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Gladiolus disorder: Virus complex and aster yellows

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Viruses can destroy the value of a gladiolus crop. Serious infections have been observed throughout Wisconsin in some years. Hobbyists sometimes give up on glads because of virus infection in stock they purchase or produce. However, many growers have not had such problems.

Aster yellows is common in Wisconsin, but usually it infects just a few gladioli scattered in plantings.

Symptoms and effects

Virus complex

Virus infection in gladiolus causes a yellowed, streaked, and mottled mosaic pattern on the leaves. Such infection frequently causes flowers to "break,"—that is, to develop unusual streaks, spots, and patches of color that are not typical of the variety. In some instances the change in flower appearance is attractive, but often the flowers fail to open completely and fade rapidly. In severe cases, the plants become stunted. Sometimes the stunting is confined primarily to the flower spike, resulting in unattractive, compacted florets.

Specific symptoms are extremely variable and depend on several factors. The most important is the specific virus and strain present in the plant.

A healthy gladiolus spike on the right and a virus-infected spike on the left. Note the mottled coloring in the infected florets and their drooping, stunted condition.

Aster yellows disease in gladiolus causes twisted spikes. The flower parts may remain green, as in the plant on the right, and the foliage may turn yellow.

Bean yellow mosaic virus often causes mild mosaic symptoms. Cucumber mosaic virus generally generates more severe symptoms, especially when other viruses are also present in the plant, and they form a complex. Presence of the tobacco ring spot virus may produce distinct rings of discolored tissue on the leaves. Tomato ring spot virus can cause stunting—short spikes with few florets. Tobacco rattle virus also infects gladiolus and may produce wavy creases and notches in the leaves.

The variety of gladiolus infected also influences the symptoms that develop. Some varieties show symptoms only in leaves, some in the flowers, and others in both leaves and flowers. Some varieties are more likely to show symptoms than others. For example, red-flowered varieties generally exhibit more severe symptoms than certain other colors, although no color group or variety is immune to virus infection.

Some symptoms appear only during cool, cloudy weather and may disappear or become "masked" during warm, sunny periods.

Many growers also have found that flowers produced from old corms have considerably more virus than those produced from younger ones. In a few situations, virus infection may create distinct diseased areas on the corms and cause them to shrivel. Only experienced growers familiar with corm characteristics of specific varieties can use this to diagnose virus infection, because healthy corms of some varieties appear similar to virus-infected corms of other varieties. In addition, infected corms are susceptible to *Fusarium* and *Stromatinia* fungi, which can cause extensive rotting of stock in storage and in the field.

Virus infection is the reason many varieties "run out," or become unsightly some years after their release. Plants are not killed by the virus; rather, they lose their aesthetic value.

Experienced growers usually can diagnose general virus infection in the field when symptoms are conspicuous. Inspect for symptoms several times during the growing season. Be aware that healthy foliage and flowers may at times show mild mottling, and this is distinct from the clear-cut virus patterns.

Other crops often are infected by these same viruses, particularly certain flowers and vegetables and numerous weeds.

Virus symptoms in leaves and flowers. Note the long streaks in the leaves and the stunted flower spike. The florets open poorly and are short-lived.

Be careful not to confuse thrips injury with virus symptoms. Thrips feed on the epidermal (outer) cells of leaves and flowers, causing the foliage to turn silvery due to the loss of cell sap. The leaves then brown and die.

A good hand lens will help you distinguish the cause of such injury. If thrips are present, you can usually find them by carefully examining leaf folds on nonflowering plants or by taking apart the florets on flowering plants. Serious growers should strive to keep thrips under control not only to minimize damage, but also to make detection and roguing (digging out) of virus-infected stock easier.

Aster yellows

Aster yellows was considered a virus until scientists found the causal organism—a mycoplasma. This disease can cause twisting and distortion of gladiolus, particularly the spike. The flower part sometimes remains green without developing normal flower coloration. Young leaves may remain green or turn yellowish. If infected early in the season, plants are usually small and spindly.

Cause

Any of the following diseases can cause virus complex: bean yellow mosaic, cucumber mosaic, tobacco ring spot, tomato ring spot, tobacco rattle, and other viruses. A mycoplasma causes aster yellows.

Vegetative propagation and local aphid infestations are important means of spreading viruses. Thrips and other insects may spread viruses occasionally, and nematodes may spread certain viruses such as tobacco ring spot.

Viruses become systemic in the plant and are passed from generation to generation in cormels that develop from diseased corms. In some situations cormels appear less severely infected than parent corms, but there is no dependable pattern.

Aphids pick up viruses by feeding on diseased plants and can transmit the viruses for a brief period after feeding. People also spread viruses mechanically via contaminated hands or knives during flower harvest, for example.

Aster yellows disease is spread by the aster leafhopper.

Control

The variable nature of these diseases and the ease with which they spread make control difficult, though serious growers have found that some control is possible by following strict cultural procedures. Gardeners casually interested in their gladioli will find it simpler to discard infected stock and search for "clean" corms. Specialty growers who can provide such stock are controlling the disease for the amateur.

Currently, the most effective control measure is to obtain reasonably virus-free planting stock and prevent its subsequent infection. You can substantially reduce virus problems—though you cannot completely eliminate them—by taking the following measures:

(1) Examine your crop several times during the growing season, looking at both leaves and flowers for severe symptoms. Rogue infected plants—including leaves and corms—and remove them from the field. Don't leave them lying at the edge of the planting. A variety or planting that shows more than 15% infection will be difficult to clean out, so discard it and replace it with clean stock.

(2) Isolate clean planting stock from diseased or suspect materials. Separate each new introduction until it passes a season's inspection. Some growers also separate cormel production fields from older stock.

(3) Avoid unnecessary handling of planting materials since this could spread the virus mechanically. For example, don't handle healthy plants during roguing operations; and don't cut diseased flower spikes and then use the same knife to harvest healthy spikes.

(4) Minimize aphid transmission by growing a tall crop such as dahlias or corn in between gladiolus rows. This stops most aphids, especially if the "trap crop" is properly treated for aphid control.

Aphid control is essential if you wish to minimize gladiolus infection. Many aphid species feed on gladiolus at different times of the growing season and, unfortunately, most can transmit viruses. Applying systemic insecticides every 10 days substantially reduces insect populations, thus reducing the chance of virus spread. Commercial growers and serious hobbyists should follow this rigorous program. More frequent applications are necessary with non-systemic materials.

The most effective way to reduce the number of aphids migrating into gladiolus plantings is to cover about 50% of the soil surface between rows with aluminum foil. Coupled with regular systemic sprays, this technique provides the greatest degree of aphid protection.

(5) Control weeds to reduce aphid problems and to make it easier to handle the crop.

(6) Control thrips and leafhoppers to ensure a healthy planting.

The primary limitation of present control measures is that some infected plants do not show symptoms. These plants provide a reservoir for continued reinfection. Serological tests or other techniques may someday offer better protection. In addition, "meristem tip culture" techniques have now been developed in certain laboratories that show promise as a means of developing disease-free plants from infected stock. Such cultured gladiolus plants, although not immune to reinfection, may serve as mother plants for subsequent commercial production.

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