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Sushma Verma

Department of Plant Pathology,
Jawaharlal Nehru Krishi
Vishwavidyalaya, Jabalpur,
Madhya Pradesh, India

UK Chanderia

Department of Horticulture,
Jawaharlal Nehru Krishi
Vishwavidyalaya, Jabalpur,
Madhya Pradesh, India

Yogita Nain

Department of Plant Pathology,
Jawaharlal Nehru Krishi
Vishwavidyalaya, Jabalpur,
Madhya Pradesh, India

Kewal Chand

Dr. Rajendra Prasad Central
Agriculture University, Pusa,
Samastipur, Bihar, India

Survey on foliar diseases of mango (*Mangifera indica* L.) in Jabalpur (M.P.) region

Sushma Verma, UK Chanderia, Yogita Nain and Kewal Chand

Abstract

Mango (*Mangifera indica* L.) is most important fruit of the tropical and subtropical region. World's largest producer of mango is India. Mango is adversely affected by wide range of diseases viz. Anthracnose, Blossom blight, Crown rot, Dieback, Leaf blight, Leaf spot, Fruit rot, Macrophoma rot, Powdery mildew, Scab, Sooty molds, Stem canker etc. The survey conducted during 2019-20 in selected blocks of Jabalpur maximum mean percent disease incidence of anthracnose was recorded in Sahapura with 28.26 per cent, malformation was recorded in Sahapura with 19.98 per cent, red rust was recorded in Sihora with 8.89 per cent, sooty mould was recorded in Sihora with 23.74 per cent and powdery mildew was recorded in Kundum with 14.02 per cent and seedling diseases viz. anthracnose, vegetative malformation were recorded in different varieties of mango during the period of survey.

Keywords: Mango, survey, per cent disease index (PDI)

Introduction

Mango (*Mangifera indica* L.) is one of the most important fruit crop. Mango is allopolyploid species of anacardiaceae family. It is crop of the tropical and subtropical countries. It is cultivated widely as a commercial fruit crop in India, China, Indonesia, Thailand and Mexico. By virtue of its wide range, delicious taste, superb flavour, very high nutritive (amino acids, carbohydrates, fatty acids, minerals, organic acids, proteins and vitamins) and medicinal value as well as great religious-historical significance, it is called the "King of the fruits" (Hayes, 1953; Pandey *et al.*, 2012) [2, 8].

Native home was suggested as Eastern India, Assam to Burma 600 possibility further in the Malay region (Propenoe, 1920). It is cultivated in 2263 M hectare area with 19687 M tones production in India. It is cultivated in the states of Uttar Pradesh, Andhra Pradesh, Karnataka, Bihar, Gujarat, Tamilnadu, Orissa, West Bengal, Jharkhand, Kerala and Maharashtra with annual production of 125.4 lakh tones from 2.30 million hectares of area.

Many fungal diseases in mango have been reported by several research workers. The most well-known fungal diseases of mango are Anthracnose (*Colletotrichum gloeosporioides*), Blossom blight (*Botrytis cinerea*), Crown rot (*Fusarium solani*), Crusty leaf spot (*Zimmermanniella trispora*), Dieback (*Botryosphaeria disrupta*), Gall (*Fusarium decemcellare*), Leaf blight (*Bipolaris hawaiiensis*), Leaf spot (*Curvularia lunata*), Fruit rot (*Alternaria alternata*), Macrophoma rot (*Macrophoma mangiferae*), Phoma blight (*Phoma glomerata*), Pink disease (*Erythricium salmonicolor*), Powdery mildew (*Oidium mangiferae*), Root rot (*Pythium splendens*), Scab (*Elsinoe mangiferae*), Sooty molds (*Capnodium citri*), Stem canker (*Phoma sp.*) etc. Bacterial, Nematode and other pathogens also destroying mango orchard. Looking to this, the survey was made to know the occurrence of this important disease in Jabalpur (M.P.) region.

Material and Methods

To know the occurrence of foliar diseases in mango regular field survey were undertaken in month of January to march 2019-20 in four blocks of Jabalpur district (Shahpura, Panager, Kundam, and Sihora). In each block five village were selected and per cent disease index was calculated as below:

Foliar diseases of mango

Anthracnose

The percent disease index recorded by using the formula given by Narasimhudu (2007) [5]. Observation of PDI were scored by using 0-5 scale as follows:

Corresponding Author:

Sushma Verma

Department of Plant Pathology,
Jawaharlal Nehru Krishi
Vishwavidyalaya, Jabalpur,
Madhya Pradesh, India

Rating	Percent leaf infected
0	0
1	1-10
2	11-20
3	21-30
4	31-50
5	>50

$$\text{Percent disease index} = \frac{\text{Sum of all numerical rating}}{\text{No of observations} \times \text{Maximum Disease grade}} \times 100$$

Malformation

The PDI of malformation recorded by using the formula and observation of PDI were scored by using 0-9 scale (Kumar and Beniwal, 1992) as follows:

Rating	Percent panical infected
0	0
3	0.1-1.0
5	1.0-10.0
7	10.1-20
9	>20

$$\text{Percent disease index} = \frac{\text{Sum of rating of panicles observed}}{\text{Number of Panicles observed} \times \text{Maximum disease grade}} \times 100$$

Red rust

Disease severity was graded on the basis of a 0-5 scale (Rashid *et al.*, 1987) ^[6]. The severity was expressed in PDI), of red rust recorded by using the formula as described below (Singh, 2000) ^[9]:

Rating	Percent leaf infected
0	0
1	1- 20
2	21-40
3	41-60
4	61-80
5	81-100

$$\text{Percent Disease Index} = \frac{\text{Sum of all ratings disease}}{\text{Total no. of ratings} \times \text{maximum disease grade}} \times 100$$

Sooty mould

The severity of the sooty fungus attack was determined on the basis of the percentage of the affected area. The percent disease index recorded by using the formula given by Wheeler (1969). It was recorded at 0-4 scale as follows:

Rating	Per Cent Leaf Infected
0	0
1	1-10
2	11-25
3	26-60
4	>50

$$\text{Percent disease index} = \frac{\text{Sum of all numerical rating}}{\text{No of observations} \times \text{Maximum Disease grade}} \times 100$$

Powdery mildew

The PDI of was calculated (Mc kinney, 1923) observation on disease severity were scored by using 0-5 scale as follows:

Rating	Per Cent inflorescences Infected
0	0
1	0.1-10
2	11-20
3	21-40
4	41-60
5	61-100

$$\text{Percent disease index} = \frac{\text{Sum of rating of inflorescences observed}}{\text{No. of inflorescences observed} \times \text{Maximum disease rating}} \times 100$$

Seedling diseases of mango

Present investigation was undertaken at four nurseries (Fruit Research Station Imalia JNKVV Jabalpur, Adhartal nursery, Sai nursery and Nahar nursery) of Jabalpur during January to March 2019-20, to find out the PDI of mango seedling diseases at nursery condition. The diagnosis of the diseases in the nursery was based on symptoms. During survey various diseases were observed and PDI was calculated using the following formula:

$$\text{Percent disease index} = \frac{\text{Total number of infected plants}}{\text{Total number of plants}} \times 100$$

An experiment was conducted at all India Co-ordinated Research Project (AICRP) labs on Chickpea during 2019-20, Department of Plant Breeding and Genetics, College of Agriculture, JNKVV, Jabalpur.

Results and Discussion

Roving method of survey was conducted in twenty villages during January to March 2019-20 in farmers' fields at Sahapura, Panager, Kundam and Sihora blocks of Jabalpur district (M.P.) and results are presented in Table 1. During survey five different foliar diseases were recorded in mango plants *i.e.* anthracnose, malformation, red rust, sooty mould and powdery mildew. PDI were recorded ranging between 7.11 to 32.90 per cent in the years 2019-2020 (Table 1.). On the basis of severity of diseases anthracnose and sooty mould were remarked as the major disease followed by mango malformation and remaining diseases (Red rust and Powdery mildew) can be regarded as minor disease that were present continuously.

Anthracnose

Maximum PDI of anthracnose was recorded in village haryi (32.90%) followed by Sunwara (32.20%), Gosalpur (31.00%) and Junmani (30.43%), respectively. Minimum percent disease index was recorded in village Jujhar (19.50%) as per data mentioned in Table 1.

Floral malformation

Mango floral malformation on panicles assessed from 14.43 to 23.54 per cent. Maximum PDI was recorded in village Junmani (23.54%) followed by Chargav (23.36%) and Bargi (22.26%) and minimum PDI was recorded in Nawargawan (14.43%), data are recorded in Table 1.

Red rust

Per cent disease index of red rust was observed in ranged from 7.11 to 12.65 per cent. Maximum PDI was recorded in village Bargi (12.65%) followed by Batai (11.34%), Fanwani (11.34%) and minimum PDI was recorded in Dharsni

(7.11%), data are recorded in Table 1.

Sooty mould

Percent disease index of sooty mould was observed in ranged from 15.57 to 32.61 per cent. Maximum PDI was recorded in village Chhattarpur (32.61%) followed by Balkheda (27.03%) and Junmani (25.85%), while minimum PDI was recorded in Jatwan (15.57%), data are recorded in Table 1.

Powdery mildew

Percent disease index of powdery mildew was observed in

ranged from 10.80 to 17.00. Maximum PDI was recorded in village Kharond (17.00%) followed by Jatwan (16.70%), Khitata (16.20%), respectively. The least PDI was recorded in Chhattarpur (10.80%), data are recorded in Table 1.

Maximum percent disease index of anthracnose (28.26%) and malformation (19.98%) were noticed in block Sahapura and maximum percent disease index of red rust was observed in block Sihora (8.89%) and sooty mould was observed in block Panager (23.74%) and powdery mildew was observed in Kundam (14.02%), respectively

Table 1: Survey for the severity of foliar diseases in Jabalpur district during 2019-20

S. No.	Block	Location	No. of plant surveyed	Month of survey	Percent disease index				
					Anthracnose	Malformation	Red rust	Sooty Mould	Powdery mildew
1	Sahapura	Chargav	20	January 2020 to March 2020	25.23	23.36	9.41	21.99	12.90
		Bargi	31		30.43	22.26	12.65	24.32	14.20
		Sunwara	25		32.20	16.59	10.11	20.02	12.95
		Haryi	20		32.90	16.59	8.89	23.11	14.00
		Mohas	27		20.90	21.19	10.34	21.84	13.80
2	Panager	Jatwan	22		22.86	16.56	9.32	15.57	16.70
		Balkheda	25		24.68	16.56	9.44	27.03	11.90
		Imlai	27		28.68	17.09	8.22	25.00	12.02
		Kharond	20		30.12	19.09	7.89	18.51	17.00
		Chhattarpur	20		27.33	19.23	8.21	32.61	10.80
3	Kundam	Batai	18		25.75	16.03	11.34	22.85	13.70
		Khitata	22		26.97	15.09	10.34	18.88	16.20
		Dadargawan	25		22.43	15.29	9.02	21.35	13.70
		Nawargawan	21		28.68	14.43	8.22	20.55	12.80
		Hansapur	20		26.57	16.41	8.32	22.05	13.70
4	Sihora	Gosalpur	23		31.00	20.00	8.02	22.32	11.90
		Jujhari	27		19.50	17.11	8.03	20.21	15.90
		Dharsni	19		22.40	18.21	7.11	23.52	12.00
		Junmani	21		30.43	23.54	9.98	25.85	13.30
		Fanwani	25		20.73	18.42	11.34	25.85	11.20

Table 2: Block wise Percent disease index (PDI) of foliar diseases

S No.	Block	Disease incidence %				
		Anthracnose	Malformation	Red rust	Sooty mould	Powdery mildew
1	Sahapura	28.26	19.98	8.25	22.25	10.98
2	Panager	26.73	17.73	8.61	23.74	11.28
3	Kundam	26.08	15.45	7.64	21.13	14.02
4	Sihora	24.81	19.45	8.89	23.39	10.46

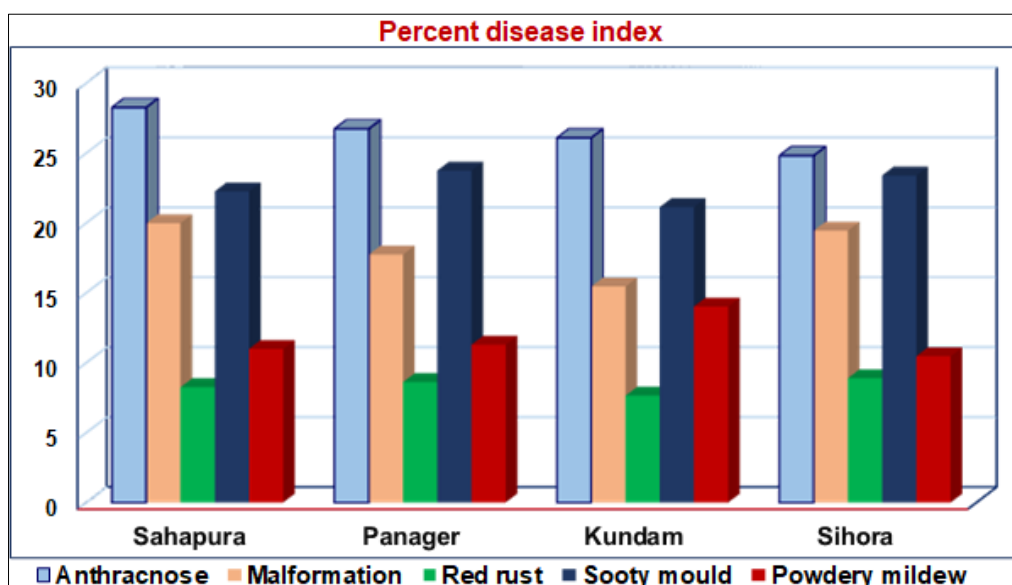


Fig 1: Percent disease index of foliar diseases in blocks of Jabalpur during 2019-20

Table 3: Percent disease index of seedling diseases in mango

S. No.	Location	Age of seedling	Total no. of seedling	Disease index (%)	
				Anthracnose	Vegetative malformation
1.	Fruit Research Station Imalia, JNKVV, Jabalpur	9 Month	280	13.11	12.22
		9 Month	250	18.11	14.32
		6 Month	200	15.55	15.51
2.	Adhartal nursery JNKVV Jabalpur	6 Month	60	14.00	14.11
		6 Month	50	20.21	19.65
		6 Month	50	19.02	18.32
3.	Sai nursery Jabalpur	7 Month	22	25.35	14.64
		7 Month	30	19.02	21.2
		6 Month	15	20.33	17.0
4.	Nahar nursery Jabalpur	6 Month	20	25.2	20.51
		9 Month	20	21.81	21.81
		9 Month	15	20.37	20.06

Percent diseases index of mango seedling diseases

In Jabalpur four nurseries were surveyed *viz.* Fruit Research Station, Imalia (JNKVV), Adhartal nursery (JNKVV), Sai nursery Jabalpur and Nahar nursery Jabalpur. Two seedling diseases were recorded (Anthracnose and vegetative malformation), in Table 2.

Maximum percent disease index of anthracnose was recorded in Sai nursery (25.35%) and Nahar nursery (25.2%). Minimum percent disease index was recorded in Fruit Research Station, Imalia (JNKVV) (13.11%) followed by Adhartal nursery (14.00%) as per data mentioned in Table 2. Maximum percent disease index of vegetative malformation was recorded in Nahar nursery (20.81%) and Sai nursery (21.2%). Minimum percent disease index was recorded in Fruit Research Station, Imalia (JNKVV) (12.22%) followed by Adhartal nursery (14.11%) as per data mentioned in Table 2.

Conclusion

Data clearly showed that the diseases was present in all the villages of Jabalpur districts. The survey results revealed that maximum mean percent disease index of anthracnose was recorded in Sahapura with 28.26 per cent, malformation was recorded in Sahapura with 19.98 per cent, red rust was recorded in Sihora with 8.89 per cent, sooty mould was recorded in Sihora with 23.74 per cent and powdery mildew was recorded in Kundum with 14.02 per cent and seedling diseases *viz.* anthracnose and vegetative malformation were recorded in different nurseries of Jabalpur during the period of survey

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