



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

Lecture 5

History of plant viruses

752 BC- Ref. in poem by one of the Japanese→ Empress named Koken in which she described the yellow leaf symptoms of Eupatorium.

1576, Carolus Clusius -Tulip color breaking- is the→ oldest known example of virus disease

1692- Yellow stripe of Jasmine was found to be→ caused by Jasmine mottle virus.

1791- Peach yellows was observed in USA→

1869- Abutilon leaf variegation was known in→ France and Belgium. Seventeenth century – “tulipomania”→

1882-1886: Actual era of Plant Virology started with→ scientific investigation by Adolf Mayer

1886- Adolf Mayer – infectious sap from tobacco induce→ disease; gave term Mosaikkrankheit for mosaic

1892 Ivanowski – Sap retained infectivity even after→ filtration through chamberland porcelain filter, doubted toxin produced by bacterium as cause.

1893-94 Hashimoto, a Rice grower in Japan suspected→ the relation between rice leaf hopper and rice dwarf disease- so is considered as first evidence of vector transmission (Later established by Fukushi).

1898 M. W. Beijerinck– in Netherland finally established→ the cause of tobacco mosaic disease and named the agent as “Contagium vivum fluidum”- gave the term Virus. Published paper “ Uber ein Contagium vivum fluidum als Ursache der Fleckenkrankheit der Tabaksblätter” ----- called Father of Plant Virology

1904- Baur experimentally proved that Abutilon→ variegation is transmitted by grafting not by sap.

1923- Schultz & Murphy identified Aphids as vector of viruses.

1928- H. Purdy Beale – TMV infected plants contained antigenic material, opened the door in development of plant virology

Gratia (1933) - plants infected with diff. viruses contain diff. antigens

Chester (1935-36): serological differentiation of TMV & PVX strains

1929 Holmes – “Local lesion assay”

– 1929- McKinney observed the phenomenon of cross protection

1931- K.M. Smith – Use of indicator plants in virus studies, helped in purifying the virus.

1932- Knoll & Ruska invented Electron Microscope.

1935 W. M. Stanley – “Isolation of crystalline protein possessing the properties of TMV”; Shared Nobel prize 1946

1936 Bawden and Pirie – reported that TMV contains nucleoprotein (5%) 1937 Best- finally confirmed nucleoprotein nature of TMV

1937- Kunkel showed that the Aster yellows virus multiplies in its leaf hopper vector.

1939 -Kausche, Pflankuch & Ruska– were the first to observe TMV under electron microscope

1940- Fukushi– Transovarial transmission of rice dwarf virus

1944 Williams and Wycoff– Metal Shadowing that enabled the detail of virus particles

1949-Markham & Smith found that the purified Turnip yellow mosaic virus contained two types of particles one contained 35% RNA and were infectious where as other had no RNA thus not infective.

1951- K. Brakke developed the method of density gradient centrifugation of plant viruses.

1952- Hershey & Chase demonstrated the infection behaviour of bacteriophage and showed that only DNA enter the host cell and protein remain outside

1955- Frankel Conrat & Williams reconstituted the virus TMV

1956- Gierer & Schramm (Germany) & Frankel Conrat showed that only nucleic acid of TMV is infective and protein coat does not have any role in infection.

1956- Krick & Watson gave the general theory of structure of capsid of virus; the cp made up of numerous identical subunits as helical rods or spherical shell.

1957- Brandes developed leaf dip method of electron microscopy

1958- Bancroft & Kaesberg observed that Alfalfa mosaic virus contain multiple components.

1960- Teakle made a significant observation that TNV can be transmitted by fungus *Olpidium brassicae*- a fungus virus vector

1960- Anderer et al., & Tsugita et al., were the first to develop the full amino acid sequence of TMV protein coat (158 aa units).

1959 Horne- Negative staining of modern day electron microscopy

1962- Kassanis- coined the term Satellite virus, associated with TNV

1963- Black & Markham demonstrated that wound Tumor virus contain dsRNA

1996,1968- Lister discovered the bipartite genome of TRV by sucrose density gradient centrifugation.

1967- Doi et. al.; Ishiie et. al.,- MLO in Mulberry dwarf, aster yellow and potato witches broom 1968- Shepherd et al., observed that CaMV contain DNA

1970- Harrison et.al. mitochondria is- concerned with the replication of Tobacco rattle virus; Classified the plant viruses into 16 groups (1971); coined the term Geminiviruses (1976)

1970- Taylor and Robertson Nematode- transmission

1971- T. O. Diener: PSTVd - Viroid-

1971– Lane and Kaesberg brome mosaic virus, has split genome

1972- Davis et al. Spiroplasmas

1973- Goheen et al. observed RLO's – alfalfa dwarf & Pierce disease of grapevine.

1975– Kohler and Milstein “Hybridoma technology” in monoclonal antibodies production – Nobel Prize in 1984

1976 – Voller et. al.: developed ELISA technique

1977- Clark & Adam: used ELISA in Plant virus detection

1977- Harrison et al. coined the term gemini virus ; transmitted by white fly and have dsDNA

1980- Frazier and Converse– genome sequence of ds DNA of CaMV (8000bp sequence).

1982- Keese and Symons– discovered virusoids

1984- Prusiner- discovered Prions in animals: Nobel Prize in 1997 in Medicines

1986- Powell-Abel et al– C.P. mediated resistance in TMV.

1989- Hiatt et al., reported that transgenic tobacco can be induced to produce antibodies

1991- Gallitelli et al. - commercial application of cross protection (Tomato-CMV; 95% protection)

Maxwell (1993) – determined the complete nucleotide sequence of bean dwarf mosaic virus

Beachy et al. (1997) – elucidated the mechanism of coat protein mediated resistance.

2001- Li et al., reported the role of proteins present in the head tissue of aphid vector in the transmission of the virus- they found two proteins as receptor of BYDV; they act as sensors and if absent in any aphid no transmission occurs

2004- Boorod et al. established that single chain antibodies for a viral RNA dependent polymerases confer resistance to three viruses of Tombusviridae- type member Tomato bushy stunt virus.

2006- A.N Fire & C.C. Mello were awarded Nobel Prize for their work RNA interferenceGene silencing by dsRNA.