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## Symptomatology of Pigeonpea host differentials against *Pigeonpea sterility mosaic virus*

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### Abstract

Ten host differentials of Pigeonpea (*Cajanus cajan* L. Millsp) viz., Bahar, BRG 1, BDN 1, ICP 7035, IPA 8F, BSMR 736, BRG 2, Purple 1, ICP 2376 and ICP 8863 were studied for symptomatology of pigeonpea sterility mosaic disease by using infector row and leaf stapling technique. Disease incidence and incubation period was recorded. Reduction in leaf size, stunted plant growth, severe mosaic symptoms and complete sterility was observed in BDN 1 and ICP 8863 host differentials whereas mild chlorosis was observed on BRG 1 and ICP 7035 host differentials. Mild mosaic without sterility was recorded on IPA 8F whereas no apparent symptom of pigeonpea sterility mosaic disease was observed on Bahar. Mild vein clearing, mild to severe mosaic with ring spots was observed on ICP 2376 host differential while light and dark green mosaic pattern, pale green appearance, severe mosaic and finally reduction of plant growth was recorded on BRG 2. Mild to severe mosaic symptoms, cessations of flowers, dark green mosaic pattern and reduction of plant growth on Purple-1 host differential whereas mild to severe mosaic symptoms, cessations of flowers, reduction in leaf size and stunted plant growth on BSMR 736 was recorded.

Genotypes found resistant to moderately resistant can be utilized as parents for transferring stable sterility mosaic resistance in varietal breeding programme.

**Keywords:** Pigeonpea, *PPSMV*, PDI, incubation period, host differential

### Introduction

Pigeonpea (*Cajanus cajan* L. Millsp) also called as Redgram or Tur, with high protein content i.e. 21.7 per cent (Mazur *et al*, 1998) [5], regarded as second major pulse crop in India after chickpea, predominantly grown in Maharashtra, Odisha, Bihar, Uttar Pradesh, Karnataka, Madhya Pradesh, Gujarat, Andhra Pradesh and Tamil Nadu under varied range of cropping system (sole, mixed and intercropping), is one of the important legume crops of the world. With a production of 4.49 million tons from an area of 5.13 million hectares and productivity of 824 Kg per hectare, India accounts for nearly 72 per cent of global output from an area of 3.9 million hectares (FAO 2018) [1].

Sterility mosaic disease caused by the *Pigeonpea sterility mosaic virus* is an economically important disease. Mitra (1931) [6] reported the disease at Pusa, (Bihar) for the first time and Capoor (1952) [2] reported wide prevalence of this disease in India while Ghanekar *et al* (1992) [3] reported effect of this disease in Indian sub-continent and other countries of Asia. Jones *et al* (2004) [4] considered this disease as “green plague of Pigeonpea” and transmitted by vector Eriophyd mite *Aceria cajani* channanasvana (Seth, 1962). The entire plant shows stunting with shortened internodes and malformed leaves. The most characteristic symptoms are the pale green colour of the plants and the absence of flowering branches (Reddy and Nene, 1981) [8].

### Materials and Methods

The symptoms of *Pigeonpea sterility mosaic virus* was observed periodically on host differentials viz., Purple 1, ICP 2376, BRG 1, ICP 8863, BDN 1, IPA 8F, ICP 7035, Bahar, BRG 2 and BSMR 736. All host differentials were inoculated artificially by standard method “Leaf stapling technique” (Nene and Reddy. 1977) [7] as in Fig-2.

### Leaf Samples

Infected leaf samples of sterility mosaic disease were collected from sterility mosaic nursery (Variety ICP 8863), which was maintained at the research farm of Tirhut College of Agriculture, Dholi, Muzaffarpur.

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## Sowing

Each host differential was sown in a plot of 6 m × 3 m with a spacing of 60 cm × 30 cm. Inside the each plot host differential was sown in alternate row with the susceptible variety ICP 8863 with same spacing as host differential. At 3 to 5 leaf stage all plants were artificially inoculated by leaf stapling technique.

Infector hedge on border line (Fig.-1) with susceptible variety ICP 8863 was also maintained to incorporate maximum population of vector mite to the plots of host differentials for assuring all conditions favourable for disease development.

## Leaf stapling technique and Inoculation

20 – 22 days old plants were inoculated by leaf stapling technique. Inoculation was carried out on the primary leaves at three to five leaf stage. Diseased leaf from susceptible variety ICP 8863 was taken from the Pigeonpea sterility mosaic disease nursery and was stapled against the primary leaf of the test seedling in such a manner that the lower surface of the infected leaf was in contact with the test leaf as in Fig-2. This helped in transmitting the mites from diseased to healthy leaf and inoculate the virus.



Fig 1: Infector hedge at Borderline



Fig 2: Artificial inoculation by Leaf stapling technique

The observations on various symptoms produced by the virus on host differentials were recorded at periodic interval of 7 days up to 90 days after sowing. Also, observations on incubation period of the virus and disease incidence were recorded. After transmission of virus from the stapled infected leaf to healthy plant, seedlings were scored for sterility mosaic disease incidence at 7 days intervals up to 90 days by counting the healthy plants (no mosaic symptoms) and diseased plants (with mosaic symptoms) as per the criterion followed in All India Coordinated Research Project (AICRP) on Pigeonpea.

$$\text{Percent disease incidence} = \frac{\text{Number of diseased plants}}{\text{Total number of plants}} \times 100$$

## Result and Discussion

The various kinds of symptoms produced by Pigeonpea sterility mosaic virus on viz., Bahar, BRG 1, BDN 1, ICP 7035, IPA 8F, BSMR 736, BRG 2, Purple 1, ICP 2376, ICP 8863 are presented in Table – 1.

On host differentials, following symptoms were observed commonly –

1. Mild to severe mosaic on leaflets, plants partially or complete sterile.
2. Mild chlorosis to severe mosaic on leaflets, reduction in leaf size, profuse branching and cessation of flowers.
3. Severe mosaic with ring spot symptoms characterized by Green Island surrounded by a chlorotic hallow on leaflets.

Each of the host differential variety exhibited a range of symptoms as in Plate – 1. Moreover, Bahar, BRG 1, ICP 7035 and IPA 8F showed resistant reaction and only one host differential i.e., ICP 2376 showed moderately resistant symptoms for sterility mosaic disease while BDN 1, BSMR 736, BRG 2, Purple 1, ICP 2376 and ICP 8863 exhibited susceptible reaction towards sterility mosaic virus. However, the incubation period of the virus on host differentials varied between 32 to 45 days after inoculation. Whereas, the sterility mosaic disease incidence on host differentials was recorded in the range of 4.5 to 100 per cent.

Table 1: Symptomatology of Pigeonpea host differentials against sterility mosaic virus.

Sl. No.	Genotypes	SMD Incidence (%)	Typical symptoms	Incubation period (Days)
1.	Bahar	00	No apparent symptom.	–
2.	BRG 1	10.2	Mild chlorosis was observed.	45
3.	BDN 1	60.2	Reduction in leaf size, stunted plant growth, severe mosaic symptoms and complete sterility.	43
4.	ICP 7035	4.5	Mild chlorosis was observed.	50
5.	IPA 8F	00	Mild mosaic and no sterility.	–
6.	BSMR 736	48.4	Mild to severe mosaic symptoms, cessations of flowers, reduction in leaf size and stunted plant growth.	46
7.	BRG 2	82.5	Light and dark green mosaic pattern, pale green appearance, severe mosaic and finally reduction of plant growth.	42
8.	Purple-1	85.6	Mild to severe mosaic symptoms, cessations of flowers, dark green mosaic pattern and reduction of plant growth.	40
9.	ICP 2376	21.5	Mild vein clearing, mild to severe mosaic with ring spots was observed.	48
10.	ICP 8863	100	Reduction in leaf size, no flower, severe mosaic symptoms, bushy appearance of plant, green chlorotic patches, profuse branching and complete sterility.	32



Mosaic



Reduced leaf size



Ring spots



Healthy leaves

**Plate 1:** Symptoms of sterility mosaic disease of Pigeonpea host differentials**References**

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