

## Screening of papaya common cultivars against papaya ring spot virus (PRSV)

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### Abstract

The study was conducted to identify the resistant cultivars of papaya against papaya ring spot virus at Department of Plant Pathology, Post Graduate Institute, Dr. PDKV, Akola, Maharashtra, India under insect proof cage house conditions. The varietal screening by sap inoculation method revealed that, none of the papaya varieties were found resistant to papaya ringspot virus. All varieties used in screening *viz.*, Honeydew, Pusa nanha, Kesar, Madhuras, Papaya S-1, Ranchi dwarf, Red lady were found susceptible to papaya ringspot virus

**Keywords:** PRSV, screening, papaya

### 1. Introduction

Papaya ringspot virus (PRSV), a member of genus Potyvirus (Brunt, *et al.*, 1996) [1], causes one of the most destructive disease, papaya ringspot, which has restricted the cultivation of papaya (*Carica papaya* L.) in the tropical and sub-tropical countries (Chandrasrikul, and Patrakosol, 1986) [4]. The incidence of ringspot disease has been reported from several parts of India, causing a fruit loss up to 70% (Capoor, and Verma, 1948 [2]; Singh, 1969 [9]; Verma, and Prasad [11], 1986; Yemewar, and Mali, 1980) [13]. The incidence of the disease has also been reported up to 95% from eastern U.P. (Khurana, 1968, 1974) [6]. In view of the heavy losses caused due to PRSV, the present investigation was undertaken to test the available cultivars of papaya against PRSV to identify the sources of resistance.

### Materials and Methods

#### Seed materials

Seeds of different cultivated varieties of Papaya *viz.*, Pusa Nanha, Honeydew, Kesar, Madhuras, Papaya S-1, Ranchi Dwarf, Red Lady were collected from the Department of Horticulture, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra.

#### Virus Isolate

The young leaves of papaya plants showing mosaic, leaf distortion, shoestring symptoms were collected from the Horticulture field of Dr. Panjabrao Deshmukh Krishi Vidyapeeth (Dr. PDKV), Akola and shoe stringing symptoms were used to establish the virus and maintain on healthy plants of papaya cv. Honeydew by mechanical inoculation using 0.1 M phosphate buffer, pH 7.5 containing sodium sulphate (0.5%) in an insect proof cage house.

#### Mechanical Inoculation

Virus inoculum was prepared by grinding PRSV-P infected leaves in mortar and pestle with 0.01 M phosphate buffer, pH 7.0 (1 g/ 2 mL buffer). The sap was then inoculated manually on the carborundum (600 mesh)-dusted leaves of the cultivars tested. Control plants consisted of non-inoculated and

buffer-inoculated plants dusted with carborundum. The papaya plants were mechanically inoculated at the 6 to 8 leaf stage. Seeds of each cultivar were germinated in plastic trays of size 75 cm x 45 cm x 20 cm containing 3:2:1 soil mixture of top soil: sand: organic manure. All experiments were conducted using 30 day-old seedlings. For each cultivar, 10 seedlings were inoculated depending on the number of seedlings germinated.

#### Screening of Papaya Varieties

Seeds of different cultivated varieties of papaya *viz.*, Pusa Nanha, Honeydew, Kesar, Madhuras, Papaya S-1, Ranchi Dwarf, Red Lady and grown in an insect proof cage house. The available papaya varieties were tested against reaction to PRSV by sap inoculation on 10 test plants of each variety at six leaves stage. The disease reaction of individual variety to PRSV infection recorded to identify sources of resistance if any.

### Results and Discussion

#### Symptoms

Typical PRSV symptoms of mottling on leaves and water soak lesions on the petioles and stem were observed on all the papaya cultivars tested. However, there are heterogenous symptoms within the population of each cultivar. The symptoms were recorded between 15-18 days after inoculation. Symptomless plants were re-inoculated again at 25 days after first inoculation and were observed for symptoms expression 15-20 days later. Plants with no symptom were re-inoculated again for the third time at 25 days after the second inoculation and again were observed for symptoms. At this stage plants without symptom was considered as tolerant or resistant. No symptoms were observed on the control plants throughout the study. None of the papaya cultivars tested in this study was completely resistant to PRSV.

#### Screening of Papaya Varieties

The results of varietal screening in present study were found to be supportive to the findings of Cook, and Zettler (1970), Singh, *et al.*, (2005) [10, 12], Kalyankar, *et al.*, (2008) [7].

The results of varietal screening revealed that all tested varieties viz., Pusa nanha, Honeydew, Kesar, Madhuras, Papaya S-1, Ranchi dwarf, Red lady found to be susceptible to papaya ringspot virus (PRSV) strain used in this investigation and collaborate with research findings of, Cook and Zettler (1970) [5]. observed that Washington, Sunrise Solo, Madhu bindu and Honeydew varieties of papaya were found highly susceptible to papaya mosaic and ringspot virus diseases. Similarly Singh *et al.*, (2005) [12, 10] tested fourteen varieties of papaya (*Carica papaya* L.) viz., Honeydew, Washington Special, Gokerella, Co-1, Co-2, Co-3, Co-4, Co-5, Co-6, Ranchi, Poona Giant, Pusa Majesty, Pusa dwarf, Harichaap to identify sources of resistance. However, none of the tested varieties was resistant to PRSV. Kalyankar, *et al.*, (2008) [7]. was studied the strain wise reactions of PRSV strains to different cultivars of papaya, in which Co-2 was only found tolerant to strain PRSV-S than Washington and Coorg honeydew, which produced mosaic

and mild leaf distortion while other cultivar produced severe leaf distortion and shoe stringing than Co-2. Vimla Singh *et al.*, (2005) [12, 10] were tested Fourteen varieties of papaya (*Carica papaya* L.) to identify sources of resistance, if any. However, none of the tested varieties was resistant to PRSV but variety Harichaap showed only 10% incidence with an average yield loss of 10.38% suggesting its better performance over others. Mohamad Roff, (2007) [8]. screened Thirty one papaya cultivars for resistance to Papaya ringspot virus type P (papaya infecting) under glasshouse conditions. No complete resistance was found among all the papaya cultivars tested. However, the cultivar 'Cariflora' was found to be tolerant to PRSV-P. Chalak, and Hasbanis (2017) observed that, at 7 months after planting genotype GKPS-2-7 recoded minimum ring spot infection (1.24 as Per cent Disease Index) However, cultivars Arka Prabhat and Red Lady recorded maximum papaya ring spot infection.

**Table 1:** Reaction of different papaya varieties against papaya ringspot virus

Sr. No.	Name of the variety	No. of plants inoculated	No. of plants infected	Symptoms noticed on the inoculated plants
1.	Pusa nanha	10	9	Mosaic, blistering
2.	Honeydew	10	10	Mosaic, upward rolling, Blistering, leaf distortion, shoestring
3.	Kesar	10	10	Mosaic, Blistering
4.	Madhuras	10	10	Mosaic
5.	Papaya S-1	10	10	Mosaic, Blistering, upward rolling
6.	Ranchi dwarf	10	9	Mosaic
7.	Red lady	10	7	Mosaic

## Conclusions

None of the papaya varieties were found resistant to papaya ring spot virus. All varieties used in screening were found susceptible to papaya ring spot virus. There is a need to develop more cultivars for the future aspect regarding losses caused to PRSV.

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