Nomenclature, Classification and Identification of Viruses:

In spite of continuous efforts made by Johnson (1927), Smith (1937), Fawcett (1940), Holmes (1939, 1948), Valleau (1940), Lwoff, Home and Tournier (1962), Pereira (1966), Tourinier (1966), Hansen (1956, 1968), Thornberry (1968), Gibbs (1969), Martyn (1968, 1970), Harrison (1971) and many others, there is no final agreement about nomenclature and classification of viruses as because viruses are genetically variable and new strains differ in host range, virulence and other characteristics arising from different arrangements of the nucleotides in the nucleic acid molecule.

A specific virus exhibits fixed characteristic properties. These include the size, structure, and chemical composition of the virus particles, the host range, the tissue specificity, and the nature of the infection caused. When the properties of a large number of different viruses are examined, it is found that they fall into groups, each characterized by the possession of a number of properties in common.

The major groups of viruses may broadly be separated on the basis of characters like:
Type of nucleic acid present in the virus particle, nature of host and disease induced, properties of virus particles (shape, size, etc.), and other related characters. Although nothing is known about the origin and relationships of the viruses, it is tempting to imagine that these groups are natural ones, each of which unites a series of virus that are genetically related to one another.

Some have gone so far to create families, genera, and species for virus, conferring on individual viruses Latin binomial designations, just as if they were cellular organisms. Since a homology between viruses and cellular organisms is still questionable, it is too early-for such an approach to the viruses.

The situation often becomes all the more difficult as viruses are genetically variable and new strains differing in host range, virulence and other characteristics arise, these perhaps representing different arrangements of the four nucleotides in the nucleic acid molecule.

Such aberrations no doubt occur during virus replication; many are probably harmful and disappear in a uniform environment but some survive and prosper under changed environmental conditions or in a different species and variety of plant, thus extending the host range of the virus.

There are probably other mechanisms, perhaps including some form of genetical recombination, which bring about variation in viruses. The problem is complicated by the difficulty of distinguishing between viruses and virus strains, and by the lack of any satisfactory system of nomenclature and classification.

Hence the classification of virus has been subject to change over the years. For one thing, as more is learned about the properties of different virus, their classifications change. For this reason only the principles of virus classification are considered here.

The most widely used taxonomic criteria for viruses depend upon the structure of a virus itself.

Four major criteria are used:
(i) The nature of a nucleic acid—DNA or RNA, single-stranded or double- stranded;

(ii) Particle structure—helical, icosahedral, or complex;

(iii) Presence or absence of viral envelope; and

(iv) Dimensions of the viral particle.

Beyond these physical characteristics, other criteria (immunologic, cytopathologic, or epidemiologic) are used to subdivide the groups. Such a classification provides great convenience and utility, although it is not necessarily based upon the evolutionary origin of individual viruses.

Following are methods that are helpful to identify plant viruses:
1. Viruses are inoculated into indicator plants which develop typical symptoms when infected by specific viruses and in virus assay.

2. Serological tests are carried out using antisera of known viruses.

3. Transmission aspects of the virus are considered: whether by sap inoculation, and the vectors, if any, involved; whether the virus is persistent or non-persistent in the vector; whether stylet borne, circulative or propagative, and other aspects of its transmission.

4. Such properties as the thermal inactivation point, the dilution end point, and survival outside the plant can be used to characterize viruses.

5. Interaction with other viruses is considered, notably cross-protection.

6. Host range and symptoms are studied.

7. Study of morphology and chemical constitution of the virus particle.