

RNA-Based Antiviral for Agricultural Virus

April 28, 2025 • vajiramandravi.com



RNA-Based Antiviral for Agricultural Virus Latest News

Plant pests and diseases destroy nearly 40% of the world's annual crop production, according to the U.N. Food and Agriculture Organisation (FAO). Plant viruses alone cause over \$30 billion in annual losses globally.

What is the Mosaic Virus?

- The Mosaic virus is a **parasite** that destroys plants at the **molecular level**.
- **Infected plants spread the virus to other plants**, potentially devastating an entire harvest.
- **It affects a wide variety of crops**, including **roses, beans, tobacco, tomatoes, potatoes, cucumbers, pumpkins, squash, melons, and peppers**.

About Cucumber Mosaic Virus (CMV)

- **CMV is a plant virus affecting a wide range of crops** such as **cucumber, melon, eggplant, tomato, carrot, and lettuce**.
- **CMV was first identified in cucumbers in 1934**, giving the virus its name.

- The virus is spread mainly through **sap-sucking insects called aphids**, with nearly **90 aphid species capable of transmitting CMV**.
- CMV can also spread through **human touch**, but the likelihood is **extremely low**.
- **Weather conditions with high temperatures and intermittent rain** promote the multiplication of aphids, thereby facilitating the spread of CMV.
- **CMV** is a major threat, infecting more than **1,200 plant species**, including **cucumbers, cereals, and medicinal plants**.
- **In India, CMV causes 25-30% yield losses in banana plantations** and up to **70% infection rates** in crops like **pumpkins, cucumbers, and melons**.

RNA-Based Defence Mechanism

- **RNA Silencing**: A **natural defence system** in plants against viral attacks.
 - **Double-stranded RNA (dsRNA)** from the virus triggers the plant's immune response.
 - **Dicer-like enzymes (DCLs)** slice the dsRNA into **small interfering RNAs (siRNAs)**.
 - **siRNAs** then guide the system to **destroy viral RNA**, stopping virus replication.

Types of RNA-Based Techniques

- **Host-Induced Gene Silencing (HIGS)**: Plants are **genetically modified** to produce **virus-targeting dsRNA** internally for **continuous protection**. However, **high costs, regulatory hurdles**, and risk of **viral resistance** limit its use.
- **Spray-Induced Gene Silencing (SIGS)**: **RNA sprays** are applied to plant leaves, **activating natural immunity** without altering plant DNA. **Cost-effective** and **environmentally friendly**, but **traditional dsRNA** often generates a **random mix of siRNAs**, reducing efficiency.

RNA-Based Antiviral for Agricultural Virus FAQs

Q1. What is a Mosaic Virus?

Ans. A Mosaic Virus is a plant virus that causes a mottled appearance with light and dark green or yellow patches on leaves, severely affecting crop growth and yield.

Q2. Which crops are commonly affected by Mosaic Virus?

Ans. Tobacco, tomato, cucumber, sugarcane, papaya, and legumes are among the crops commonly affected by different types of Mosaic Viruses.

Q3. What are the major types of Mosaic Viruses?

Ans. The major types include Tobacco Mosaic Virus (TMV), Cucumber Mosaic Virus (CMV), and Papaya Ringspot Virus (PRSV).

Source: TH