New York Agricultural Experiment Station.

POPULAR EDITION
OF
BULLETIN NO. 124.

PREVENTIVE TREATMENT OF RASPBERRY ANTHRACNOSE.

APRIL, 1897.

GENEVA, N. Y.
BOARD OF CONTROL.

GOVERNOR BLACK, Albany.
WILLIAM C. BARRY, Rochester, Monroe County.
S. H. HAMMOND, Geneva, Ontario Co.
MARTIN V. B. IVES, Potsdam, St. Lawrence Co.
A. C. CHASE, Syracuse, Onondaga County.
F. O. CHAMBERLAIN, Canandaigua, Ontario Co.
F. C. SCHAUB, Lowville, Lewis Co.
NICHOLAS HALLOCK, Queens, Queens Co.
LYMAN P. HAVILAND, Camden, Oneida Co.
G. HOWARD DAVISON, Millbrook, Dutchess Co.

OFFICERS OF THE BOARD.

MARTIN V. B. IVES, - President.
W. O' HANLON, - Secretary and Treasurer.
S. H. HAMMOND,
W. C. BARRY,
F. O. CHAMBERLAIN,
F. C. SCHAUB

Executive Committee.

STATION STAFF.

W. H. JORDAN, Sc. D., Director.
L. L. VAN SLYKE, Ph. D., Chemist.
WM. P. WHEELER, First Assistant.
S. A. BEACH, M. S., Horticulturist.
VICTOR H. LOWE, B. S., Entomologist.
*F. A. SIRRINE, M. S., Entomologist.
*F. C. STEWART, M. S., Mycologist.
FRANK H. HALL, B. S., Editor and Librarian.
GEO. W. CHURCHILL, Agriculturist and Sup't of Labor.

WENDELL PADDOCK, B. S., Assistant Horticulturist.
C. G. JENTER, Ph. C., Assistant Chemist.
A. L. KNISELY, M. S., Assistant Chemist.
†W. H. ANDREWS, B. S., Assistant Chemist.
J. A. LE CLERC, B. S., Assistant Chemist.
†A. D. COOK, Ph. C., Assistant Chemist.
C. P. CLOSE, B. S., Assistant Horticulturist.
FRANK E. NEWTON, Clerk and Stenographer.

Address all correspondence, not to individual members of the staff, but to the New York Agricultural Experiment Station, Geneva, N. Y.

The Bulletins published by the Station will be sent free to any farmer applying for them.

*Connected with Second Judicial Department Branch Station.
†Connected with Fertilizer Control.
POPULAR EDITION*

OF

BULLETIN NO. 124.

PREVENTIVE TREATMENT OF RASPBERRY
ANTHRACNOSE.

F. H. HALL.

One of the most troublesome of the compara-
Ravages of tively few enemies of the black raspberry is the
the disease. fungous disease, anthracnose. Not striking in
color like the orange rust, slow in its development
and obscure in its effects, the disease frequently gains a firm foot-
hold in the plantation before the owner is aware of its presence
or understands its dangerous character. To one unfamiliar with
the disease or careless in observation the bushes will appear
healthy and vigorous for two years after setting; but in the third
year when they should produce their heaviest crop of fruit the
canes may bear at harvest only dry, shriveled berries and
unhealthy colored leaves. The next spring the foliage will be
pale and scanty, the leaves will soon turn brown and dry up and
by midsummer many of the plants may be dead. Many growers
have seen their plantations thus ruined in what should have been
their prime.

Usually, however, anthracnose is not so disastrous in effect; it
may continue for years in the plantation spreading only a little
each year; or it may affect the yield indirectly, lessening the
vitality of the canes and subjecting them to injury from winter-
killing and other causes which they would ordinarily withstand.

*This is a brief review of Bulletin No. 124 of this Station on Anthracnose
of the Black Raspberry, by Wendell Paddock. Anyone specially interested
in the detailed account of the investigations will be furnished, on applica-
tion, with a copy of the complete Bulletin.
It seems to be abundant in some locations, rare in others; and it affects different varieties in varying degree. The other cultivated raspberries are subject to injury as well as the black varieties and the blackberry and its near relatives are not exempt.

The disease is due to the attack of a parasitic fungus, a tiny plant which germinates and grows upon the tissues of the raspberry and lives upon the juices which its host plant has prepared for its own use. These little plants remain dormant in the diseased spots of the canes during the winter but, stimulated by warmth and moisture, they produce in the spring great numbers of minute spores, or bodies having the functions of seeds. These are borne by the wind or other agencies to spots suitable for their germination, usually upon the tender new growth of the shooting canes. They send out germ tubes which enter the delicate tissues of the raspberry just beneath the bark, divide and ramify in all directions, forming an interlacing network of threads which absorb the sap of the cells, causing them to collapse and die.

Small dark or purple colored spots with slightly raised brown or purplish borders form upon the bark, enlarge and become brown or dirty white at the center as the fungus spreads. The cane strives to heal the wounds and throws out around the spots layers of corky tissue which make rough, unsightly blotches or scabs on the bark. When abundant the diseased portions unite to form large patches, sometimes six or eight inches long and reaching nearly or entirely around the cane. In such a case the stem is most effectually girdled and soon dies. As the little parasitic plants mature each diseased area becomes a new center of infection and the fungus spreads, usually ascending the stem and keeping pace with the growth of the tender tips. Leaves and other parts of the plant may also be attacked but the most common seat of the disease is in the canes.

Like all fungous diseases, anthracnose cannot be cured; it must be prevented. To this end the diseased canes are cut out and burned to remove as completely as possible the source of infection and the young canes are sprayed during the spring and summer with some fungicide to prevent the spores from germinating when
they rest upon the plant tissues. The Station has conducted experiments along these lines for three seasons but has obtained slightly peculiar results. The spread of the disease can be quite easily checked, and its occurrence on the new canes almost entirely prevented; but the yields of fruit from such treated areas have not been sufficiently increased to make the work directly profitable.

In 1894, Mr. S. A. Hosmer, of Clifton, N. Y., offered to the Station for experiment, the three acre plot remaining of a once large plantation of Gregg raspberry. The bushes had been set in 1890 and were, when the experiment began, in a badly diseased condition, almost every cane showing large scabbed areas and many of them being nearly or completely girdled. The 50 rows of the plantation were divided, by taking every third row, into three sections. Just as the leaf buds began to swell, one section received an application of copper sulphate solution (3 pounds to 11 gallons of water); the second section, a spraying with a saturated solution of iron sulphate in water; and the third remained unsprayed throughout the season. Two rows remained, and one of them was treated at the same time with a solution of 10 parts of a saturated solution of copper sulphate and 1 part of sulphuric acid, and the other row with a 10 per cent solution of sulphuric acid. All these solutions are very strong but it was thought they could be safely applied at this time of the year as there was no foliage to injure. Both of those containing sulphuric acid, however, produced burned spots on the canes proving such treatment too heroic.

Upon all except the unsprayed rows five applications of Bordeaux mixture were made at intervals of two weeks or more throughout the season, and the berries when picked were carefully measured.

As the season progressed it was noted that treatment was very effectual in diminishing the amount of disease, only a few spots appearing on the sprayed rows; but there was no noticeable difference between those receiving the different early applications. By an error in the preparation of the Bordeaux mixture for one spraying the foliage of the treated rows was badly injured so that the yield of berries was less on these than on the check rows.

At the close of the season all diseased canes were removed, and
in 1895 the same course of treatment was pursued. Again the amount of disease was lessened materially and about the same by the two treatments but the yield of berries was only slightly increased.

In 1896 it was found necessary to make only three sprayings with Bordeaux mixture so completely had the spread of the disease been checked; yet the fruit yield showed little gain from the better health of the canes.

During the season of 1896 an experiment along the same lines, but with slight variations, was made upon a small, two-year-old, badly diseased plantation at Manchester, N. Y., owned by Mr. Luther Rice. Two sections of the plantation, as in the experiments at Clifton, received early applications of strong copper sulphate and iron sulphate solutions, followed by three applications of Bordeaux mixture; one section received only the three applications of Bordeaux; another only the last two treatments with the mixture; and the fifth was unsprayed. No advantage was shown in favor of the strong early applications, nor was the yield of fruit increased by any of the treatments; but all the sprayed rows were only slightly affected by the disease while the untreated rows contained many diseased canes.

These experiments prove beyond doubt that anthracnose of the black raspberry can be almost completely eradicated by spraying with fungicides and removing diseased canes; but the applications did not increase the yield enough to repay the expense involved; so the treatment cannot be unhesitatingly recommended to all. Each grower must decide for himself, after careful study of the condition of his bushes, whether spraying will be best or not. If anthracnose has been alarmingly prevalent in the neighborhood, if there is any suspicion that his plants have come from diseased stock, or if the plantation is to be continued for more than three years without renewal spraying will probably be advisable.

Usually the profitableness of a commercial raspberry plantation does not extend beyond its third crop and it will be found best to set out a new one. Under such conditions, if disease-free plants are used and careful culture is given anthracnose is not liable to become so troublesome as to require treatment.
The ordinary farm grower, however, frequently finds it desirable to allow his bushes to fruit more than three years and may find treatment necessary to prolong the life of the canes. In this case it will be best to cut out all diseased canes at the close of each fruiting season and to spray the new canes when the first little diseased spots appear upon them in the spring, using 1-to-11 Bordeaux mixture. Repeat the application two or more times during the season as the symptoms of the disease seem to demand.

Careful study of conditions must guide the grower, for the disease so varies in its virulence and damage in different localities and seasons that a course outlined for one set of conditions might mean only unnecessary expense under other circumstances.