



This cattleya was growing vigorously but had ugly black splotches on the leaves that did not look like any of the common maladies. It tested positive for virus.

I finally got tired of not knowing what those ugly black markings were on my cattleyas. I pulled together a group of plants that had similar blotches and streaking for testing to see if the culprit was virus. Agdia makes ImmunoStrip test kits for at home testing that are easy to use, cost between \$6 and \$10 each depending on how many you buy and give you a result in less than 5 minutes. The ImmunoStrip can be used to detect Cymbidium Mosaic Virus (CyMV) and Odontoglossum Ringspot Virus (ORSV), the two most prominent viruses found in orchid plants although there are perhaps more than 20 viruses that can infect orchids.

Virus Detection. I assembled a group of ugly duckling cattleyas that had similar leaf blighting. This group of ugly plants had necrotic markings that tended to occur initially on the older growths and then moved into the newer growths. The markings tended to express themselves on both sides of the leaves. They didn't rub off like a sooty mold, they weren't raised like edema, they weren't sunken like bacterial brown spot and they weren't surrounded by yellow halos like a bacterial infection. Sometimes the plant vigor was



impaired and the plant looked sickly, other times it was a vigorously growing plant with one or more flower sheaths. The results were not pretty.



The virus test is easy to do. You cut off a quarter size piece of the plant using sterile tools and wearing gloves. I usually cut from one of the older leaves. Insert the plant tissue into the mesh bag provided and smash it with a meat tenderizer or something similar to extract the sample until the fluid in the bag turns green. Insert the test strip into the extract; there is a slot on the side of the bag for this purpose (though I didn't know that at the time). The strip is dipped about ¼ inch deep into the fluid up to the white sample line. If you immerse it too deeply, it might overwhelm the test strip and invalidate the test.

Then you wait for the pink coloration to start traveling up the strip and ultimately form distinct lines. From left to right, the strips indicate CyMV, ORSV, a double infection with both CyMV and ORSV, and a clean test with only the control line showing.

You can probably diagnose severely infected plants exhibiting significant blotching and streaking by sight without spending the money on test strips. Other plants may just look unhappy. Despite your efforts to get them growing, they have no vigor and sometimes this lack of vigor is a consequence of the presence of virus. After testing many plants, you may think your eyes are calibrated and you can tell whether or not a plant is virused by its appearance. The only way to know with certainty is to test the plant. If the plant is so ugly that you don't want it in your growing area, don't hesitate to discard it. If it is has odd leaf markings, it is a valuable plant or the plant has sentimental value, you may want to confirm your suspicions by performing a virus test to be sure.



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These cattleya alliance hybrids all have one thing in common, they are really ugly plants. Some tested positive for CyMV, some for ORSV and some for both. The black necrotic splotching, spotting and streaking are indicative of severe viral infections.



This bifoliate was not growing well and the leaves had maroon rather than black splotching. It tested positive for virus.



This Cattleya dowiana was a poor grower and looked unhealthy though the flower was gorgeous. It tested positive for virus.



You may find you don't want to test a plant because you don't really want the answer, as with this cattleya with red spotted flowers. It tested positive for virus.



The circular sunken lesions were suspicious on this cattleya, but it tested negative for virus. The sunken lesions are probably bacterial in origin.

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This myrmecophila hybrid had suspicious reddish mottling but it tested negative for virus. The semicircular reddish spotting is probably some sort of fungal infection rather than virus.



This cattleya had suspicious chlorotic mottling but it tested negative for virus. The heat mottling is perhaps symptomatic of a magnesium deficiency rather than virus.

Response to Virus. Once you confirm the presence of virus, what next? Some plants you may have had for many years. Some may be famous clones. Some may have fabulous flowers. Should you play it safe and discard the plant to prevent the spread of virus to the rest of the growing area or isolate infected plants? I turned to my go to guy for advice, Dr. Courtney Hackney, who offered his approach:

My approach is to discard any plant whose flowers exhibit color breaks. I have found that orchids with true color break are always virused. Any plant that has unexplained poor growth I discard, whether it tests positive or not, unless it is a really special plant. I hate the black leaves, but keep a few with it. In my opinion, the jury is still out on transmission by thrips and other insects. The prime way to transmit virus is through cutting without flaming. When I started testing my plants, I discovered that some of the plants in my collection for 30 years were virused, but never showed any symptom. What surprised me was that my entire collection had not become infected since the plant had been among them for many years.

As you might suspect, many of the old things I find have one of the viruses but do not have any spots on leaves. They look perfect so leaf spotting is not always a positive or negative indicator. When they test positive, it is usually Cymbidium Mosaic Virus. The one virus that really causes problems is the Odontoglossom Ringspot Virus, especially when combined with another virus. There are 20+ other viruses out there, but we can only test for a few easily. Some viruses of the same type are less vigorous and probably less infectious than other strains.

At one time, I tested every one of the old clones I found, but finally realized that I was going to keep them no matter what, so I no longer do that. Most grow very well. I only hybridize with them as the pod parent and sow as dry seed to prevent passing the virus along.



Newly purchased plants may also be virused, whether or not the signs of virus are immediately noticeable. I regularly used to get photos of what were clearly virused flowers from people on the internet who responded that it could not be virused because it was a mericlone they just purchased. Often an orchid that is being grown fast will show no signs of virus until growth of the plant slows and virus catches up with the new growth. Also, the handling associated with commercial production, transport, and retail sales practices can be the source of virus. The plant may have left the nursery healthy, only to be infected when placed into commerce.

Virus not only can give your orchid a case of ugly plant syndrome, it can ruin the flowers that you've been waiting for for so long. Severe color break is characterized by variegation in the flower, where the normal pigment of the petals and sepals is replaced with irregular patches of tissue that are either more or less intense in color than the normal flower. You occasionally might see floral damage that is suggestive of color break but is really caused by crippling, environmental stresses, genetic quirks or thrips. In addition to color break, virus can cause Blossom necrotic streak, a strain of the CyMV that becomes visible on the flower a week or so after opening, starting on the midribs of the flower.



These cattleya alliance hybrids all have flower blighting from virus, the top two images are color break and the bottom two images are blossom necrotic streak.

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I follow Courtney's rules in handling sickly or virused plants.

Courtney Rule Number 1. Any plant, regardless of whether it tests positive or not, that has color breaks in flowers is discarded.

Courtney Rule Number Two: Discard any plant that has unexplained poor growth, whether it tests positive or not. The only exception to this rule is if it is a really special plant.

Courtney Rule Number Three: If you decide to isolate plants, place them in a quarantine area that you recognize as such and use extra special precautions in handling these plants to prevent the transmission of plant sap from infected plants to other plants.

Preventing Transmission of Virus. The most common way in which CyMV and ORSV can infect your orchids is mechanical transmission via your hands and cutting tools. There are other viruses that can infect orchids like Tospoviruses, potyviruses, Cucumber mosaic virus and Orchid Fleck, and some of these can be transmitted by plant pests including thrips. The best way to prevent spreading the mechanically transmitted viruses is to treat every plant as if it were potentially virused. Viruses can be spread whenever sap from an infected plant contaminates the sap of another plant. Good sanitation practices include:

Use Sterile Cutting Tools – The primary means by which viruses are spread from plant to plant is by using improperly sterilized cutting tools.

- Sterilize Tools. Only use sterile cutting tools. Single edged razor blades can be used and either discarded after each and every use or baked in an oven at 400F for two hours prior to reuse. A *torch* such as those sold by BernzOMatic equipped with a MAPP gas (propylene) tank is an ideal tool for sterilizing shears or other cutting tools on a given plant. The cutting tool should be sterilized for 15 to 20 seconds with a hot flame on each side. You can also sterilize your tools by dropping them in a supersaturated solution of *trisodium phosphate* (TSP). TSP alone will sterilize cutting tools, but the books say the cutting tools should sit for 20 minutes in the solution before they are sterile. Do not substitute the ecofriendly nonphosphate version of TSP because it does not have the same sterilization capacity. To make a supersaturated solution with water, add more TSP to a container than can be dissolved in the water so there are undissolved TSP crystals in the bottom of the container. The solution should be refreshed at least daily.

- Added Protection with TSP Dip. After Courtney flames his cutting tools, he dips them in the TSP solution for a moment. The heat in the metal quickly evaporates the TSP solution leaving a surface film of TSP, hopefully getting into every nook and cranny of the cutting tool. He stores his tools in a supersaturated solution of TSP when not in use. The TSP also keeps the cutting tools from rusting so they just have to be sharpened periodically.

- Cutting Inflorescences. Use a sterile tool to cut each inflorescence from the plant. The easiest way to do this is to use a sterile, single edged razor blade to remove the



inflorescence and discard or sterilize it after each use. If you use shears, you should flame sterilize them between cutting each inflorescence.

- *Removing Inflorescences by Hand.* Don't do it! A virus, if present, can be unknowingly transmitted to your hand and you can infect the next plant when you touch it or remove the next dead flower bud. Instead, use a sterile razor blade and discard it after each use.

Controls During Repotting –Observe these additional controls when repotting:

- *Gloves.* Wear latex or nitrile gloves when handling a given plant and discard those gloves when you are done handling the plant. Your bare hands can come into contact with plant sap containing the virus and infect the next plant.

- *Newspaper on the Potting Surface.* Keep the potting surface clean. Keep a stack of newspapers handy and when repotting, place newspaper under the potting area. Upon completion, wrap up the newspaper, gloves and other detritus and discard them before touching the next plant.

Disinfect Your Pots Prior to Reuse – Make sure your pots are sterile:

- Disinfection of Plastic Pots. Plastic pots can be disinfected by first washing them with soap to remove residual organic matter, then soaking them for an hour in a 10% bleach solution. You can add Physan mixed per label instructions for more killing power.

- *Disinfection of Clay Pots.* Clay pots are porous and cannot be sterilized against viruses by using bleach and Physan alone. Follow the normal disinfection routine for plastic pots above and then bake them in an oven at 400F for two hours to kill any residual virus.

Viruses can infect just about any plant in the entire plant kingdom, not just orchids. You should not become overly paranoid, thinking every blemish is indicative of virus. Likewise, do not become overly complacent about virus. Fine tune your orchid practices. Examine plants for vigor and coloration before purchasing them and bringing them into your growing area. Once plants are in your care, be dogmatic about sanitation. Keep your growing area clean and weed free. Periodically spray bleach on and under benches in your growing area. Observe your plants, looking at each one, as you water for signs of stress or other problems. Use sterile potting mixes, tools and pots. Be vigilant, but most important of all, enjoy your beautiful orchids.

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