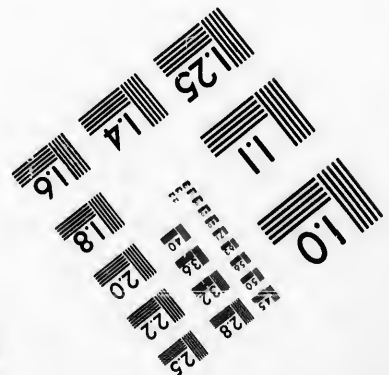
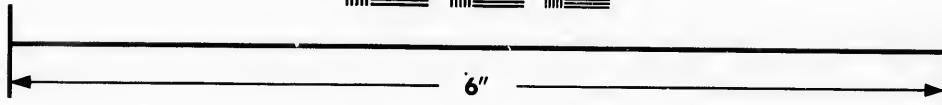
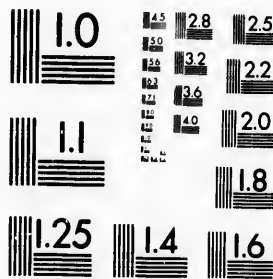


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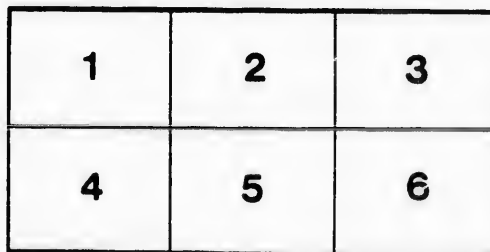
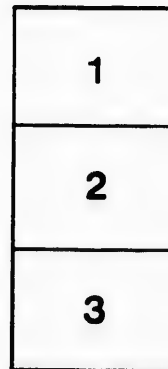
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CENTRAL EXPERIMENTAL FARM.

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DEPARTMENT OF AGRICULTURE,
OTTAWA, . . . CANADA.

—:0:—

BULLETIN No. 22.

—:0:—

RASPBERRIES.

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MARCH, 1895.

To the Honourable
The Minister of Agriculture.

SIR,—I have the honour to submit for your approval Bulletin No. 22, of the Experimental Farm series, on Raspberries, which has been prepared under my direction by Mr. John Craig, Horticulturist of the Central Experimental Farm.

The cultivated varieties of the Raspberry are much esteemed by the public generally and are growing constantly in favour. Within the past few years much attention has been given to the improvement of this fruit and many new sorts have been introduced, some of which have been originated in connection with the work of the Experimental Farms. The hardiness and quality of the leading varieties are discussed in this bulletin in the light of the experience gained at the Experimental Farm. The best methods of treatment are referred to and remedies suggested for some of the diseases to which this plant is subject.

It is hoped that the information given in this bulletin may encourage the growth of this fruit by farmers generally. Where land can be had, there is no reason why every household should not have an ample supply of this delicious fruit for several weeks during the warm summer weather, when such an addition to the diet is most agreeable and healthful.

The figures used in this bulletin have been engraved from photographs of clusters of berries grown on the Experimental Farm, and show the exact size of good samples of these fruits.

I have the honour to be
Your obedient servant,

WM. SAUNDERS,
Director Experimental Farm.

OTTAWA, March 22nd, 1895.

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RASPBERRIES

BY

JOHN CRAIG, Horticulturist.

The object of this bulletin is to bring before the farmers and fruit growers of Canada, some information regarding the cultivation of the raspberry, together with the experience gained during a period of five years, in testing a large number of varieties at the Central Experimental Farm.

Before going into cultural details it may be interesting to glance hastily at the sources from which our cultivated raspberries have been derived. They have been developed from three wild species. Their origin is clearly and concisely outlined by Prof. A. A. Crozier, in a recent bulletin published by the Michigan Agricultural College, as follows in speaking of:—"The wild red raspberry of Europe, our own wild red raspberry, and our native black cap. The first was known and apparently cultivated by the ancient Greeks, who traced its origin to Mount Ida, where it flourished wild, and from which it received its name, *Rubus Idæus*. Paladius, a Roman agricultural writer of the fourth century, mentions the raspberry as one of the cultivated fruits of his time. From the gardens of Southern Europe it found its way into France, the Low countries, and England, and from these sources into the United States. To this species belong the Red and White Antwerps, which have remained standards of excellence for upwards of a century, the Hudson River Antwerp, Franconia, and other similar varieties." These foreign sorts, though often abundant bearers of large, finely flavoured fruit, as Mr. Crozier further points out, have not proved adapted to the climatic conditions of the United States, and this is also true with regard to Canada, owing to a lack of hardiness and a liability to be injured by our hot summer suns. "These defects finally directed attention to our native raspberries. The black cap (*Rubus occidentalis*) seems to have been the first of these to have been brought into cultivation, and from the time of the earliest settlements we hear of the wild bushes being occasionally removed to the gardens." Prof. Macoun, of the Geological Survey of Canada, kindly furnishes the following particulars regarding the distribution of this species in Canada:—" *Rubus occidentalis* has a very restricted range both to the north and west. It is sparingly found in New Brunswick, quite common in Quebec, west of that city and through Ontario to Lake Huron, though apparently absent from Toronto westward to Lake Erie. On the west coast this species is replaced by one very like it named

Rubus leucodermis, which is common on Vancouver Island, and has been collected as far east as the Columbia River Valley, 100 miles south of Revelstoke.

In the east *R. strigosus* and *R. occidentalis* hybridize and form a species (?) named by Prof. Peck, *R. neglectus*. In the west *R. strigosus* and *R. leucodermis* form a hybrid which is far superior to *R. neglectus*. This form grows in abundance at Sicamous, B. C., close to the C. P. R. station, where it was found fruiting finely in July, 1880." *Rubus leucodermis* in its native state appears quite promising, but as yet has furnished no variety adapted to general cultivation.

"The first distinct variety of black cap (*Rubus occidentalis*) of which we have record, is the Ohio Everbearing, which attracted attention as early as 1832, from its habit of fruiting to a greater or less extent upon the young canes in autumn. For a family garden this was considered to be a desirable feature, though no varieties of this class ever found favour for market purposes. The yellow form of the black cap, represented by Golden Cap and other varieties, was introduced about the same time. The Doolittle next came into notice, about 1850, and attained considerable prominence." (Crozier).

In some districts of the United States black raspberries are extensively cultivated for drying, the "Ohio" being one of the favourite varieties grown for this purpose.

Our native red raspberry has a wider range than the black cap, extending especially much farther northward. Prof. Macoun also furnishes me with the following particulars regarding the distribution of this species:—" *Rubus strigosus* has a very wide range in Canada, passing without a break to the Coast Range in British Columbia. Mr. Low found it in Labrador on the height of land at the source of the Ungava River, down which it descends to Lat. 57°. Mr. J. B. Tyrrell brought back specimens from the "Barren Grounds" gathered in Lat. 62° 17', Long. 103° 07' West. Miss E. Taylor collected it in the delta of the Mackenzie River, on Peel's River, 30 miles north of the Arctic circle, and lastly Mr. James McEvoy gathered abundance of ripe fruit on the Yukon, north of Lat. 62°. I have gathered specimens in the mountains at an altitude of 7,000 feet. It will be seen by the above that it has a very wide range."

Mr. Crozier further states that "This species does not take so kindly to cultivation (as the black cap), and the origin of our varieties belonging to it is often obscure; we have but few well authenticated examples of the species in its purity having been brought from the wild state into cultivation, and most of these soon disappear. The evidence by which certain of our well known red varieties are assigned by botanists (doubtless correctly) to the native species is mainly structural, and not historical, since nearly all have originated, directly or by descent, as chance or artificial seedlings upon cultivated ground. That our native red raspberry has played a large and perhaps controlling part in the production of our most popu-

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lar hardy red raspberries need not be denied, but the doubt which we are obliged to recognize on this point rests on circumstantial evidence too strong to be entirely overlooked."

The purple raspberry, of which we have such a notable example in "*Shaffer*," was first designated a distinct species, but recent investigations point to hybrid origin. This assumption appears to be well grounded, owing to the fact that nearly all hybrids between the black and the red raspberry produced here and elsewhere, have borne purple fruit, much resembling the "*Shaffer*" in colour and flavour as well as habit of growth. Prof. Saunders has probably fruited more true hybrids of this class than any other experimenter, the majority of which were intermediate in habit of growth and character of fruit. Their good points are vigour and productiveness; their weak points are the softness and acidity as well as unattractive colour of the fruit.

SOIL.

All varieties of *red raspberries* do not succeed equally well on the same kind of soil. For instance, varieties of foreign extraction (*Rubus idæus*), such as "*Clark*," "*Hornet*" and "*Brinckle's Orange*" do not flourish on sandy or light soils, but are more at home on a deep, rich, moist soil that is rather compact. On light soils their leaves are apt to burn in summer, which prevents the canes from maturing perfectly, and consequently renders them liable to injury by winter. For most varieties of raspberries a cool, loamy soil, moist, but not sodden, will usually give the best results.

The *black raspberry*, on the other hand, seems equally at home on sand or loam, and on well drained clayey soils; but on heavy compact soils which are cold, it does not thrive. Anyone who has attempted to grow black caps in cold and sodden soil will readily appreciate the truth of this statement. In ground of this kind the canes are subject to disease, are easily winter killed and prove generally unprofitable.

SUITABLE PLANTS FOR SETTING OUT.

It is well to remember that the raspberry plant is a perennial in regard to its roots. The canes which are produced this year bear fruit the following summer, and die in the autumn of that year. Thus, although the roots are perennial the canes are biennial only, existing only for two years.

In the case of suckering kinds the best plants are obtained from the vigorous shoots of the previous year's growth. These may be taken up and set out either in the fall or in the spring; or during a rainy season the young sprouts may be transplanted successfully after the middle of June and up to the middle of July.

When fall planting is found convenient, it may be done usually with greatest success during the first half of September. Setting out at this time encourages immediate root growth, which assists in carrying

the plant through the winter and favours a vigorous growth in spring. All plants should be cut back within six or eight inches of the ground at the time of transplanting.

Black caps, known as "tip varieties," are multiplied by the tip bending down to the ground and striking root. This usually takes place after the fruiting season is over; in this latitude, from the middle of September to the middle of October. Propagation is facilitated by covering the tips of the canes with sufficient soil to hold them down.

Care should be exercised in planting these tips in order to prevent them from being set too deep, as if covered with more than two inches of soil they are apt to be smothered. In buying plants which have to be shipped some distance, it is usually best therefore to order one year old plants of the black caps instead of young "tips" which are more difficult to ship and transplant successfully. By taking this precaution a large percentage of failure will be avoided.

The stools or root clusters of both red and black raspberries may be taken up and divided in order to form a new plantation, but this method is not to be recommended, as old stools rarely make a vigorous growth, and much better results will be obtained by starting with young plants.

PREPARATION OF THE SOIL.

Labour spent in securing a thorough preparation of the soil, including deep ploughing and liberal manuring, will always repay the small fruit planter.

If the soil is light in character, it should be heavily dressed with barnyard manure in the spring, after being brought into a good state of tilth by growing on it a hoed crop the previous season. If of a clayey nature, it should be adequately drained, and the texture may be improved by ploughing under a green crop such as clover or peas.

Sub-soiling is not always absolutely necessary, but is always attended with good results, and should be practised when the under-soil is hard and of a retentive character. In other cases where the surface soil is shallow and the underlying soil hard, unless it is loosened by means of a sub-soil plough, following the furrow of the ordinary turning plough, the roots will be unable to penetrate deep enough to obtain a sufficiency of moisture during periods of dry weather. In all gardening operations on a scale large enough to admit of its use, the sub-soil plough should be brought into play.

The necessary amount of hand labour involved in weeding subsequent to planting, will be greatly lessened by allowing no weeds to go to seed the previous year.

In brief, select when possible, deep, loamy, well drained soil; if this is not available bring the most desirable piece of ground into good condition by draining, sub-soiling and manuring. Raspberries, like strawberries, are not often, nor are they easily injured, by too heavy manuring, the error is generally on the other side.

PLANTING, CULTIVATING AND PRUNING.

In field culture, suckering varieties, red, purple and yellow, should be planted in rows six to seven feet apart, and three feet apart in the row. The rows should be accurately measured and indicated by stakes previous to planting. The work of planting is much facilitated by carefully opening with a plough a furrow 4 or 5 inches deep in the line of the row for the reception of the plants. Two plants may be set in a hill, using a hoe to fill in the soil, which should be carefully compacted. Setting out two shoots to begin with, ensures a much better and even growth in the whole field, than if a single cane is used in each case, and fewer failures will result if this plan is adopted. The cultivator, which should be started as soon as the planting is done, will effectually complete the filling of the furrow.

Black caps may be planted in rows in the same way. They are also successfully grown by planting in hills four or five feet apart each way. This method allows of very thorough cultivation by horse power, thus greatly lessening the amount of hand labour.

The canes of black raspberries should be cut back each season when they have reached a height of two, to two and a half feet; unless treated in this way they are difficult to manage. This pinching back causes the plants to grow stocky and to throw out laterals. The laterals may be cut back to a length of 12 to 15 inches in the autumn; but the best plan is to leave them till the following spring when the injured wood, if any, may be removed at the same time. The bearing wood should be removed as soon as the fruiting season is over. Experiments carried on here during the past two years, and still in progress, have not indicated any striking advantage from leaving the removal of the old wood till spring. There is generally more time to attend to this work in early autumn, than during the hurry of spring work.

Clean culture with all fruit crops always pays best. In the case of the raspberry, this is particularly true. Frequent shallow cultivation will keep down weeds, and preserve the moisture of the soil, often lacking during the season of fruit harvesting. A superfluous growth of suckers in the case of red raspberries, may be kept under by the cultivator and the vigor of the canes in the row thereby increased. Satisfactory results are also obtained by some growers, by mulching with straw or coarse manure instead of cultivating. With comparatively limited areas and situated within easy distance of a cheap manure supply, suburban gardeners can by mulching heavily in this way with strawy manure, grow a greater number of plants to the row, and obtain fruit of undiminished size. Some growers mulch the rows of plants only, leaving a strip in the centre of the inter space, which is kept clear of weeds by the horse cultivator. Weeds which appear in the rows are hoed out, or pulled by hand. Under ordinary conditions, when the plants are not thinned to something approaching a hill system, the fruit becomes small and the plants lose vigour.

The Illinois experiment station bulletin No. 30, reports the result of an experiment designed to show the benefit of cultivating the black raspberry throughout the summer, as against cultivation during the latter part of the season, after the fruit was picked. The experiment was carried on for four years, with the result that the area kept cultivated from early spring until fall, yielded 500 boxes more than the same area cultivated from the time the fruit was taken off, until fall.

TRAINING.

In this district, there are two principal methods of growing the red, yellow and purple raspberry, viz. : (1) growing tall canes which are bent over and covered in the autumn for better winter protection ; (2) growing shorter canes and thus increasing the likelihood of their being covered naturally, by snow fall.

Canes which are to be covered should be grown to a height of from 5 to 6 feet, this usually necessitates very little pinching back during summer. In the autumn or immediately after the fruit is picked, the old canes are thinned out, leaving four to six shoots in each hill ; the hills being about three feet apart. To bend down and cover these without fear of breaking them, a little earth is taken out on one side of the hill, the canes are then collected in a bunch, and pressed down in the line of row by means of a fork in the hands of one man, while sufficient earth is applied to the canes to hold them down by another man. The cost of the labour involved in covering an acre should not exceed \$2.00. By this method larger and finer fruit may be obtained earlier in the season than without protection, and it is *par excellence*, the best method for the amateur. Some commercial growers in cold regions follow this practice successfully, while others do not find it satisfactory. In cultivating the suckering varieties of the raspberry for market, it will depend somewhat on the situation and the varieties grown, whether it will pay the grower to adopt this plan or follow the next outlined.

The other method, that of keeping the plants low by summer pruning, is the one usually adopted. To carry this out properly, the canes should be pinched back when they have attained a height of from ten to fifteen inches (when the climate is not severe they may be grown taller as stated above). This will cause them to throw out laterals, which in turn should be pinched after making a growth of 12 or 15 inches. Sometimes this second pinching is deferred till the following spring. This system develops a very sturdy and stocky bush and one which is less liable to be injured by winter's cold—because usually covered by snow—than one grown by the former plan and left unprotected.

TRELLISES OR SUPPORTS.

It should be mentioned in connection with the first system—protecting in winter—that a trellis is necessary to support the canes after uncovering them in spring. Unless a trellis is used, mulching the ground

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will be essential in order to keep the fruit from being soiled during rain and wind storms. A cheap trellis can be constructed with little trouble by using posts 5 feet long, made of 2 by 6 inch planks, and driving them edgewise across the rows, at distances of 3 to 4 rods apart. A single wire stapled to the outside of these posts will be sufficient to hold the canes in place, and prevent them from being borne to the ground by the weight of the fruit, or by rain or wind. Another plan is to use posts made of 2 x 4 inch scantling. Cross pieces 15 to 18 inches in length are nailed on the posts about three feet from the ground. The ends of the cross pieces are notched. The wire is nailed to the end posts of each row, and is held in place by the notches in the cross pieces into which it is laid. This method allows of the easy removal of the wire when desired.

In garden culture, it always pays to grow the canes in hills. Each hill should be supplied with a stake to which the canes may be tied. In brief, it may be stated that with winter protection, trellising or mulching is necessary. Without winter protection in the colder regions, growers run the risk of occasional injury to the plants, sometimes amounting to the loss of a crop, and besides are unable to grow the European varieties of raspberries with uniform success.

The following results were obtained from experiments planned with a view of testing the advantage and cost of protecting raspberries during winter by laying them down:—

1. The first effect was to hasten the ripening of varieties so treated, from 5 to 8 days.
2. With such hardy kinds as "Turner" and "Hansell" the increased productiveness and earliness did not more than repay the cost of such protection.
3. With varieties of the grade of hardiness of "Cuthbert", "Herstine", "Heebner", "Golden Queen", "Niagara", "Clark" and "Antwerp", productiveness was increased from 16 to 22 per cent. This, with the advantage of increased earliness, more than repaid the cost of protecting them.

The following tables of yields are given and estimated on the returns of the past season. They cannot be accepted as relatively accurate in all cases on account of the difference in the age of the plants making up the rows of the several varieties. In the case of the Black caps, the loss of a few plants in the row materially affected the result, as shown by the yield of Hilborn, usually a very productive variety. The severity of the winter injured the raspberries, thus considerably lessening the general yield.

SHOWING YIELDS OF PRINCIPAL VARIETIES OF RED RASPBERRIES
IN 1893.

Raspberries. Red Varieties.	Date of First Picking	Date of Last Picking	Yield, in Boxes.	Length of Row, in feet.	Estimated Yield in Boxes, per acre.	Showing Injury from Winter 93-94 Scale, 1-10.	REMARKS.
Heebner.....	July 10.	July 30.	73½	350	1,302	9	Rows well filled with plants.
Parnell.....	do 10.	do 28.	55	350	978	9	
Brandywine.....	do 10.	do 30.	35½	350	630	9	Suffered from winter. Rows not fully established.
Clarke.....	do 10.	do 30.	32½	350	578	5	
Turner.....	do 10.	do 28.	31	350	551	9	
Niagara.....	do 10.	Aug. 4.	29½	350	520	7	
Hansell.....	do 10.	July 28.	26½	350	474	7	
Royal Church.....	do 10.	Aug. 4.	23½	350	422	4	
Thompson's E'y. Prolific	do 10.	July 28.	23½	350	422	8	
Marlboro.....	do 10.	do 25.	23	350	410	7	
Cuthbert.....	do 13.	Aug. 4.	21½	350	381	5	
Herstine.....	do 10.	do 4.	20½	350	364	6	
Reeder.....	do 10.	do 4.	19½	350	343	5	

SHOWING YIELD OF SOME OF THE NEWER VARIETIES OF BLACK CAP
RASPBERRIES IN 1893.

Raspberries. Black Cap Varieties.	Date of First Picking	Date of Last Picking	Yield, in Boxes.	Length of Row, in feet.	Estimated Yield in Boxes, per acre.	Showing Injury from Winter 93-94 Scale, 1-10.	REMARKS.
Pioneer.....	July 11.	July 21.	67½	175	2,400	9	Two year old plants. do do
Older.....	do 10.	do 28.	48½	175	1,724	10	
Springfield.....	do 10.	do 28.	16½	59	1,714	4	Rows not complete.
Smith's Prolific.....	do 10.	do 21.	8½	45	1,175	4	
Palmer.....	do 10.	do 21.	8	45	1,104	4	
Ada.....	do 10.	do 21.	4½	52	538	7	
Hilborn.....	do 10.	do 25.	24	350	427	9	

It may be well to state here that raspberries are sometimes divided for convenience into two classes according to their methods of propagation.

1st. Upright varieties, increased by suckers from the roots, this including mainly our red and yellow sorts.

2nd. Drooping canes, rooting from tips, commonly called "tip varieties." These with one or two exceptions, bear fruit black or purple in colour. In the following descriptive list they are simply arranged in alphabetical order, the colour being indicated in each case. They have all been tested here; and the opinions expressed are based upon experience gained here, except where otherwise stated.

VARIETIES.

ADA.—Black cap. Originated with Mr. H. M. Young of Ada, Ohio. Planted here in 1893, it made a fair growth. The fruit is of medium size, soft, of fair quality and ripens later than Gregg, which it almost equals in size. With two years' experience, it does not seem promising.

BEEBE.—Yellow cap. Introduced from New York in 1886 under the name of *Beebe's Golden*. The canes have proved very tender and are easily broken by snow and the cultivator. The berry is one of the so-called yellow caps and is more curious than useful. After ripening, it soon turns a dingy orange brown, which renders it most unattractive.

BRANDYWINE.—Red. Originated in Ohio about 20 years ago. In some sections it is highly thought of as a market berry. Here the canes have not been vigorous, while the berry is only of medium size, soft and of poor quality.

BAUMFORTH.—Red. An English seedling raised by John Baumforth. Plants were received from W. W. Dunlop, Outremont, Que., in 1891. The cane is a weak grower, bearing large, dark red fairly fine berries of good quality. Season late. Needs high cultivation and winter protection.

CARTER'S PROLIFIC.—Red. Planted spring of 1891. This has proved itself one of the most vigorous of the English varieties. The fruit is medium to large in size, conical, firm and of good flavour. The cane needs winter protection.

CARMEN.—Red. Mr. A. A. Crozier describes Carmen as an early black cap. That variety fruited here for three years is a small red raspberry of the Hansell type. Neither appear to be valuable.

CHAPMAN.—Black cap. Originated in the State of Ohio and said to be a synonym of the raspberry of that name. Here it appears to be distinct, having proved so tender as to kill out entirely the second year after planting.

CLARKE.—Red. A large red berry belonging to the European type of berries. It originated with Mr. E. E. Clarke of New Haven, Conn., nearly 40 years ago. The plant is probably the most vigorous of the class to which it belongs. Fruit, large, dark red, conical, moderately firm; quality good. This variety should be grown for home use and might be profitably cultivated for select market purposes. It will pay to protect it in winter.

CUTHBERT.—Red. Mr. A. A. Crozier in his exhaustive descriptive catalogue of raspberries, says: This originated in the garden of Thomas Cuthbert, Esq., of Riverdale, New York, about 25 years ago.



Fig. 1. CUTHBERT.

It has been extensively planted since 1880. At the present time it is without doubt the most valuable red raspberry in cultivation. It is a strong, vigorous grower, and while not as hardy as Marlboro' or Turner, it is found adapted to a greater variety of soil and climatic conditions. Under conditions at all favourable to raspberry culture the results attained in growing this variety are mainly satisfactory. The fruit is of the largest size, conical, dark red, firm, not juicy, but of excellent quality. Season late. It does not ship as satisfactorily as Marlboro', but if handled carefully can be placed on the market in a presentable condition. At Ottawa, the expense involved in covering it, has been more than repaid by increased earliness and productiveness. It is the most reliable market sort grown, and is much esteemed for home use.

CAROLINE.—Yellow. Said to be the product of a cross between Brinckle's Orange and the Yellow cap, by S. P. Carpenter of New Rochelle, New York. The plant is a vigorous grower and among the hardiest of the red or yellow varieties. It is also exceedingly productive.

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The berries are of medium size, dark orange yellow with a pleasant acidity. It is much too soft for a market variety, which is probably its weakest point. The canes have suffered considerably from cane rust or Anthracnose. Golden Queen is superseding this variety in the majority of commercial plantations.

COLUMBIAN.—Purple. Originated with Mr. J. T. Thompson of Oneida, N. Y., who says it is a seedling of Cuthbert, and supposes it to have been crossed with Gregg. Plants were obtained in the spring of 1893. They grew vigorously and fruited abundantly last season. In appearance of cane and habit of growth it much resembles Shaffer. The fruit also is much like that variety, with perhaps less acidity and more firmness. It has been reported favourably upon by the Rural New Yorker, the State Experiment Stations of New York and Michigan.

CHAMPLAIN.—White. Originated with J. T. Macomber, Grand Isle Co., Vermont, from seed of White Antwerp. Plants obtained from Ellwanger & Barry in 1892. Cane moderately vigorous, not productive so far. Fruit medium size, light yellow or white, round, soft, juicy; fine quality, fully equal to Brinckle's Orange. It may be valuable as an amateur variety.

DOOLITTLE.—Black cap. Introduced by Mr. Doolittle of New York about 45 years ago. For a long time it was the leading black cap raspberry, but is now superseded by larger and more productive varieties.

EARHART.—Black cap. A so called ever-bearing variety. It may be of value in the milder portions of Ontario, where the season will admit of a second crop, which, under favourable circumstances, is usually borne before growth is checked by frost. In this locality the second crop produced on the young wood does not mature. The cane is not hardy.

FASTOLLE.—Red. An old English variety, which has been affected in a marked degree by Anthracnose or cane rust, and thus rendered quite unprofitable.



Fig. 2. GOLDEN QUEEN.

GOLDEN QUEEN.—Yellow. Originated in New Jersey, and supposed to be a sport of Cuthbert, among plants of which variety it was found

growing. During the last ten years it has rapidly come to the front and now is the most esteemed of the yellow varieties for market purposes. In this locality it is not as vigorous as Cuthbert, and is more subject to cane rust. Productive. The berry is of good size, Cuthbert shape, but less firm. Quality good. Undoubtedly the best yellow berry now grown, for commercial purposes.

GLADSTONE.—Red. This undoubtedly belongs to the European type. Plants set out in the spring of 1892 have grown vigorously and borne fruit of medium size, dark red, conical, of good quality, but very soft; quite too soft for market purposes and not sufficiently productive. Last season it bore a small crop on the young wood.



Fig. 3. GREGG.

GREGG.—Black cap. This variety originated in Indiana about 30 years ago. It usually completes the raspberry season in time of ripening. It is also vigorous, productive, and ships well. It does not, however, rank as high in quality as 'Ifilborn', nor does it equal that variety in hardiness, but is indispensable in the market gardener's list. Large quantities of this are now used in the evaporating industry.

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HANSELL.—Red. Originated as a chance seedling in Burlington Co., N. Y. This is one of the earliest of the red raspberries. It is hardy, but is only a slight improvement over the wild native sort. It bears well, but can scarcely be commended for general culture on account of lack of size and general appearance. The fruit is not equal to Rancocas in quality, but the season is extended over a longer period.

HEEBNER.—Red. Grown from seed of the wild raspberry found in Muskoka, propagated by W. W. Hilborn, Leamington, Ont. It resembles the European type much more closely than the American. Is a fair grower, moderately hardy, bearing large, dark red, roundish, highly flavoured fruit. During the past rainy season it has not set well. The quality is good to best, and very productive. The variety will probably be valuable for near market. It is not sufficiently firm to bear distant transportation. It has not yet been introduced.

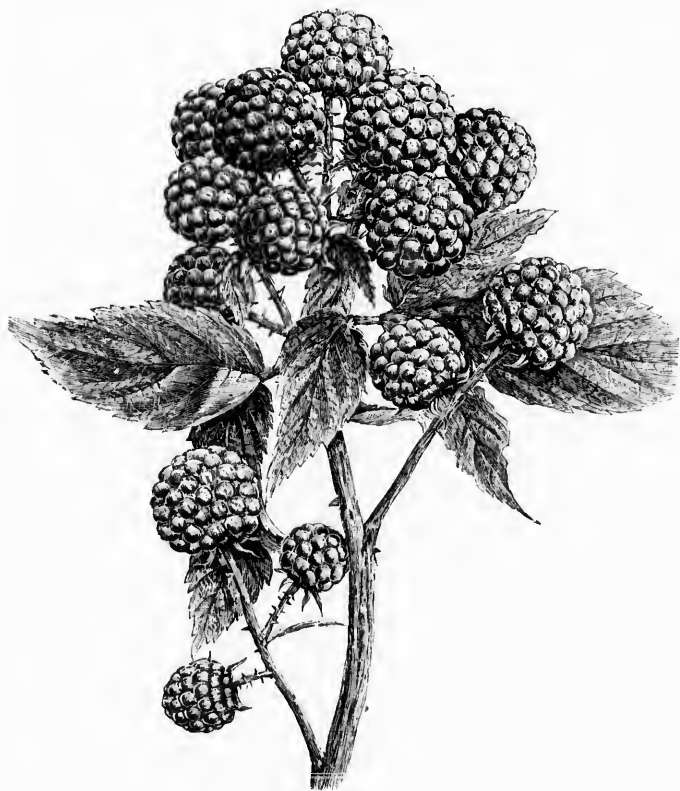


Fig. 4. HILBORN.

HERSTINE.—Red. Originated with Mr. W. D. Herstine of Philadelphia. Cane fairly vigorous, but needs winter protection here. Fruit,

large, bright red, rather soft, productive; quality good. Ripens, medium to late. While of better quality than Heebner, on account of its lack of vigour and want of hardiness the Heebner is to be preferred.

HILBORN.—Black cap. (*See Page 15*). Named after the introducer, W. W. Hilborn, Leamington, Ontario, and said to be an accidental seedling. A medium early sort, of good quality and a heavy bearer. The cane is hardy but has been somewhat affected with 'Anthracnose.' This is an excellent berry for a near market, but is of special value to the amateur grower; it is also valuable for canning. "Older" will probably prove a strong competitor coming in as it does at the same season.

HIGHLAND HARDY.—Red. This variety has been popular in certain sections in New York State, chiefly on account of its earliness, but is now being superseded by Cuthbert and Marlboro'. It has been found here to be lacking in vigour. The fruit is too small to compete with other varieties now in cultivation.

HORNET.—Red. A French variety of large size and fine quality, but quite tender in this vicinity. Can only be grown in the colder sections by giving it winter protection, and then in a limited way.

KNEVETT'S.—Red. An English variety introduced many years ago. Planted here in 1892. Fairly vigorous, but much affected by leaf and cane rust. The fruit is of the largest size, round, dark red, rather soft; of good quality; ripens in mid-season. Not hardy. Not promising.

KENYON.—This was introduced by O. A. Kenyon of McGregor, Ia., as a chance seedling in 1885. Evidently belongs to the European type of raspberry, and does not seem to be entirely at home in this climate. The cane thus far is rather a weak grower, and the foliage liable to rust. Berry large, dark red, soft, of good quality; hardly promising here. In Iowa, Prof. Budd reports it hardy and promising.

LOUIS BONNE.—Imported from France by W. W. Dunlop of Montreal in 1892. The plant is a moderate grower with curious blackberry type of foliage. The fruit has been of no value on account of imperfect setting. A large proportion of the drupes fail to develop.

MAMMOTH CLUSTER.—Black cap. (*McCormick of the West*). Originated in Indiana many years ago. The cane is vigorous and productive, but is easily broken by snow and the force of wind. Up to the time that Gregg and Hilborn were introduced, it was the favourite mid-season black cap. The berry is softer and less attractive than Hilborn.

MARLBORO'.—Red. Originated with A. J. Caywood, of Marlboro', N. Y., the product of a cross between a hybrid and Highland Hardy. It was introduced in 1884. As a market variety it is now extensively grown; but, as a correspondent pointedly remarks, "the public have made a note of it and now want something as fine looking, but of better quality." It has proved itself, during the past trying season, to be a very reliable variety. In many situations it has withstood the winter's cold better than most other varieties. It is not a free grower and requires

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Fig. 5. MARLBORO'.

firm; quality, medium to poor. Season, among the earliest; fairly productive.

MUSKINGUM.—Purple. From Ohio. This is of the Shaffer type, but does not seem to be any improvement on that variety. It is a trifle firmer and somewhat smaller.

NIAGARA.—Red. Planted in 1888. Plant fairly vigorous and hardy; very productive. Berries medium to large, round, dark red, moderately firm, pleasant acid, ripens with Marlboro'. A good many of the berries are imperfectly developed. This variety is worthy of trial.

OLDER.—Black cap. Said to have originated as a chance seedling in the garden of Mr. Older, of Independence, Iowa, it was first introduced in a small way by L. K. Ballard, of Warren, Ill., but in 1882 was offered to the trade by R. D. McGeehon, of Atlantic City, Iowa. It was planted on the Experimental Farm in the spring of 1892, and has given an abundant crop of berries the past two seasons. The cane is an exceedingly vigorous grower, is hardy and strikes from the tip very readily. Berries are large, round, dead black; bloomless, with very large drupes. The seeds are not prominent, and the berries are borne in good sized clusters. It also has the habit of fruiting heavily on young wood. During the past season it

began to ripen with Hilborn and continued bearing until after the sea-



Fig. 6. OLDER.

son of Gregg had closed. From present experience this would seem to be a very profitable variety.

ORANGE. Yellow (*Brinckle's Orange*).—This variety, commonly accepted as a standard of excellence among raspberries, originated with Dr. D. W. Brinckle, of Philadelphia, about 50 years ago. The plant is a weak grower and very sensitive to cold. It cannot be grown satisfactorily in this vicinity without careful winter protection. The fruit is of a clear orange yellow colour, of fair size, but soft in texture. Quality, best.

OHIO.—Black cap. This is said to have originated in the State which bears its name. The cane is a hardy vigorous grower and very productive. The fruit ripens in mid-season and is of good quality, but the seeds are unpleasantly prominent. Mr. Crozier states that this

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variety is grown in Western New York by the hundreds of acres "for evaporating purposes and for use in the fresh state." On account of its seediness it is particularly esteemed for drying.

PALMER.—Black cap. Originated with F. R. Palmer, of Mansfield, Ohio, and introduced in 1888. It was planted in 1892, and has proved moderately vigorous. It is one of the earliest varieties tried. The picking season is, however, very short, usually not extending over ten days. Fruit, medium size, glossy black, juicy, of good quality. Thus far it has been slightly more productive than Souhegan and Tyler. It is doubtful, however, that it will supersede these varieties in this locality. In 1893 it was quite promising, but the past season the later pickings were unsatisfactory.

PARNELL.—Red. On somewhat cold soil the plant has proved a weak grower. Fruit, medium to large, conical, dark red, richly acid, texture soft, quality good. On good soil this would probably prove valuable for home use or near market.



Fig. 7. PIONEER.

PIONEER (Progress).—Black cap. This originated in New Jersey some years ago. It was offered to the public in 1889 by the Lovett Co., of New Jersey, under the name of "Progress." Plant, vigorous, but the canes are brittle and easily break down; propagates very readily. Fruit

ripens somewhat later than Tyler or Souhegan. It is of medium size, rather seedy and of fair quality. Worthy of trial.

RANCOCAS.—Red. Introduced by W. H. Moon, of Morrisville, Pa., in 1884. It is one of the earliest, as well as one of the hardiest varieties which we have in cultivation. It has not been productive here, and the fruit is too soft and too apt to crumble when picked, to merit special praise.

REEDER.—Red. Origin, a chance seedling found by Mr. Reeder, of Berien County, Michigan, 1875. Medium size, round, fair quality, moderately firm, a little earlier than Marlboro', but smaller, rather soft. The canes are also rather tender, and should always be covered in the autumn when grown in this locality.

ROYAL CHURCH.—Red. Thought to be a seedling of Herstine by the originator Mr. Royal Church, of Harrisonville, Ohio. Plant moderately vigorous and hardy, though not equal to Cuthbert in this respect; berry, medium to large, round, bright red with very large drupes which are inclined to break apart, making the fruit rather crumbly. Season, medium; quality, good. Not promising here as a market sort and not equal to other varieties for home use. In other localities it is highly spoken of.

SHAFFER.—Purple. This valuable variety was found as a chance seedling on the farm of Mr. Shaffer in Munroe Co., N. Y., and introduced by Chas. A. Green, the nurseryman, in 1878. It is sometimes known as "Shaffer's Colossal." The plant is a fine strong grower, an immense bearer of large purple berries, which are rich and juicy, putting it at the head of the list of canning berries, at least for home use. Its dull colour and lack of firmness prevent it taking a high place as a market variety, but where well known it is highly appreciated. Mr. Wellington Boulter, Picton, Ont., however, does not use the Shaffer in his commercial canning establishment on account of the softness of the berry.

SUPERLATIVE.—Red. Belongs to the European type. Plant lacking in vigour and hardness. Berry large, pointed, dark red, Cuthbert type in appearance, very soft, of good quality. This variety on rich soil with good cultivation and winter protection might be useful for home use.

SMITH'S PROLIFIC.—Black cap. Originated about ten years ago on the ground of Ezra G. Smith of Manchester, N. Y. Planted here in the spring of 1892. Cane, a rampant grower, but tender. Fruit rather larger and later than Hilborn; not so productive, but still a good cropper. It will receive further trial.

SMITH'S GIANT.—Black cap. Received from the originator, Mr. A. M. Smith of St. Catharines, Ont., in 1891. Plant, a strong grower, fairly hardy. Fruit, medium to large, of good quality, ripening somewhat earlier than Gregg. Mr. Smith claims it surpasses that variety in hardness. On these grounds there has been little difference noticeable.

STAYMAN'S No. 5.—Red. Since named *Olathe*. Originated with J. Stayman of Leavenworth, Kansas, from seed of Reliance. Cane,

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hardy but a weak grower. Fruit, of medium size and quality. Not promising here, though spoken well of elsewhere.

SOUHEGAN.—Black cap. Originated in New Hampshire from seed of Doolittle. It is the standard early black cap, but without high cultivation the berries become small and the canes soon die out.

THOMPSON'S EARLY PROLIFIC.—Red. A chance seedling introduced by the Cleveland Nursery Company, of Ohio, in 1888. It has proved a moderate grower, fairly hardy. Fruit firm, medium size, round, bright red; quality, medium. It ripens here usually during the first week in July, but after one or two pickings the size rapidly diminishes. It does not seem to be much of an improvement on Hausell.

THOMPSON'S EARLY PRIDE.—Red. Same source as last. As fruited here, not sufficiently distinct from the last to warrant a description, or sufficiently valuable for general cultivation.

TURNER.—Originated 60 years ago by Prof. Turner, of Illinois. A very vigorous red raspberry, one of the hardiest of the class. Since the advent of the Cuthbert, its popularity has been waning. Fruit, medium size, pointed, crimson, lacking firmness, very juicy. It suckers very freely. For exposed situations this is a very valuable berry, but is not sufficiently firm for transportation. One or two instances of the impotence of this variety with its own pollen, have been brought to my notice, when it has been planted on rich soil. In such situations it seems to have run largely to wood at the expense of fruitfulness.

TYLER.—Black cap. Originated in New York a few years after Souhegan. There is practically no difference between the fruit of these varieties. Tyler is perhaps a stronger grower and may succeed better under unfavourable circumstances.

SEEDLING AND HYBRID RASPBERRIES.

Extensive experiments have been carried on in the work of originating and testing seedlings and hybrids since the spring of 1888. In this line of work this division was fortunate in securing the large number of valuable seedlings and hybrids grown and originated by Prof. Saunders, at London, Ont., prior to his connection with the Farm. A report on these seedlings by a committee of the Fruit Growers' Associations of Ontario and Quebec appears in the annual report of the Experimental Farms for 1890, page 100. The varieties then noted have since been carefully tested on a more extensive scale.

One variety not mentioned by the committee in this report for the reason that, being very late, it was not at its best during the time of their visit, has since shown so many points of excellence that it has been named and is now being propagated for distribution. It has been described as follows:—

SARAH.—(Record number 4-38.) Produced in London, Ont., by Prof. Saunders, from seed of Shaffer's Colossal. Plant a moderate grower, suckering freely, and propagating naturally only in this way.

The foliage seems to be intermediate between the European raspberry *Rubus Idaeus* and the American *Rubus Strigosus*. The canes have been



FIG. 8. SARAH.

affected to some extent by anthracnose, but not more than Cuthbert or Marlboro' growing on the same side. Fruit large, round; drupes large, deep garnet, firm, very juicy, pleasantly acid and exceptionally rich. See Fig. 6. A few ripe berries were seen last year, and this year, at the time of the first picking of Cuthbert, but the main crop did not ripen till the season of Cuthbert was over, the last picking taking place each year from the 8th to 12th August.

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A striking characteristic of this variety is its habit of ripening the fruit in consecutive order and with much regularity, on the canes, beginning with the terminal clusters of each branch. Of course this habit is in a measure characteristic of all red raspberries, but none that I know of carry the peculiarity to the same extent.

With regard to the list reported on by the committee referred to, additional experience has in many instances modified opinions then expressed. Quite a number have proved more productive than named sorts: but the difficulty has been to secure a variety with fruit firm enough to answer the requirements of a market berry. Last spring the following varieties were chosen, named by Prof. Saunders, and a few plants of each sent to the Branch Farms for trial. They have all proved fairly productive. They will not be distributed till their usefulness has been satisfactorily demonstrated.

RASPBERRIES.

Record Number.	Name.	Origin.	Propagated by	Colour.	Size.	Texture.	Quality.	Season.	Plant.
3-13	Count.....	Seedling of Biggar's Seedling.....	Suckers.....	Red.....	Large.....	Moderately firm..	Good.....	Early.....	Vigorous.
5-41	Citizen.....	Gregg X. Cuthbert.....	do.....	Purple.....	Medium.....	do.....	do.....	Mid-season.....	Fairly vigorous.
3-11	Carleton.....	Seedling of Biggar's Seedling.....	do.....	Red.....	do.....	Soft.....	do.....	Early.....	do
3-39	Craig.....	Unknown.....	do.....	Red.....	Large.....	Moderately firm..	do.....	Mid-season.....	do
5-42	Duncan.....	Gregg X. Cuthbert.....	Suckers and tips..	Purple.....	Large.....	do.....	do.....	Late.....	Vigorous.
6-47	Empire.....	Seedling of Biggar's Seedling.....	Suckers.....	Red.....	Large.....	Firm.....	do.....	Early.....	do
3-21	Garfield.....	do.....	do.....	Red.....	do.....	do.....	do.....	Mid-season.....	Weak.
3-52	Garnet.....	Seedling of Philadelphia.....	do.....	Purple.....	Medium.....	Moderately firm..	do.....	Late.....	Vigorous.
3-8	Lady Ann.....	Seedling of Biggar's Seedling.....	do.....	Yellow.....	do.....	do.....	Best.....	Mid-season.....	Weak.
3-14	Muriel.....	do.....	do.....	Red.....	Large.....	do.....	Good.....	do.....	Vigorous.
3-36	Mary.....	Unknown.....	do.....	Red.....	do.....	do.....	Best.....	do.....	Weak.
3-17	Sharpe.....	Seedling of Biggar's Seedling.....	do.....	Red.....	do.....	Firm.....	Good.....	Early.....	Vigorous.
6-34	Sir John.....	do.....	do.....	Red.....	do.....	Soft.....	do.....	do.....	do
8-72	Trusty.....	Unknown.....	do.....	Red.....	Medium.....	Firm.....	do.....	Late.....	do

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DISEASES.

A serious disease affecting both the red and black cap raspberries, as well as blackberries, has appeared in most parts of the country to a greater or less extent during the last 8 or 10 years. This is called "Anthracnose" or "Raspberry Cane Rust" (*Glæsporium venetum*).



Fig. 9. ANTHRACNOSE—GLÆSPORIUM VENETUM.

It appears as brown or grayish blotches or pits upon the young shoots, petioles, leaves and stems, soon after they have attained a height of 12 or 15 inches. The ill effects of the disease are more apparent on two year old or bearing wood, than up on the summer sprouts. The effect is seen in the shrivelling of the fruit before maturity. The blotches enlarge as the

season advances, increasing in size to such an extent as to encircle the stem. All the growing parts of the plant thus being affected, the cane usually withers and dies before fruiting.

Diseased plants have small buds and unhealthy looking leaves. The vegetative portion of the fungus penetrates the intercellular spaces of the host plant and robs it of its food material. The disease reproduces itself by means of summer spores which are distributed by natural agencies, and it is probably carried through the winter by means of the vegetative portion or mycelium of the fungus, which is supposed to be of a perennial character.

In the case of the black raspberry the characteristic blotches very often appear first at the base of the cane. The same general effect then follows as in the case of the red raspberry.

TREATMENT.

Experiments in treating this disease by spraying with Bordeaux mixture have been carried on during the last two or three years. It cannot be said to yield readily to this treatment, although it may be kept in check by spraying faithfully.

Prof. Green, of the Ohio Experiment Station, publishes the results of successful experiments in treating this disease and gives instruction for its treatment by spraying with Bordeaux mixture as follows:—

“The first application should be made early in the spring before the leaves open, at which time the spraying should be very thoroughly done. The second application should be made soon after the young canes appear above ground, and the spray directed to them alone. The third application is to be made about two weeks from the date of the second, taking the same precaution to spray the young canes principally. The fourth and last application should be made just previous to the time of blooming, in the same manner as advised for the second and third sprayings. Raspberry leaves are very tender, and the mixture may injure them slightly, but not enough to preclude its use, especially if some care is taken to keep it off the leaves of the bearing canes. The leaves on the young shoots of the current season's growth are not so easily harmed, hence no pains need be taken to keep it off them.”

Mr. Green also reports good results from the use of ammoniacal copper carbonate solution, stating that it can be used “with even less harm to the foliage, but, all things considered, the dilute Bordeaux mixture is preferred.” It is advisable to cut out and burn all fruiting canes each summer as soon as the crop is gathered.

ORANGE RUST.

Another troublesome disease affecting blackberries, however, more than raspberries is known as the “Orange Rust,” (*Uromyces nitens*). The following description of the disease is given by Dr. Clarence M. Weed, in his work on “Fungi and Fungicides.”

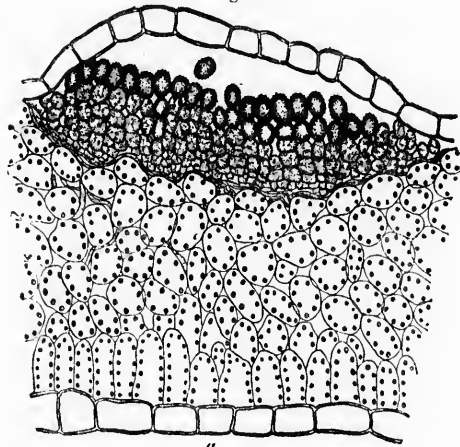
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“The disease becomes noticeable as soon as the foliage expands in spring, affected leaves having a peculiar golden colour, which at once distinguishes them. A little later the surface becomes more or less covered with small round patches of orange-coloured spores, to which the common name is due. The life-history of the fungus has only recently been definitely worked out.

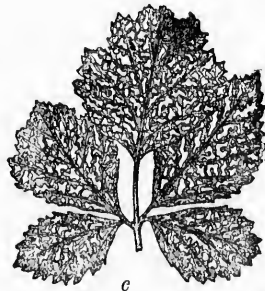
Fig. 10.



a
Section of Blackberry leaf showing development of orange rust spores, magnified.



b
Raspberry leaf affected by orange rust.



c
Blackberry leaf affected by orange rust.

“The fungus exists on the blackberry plant in two very different stages. The orange spores that are developed in spring and early summer, as shown in Fig. 10, belong to the *acidium* stage. [The above illustration

has been kindly loaned by the Ohio Experiment Station.] They germinate on the leaves of the raspberry and blackberry; the germinating tubes enter the stomata or breathing pores of the leaf, develop a mycelium inside and finally produce on the surface, the spores of the *teleuto* stage, which had heretofore been considered an entirely different fungus, called by botanists *Puccinia peckiana*. These Puccinia spores are believed to be washed down to the underground shoots, and to infect them with the mycelium, which subsequently produces the orange spores of spring. Blackberries are most commonly affected by this fungus, especially certain varieties, but black cap raspberries often suffer also.

TREATMENT.

“All diseased canes should be cut out and burned as soon as they show signs of disease. Insist on your neighbours keeping the rust in check, and also look out for wild plants that have it. A spraying with fungicides will doubtless assist in preventing infection, especially of the Puccinia stage.”

SELECT LIST OF RASPBERRIES FOR GARDEN CULTURE.

YELLOW—Brinckle's Orange, Golden Queen.

RED—Heebner, Cuthbert.

BLACK—Older, Gregg.

PURPLE—Shaffer.

LIST FOR COMMERCIAL PURPOSES.

YELLOW—Golden Queen.

RED—Hansell, Marlboro', Cuthbert.

BLACK—Older, Hilborn, Gregg.

PURPLE—Shaffer (for near market).

