

Original Research Article

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Documentation of Weeds Expressed with Sterility Symptoms in Pulse Growing Area

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ABSTRACT

Weeds are considered as a source of new viruses and reservoirs of unidentified economically important viruses but are often neglected during diversity studies. Here, the weeds which are highly susceptible for the virus infection found in the Pulse Research block of Tamil Nadu Agricultural University, Coimbatore is documented. Many scientific reports have demonstrated that weeds serve as reservoir or alternative hosts for begomovirus survival and spread in the absence of the main crops. Now some new weeds are also added to the list in transmitting virus and host for vector. Weeds which continuously acts as a carrier of virus particles over season is observed and this was documented. *Euphorbia geniculata* was observed with similar symptom as developed by the Black gram and Green gram Yellow Mosaic virus. Already for powdery mildew this weed is the host and now this is observed with sterility symptoms similar to Yellow Mosaic Virus. The fruiting bodies are turning in to a claw like structure with severe malformation depicting the same in blackgram and *Euphorbia geniculata*. The most hardy *Pathenium hysterophorus* also reported with sterility symptom due to virus infection. *Phyllanthus niruri*, *Croton sparsiflorus* also observed with sterility symptoms. *Cleome viscosa* is observed with severe sterility similar to phyllody in the Research block and as well as all the parts of Tamil Nadu and this is commonly occurring even in roadsides expressed with partial and complete sterility and spreads in North and South Tamil Nadu. Hence these weeds should be watched for virus transmission to the crops as they persist over generation and their transmission by seeds also to be verified. Plant Pathologist should detail the flow of virus between weeds and crops since, the hardy weeds are also expressing with severe sterility symptoms in field condition.

Keywords

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Introduction

Role of weeds/alternate hosts on the epidemiology of viral disease has been studied in case of many important viruses from India and abroad which are the major limiting factors to cultivation of important crops. Tomato leaf curl New Delhi virus

(ToLCNDV) was detected in sponge gourd, chilli, potato and tomato; and Ageratum enation virus (AEV) in black gram, *A. conyzoides* and *C. bonplandianum* samples. In phylogenetic analysis, ToLCNDV, and AEV isolates clustered in two distinct clades with their respective begomovirus isolates. This is the first record of tentative identification of

AEV infecting black gram and *C. bonplandianum* in India (Mohammad Sajid Khan *et al.*, 2014). *Sida* spp. are arguably the most abundant natural reservoirs for begomoviruses in several regions of the world (Frischmuth *et al.*, 1997). For controlling virus infection, use of virus free planting materials, regular surveillance for disease symptoms at early stages of plants, followed by cleaning and removal of commonly growing weeds viz. *Ageratum conyzoides*, *Acalypha indica*, *Croton bonplandianum*, *Eclipta prostrata*, *Physalis minima*, *Nicandra physaloides*, *Solanum nigrum*, *Datura stramonium*, *D. metel* and other weeds (which act as potential reservoirs of begomovirus) from fields was found to be very effective (Prajapat *et al.*, 2014).

Pulses especially black gram and greengram was severely infected with virus (Yellow Mosaic virus). Hence in the research block of pulses, Tamil Nadu Agricultural University, Coimbatore, a surveillance was made to document the weeds infected with sterility symptoms. Weeds namely *Euphorbia geniculata*, *Parthenium hysterophorus*, *Phyllanthus niruri*, *Croton sparsiflorus* and *Cleome viscosa* were reported with severe sterility symptoms and the infection were carried over seasons and found in large numbers.

Materials and Methods

Pulses especially black gram and greengram was severely infected with virus (Yellow Mosaic virus). Hence in the research block of pulses, Tamil Nadu Agricultural University, Coimbatore, a surveillance was made to document the weeds infected with sterility symptoms and some partial seed formation are also observed and the seeds from infected plants were collected for studying seed transmission. Seeds were collected from the infected plant but unfortunately there was poor germination under invitro study and could not be documented. Sterility documents were photographed and presented.

Results and Discussion

Weeds namely *Euphorbia geniculata*, *Parthenium hysterophorus*, *Phyllanthus niruri*, *Croton sparsiflorus* and *Cleome viscosa* were reported with severe sterility symptoms and the infection were carried over seasons. *Euphorbia geniculata* was observed with similar symptom as developed by the Black gram and Green gram Yellow Mosaic virus. Already for powdery mildew this weed is the important host and now this is observed with sterility symptoms similar to Yellow Mosaic Virus (Fig. 1–4).

Fig.1



Cleome viscosa – sterility – flowers modified in to leafy structure

Fig.2



Parthenium hysterophorus – sterility infection varies from severe to mild



Fig.3



Euphorbia geniculata - sterility - modified floral and fruiting parts and the same symptom was identified in blackgram



Euphorbia geniculata - Leaf crinkling with chlorosis

Fig.4



Phyllanthus niruri – sterility - floral modification in to cluster of leaves

The fruiting bodies are turning in to a claw like structure with severe malformation depicting the same in blackgram and *Euphorbia geniculata* (Fig. 1). The most

hardy *Parthenium hysterophorus* also reported with sterility symptom due to virus infection. This is in accordance with the report of Prajapat *et al.*, (2014) that *Croton*

bonplandianum to be the host of Tomato leaf curl New Delhi virus (ToLCNDV) and *Parthenium hysterophorus* was found to host of Tomato leaf curl Karnataka virus (ToLCKV).

Phyllanthus niruri, *Croton sparsiflorus* also observed with sterility symptoms. *Cleome viscosa* is observed with severe sterility similar to phyllody in the Research block and as well as all the parts of Tamil Nadu and this is commonly occurring and spreads in North and South Tamil Nadu. Hence these weeds should be watched for virus transmission to the crops as they persist over generation and the transmission by seeds also to be verified. *Sida* sp. and *Abutilon indicum* as alternate hosts of Cotton leaf curl virus in Punjab (Singh *et al.*, 1994). Valand and Muniyappa, 1992 reported *Nicotiana plumbaginifolia*, *Physalis minima*, *Coccinia grandis*, *Solanum nigrum*, *Momordica charantia* (wild), *Sorghum vulgare* (widely growing) and *Luffa* spp. weeds have been found to be the hosts of geminivirus in north India.

Therefore, these weeds (*Euphorbia geniculata*, *Parthenium hysterophorus*, *Phyllanthus niruri*, *Croton sparsiflorus* and *Cleome viscosa*) must be removed from and around the agricultural crop fields especially in pulse growing areas to minimize the source of reservoirs of many begomoviruses which also provide the shelter to whitefly, the known vector for transmission of a variety of begomoviruses.

References

- Frischmuth T., Engel M., Lauster S., Jeske H. 1997 Nucleotide sequence evidence for the occurrence of three distinct whitefly-transmitted, Sida-infecting bipartite geminiviruses in Central America. *Journal of General Virology*, 78, 2675–2682.
- Mohammad Sajid Khan, Ajay Kumar Tiwari, Shri Krishna Raj, Ashish Srivastava, Sang Hye Ji and Se Chul Chun, 2014. Molecular epidemiology of begomoviruses occurring on some vegetables, grain legume and weed species in the Terai belt of north India, *Journal of Plant Diseases and Protection* Vol. 121, No. 2: pp. 53-57.
- Prajapat, R., A. Marwal & R.K. Gaur. 2014. Begomovirus associated with alternative host weeds: a critical appraisal, *Archives of Phytopathology and Plant Protection*, 47:2, 157-170, DOI: 10.1080/03235408.2013.805497
- Singh J, Sohi AS, Mann HS, Kapoor SP, 1994. Studies on whitefly Bemisia tabaci (Genn.) transmitted cotton leaf curl virus disease in Punjab. *J Insect Sci* 7: 194-198.
- Valand GB, Muniyappa V, 1992. Epidemiology of tobacco leaf curl virus in India. *Ann Appl Biol* 120: 257-267.

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