VIRUS RING SPOT OF PEPEROMIA OBTUSIFOLIA AND PEPEROMIA OBTUSIFOLIA VAR. VARIEGATA

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Peperomias, both the green and variegated types, are ornamental foliage plants grown for their attractive leaves. One of the more serious diseases of the green peperomia in Florida is a ring spot which results in the leaves being disfigured and often times distorted. Plants which are seriously affected may be stunted and deformed. Many growers in this State have experienced losses of over 25 percent due to this disease. Symptoms of ring spot in commercial plantings of the variegated peperomia have not been noticed by the author.

Disease material sent in by the State Plant Board, Plant Pathology Laboratories, emphasized the serious nature of the disease and instigated an investigation to ascertain whether 1) the disease-causing entity is a virus, 2) to describe the various symptoms of the disease, and 3) to make recommendations as to possible control measures.

A ring spot disease of Peperomia obtusifolia was described and shown to be caused by a graft-transmissible virus in 1941 by Creager in Illinois (1). Reference is made to a ring spot of green peperomia by Forsberg in his handbook of "Diseases of Ornamental Plants" 1946 (2).

Infected green peperomia plants can be readily recognized by the concentric ring markings and the disfigured leaves. Some leaves, especially the young ones, may show severe distortion (cupping, curling, twisting) with or without any visible symptoms of ring spot. (Fig. 1 shows such a leaf with a chlorotic ring partly visible.) The rings are usually chlorotic but may under certain conditions appear to be necrotic with the leaf tissue sunken or grooved and following a definite zonal pattern. The concentric zonal markings may assume various designs. Young leaves may show chlorotic spots (Fig. 2) which may enlarge

Fig. 1. Young green peperomia leaf showing distortion and a chlorotic ring spot.

Fig. 2. Left—Young leaf showing small chlorotic spots—the beginning of the concentric rings. Right—Older leaf showing numerous chlorotic concentric ring spots.
into concentric rings which are readily visible. Older leaves may display one large ring which may include the entire leaf or several rings joined together to give a pattern effect as shown in Fig. 3. Ring spots on older leaves may appear only near the base of the leaf or they may occur as separate rings (Fig. 4). Rings may appear at the leaf margins in which case only half a ring spot is seen.

The ring spot may cause the lower epidermis of an infected leaf to be raised and may be mistaken for oedema. In the case of the ring spot the raised portion always assumes a zonal ring pattern. Oedema usually occurs on the under surface of older leaves and shows as small individual raised areas or bumps (Fig. 5).

Severely affected plants may be stunted and all leaves do not necessarily exhibit the ring spots. Many plants exhibit the various ring pattern on the lower or older leaves while the upper or younger leaves may appear completely healthy or show only a mild distortion.

Diseased and healthy plants were selected for studying the disease. Plants which showed no symptoms of infection were used for propagating material. Clonal cuttings were made from these plants. All cuttings were rooted and planted in 4 inch clay pots of composted soil. After these clonal plants had produced new growth, which showed no symptoms of infection, and attained a height of 4-5 inches they were decapitated and their leaves were removed. These stocks were cleft grafted as follows. A scion from a plant, showing symptoms of infection, was tapered and inserted into a slit made with a razor blade down through the healthy stock. The scion was held secure in the stock by means of a wooden...
clothes pin. After scion-stock union had occurred the clothes pin was removed and the plant left to grow.

Under the conditions in which the plants were grown chlorotic ring spots occurred in the new growth of the stock after 30-60 days. The grafted plants grew well and developed ring spot symptoms typical of the disease. Secondary grafts have been made from the diseased stocks resulting in, again, typical symptoms of infection. Healthy clonal plants were maintained throughout the length of the experiment as checks and in all cases they showed no symptoms of virus infection.

Grafting, the universal method of virus transmission has shown that the ring spot disease of *Peperomia obtusifolia* is caused by a virus, thus confirming the work of Creager (1).

Diseased peperomia leaves were triturated with a mortar and pestle. Juice thus obtained was used for mechanical inoculation by the carborundum gauze pad method to healthy green peperomia and the following virus indicator plants; *Nicotiana tabacum* var. Turkish, *N. glutinosa*, *Datura stramonium*, *Capsicum frutescens*, *Zinnia elegans* and *Gomphrena globosa*. All plants were held for a period of 30 days after which they showed no visible symptoms of infection and were discarded. The peperomias showed no visible symptoms of infection and were held for a period of 3 months after which they were grafted to healthy stocks. Virus was not recovered from these plants giving a good indication that the virus is not mechanically transmissible.

The insect vectors of most virus ring spot diseases are unknown thus, insect transmission with its many complications was not attempted at this time.

It was brought to the author's attention that the ring spot as commonly seen in the green peperomia is not noticed in plantings of the variegated variety. Plants of the variegated peperomia, *Peperomia obtusifolia* var. *variegata* (Fig. 6) were selected and used as healthy parental material from which clonal cuttings were made. These clonal plants were grafted as described and within 2 weeks the new leaves on the stock were exhibiting brown necrotic concentric rings (Fig. 7). Small brown necrotic spots occurred on the leaves with the rings and the leaves dropped within a few days. This necrotic effect and dropping of the infected leaves may account for the fact that the ring spot symptoms are not commonly seen in the variegated peperomia.

Variegated peperomia leaf tissue was rooted and green peperomia plants were obtained. These plants were grafted with diseased green
peperomia scions and reactions similar to those previously described for green peperomia were obtained.

Based upon what is known about this and similar diseases the following control recommendations are suggested. Since grafting is the only known means of transmitting the virus then its spread is most likely by the propagation of cuttings from diseased stock-plants. All cuttings taken from a diseased plant may be infected with the virus even though they show no symptoms at the time of removal. This means of spread is very important when control measures are considered and may explain why, when apparently disease-free cuttings are taken an epiphytotic may occur.

At present, the only known means of controlling the virus ring spot disease of peperomia is to rogue and destroy all infected plants. Since the symptoms may be slow in showing, the control must be based on a long term visual examination of stock-plants used in propagation. To control the disease in as short a time possible, the following procedure is recommended:

1. Select from stock beds vigorous plants which show no symptoms of infection on any of the leaves (i.e., leaf distortion, ring spotting or fungus diseases).
2. From these plants take cuttings and root them in sterilized or fumigated raised benches. If at any time symptoms of the disease is noticed destroy all cuttings taken from that plant.
3. When cuttings are rooted they may be planted directly into raised sterilized or fumigated benches. These plants would form disease-free mother or nucleus block for all increase material or stock plants. They should be kept free as possible of all peperomia diseases (Pythium Root Rot, Rhizoctonia and Phytophthora Rots). This block should be examined periodically and any plant showing symptoms of virus ring spot should be rogued. Although not known to occur it may be possible to transmit the virus by root grafts in the nucleus block. If this should be the case, and thought worth while the plants in this block may be planted in 4 inch clay pots of one plant per pot.

Though virus ring spot is at present a serious disease of green peperomia there is no reason why it cannot quickly and effectively be controlled by following the above procedure.

LITERATURE CITED


HOW TO LANDSCAPE OUR OUTDOOR SPACE FOR LIVING

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We are moving outdoors in Florida! The trend towards living out-of-doors is expressed in modern house design evidenced through the use of the Florida room, picture-windows, patios, terraces and outdoor-living areas within the home grounds. Our modern home is smaller and more compact. This tends to necessitate the extension of living out-of-doors to alleviate the feeling of cramped living. This modern house need not be just another house. It can and should be different through its design to use the space outside and adjacent to the house for outdoor-living. Florida’s sunny days and moderate temperatures provide climatic conditions conducive to this movement to the outdoors. If you are fortunate enough to be one of the thousands of people in Florida who at the present time are planning new homes, you should start thinking and planning not only the house itself, but the way the house is to fit upon the lot; the way the house and the grounds fit together; the way you will project the rooms of the house into the grounds; or the way indoor and outdoor living will be integrated to enable the family to get the most from their outdoor