

JUNE 27, 1914.]

THE  
GARDENERS' CHRONICLE

A Weekly Illustrated Journal

OF

HORTICULTURE AND ALLIED SUBJECTS.

*(ESTABLISHED IN 1841.)*

VOL. LV.—THIRD SERIES.

JANUARY TO JUNE, 1914.

LONDON:  
41, WELLINGTON STREET, COVENT GARDEN, W.C.

1914.  
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THE

# Gardeners' Chronicle

No. 1,429.—SATURDAY, MAY 16, 1914.

## CONTENTS.

American Gooseberry Mildew and its cure	325	Owls, strange nesting- place of	337
Beauty of fruit blossom	335	Pachysandra procumbens	335
Books, notices of— Hardy Coniferae	329	Peach "curl"	336
The Seasons	329	Plants, new or noteworthy— Cypripedium Pereirae	326
Chinese trees and shrubs	333	Potato crop in 1913	333
Cut flowers, the treatment of	333	Rhododendron Searsiae	335
Dahlia Show, the National Society's	333	Rhubarb, the cultivation of, for medicine	327
Damage to fruit by frost	336	R.H.S. Chelsea Show	332
Double flowers, a lecture on	332	Servants of the Crown Societies— Debating Club	339
French horticulture, notes on	329	Horticultural Club	337
Fuchsias for summer bedding	327	Manchester & North of England Orchid Perpetual-flowering Carnation	333, 339
Holly Hill, Buckinghamshire	334	Royal Horticultural (Scientific Committee)	337
Hospital egg week	333	Scottish Hort.	339
Kensal Town, new public garden at	333	United Horticultural Benefit & Provident	339
Leonardslee and Sussex charities	333	Trees and Shrubs	336
Manganese as a fertiliser	332	Veronicas, disease of	335
Narcissus fly, the	336	Week's work, the— Apiary	331
Obituary— Earp, William	341	Flower garden, the	330
Tieghem, Philippe	342	"French" garden, the	330
Orchid notes and gleanings— Classification of hybrids	326	Fruits under glass	331
Oncidioda Mauricii	326	Hardy fruit garden	331
Three Canadian Cypripediums	327	Kitchen garden, the	331
Orphan Fund, Royal Gardeners'	333	Orchid houses, the	330
		Plants under glass	330
		Winter spraying with nitrates	333

## ILLUSTRATIONS.

Cypripedium spectabile growing wild in Canada	327
Dutch garden and rosary at Holly Hill, Buckinghamshire. (Supplementary Illustration.)	
Holly Hill, Buckinghamshire, view in the gardens at	329
Oncidioda Mauricii	326
Pachysandra procumbens	335
Peronospora grisea, a disease of Veronica	336
Rheum officinale, a field of, in flower	325
Rhododendron Searsiae	334

## NEW FACTS CONCERNING AMERICAN GOOSEBERRY MILDEW AND ITS CURE.

THE purposes of this article are to describe the results obtained by the author in a series of spraying experiments carried out in 1913, and to draw attention to some fresh facts which have been discovered in the life-history of this mildew.\* Both matters are likely to prove of importance to the gardener and fruit-grower. It is satisfactory to note that while, unfortunately, the official legislative measures which were adopted on the importation of this new pest have not prevented its spread far and wide over the country, the attention which has been directed to this mildew is resulting in the acquisition of a better knowledge both of the details of its life-history and of the means of checking its ravages. As will be seen from the facts mentioned below, there is now reason to believe that gardeners, and fruit-growers of a small acreage of Gooseberries, will be able, if attention is paid to certain all-important points, to prevent epidemic outbreaks of the mildew, and save the crop and bushes from serious injury.

In the spraying experiments carried

out with the assistance of Mr. R. G. Hatton, plots comprising several hundred bushes of a number of different varieties, situated on commercial fruit-farms at three centres in Kent (Rodmersham, Mereworth, and Boughton-under-Blean) were sprayed with either the lime-sulphur wash or with a solution of liver of sulphur. The results obtained show clearly the superiority of lime-sulphur over liver of sulphur for preventing the spread of the mildew in its white powdery "summer stage." In one experiment bushes previously quite free from mildew were observed to show a slight trace of it on June 6. The bushes were immediately drenched with the liver of sulphur solution at the strength of two ounces to three gallons of water—clearly the strongest solution advisable, since at this strength the tips of the youngest shoots are turned brown and killed, and the edges of the young leaves are scorched and shrivelled. Another drenching with the same wash was given on June 12—less than a week after; yet an examination on June 23 showed that the disease had not been appreciably checked, many of the shoots and berries being smothered with mildew. Similar results were obtained in other sprayings, while in most cases the use of the lime-sulphur wash greatly checked the spread of the disease.

The lime-sulphur spray at full strength (1.01 sp. gr.) can be used during the early part of the season, April to June, and probably during July in most years, on the varieties named below, without causing any serious injury, even when applied several times successively to the same bushes. The bushes which may be thus treated are:—Whinham's Industry, Rifleman, Warrington, May Duke, Howard's Lancer, Gunner's Seedling, and Cousin's Seedling (Sandwich Yellow), and, when growing in a shaded position, Berry's Early and Lancashire Lad. The varieties named below are liable to be injured if the bushes are sprayed many times successively, or if they are situated in a sunny position:—Berry's Early, Freedom, Lancashire Lad, and Crown Boh. and it is, therefore, advisable to use the half-strength lime-sulphur wash (1.005 sp. gr.) on these varieties, and to avoid spraying late in the season. The varieties Yellow Rough (Golden Drop) and Valentine's Seedling show so great a susceptibility to injury by lime-sulphur and other sulphur-containing fungicides that they cannot be treated.

In early seasons—such as the present season, when the mildew made its appearance so soon as April 6—spraying should be commenced as a general rule in mid-April in all plantations where the disease occurred in the previous season: in other circumstances the first week in May is early enough. The spraying with lime-sulphur should be continued at intervals of about a fortnight to within about a month of the picking of the berries, when the liver-of-sulphur solution or flowers of sulphur should be tried for the purpose of stopping the spread of the mildew to the fruit. By these means it

should be possible to grow a clean crop of berries. After the crop has been gathered a good final spraying with lime-sulphur should be given.

The advantages of the lime-sulphur wash are its cheapness, ease of application, and adhesiveness when dry; a slight disadvantage consists of its sediment marking the berries. The wash is best purchased from firms of repute, who now place on the market lime-sulphur in a concentrated form, with a guaranteed specific gravity of 1.3. Lime-sulphur washes of unknown specific gravity should always be avoided. One gallon of the concentrated wash of 1.3 sp. gr. requires making up with water to 30 gallons in order to obtain the full strength wash of 1.01 sp. gr. suitable for spraying the most varieties of Gooseberries; for the half-strength wash of 1.005 sp. gr. one gallon must be made up with water to 60 gallons. The wash is best applied by a knapsack pump, which must be fitted with a nozzle which gives a fine misty spray, such as is supplied with the Vermorel "Eclair" knapsack pump.

The spray, when dry, is so remarkably adherent that even heavy rains do not wash it off; consequently, if there are berries on the bush they become much marked by the whitish sediment. The handling of the berries in the operation of picking removes a good deal of the sediment, and should any appreciable amount still remain, and this be objected to, the berries can be cleaned by a vigorous rinsing in water. It is pointed out—and this is a matter which will need emphasising now that the use of lime-sulphur is becoming so common—that there can be no danger to health in the use of berries with lime-sulphur sediment on them; sulphur is not a poison, and the very small quantities present on berries could not possibly cause any disagreeable effects. As a matter of experiment, I took some berries, which had been specially heavily sprayed with lime-sulphur, with the result that when dry, they were well covered with the whitish sediment, and boiled them with sugar as in ordinary domestic cookery; it was found that no objectionable smell was given off during the cooking, and that the berries when eaten had no objectionable taste or unpleasant after-effects.

While, however, spraying with lime-sulphur is very often successful in keeping the mildew from attacking the berries, I find that in cases where the soil under or round the bushes has become infested with the "winter spores," the berries become badly mildewed in spite of frequent and thorough sprayings. In order to understand how this happens a brief review of the main facts in the life-history of the mildew is necessary. As shown in the coloured illustrations published in *Gard. Chron.*, Dec. 7, 1912, the American Gooseberry mildew passes through two distinct stages in its life-cycle every year: in its "summer stage" it is white and powdery and extremely infectious, the "powder" consisting of myriads of minute "summer spores" (conidia), very light and easily carried by the wind. These spores:

\* See *Journal of the Board of Agriculture*, March, 1914.



convey the disease to the leaves, shoots, and berries, and in this stage the disease can be checked by spraying. In the second stage—called the “winter stage,” because, although formed during the summer, it carries on the life of the mildew through the winter—the fungus becomes dense and scurf-like, and produces hundreds of minute blackish fruit-bodies (perithecia), inside each of which is found a little sac (ascus) containing eight “winter spores” (ascospores). No spraying is of any use against this winter stage, because, the walls of the fruit-body being of a corky nature, no chemical is able to penetrate them and reach the “winter spores” inside; consequently, the only way of dealing with the winter stage is to remove and burn it. From personal observations I am able to describe the mode of opening of the perithecia. When moistened with water, a perfectly ripe fruit-body soon cracks open by a slit at the top, and the contained sac begins to swell and protrude through the opening. In about five minutes the sac has swollen enormously, and has become about eight times as large as it was when inside the fruit-body. The wall of the sac becomes thinner and thinner in consequence of the increase in size—just as in the case of a bladder or soap-bubble when blown out—until in a short time it splits and the eight “winter spores” are forcibly ejected into the air to a distance of about 1 inch. Carried about by currents of air, these ascospores reach the leaf-stem or berry and give rise in a few days to fresh patches of mildew in its white, powdery, infectious “summer stage.”

Now, these fruit-bodies are at first firmly attached to the brown patches of “spawn” on the shoots; but as these patches begin to be affected by weather conditions in winter they become loose and drop to the ground. There they remain during the winter, burst open in the spring, and discharge their “winter spores,” which give rise to the fresh spring and early summer outbreaks. This fact has been known for some time, and on this account the removal and burning of all diseased tips of shoots in the early autumn—about October—has been enforced (so far as possible) by the authorities. I have discovered, however, that this soil infestation may take place much earlier. Thus, in August the fruit-bodies formed in the “winter stage” on infested berries have become free; when such a mildewed berry is gently tapped over a piece of white paper hundreds of just visible black “specks” may be observed; these are ripe fruit-bodies containing mature “winter spores.”

In the light of this fresh fact, it is a matter of great practical importance in fighting the mildew not to allow berries with any brown “winter stage” on them to remain on the bush, as there will always be the serious danger of the soil under the bushes becoming heavily infested, in which case spraying in the next season would probably be of little avail in keeping off the mildew from the berries. It was observed that last season this infestation of the soil occurred in August in many plantations in Kent, where late dessert varieties of Gooseberries are grown.

Another fact of equal practical importance is the frequent occurrence of the “winter stage” of the mildew on the leaf of the Gooseberry. In cases where the shoot is severely attacked the young leaves become arrested in growth, and finally covered with the brown “winter stage.” In other cases the leaf itself is not affected in size or shape, and the mildew is confined to the lower part of the leaf-stalk, where a small brown patch of the winter stage is formed. In either case, if such diseased leaves are allowed to fall to the ground they inevitably infest the soil, with the result that next spring the “winter spores” cause fresh outbreaks of mildew. To prevent such soil infestation, “tipping” in August before the leaves fall must be resorted to.

Taking everything into consideration, “tipping” in August or early in September before the leaves have fallen is to be strongly recommended. In some seasons and with bushes of a certain age no further growth of the shoots will take place after this tipping is done; and if all the mildew has been cut off the bush is freed from the parasites, since the disease is always confined to the young wood. If, as will probably occur in some seasons, a little fresh growth is made and this becomes infected with mildew, the grower will still be in a better position, since there will certainly be much less disease to be removed before the “fruit-bodies” fall to the ground.

The following conditions of culture help bushes to withstand attacks of mildew:—(1) An open



FIG. 143.—ONCIDIODA MAURICII: SEPALS AND PETALS DULL PURPLE, FRONT OF LIP PRIMROSE YELLOW

(R.H.S. Award of Merit, May 5, 1914.)

situation. (2) Not too close planting. (3) A natural unforced growth; such is obtained naturally in a good soil or by well-balanced manuring. Excessive nitrogenous manuring—e.g., heavy dressings of organic manures—causes the bushes to produce sappy shoots, which are liable to become virulently attacked by mildew.

In conclusion, it may be pointed out that it is clear that, with the new facts now brought forward, the combat against the American Gooseberry mildew has entered on a fresh stage. If we may conclude, as there seems ground for doing, that the lime-sulphur spray will keep the “summer stage” from doing serious injury, and

that “tipping” in August or September will prevent soil infestation, then all growers of Gooseberries on a small scale should not find it too difficult a task to grow a healthy crop of Gooseberries in spite of the introduction into this country (and doubtless the permanent establishment) of this most serious pest of the Gooseberry. E. S. Salmon.

## NEW OR NOTEWORTHY PLANTS.

### CYPRIPEDIUM PEREIRAE.

THE subject of this note is a remarkable *Cypripedium*, of which a specimen in formalin and a coloured drawing were sent to me by Mr. J. D. Pereira, Singapore. The plant which he has for sale was obtained on one of the islands near the Laukawi group north of Penang, the home of *Cypripedium niveum*. He suggests that it may be a natural hybrid between *C. niveum* and *C. exul*, although, so far as we know, the latter species has not yet been met with in this region. It certainly has the appearance of being a hybrid of *C. niveum*, with some other species at least allied to, if not actually, *C. exul*. The leaves are linear, rounded, and unequally lobed at the tip, 15 cm. long, green, faintly mottled; the peduncle is 12 cm. or more long, the bract lanceolate, much longer than *C. niveum*, but shorter than *C. exul*, shorter than the ovary. The flower is white, with pink spots on the bases of the upper sepal and the petals. The upper sepal is ovate, pubescent, obtuse, 12-nerved, 3 cm. long, broad-based, and as wide and less orbicular in outline than in *C. niveum*. The lower connate sepals are lanceolate, ovate, obtuse, 3 cm. long and 2.5 cm. wide, shorter than the lip. The petals are oblong, undulate, slightly twisted at the tip, pubescent all over, 4 cm. long and 1.5 cm. across, utterly unlike those of *C. niveum* and its allies. The lip is glabrous, a little longer than the sepals, longer in proportion to its width than in *C. niveum*, with the basal lobes well developed and strongly incurved, as in *C. exul*. The column is thick and hairy, the shield obovate, pubescent, broad, with a short terminal median tooth, but no central base (as there is in *C. exul*), nor is it cordate at the base.

No artificial hybrid of these two species appears to have been made as yet, but a study of the peculiarities of the different organs seems to suggest that Mr. Pereira's theory is correct, and that it is a natural hybrid between the two species. I gather from his letter that only one clump of four plants has been found. It seems to be quite a handsome plant, the nearly pure white flower standing up well on its tall stalk. H. W. Ridley.

## ORCHID NOTES AND CLEANINGS.

### ONCIDIODA MAURICII.

OUR illustration (fig. 143) represents this interesting cross between *Oncidium tigrinum* and *Cochlioda vulcanica*, for which Monsieur H. Graire, Amiens, received an Award of Merit at the Royal Horticultural Society's meeting on May 5. The sepals and petals are dull purple and the lip primrose yellow. The hybrid is a very interesting one, in that the colouring of the outer segments is like the *Cochlioda*, whilst the lip resembles the *Oncidium*.

### CLASSIFICATION OF HYBRID ORCHIDS.

Mr. J. GURNEY FOWLER, chairman of the Orchid Committee of the Royal Horticultural Society, submitted at the last meeting of the Orchid Committee, for the consideration of the