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First report of Mothbean wilt incited by *Fusarium pallidorozeum* under South Gujarat

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Moth bean is a multipurpose crop but mainly grown for food, feed, pasture, and fodder. In addition, it is used in crop rotation to capture and provide the atmospheric nitrogen into the soils for succeeding crops like gram, mustard, linseed, cotton, and barley. Mothbean wilt was recorded from last two years in Bharuch district (2021-2022). The survey conducted regarding Mothbean wilt incidence and 10-15% wilt observed in Mothbean cultivation areas. The pathogen causing mothbean wilt identified as *Fusarium pallidorozeum*. Hence, this is first report of Mothbean wilt caused by *Fusarium pallidorozeum* under Gujarat condition.

Keywords: *Fusarium pallidorozeum*, Mothbean, Wilt

INTRODUCTION

India is the largest producer and consumer of pulses in the world accounting for about 29% of the world area and 19 per cent of the world's production which is the largest importer and processor of pulses in the world. Ironically, the country's pulse production has been hovering around 14–15 MT, coming from a near-stagnated area of 22–23 M ha, since 1990–91 (Singh *et al.* 2013). Pulses are versatile crops that are better for nutritional security and soil health. It is long established fact that, pulses are important part of daily diets, particularly in Asian continent. Pulses are a chief source of protein for a massive section of Indian particularly for the poor and most of the conventionally vegetarian population. India accounts for 33% of the world area and 22% of the world production of pulses. Pigeon pea, chickpea, black gram, green gram, lentils, mothbean and peas are major pulses cultivated in India (More and Bhatt, 2018).

Mothbean, [*Vigna aconitifolia* (Jacq.) Marechal] is an important *Kharif* pulse crop belongs to family

Fabaceae and it is also known as Mat bean, Dew bean and Turkish gram in English, Motth in Hindi, Math in Gujarati, Thannikaalu in Kannada, Matki in Marathi, Kanchamuga in Oriya, Thattapayaru in Tamil, Kheri in Bengali and Bobbarlu in Telugu. In India, during 2018-19 Mothbean has been grown on about 10.95 M ha area with 3.34 MT production and 305 kg ha⁻¹ productivity. The major growing states are Rajasthan, Gujarat, Maharashtra, Jammu & Kashmir and Punjab. Mothbean production has been highest (97%) in Rajasthan followed by Gujarat (3%). However, yield of Rajasthan (302 kg ha⁻¹) was below the national average yield of (305 kg ha⁻¹). In Gujarat, Mothbean have been grown on 0.12 M ha area with 0.05 MT production and 462 kg ha⁻¹ productivity. The major growing districts are Kutch, Ahmedabad, Banaskantha, Patan, Surendranagar, Surat, Mehsana, Bharuch, Bhavnagar, Rajkot, Vadodara and Kheda (Anonymous, 2020).

MATERIALS AND METHODS

The fixed plot survey of Mothbean fields was conducted from November-2021 to January-2022 at mothbean cultivating farmer's field in the Bharuch district to record the percent disease incidence of mothbean wilt. Wilt disease caused

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by *Fusarium* spp. are an important factor that limit yields and reduce quality of edible legumes. The yield losses amount around 50 per cent in pulse crop. The mothbean wilt was observed from seedling to maturity stage of plant. At the seedling stage, drooping of leaves and cortical decay of seedling were observed. In case of young plants, leaves turned yellow followed by wrinkling and drying, loss of turgidity with brownish discoloration of stem near soil base. Roots became soft and browning of vascular bundles was observed. The vascular discoloration of stem extended throughout the plant. White mycelial growth was also observed at the collar region of the infected plants. The roots of such infected plants were split opened and examined; the brownish black discoloration of vascular system was observed. Plants were affected during the mid to late-pod filling stages, seeds are often shrivelled. At later stage whole plants dried, wilted, and died.

Small pieces of diseased root tissues along with adjoining healthy tissues were cut and sterilized by dipping in 0.1% NaOCl solution for one min. followed by three successive washings with sterile water. The Petri plates were incubated at $26 \pm 1^\circ\text{C}$ in BOD incubator for seven days. The mycelium was isolated by tissue isolation method and purified by serial dilution method. The pathogenicity of isolated culture causing Mothbean wilt was tested by growing these plants in pots containing pathogen-infested soil as per Koch's postulates. Initially, the required quantity of soil was sterilized by using formalin solution (1.5–2.0%) then the mass multiplied fungal inoculums (2×10^4 to 3×10^4 /ml sporulation) were mixed separately @ 5g/kg with sterilized soil (Srivastava and Dhakad, 2021). Then the inoculated soil was filled in sterilized pots. The pots filled with inoculated soil were kept in green house for seven days and frequently water to be



Fig. 1: The infected field of Mothbean wilt

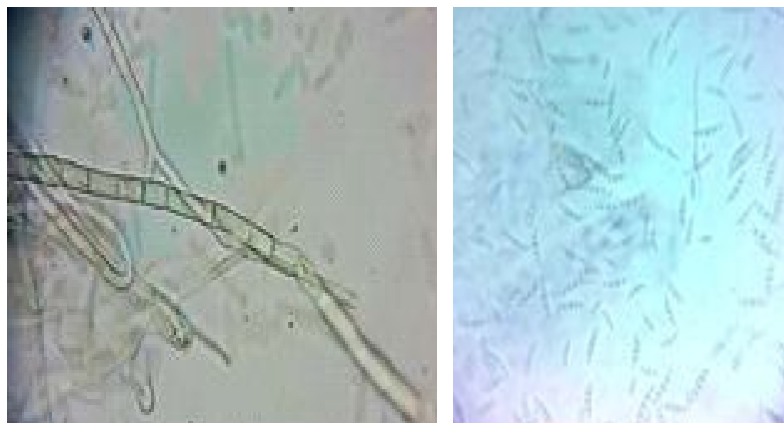


Fig. 2: Microscopic photographs of *Fusarium pallidoroseum*

added in pot for the establishment of pathogen. The local seeds of susceptible cultivar of mothbean were sown in the inoculated pots @2 seeds/pot. The un-inoculated (pathogen free) pot were considered as a control. The pots were observed upto 20 days for the wilt symptoms. The re-isolation of the pathogen was attempted to prove the Koch's postulates.

RESULTS AND DISCUSSION

The disease incidence was recorded after initiation of disease at 15 days interval. The disease could be observed from seedling stage till maturity of crop (Fig.1). The average percent disease incidence of Mothbean wilt was 10.48% in Bharuch district and 15.60% in Vagra taluka of Bharuch district. Maurya (2020) who surveyed in Prayagraj district of Uttar Pradesh to evaluate the disease incidence of pigeon pea wilt and the maximum wilt incidence (57.6%) was recorded in Dari village followed by Pump House (56%) and Purwa (51.2%).

The pure culture of pathogen was maintained on Potato Dextrose Agar (PDA) slants. Periodical sub-culturing was done on the PDA to keep cultures fresh and to use throughout the experiments. The pathogen produces fluffy raised mycelium with pale white to light pink at centre. The mycelium was septate, hyaline and produced three types of spores. Macro conidia were long, curved and pointed at tip with three to four septa and micro conidia were smaller than macro conidia and were elliptical in shape with no septa or single septa. The pathogen formed chlamydospores which were spherical in shape formed in older cultures from any cell of the hyphae (Fig. 2). The pure culture of the pathogen causing mothbean wilt was obtained through the

serial dilution method and culture was sent for the identification to Indian Type Culture Collection (I.T.C.C.), Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi. Based on colony and morphological characteristics wilt causing pathogen was identified as *Fusarium pallidoroseum* (ITCC ID no. 11,584.21) in Bharuch district. Meager research work has been recorded on mothbean wilt in Indian condition and there has been no report on wilt incidence in mothbean under Gujarat condition. It is considered as first report of mothbean wilt caused by *Fusarium pallidoroseum* under Gujarat condition.

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