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Short Communication
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Field occurrence of phytoplasma-associated leaf phyllody and malformation in mango (*Mangifera indica* L.) in Latur, Maharashtra, India

U.N. Bhale*[1], Omprakash Bhusnure[2], and A.B.Ade[3]

[1]*Department of Botany Arts, Science and Commerce College, Naldurg, Tuljapur, Dharashiv (Osmanabad), Maharashtra, 413602, India.*
[2]*Channabasweshwar Pharmacy College, Latur, Maharashtra, 413512, India*
[3]*Department of Botany Savitribai Phule Pune University, Pune, Maharashtra, 411007, India*

Corresponding author: **U. N. Bhale** | E-mail: **unbhale2007@rediffmail.com**

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Abstract

During August 2025, mango (Mangifera indica L.) plants showing leaf phyllody, panicle malformation, thickened and stunted peduncles, witches' broom-like shoot proliferation, and failure of fruit set were observed at Narendradham Colony, Katpur Road, Latur, Maharashtra, India. Symptomatic tissues were collected from one young seedling, two panicles, and four branch nodal sections; 24 asymptomatic leaf and shoot samples from adjacent trees were collected as healthy controls. Field symptom assessment indicated a phytoplasma-associated disorder. The affected plants showed conversion of floral structures into leaf-like organs, shortened internodes, crowded shoot proliferation, and localized shoot decline. The observations provide a basis for subsequent morphological and epidemiological investigation of mango phyllody and malformation in this region.

Keywords: *Mangifera indica, Mango malformation, Leaf phyllody, Phytoplasma, Witches' broom, Marathwada*

Introduction

Mango (*Mangifera indica* L., family Anacardiaceae), revered as the "king of fruits," is a major tropical fruit crop of high socio-economic importance in India and worldwide. However, sustained crop productivity is continuously threatened by diverse biotic stresses. Among these, disorders leading to abnormal vegetative proliferation and floral malformations cause significant economic losses by drastically impairing fruit yield. Phytoplasmas are unculturable, cell-wall-less, phloem-restricted prokaryotes belonging to the class Mollicutes. Residing within the sieve tube elements of host plants, these pathogens disrupt endogenous hormonal regulation and nutrient transport, triggering characteristic morphogenic anomalies such as phyllody (conversion of floral organs into leafy structures), virescence, witches' broom growth, and stunting [1].

The Marathwada region of Maharashtra, situated on the Deccan Plateau of Western India, is characterized by a dry, drought-prone climate and rocky terrain. In [2] August 2025, severe malformation and leaf phyllody symptoms were observed in mango trees in Latur, Maharashtra. This report provides the first field occurrence and morphological characterization of phytoplasma-associated mango leaf phyllody in this specific agro-climatic region.

Materials and Methods

Study Site Description

Field surveys were conducted during August 2025 at Narendradham Colony, Katpur Road, Latur, and Maharashtra, India.. It has an average elevation of 566 meters (1856 feet). The study site is located at 17.49°N Latitude, 76.16°E Longitude, with an altitude of 509 m. This area lacks natural resources and is prone to drought, rocky and dry with low and uncertain rainfall.

Sampling and Disease Diagnostics

Systematic visual inspections were conducted across local mango orchards. Tissue samples showing overt symptoms of malformation and phyllody were collected for pathological study. In total, symptomatic tissues were sampled from:

- 1 young seedling (vegetative malformation)
- 2 panicles (floral malformation and phyllody)
- 4 branch nodal tissue sections from distinct mature trees

Sample collection accounted for potential uneven pathogen distribution and low phytoplasma titers, as previously reported in woody perennial hosts [3]. Additionally, 24 asymptomatic green leaf and shoot samples were collected from adjacent non-symptomatic trees to serve as healthy controls.

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Results

Symptomology

Symptomatic mango trees displayed prominent anatomical and morphological deformations on both vegetative shoots and reproductive structures (Figure 1):

1. Vegetative Malformation & Witches' Broom: Affected young seedlings and lateral shoots exhibited abnormal, swollen growth with severely shortened internodes. Shoot tips displayed a characteristic "bunchy top" appearance caused by excessive sprouting of crowded, underdeveloped shoot-lets with tiny, pale-green scaly leaves (Figure 1a, 1c).

2. Panicle Phyllody & Floral Sterility: Inflorescences showed marked hypertrophy with abnormally thickened, stunted, and shortened peduncles. Individual floral parts were transformed into green, leafy structures (phyllody) (Figure 1b, 1d). Affected panicles failed to set fruit, resulting in complete reproductive sterility on symptomatic branches.

3. Tree Decline: Severe cases exhibited localized shoot dieback, loss of apical dominance, and general stunting of tree vigor.

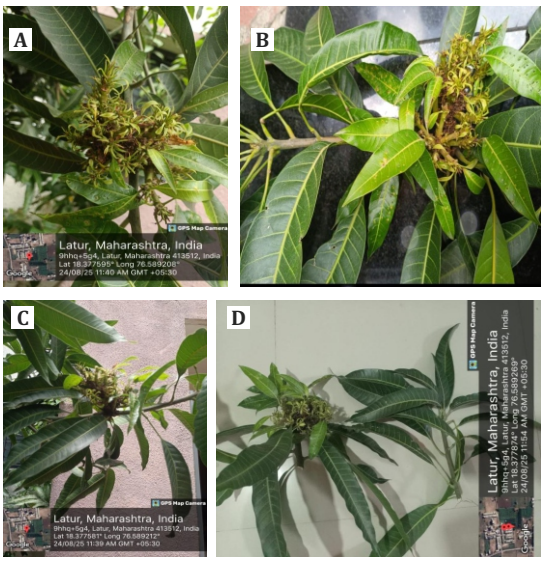


*Fig. 1 Symptoms of phytoplasma-associated leaf phyllody and malformation in mango (Mangifera indica L.) at Latur, Maharashtra, India: **a** Vegetative malformation showing crowded shoot proliferation at lateral branch nodes; **b** Close-up view of inflorescence panicle transformed into leafy structures (phyllody); **c** Field view of affected shoot exhibiting "witches' broom" appearance; **d** Harvested shoot specimen showing hypertrophic peduncle and leaf-like floral metaplasia*

Discussion

Etiological Context

The symptoms observed at Latur match classical phytoplasma-induced malformations documented in other mango-growing belts of India [4]. Similar malformation disorders associated with uncultivated prokaryotic agents were early characterized by electron microscopy [5]. The sporadic and localized presence of symptoms across individual branches on mature trees aligns with the known pattern of uneven phytoplasma distribution and variable systemic titers within host vascular systems [3].

In nature, phytoplasmas are transmitted horizontally by sap-sucking insect vectors belonging to the families Cicadellidae (leafhoppers) and Psyllidae (psyllids), as well as through vegetative propagation via infected scion wood [6]. The presence of polyphagous insect vectors in the region likely facilitates phytoplasma transmission between alternate weed/crop hosts and commercial mango orchards.

Conclusion and Recommendations

This investigation documents a field occurrence of mango leaf phyllody and malformation showing symptoms consistent with phytoplasma association in the Latur district of Maharashtra, India. Given the destructive potential of phytoplasma diseases and the absence of direct curative chemical remedies, an Integrated Disease Management (IDM) strategy is critical:

1. Sanitation: Prompt pruning and burning of symptomatic malformed shoots and phylloid panicles at least 15–20 cm below the affected site to reduce local inoculum.

2. Clean Propagation: Strict utilization of phytosanitarily certified, phytoplasma-free grafting material and rootstocks.

3. Vector Control: Regular monitoring and targeted management of sap-sucking insect vector populations using appropriate bio-agents or systemic insecticides during active flush periods.

4. Epidemiological Surveillance: Detailed molecular characterization (nested PCR targeting 16S rRNA gene sequences) across diverse agro-climatic zones of Maharashtra to identify specific 16Sr phytoplasma groups involved.

Conflict of Interest

The authors declare that they have no conflict of interest.

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