

Geminivirus Isolation and DNA Extraction

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1. Introduction

Geminiviruses, named for their unique geminate capsid morphology, have small single-stranded (ss) circular DNA genomes that replicate in the nuclei of infected cells via a double stranded (ds) DNA intermediate. They are responsible for economically devastating diseases in a wide variety of crop species from cereals to legumes; it is thus important to gain a better understanding of their epidemiology, genetic diversity, and molecular mechanisms of replication and pathogenicity, for the design of effective resistance strategies (for reviews, *see refs. 1 and 2*). Each geminate particle encapsidates a circular single stranded genomic component of between 2.5 and 3 kb. Viruses in the taxonomic family *Geminiviridae* are classified into three genera (Mastrevirus, Curtovirus, Begomovirus), based on their host range, genome organization, and vector species (3,4). Mastreviruses, such as maize streak virus (MSV) and wheat dwarf virus (WDV), have monopartite genomes, are transmitted by leafhopper species, and, with a few exceptions, infect monocotyledonous plants. Begomoviruses, such as bean and tomato golden mosaic viruses (BGMV and TGMV), are transmitted by whiteflies (*Bemisia tabacci*) and all infect dicotyledonous plants; most have bipartite genomes, although there are some viruses in this group that apparently have monopartite genomes. Curtoviruses, such as beet curly top and tomato pseudo curly top viruses (BCTV and TPCTV), occupy an intermediate position between Mastreviruses and Begomoviruses, in that these viruses have monopartite genomes and are transmitted by leafhopper species, but only infect dicotyledonous hosts.

The genomic organization of geminiviruses is illustrated in **Fig. 1**. Geminiviruses rely entirely on the host machinery for replication of the viral genome