



## Vector Borne Disease of Banana (Kokkan) and Their Management

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### Abstract

Banana (*Musa* spp.) cultivation is threatened by vector-borne diseases, notably Banana Kokkan disease, which is spread by four species of aphids. BBTv, a key concern, reduces bunch weights and fruit quality, often leading to fruit rejection and unmarketable, malformed bunches. Effective management includes using virus-free planting material, controlling aphid populations and employing biological agents. Integrated Pest Management (IPM) is essential, combining resistant varieties, cultural practices and minimal insecticide use. Key vector management strategies include regular field sanitation, early detection monitoring, promoting natural predators and farmer education. These methods ensure effective disease control and sustainable banana production.

**Keywords:** Aphid control, Banana diseases, Integrated pest management, Virus-free planting material

### Introduction

The disease of vector borne contributes to a considerable numerator of all transmissible diseases and poses a serious danger to both common health and undomesticated species (Jones *et al.*, 2008; Miller and Huppert, 2013). According to estimates from the WHO (2004) 1.5 million people year<sup>-1</sup> pass away from vector borne diseases. In general, the significance of spreading plant diseases by insects has been greatly underestimated. When specific or non-specific insect vectors are present in many plant diseases that affect harvested or field-grown produce become much more dangerous and destructive that spreading the pathogen to new hosts. Numerous insects cause wounds on above-ground or below-ground plant organs, which allow a pathogen to enter its host more easily. Occasionally, insects facilitate the pathogen's survival by enabling it to overwinter inside their bodies. Ultimately, insects frequently contribute to the existence of plant diseases by acquiring, transporting and introducing pathogens into host plants that would not have been able to spread and thus not be able to cause disease. An estimated that 30-40% of the losses and damage brought on by plant diseases can be attributed directly or indirectly to the insects that help spread the pathogens. Insects are capable

of spreading almost every kind of pathogen, including bacteria, fungi, viruses, nematodes and protozoa. Through their consumption of plant sap, a number of insects are able to spread particular viruses, phytoplasmas, protozoa, nematodes and bacteria that inhabit the growth of xylem and phloem plant tissue. The virus subsequently spreads throughout the insect's body until it does so, either with or without the insect's continued multiplication; through the pathogen's entry into the insect's mouth parts and salivary glands, it is injected into the following plant the insect feeds on.

### Mode of Transmission

The transmission of virus is take place through the aphids in non-persistent (non-circulative) manner. In non-persistent type of virus transmission by insect vector is characterized by a very short period of retention within the vector (Aphids). The virus particle can be acquired from the infected host and inoculated to a healthy host very rapidly. The virus is acquired with proboscis retain in stylet and don't move beyond the epidermal cells. In this non-persistent category there are different type of viruses like Alfamo virus, Carla virus, Cucumo virus, Faba virus, Macula virus and Poty virus transmitted by vector into the host plant. In the poty virus

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genus includes the banana bract mosaic virus (BBMV), one of the dangerous viruses that infect bananas and cause bract mosaic disease, which has a major detrimental effect on the productivity and production in the Philippines and India. Mosaic symptoms on leaves, leaf sheaths, fruits, petioles, malformed fingers and bunches are caused by this poty virus. According to current reports, BBMV only spreads to a few nations, including India and can infect bananas and other cultivated plants like cardamom and flowering ginger. There are four species of aphids which is transmitting the disease of banana in non-persistent manner.

- a) *Pentalonia nigronervosa* (Banana aphid).
- b) *Rhopaloshiphum maidis* (Corn aphid).
- c) *Aphis gossypii* (Cotton or melon aphid).
- d) *Aphis craccivora* (Cowpea aphid).

**Nature of Damage**

There is no economic damage of host plant by the aphids but it is the major role play in transmission of kokkan disease as a vector. In four species of aphids, they have piercing and sucking type of mouth part which sucking the cell sap from the plant’s tender section. The disease of kokkan or banana bract mosaic is transmitted by a minimum four type of aphids in non-persistently, which pick up the virus while ingesting plants that are infected.

**Symptoms of Disease**

Aphids belonging to four different of species and it is spread the disease by non-persistent manner in the banana. Initial symptoms of this disease are red-brown spots that appear like streaks or spindle lesions on stem, stalks and flower of the plant (Figure 1 and 2). Pale yellow or yellow white streaks appear on fingers. The disease is identified by the appearance of pinkish to reddish streaks on pseudo stem, peduncle and midrib. On bracts and fingers, typical mosaic and spindle-shaped mild mosaic stripes are also seen. Other major symptoms are a tourers palm-like appearance and a clustering of leaves at the crown. BBMV causes reduction of bunch weights and quality of fruit. Furthermore, a notable percentage of fruit are rendered unmarketable due to the development of malformed bunches and underdeveloped fingers.



Figure 1: Red brown mosaic pattern on flower



Figure 2: Red brown stripe on leaf

**Management**

- In initial stage as soon as a diseased plant is indentified, it should be removed to stops its spread.
- It is best to use the planting materials is free from any kind of diseases. Because, BBMV is spread longer distance by infected banana planting material.
- Aphids are attracted to and killed by the use of yellow sticky trap.
- A weeds free banana orchard is desirable. The virus can survive in nearby weeds during the off-season, so it is best to get rid of them.
- Early identification is achieved through routine planting inspections and the prompt removal of diseased plants from the field.
- Using insecticide spray to control the insect vector like Imidacloprid 17.8 SL and Dimethoate 30 EC @ 1 ml litre<sup>-1</sup>.

**Conclusion**

In conclusion, the cultivation of banana (*Musa spp.*) faces significant challenges from vector-borne diseases, particularly Banana Kokkan disease, which is transmitted by four species of aphids. BBTv, a major concern, leads to reduced bunch weights and fruit quality, often resulting in fruit rejection and unmarketable produce due to malformed bunches and underdeveloped fingers. Effective management strategies are essential for mitigating these impacts. Key approaches include the use of virus-free planting material, effective aphid population control and the implementation of biological agents. Integrated Pest Management (IPM) is crucial, combining resistant varieties, cultural practices and minimal insecticide use. Regular field sanitation, early detection monitoring, promotion of natural predators and farmer education are vital components of a successful vector management strategy. These methods collectively ensure the effective control of vector-borne diseases, promoting sustainable banana production and enhancing the overall quality and marketability of the fruit.

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