7	6	7	red	10	9	9	.....	Too late in ripening.
Centennial	Aestivalis	7	7	7	6	5	white	7	7	7	Oct. 4	Very productive.
Champion	.....	4	8	8	8	7	black	5	8	8	Sept. 14	Of poor quality.
Concord**	Lab.	7	9	9	10	10	black	8	8	8	Sept. 30	Well known.
Cottage	Lab.	6	9	9	10	6	black	7	7	7	Sept. 17	A valuable variety.
Clinton	Riparia	0	10	10	10	4	black	4	5	5	Oct. 1	Rejected.
Creveling	Lab. x ..	6	5	4	3	7	black	4	6	6	Sept. 13	Poor foliage.
Delaware**	Lab. x ..	10	7	2	4	4	red	8	10	10	Sept. 23	Well known.
Duchess	Lab. x ..	2	5	6	4	4	white	8	9	9	Oct. 3	Of very fine quality.
Early Victor	Lab.	7	0	10	8	5	black	4	7	7	Sept. 18	Not productive.
Elsinburg	Aest.	9	7	6	6	4	black	4	6	6	.....	Bunches very small.
Elvira	Lab. x ..	7	10	10	10	10	white	8	8	8	Oct. 7	Too late in ripening.
El Dorado	Lab. x ..	10	7	7	6	5	white	7	8	8	Sept. 20	Of fine quality.
Empire State	Lab. x Rip.	5	6	5	6	5	white	5	8	8	Oct. 5	Not productive enough.
Eumelan	Aest.	7	8	5	7	8	black	6	8	8	Sept. 27	A good variety.
Faith	Rip. x ..	7	7	7	6	6	white	4	6	6	Sept. 15	Not valuable.
Goethe	Lab. x Vin.	7	9	6	7	7	9	?	?	?	.....	Too late in ripening.
Green Mountain	Lab.	9	9	10	10	7	white	4	7	7	Sept. 29	A reliable new kind.
Hartford**	Lab.	6	9	10	10	8	black	5	7	7	Sept. 10	Very productive but drops badly.
F. B. Hays	Lab.	7	6	6	6	4	white	5	5	7	Sept. 17	Not sufficiently productive.
Herbert (Rog. 44.)	Lab. x Vin.	8	9	10	9	8	black	9	10	10	Sept. 20	Should be more widely known.
Ives	Lab.	3	9	10	9	8	black	3	7	7	Oct. 10	Very early but of poor quality.
Janesville	Lab. x Rep.	4	10	10	4	7	black	8	7	7	Sept. 12	Very hardy.
Lady*	Lab.	9	8	7	8	6	white	7	7	7	Sept. 16	Rather weak grower.
Lady Washington	Lab.	8	8	8	8	7	white	8	9	9	Oct. 10	Too late in ripening.

GRAPES.	Percentage	Quality for table use (scale 0-10)	Hardin's. (scale 0-10)	Health of Foliage (scale 0-10)	Vigor of Growth (scale 0-10)	Productiveness/scale 0-10)	Size of Berry (scale 0-10)	Color of Berry	Keeping Quality [scale 0-10]	General Appearance [scale 0-10]	When Ripe in 1892	REMARKS.
Lindley (Rog. 9)	Lab. x Vin.	9	8	7	8	9	7	red	10	8	Sept. 27	Extra good keeper.
Massasoit (Rog. 3)	Lab. x Vin.	9	7	6	8	6	8	red	5	9	Sept. 27	Not productive enough.
Martha	Lab.	9	9	9	8	8	6	white	7	8	Sept. 30	There are better white grapes.
Merrimac (Rog. 19)	Lab. x Vin.	9	8	7	8	8	7	black	9	6	Oct. 1	Liable to mildew.
Montefiore	Lab. x Rip.	3	3	6	6	6	5	black	6	6	Oct. 6	Not productive.
Moor's Diamond	Lab.	9	9	9	9	9	7	white	7	9	Sept. 28	A fine new white sort.
Moor's Early	Lab.	9	8	9	8	6	2	black	5	9	Sept. 15	Generally not very productive.
Moyer	Lab. x	9	8	9	8	8	3	red	6	7	Sept. 10	Bunches very small,
Niagara	Lab.	8	8	7	7	7	7	white	8	8	Oct. 4	Too late.
Northern Muscadine	Lab.	6	10	10	10	6	6	red	4	6	Sept. 15	Not prolific, drops badly.
Pocklington	Lab.	9	9	9	9	5	9	white	8	9	Sept. 30	A magnificent variety.
Prentiss	Lab.	9	8	7	8	7	7	white	8	8	Sept. 30	Uncertain.
Salem (Rog. 53)	Lab. x Vin.	10	9	7	8	7	7	red	8	8	Sept. 30	A good variety.
Whitchall	Lab.	6	9	9	7	4	8	black	6	8	Sept. 15	Of very poor quality,
Worden	Lab.	10	9	8	8	8	9	black	7	9	Sept. 20	Of best quality and early.
Woodruff Red	Lab.	6	8	8	7	8	8	red	10	10	Oct. 2	Very handsome.
Wyoming Red	Lab.	6	9	8	8	7	7	red	7	9	Sept. 12	Very pulpy.
Wildier (Rog. 4)	Lab. x Vin.	9	8	8	8	8	8	black	7	9	?	Foliage liable to mildew.

*SMALL-FRUIT NOTES FROM OUR TRIAL STATIONS
FOR 1892.*

These stations were selected by the executive committee of the state Horticultural Society as proper places for testing new varieties that the Horticultural Division of the experiment station might desire to have widely tried.

FROM WINDOM, COTTONWOOD COUNTY.

DEWAIN COOK, SUPT.

Strawberries. A little over one-half a crop, but the Warfield was an exception. They gave a full crop of fine fruit. The Enhance is especially promising. The Sandoval I consider worthless on account of its liability to leaf fungus. The finest variety in this section was the Cumberland, grown on poor, sandy soil.

Raspberries. Most varieties of the suckering kinds were much troubled with some disease. The cap varieties were quite healthy. The Cuthbert did the poorest and Brandywine the best of all the reds, and all things considered regard the last as the most reliable variety I grow. The black-caps Gregg and Souhegan are the best of their class.

Blackberries and Dewberries. Have done extra well and are in fine condition for a good crop next year. They stood the cold of last winter without protection. I am very much pleased with Ancient Briton, but do not consider it as hardy as Snyder, Agawam, Stone's Hardy or Wachusett.

Grapes. Have done finely in about every respect. Moor's Early, Delaware and Janesville have been the most satisfactory.

FROM LA CRESENT, HOUSTON COUNTY.

 I. S. HARRIS, SUPT.

Strawberries were half to two-thirds a full crop. Warfield No. 2 when fertilized with Michel's Early did best of all. Kramer's Princess came next to Warfield and Crescent came in for third place.

Parker Earle promised the best of all but for some reason all but the first picking was small and poor.

Michel's Early did not prove satisfactory as a fruiter.

Captain Jack did not bring half a crop.

Jessie was nearly a total failure.

The varieties in our new experiment plantation were set late in 1891 and did not make a very satisfactory growth. Of the new varieties the most promising among them were the Haverland, Schuster's Gem, Eureka, Pearl, Bubach and Crawford. The Warfield and Crescent hold the lead for commercial purposes, but a better pollenizer than we now have is needed for them.

Raspberries were about half a crop. The Ohio black cap is the best of the cap varieties, and the Cuthbert and Marlboro the best of the red. Turner continued longest in bearing but the yield was light. None of the reds were entirely exempt from "curl leaf."

Blackberries have done the best of all the small fruits. The crop was immense and the quality good. The Ancient Briton is taking the lead as a market fruit.

Grapes were considerable below an average crop. Mildew was very abundant and destructive.

Delaware, Niagara, Lady, Pocklington and some of the Roger's hybrids lost much of their foliage from mildew and consequently failed to ripen.

Moor's Early set but little fruit.

Concord, Worden and Brighton are doing the best with me.

FROM FERGUS FALLS, OTTER TAIL COUNTY.

F. H. FIELDER, SUPT.

STRAWBERRIES.

Bubach. (p) The largest berry I grow; very vigorous and one of the best for this section.

Cloud. (p) Did not fruit much.

Daisy. (p) Not as good as Crescent, nor so large.

Jessie. (b) A fine berry, and did the best of all this season.

Oliver. (b) Did not produce fruit.

Warfield. (p) More productive than Crescent; makes the largest amount of runners I ever saw.

Wilson. (b) Too small.

Crescent. (p) As good as many varieties, but I think the Bubach and Warfield are better.

RASPBERRIES.

Turner. Too small this season.

Caroline. Berries soft and of poor quality, but very productive.

Cuthbert. Best of the Raspberries.

Gladstone. Of no value. Berries small, dull red.

Gregg. The best blackcap I grow.

Dewberry. Quite productive, but berries are small, imperfect and of poor quality,

FROM ALBERT LEA.

CLARENCE WEDGE, SUPT.

STRAWBERRIES.

Michel's Early ripened a few berries the first of any variety, but was a light crop and is worthless except as a pollinizer.

Crescent produced at least three times as many berries per row as any other variety grown, and throughout the wet hot weather remained in choice condition for home market.

Wilson came next to Crescent in yield of fruit, but its color and the dead condition of the Calyx gave them a poor appearance.

Jessie and **Bubach** were the special delight of a big flock of birds, which prevented my getting any perfect fruit from them. Neither of these varieties would have given a profitable crop, however, even if the birds had let them alone. The Bubach rotted before it was ripe enough to pick. A few plants of Haverland fruited and gave promise of something fancy for the home market and I shall plant them largely next year.

RASPBERRIES AND BLACKBERRIES.

The Cutlbert raspberry is the most satisfactory variety I have. I grow Ancient Briton, Snyder, and Wilcox blackberries and the Ancient Briton is the best of all.

FROM MINNSOTA CITY.

O. M. LORD, SUPT.

Strawberries. A fair crop. Warfield No. 2 exceeded all others in yield. Crescent came next; then Bubach, Jessie, Princess and Downer's Prolific in the order named. The last rusted so much as to materially reduce the yield.

Raspberries. The Gregg did very well and the Schaffer was abundant.

Blackberries. Ancient Briton, Snyder and Stone's Hardy all did well.