Under natural conditions, most plant viruses are transmitted by insects. Usually a specific relationship exists between the virus and the vector, any one virus being transmitted by a single vector species or by closely related species. Most vectors have sucking mouthparts and belong to the hemiptera (aphids, mealy bugs, leaf hoppers and whiteflies). A few have biting mouthparts e.g. beetles, or rasping ones e.g. thrips.

Insect-transmitted plant viruses have been broadly divided into two classes - "persistent viruses" and "non-persistent viruses". Typically the differences between the two groups are as follows:

I. Infection feeding period

The vectors of non-persistent viruses only need to feed on an infected source plant for a few minutes to become infective. Much longer is generally required by persistent virus vectors.

II. Length of latent period and persistency

The vectors of non-persistent viruses can infect healthy plants immediately they have acquired the virus, but they soon cease to be able to do so, sometimes becoming non-infective within minutes and always within hours of leaving the infected plants. The vectors of persistent viruses cannot transfer an acquired virus immediately to healthy plants - there is a "latent period" between infection feeding and development of infectivity. Once infective, however, these vectors may remain so for long periods, sometimes for the remainder of their lives. The latent period appears to be the time taken for the virus to reach the salivary glands in sufficient concentration to give a reasonable chance of infection.
III. Sap-transmissibility

Sap-transmissible viruses are usually of the non-persistent type. Most persistent viruses are not sap-transmissible; exceptions are found among those transmitted by biting-insect vectors (Dale, 1953).

Persistent viruses are transmitted by leafhoppers, whiteflies and thrips. Some aphid-transmitted viruses are persistent, but more are not. Most biting-insects are thought to transmit viruses by simple contamination of mouthparts, being merely occasional vectors. But for at least three viruses biting-insects are very efficient vectors, retaining the virus for some days: squash mosaic virus, transmitted by *Diabrotica* spp. (Freitag, 1950); Trinidad cowpea mosaic virus, transmitted by *Ceratoma ruficornis* (Dale, 1953); turnip yellow mosaic virus, transmitted by *Phaedon cochleariae* (Smith, 1951). In general characteristics these three viruses are more like some of the non-persistent mosaic group. These vectors probably transmit by regurgitation of infective juice from the fore-gut while feeding on healthy plants. Their salivary glands are vestigial and they appear to regurgitate to aid mastication. Non-persistent viruses are almost all transmitted by aphids.

There has been considerable debate as to the most suitable criterion for separating these two groups. Watson and Roberts (1939, 1940) first coined the terms "persistent" and "non-persistent", using the length of the infective period (persistency) as a basis for division.

More recently, Watson (1946) has found that the persistency of non-persistent viruses varies with:

(a) The length of a preliminary period of fasting, before the vector is allowed to feed on an infected source plant, and

(b) The length of the infection feeding period (period of feeding on infected source plant tissue).