

VEGETABLE CROPS

DISEASES OF PEA Virus Diseases

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Virus Diseases of Pea

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Peas are susceptible to a large number of aphid-transmitted viruses, which can produce diseases individually

or in combination. Many common names have been used to describe these diseases, and to avoid confusion they will be mentioned in the discussion under each virus. The main viruses infecting pea belong to three distinct virus groups designated by virologists. Pea enation mosaic is the only member of one group, pea streak and red clover vein mosaic belong to a second group, and the final group includes bean yellow mosaic (also called pea mosaic), clover yellow vein, and pea seedborne mosaic.

Pea enation mosaic virus (PEMV) is one of only a few viruses with unique properties and hence has been assigned to a separate virus group. The virus

mainly infects legumes in the temperate regions of the world. In addition to pea, PEMV also infects broadbean (from which the virus was first described in New York in 1935), sweet pea, and alfalfa and probably overwinters in many common perennial legumes. The virus is spread in nature most efficiently by the pea aphid (*Acyrtosiphon pisum*) and to a lesser extent by the green peach aphid (*Myzus persicae*). The virus is transmitted in a persistent (circulative) manner.

Infected pea plants develop mosaic and chlorotic vein flecking (appears as translucent windows) and veinal enations (blisterlike outgrowths), which are



very characteristic for PEMV (fig. 1). Plants are stunted, and proliferation of basal branches is common. Pods are distorted, split open, and may show prominent enations.

Many American cultivars are resistant to PEMV. The method of virus transmission and the behavior of the pea aphid are two factors aiding in the control of PEMV. Spraying plants with insecticides reduces the incidence of the virus because of the persistent nature of spread and because the pea aphid readily colonizes peas and broadbean. The aphids can be controlled before much secondary spread occurs. Removal of perennial legumes bordering the planting area also reduces the primary virus reservoir.

Pea streak diseases are a *general* grouping of virus diseases in which the symptoms of infected plants appear as conspicuous purple brown streaks extending the entire length of the stem and petioles (fig. 2). The plant growing points are curved and brittle; and if pods are present at the time of infection, they remain flat and turn dark purple brown. Pods already formed before infection develop purple pitting.

Pea streak may be caused by a specific virus, **pea streak virus** (PSV), also called Wisconsin pea streak, by cucumber mosaic virus or alfalfa mosaic virus, or by the combination of bean yellow mosaic virus and red clover vein mosaic virus. The latter two viruses are discussed separately in this fact sheet.

PSV is very widespread and prevalent in other pea-growing states such as Wisconsin, Idaho, and Washington. The virus is not seedborne in legumes, but can be overwintered in perennial legumes such as red clover. Because so many viruses or combinations of viruses can cause streak, symptomatology alone cannot be relied upon to identify true pea streak virus. The pea aphid is the principal vector of PSV, and transmission is in a nonpersistent manner. Control measures discussed under pea enation mosaic apply.

Red clover vein mosaic virus (RCVMV) belongs to the same virus group as pea stunt virus, but can be distinguished from the latter virus by symptomatology and laboratory tests.

RCVMV was formerly called Wisconsin pea stunt virus. Plants appear stunted, with leaves showing vein chlorosis and curling, resulting in apical rosetting (fig. 3). After stem necrosis develops, there is a rapid wilt and collapse of the plants.

RCVMV has a slightly larger host range than PSV and is reported to be seedborne in red clover. The virus naturally infects many legumes besides pea; many are common forage crops such as red, white, Alsike, and Ladino clover. A number of aphid species, including the pea aphid, can transmit the virus in a nonpersistent manner. There are no known resistant commercial cultivars. Controls rely on isolation of pea plantings from virus sources.

Bean yellow mosaic virus (BYMV), also called bean virus 2 in older literature, includes pea mosaic virus strains, which some authors treat separately. BYMV is widely distributed in the state and is transmitted by at least 20 aphid species in a nonpersistent manner. This virus is also discussed under the virus diseases affecting bean.

The symptoms of BYMV depend upon the strain of virus involved. The pea strain, for example, causes a very bright yellow mosaic (fig. 4), whereas the more typical isolates produce a dull light and dark green mosaic. Symptoms are masked or delayed at low temperatures (below 60° F), but develop normally at 65°–75° F.

Resistance to BYMV has been identified and extends to the Perfection types used for both canning and freezing. Resistance is conditioned by a recessive factor, which, when it occurs in a heterozygous condition, is strongly influenced by temperature. Seed transmission is absent or very rare in pea and several other legumes. Aphid control may help to reduce the rate of spread in susceptible cultivars.

Clover yellow vein virus (CYVV) causes a serious disease of pea. A severe strain can cause intense veinal chlorosis or severe yellowing, followed by apical necrosis and premature death. Plants are usually stunted, and pods show some deformation. The virus is transmitted in nature by at least four aphid species (including the pea aphid) in a nonpersistent manner. This virus also naturally infects bean and cucurbits, as well as many cultivated and wild legumes, and ornamentals such as wild violet.

Symptoms of CYVV infection in pea consist of veinal chlorosis, mosaic, curling, and apical rosetting, with suppression of pod size and number (fig. 5). Cultivars resistant to BYMV are also resistant to this virus.

Isolate plantings from potential virus reservoirs or take steps to remove these sources before the crop is planted.

Pea seedborne mosaic virus (PSBMV) is not a problem for commercial fields in New York at this time. The virus is readily seedborne in pea, with up to 90% infected seed reported in some commercial seed lots. Seed coats may split as the seed approaches maturity, but the likelihood of this occurring varies among varieties. This characteristic is not unique to virus infection. The virus has been found in the "plant introduction" collection, its distribution being increased by exchange of infected seed lots.

The virus has previously been known as pea leafroll mosaic virus or pea fizletop virus. In pea, the symptoms consist of leaf narrowing and downward leaf rolling, accompanied by a mild mosaic. Plants are somewhat reduced in size.

The virus is predominantly spread by seed, although it is also spread in nature by aphids in a nonpersistent manner. Most Perfection-type pea varieties are very susceptible, and no resistant varieties are presently available. Resistance is conditioned by a recessive factor.

Quantity discount available.