

Breakthrough in the Identification of the Causal Virus of Pigeonpea Sterility Mosaic Disease

P. Lava Kumar, A. T. Jones¹, P. Sreenivasulu² and D. V. R. Reddy

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, India; ¹Scottish Crop Research Institute (SCRI), Invergowrie DD2 5DA, Scotland, UK; ²Department of Virology, Sri Venkateswara University, Tirupati 517 502, Andhra Pradesh, India

Accepted for publication: 28 June 2000

Key words: Pigeonpea, sterility mosaic disease, virus

Sterility mosaic disease (SMD), a potential threat to pigeonpea production in the Indian subcontinent was first reported in 1931. SMD results in annual losses exceeding 205,000 tones of grain (over \$100 million) in India alone. The eriophyid mite *Aceria cajani* transmits the causal agent under natural conditions. Several attempts to identify the SMD causal agent were not successful and this problem remained enigmatic and posed a big challenge to the scientific community (Reddy *et al.*, 1994; Singh *et al.*, 1999). Recently, using a newly developed protocol a *tenui-like* virus of asymmetric morphology was isolated from the SMD-affected plants. The virus particles are highly flexuous and branched filaments measuring 3-8 nm in diameter (Plate 1). The virus contains a 32 kDa coat protein and 4-5 segmented RNA of size 0.8 - 3.5 kilo bases. It has been named as pigeonpea sterility mosaic virus (PPSMV) (Kumar *et al.*, 1999). Polyclonal antibodies were produced to PPSMV in rabbit and mice that are now being used to detect the virus in SMD-affected plants by ELISA. This virus was detected consistently from all the SMD-affected samples analysed from several different

locations of the Indian peninsula, and from every one of the pigeonpea plants inoculated with infectious mites (*A. cajani*) under laboratory conditions. Leaves from over 300 healthy or uninoculated pigeonpea plants gave negative ELISA results. Additionally none of the healthy samples processed by the same protocol as that for virus isolation, contained any virus particles. This is the first confirmatory report of the identification of the SMD causal agent ending seven decades long search for the elusive pathogen. Further this is the first report of isolation of a *tenui-like* virus from dicotyledonous plants, transmitted by eriophyid mites.

With the availability of data on virus identity and diagnostic tests, it should be possible to screen pigeonpea genotypes for virus resistance precisely and devise molecular tools for distinguishing rapidly various biotypes of the PPSMV.

Acknowledgements

We are grateful to Dr. Y.L. Nene, for the inspiration we drawn for tackling this problem. This document is an output from the projects funded by the Natural Resource International (NRI) and Department for International Development (DFID), United Kingdom, for the benefit of developing countries. The views expressed are not necessarily those of DFID.

References

- Kumar, P.L., A.T. Jones, P. Sreenivasulu and D.V.R. Reddy. 1999. Abstracts, XIth International Congress of Virology, 9-13, August 1999, Sydney. pp 90.
- Reddy, M.V., D.V.R. Reddy and W.R. Sacks. 1994. Proceedings of the International Symposium: Rose Rosette and other Eriophyid Mite-transmitted Plant Disease Agents of Uncertain Etiology : Iowa State University. pp. 29-32.
- Singh, A.K., Y.P.S. Rathi and K.C. Agarwal. 1999. *Indian J. of Virol.* 15:85-92.

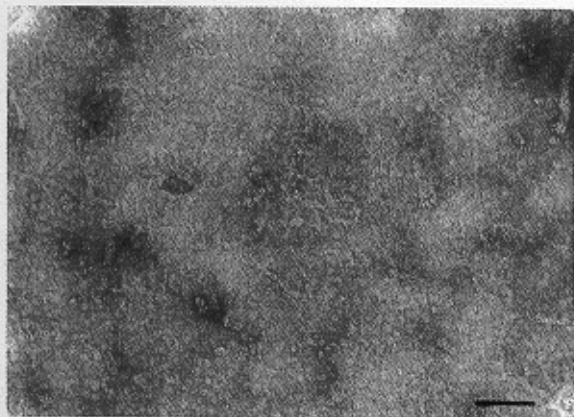


Plate 1. Transmission electron micrograph of the PPSMV particles. Bar represents 100 nm.