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Studies on location specific seasonal survey for digital mapping of important mango diseases Y.R.

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Abstract

The field experiment has been conducted in 2021-22 & 2022-23 to study the location specific survey for digital mapping of important disease of mango in Sindhudurg district. The data of disease index of different major and minor disease has been collected at two different locations from each tehsil of Sindhudurg district. The collected information was compiled and formatted in to virtual image on computer by producing map that gives accurate information of disease status in the Sindhudurg district. During 2021-22. The Kankavali Tahsil recorded, high disease intensity of mango disease such as anthracnose, blossom blight, Sooty mould of leaf and panicle and pink disease during winter and higher Anthracnose, powdery mildew and pink diseases during summer season.. During the year 2022-23, the Vaibhawadi Tehsil recorded, high percent disease index of mango disease such as anthracnose and branch dying during rainy and winter season. The disease intensity of major diseases such as Anthracnose. Red rust get decrease as compared to previous years.

Keywords: Mango, digital mapping, disease intensity, PI, PDI, Sindhudurg, winter and summer

Introduction

Mango has been an important crop in Konkan region of Maharashtra state. The present study was undertaken to study the variation in disease intensity of cashew in Konkan region of Maharashtra state. The variation of disease incidence and severity of disease resulting from devastating effects of plant pathogens, limits crop productivity globally, thus affecting food security. The effects of globalization, climate change, evolution and new emergence of pathogens, increases the more variation in spread of different plant disease. (Agrios, 2005) ^[1]. Plant-pathogenic fungal, bacterial and virus growth, development and disease is guided by critical environmental factors and are crucial in limiting the quality and quantity of agricultural produce.

Climate change also disrupts and alters the distribution of different diseases, which poses a threat to agriculture (Rosenzweig *et al.*, 2000; Scherm *et al.*, 2000) ^[6, 7]. The season wise climate variation is becoming increasingly extreme and unpredictable (Paul *et al.*, 2009) ^[5]. Consequently, early detection of pathogens, accurate diagnosis, assessment and its immediate intimation to the beneficiary or farmers is very crucial to undertake prevention and management measures in a particular area. (Myerson and Reaser, 2002) ^[4]. Lack of these measures will lead directly to inadequate disease control and reductions in crop production and quality. The collection and interpretation of data can be compiled and formatted in to virtual image on computer by producing map is called as digital mapping which will gives quick accurate information of disease status for the users or beneficiary. The Digital mapping will help to transfer the technology to enhance the delivery of public services, improve efficiency, and faster transparency (Guler M and Buyukozkon G 2023) ^[3]

With this view, the efforts have been made to do location specific survey for digital mapping of important disease of mango in Sindhudurg district during winter and summer season for consecutive two years (2021-22) & (2022-23). The data of different disease collected is compiled and formatted into virtual image and make available for users.

Materials and Methods

A Field experiment was started by conducting fixed location survey of Mango crop during winter and summer season 2021-22 & 2022-23 at the different selected locations in

Sindhudurg district. The trial has been initiated by selecting the two farmers from each Tehsil of Sindhudurg district so as to conduct the fixed plot survey for digital mapping. The five trees each of mango were selected and tagged for future monitoring. On the basis of observations, Percent Disease Incidence (PI) and Percent Disease Index (PDI) of mango were calculated. (Table no.1 to 8).

The Percent Incidence (PI) and PDI is calculated by following formula.

$$\text{Percent Incidence (PI) (\%)} = \frac{\text{No. of disease plant part observed}}{\text{Total number of plant part observed}} \times 100$$

Percent Disease Index (PDI) was calculated by using the formula.

$$\text{PDI (\%)} = \frac{\text{Sum of all disease ratings}}{\text{Total no. of ratings} \times \text{Maximum disease grade}} \times 100$$

Table 1: Comparative study of Percent incidence of major disease of mango during the last two years during winter season. (OCT-21 TO JAN-22) and (OCT-22 TO JAN-23)

Locations	Anthracnose		Red rust		Blossom blight		Sooty mould (Leaf)		Sooty mould (Panicle)	
	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23
Dodamarg	68	16	14	18	54	04	34	0.0	40	0.0
Sawantwadi	72	22	06	20	64	10	32	0.0	38	0.0
Kudal	76	20	18	22	52	08	30	0.0	36	0.0
Kankavali	78	14	14	14	66	10	36	0.0	46	0.0
V.wadi	76	24	14	14	54	08	34	0.0	44	0.0
Vengurla	70	18	10	14	62	06	30	0.0	34	0.0
Deogad	74	20	16	20	60	08	32	0.0	34	0.0
Malvan	70	14	10	14	48	12	34	14.0	38	0.0
Average	73	18.5	12.75	17	57.5	8.25	32.75	0.0	38.75	0.0

Table 2: Comparative study of % incidence of minor disease of mango during the last two years during winter season. (OCT-21 TO JAN-22) and (OCT-22 TO JAN-23).

Locations	Branch dying		Pink disease		Black banded disease	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Dodamarg	6	02	2	00	4	00
Sawantwadi	8	00	2	00	2	04
Kudal	4	02	2	02	4	02
Kankavali	8	06	6	04	2	00
V.wadi	6	10	2	04	2	02
Vengurla	8	10	2	02	4	02
Deogad	10	04	2	04	6	02
Malvan	8	08	4	00	2	02
Average	7.25	4.75	2.75	2.0	3.25	1.75

Table 3: Comparative study of PDI of major disease of mango during the last two years during winter. (OCT-21 TO JAN-22) and (OCT-22 TO JAN-23).

Locations	Anthracnose		Red rust		Blossom blight		Sooty mould (Leaf)		Sooty mould (Panicle)	
	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23
Dod.	37.6	5.2	4.4	6.0	32	0.8	14.8	0.0	20.8	0.0
Saw.	39.2	6.4	2.4	6.0	37.2	2.0	14	0.0	21.2	0.0
Kudal	42	6.4	6.8	6.8	30.4	1.6	14.4	0.0	18.8	0.0
Kank.	43.2	3.6	4.0	3.6	38.4	3.2	18.4	0.0	25.6	0.0
Vaib.	39.2	6.4	4.8	3.6	31.6	1.6	14.4	0.0	24.4	0.0
Veng.	39.6	7.2	3.6	5.2	35.6	1.2	14.4	0.0	18.8	0.0
Deog.	40.0	6.8	6.4	6.4	33.6	2.0	14	0.0	20.8	0.0
Malvan	39.6	4.0	3.6	3.2	27.6	3.6	16.4	5.2	21.6	0.0
Aver.	40.05	5.75	4.5	5.1	33.3	2.0	15.1	0.0	21.5	0.0

Table 4: Comparative study of Percent incidence of major disease of mango during the last two years during summer season. (FEB-22 TO MAY-22) and (FEB-23 TO MAY-23)

Locations	Anthracnose		Red rust		Powdery Mildew		Sooty mould (Leaf)		Sooty mould (Panicle)	
	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23
Dodamarg	20	12	26	16	62	8.0	40	8.0	46	8.0
Sawantwadi	18	10	24	22	62	4.0	36	10.0	42	12.0
Kudal	14	04	28	24	60	6.0	34	4.0	30	6.0
Kankavali	24	08	24	20	64	8.0	44	8.0	46	8.0
V.wadi	18	12	22	18	56	6.0	46	6.0	48	8.0
Vengurla	14	08	26	14	60	8.0	30	6.0	40	6.0
Deogad	18	10	24	20	58	4.0	38	8.0	44	10.0
Malvan	18	14	28	22	56	6.0	40	8.0	46	8.0
Aver.	18	9.75	25.25	19.5	59.75	6.25	38.5	7.25	42.75	8.25

Table 5: Comparative study of % incidence of minor disease of mango during the last two years during summer season (FEB-22 TO MAY-22) and (FEB-23 TO MAY-23)

Locations	Branch dying		Pink disease		Black banded disease	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Dodamarg	4	06	2	00	2	00
Sawantwadi	4	00	2	00	2	06
Kudal	2	04	2	02	4	02
Kankavali	4	08	4	06	2	00
V.wadi	2	10	2	04	2	02
Vengurla	6	08	2	02	2	02
Deogad	8	06	2	06	4	04
Malvan	4	08	2	00	2	02
Average	4.25	6.25	2.25	2.5	2.5	2.25

Table 6: Comparative study of PDI of major disease of mango during the last two years during winter. (FEB-22 TO MAY-22) and (FEB-23 TO MAY-23)

Locations	Anthracnose		Red rust		Powdery Mildew.		Sooty mould (Leaf)		Sooty mould (Panicle)	
	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23	21-22	22-23
Dod.	5.6	3.2	16.8	6.0	37.2	3.2	18.4	2.4	22.4	3.2
Saw.	5.2	2.0	14.8	7.2	36.8	1.6	16.8	2.4	20	4.4
Kudal	4.8	0.8	19.2	10.0	34	2.0	17.2	0.8	14.4	1.6
Kank.	8.8	1.6	15.6	6.4	36.8	4.8	21.2	2.0	22.4	3.2
Vaib.	6	2.8	13.2	6.0	32.8	3.6	22.8	1.2	23.2	3.2
Veng.	5.2	1.6	16.8	5.2	36	3.2	15.6	1.2	20.8	2.8
Deog.	7.2	2.0	14.4	6.0	34	2.4	16.8	2.0	18.4	4.8
Malvan	7.2	2.8	18.8	6.8	33.2	3.6	22	2.4	22.8	3.2
Aver.	6.25	2.1	16.05	6.7	35.1	3.05	18.85	1.8	20.4	3.3

Table 7: Comparative study of Percent incidence of major disease of mango during the last two years during rainy season. (JUNE-22 TO SEPT-22) and (JUNE-23 TO SEPT-23)

Locations	Anthracnose		Red rust		Branch dying		Pink disease.		Black banded.	
	22-23	23-24	22-23	23-24	22-23	23-24	22-23	23-24	22-23	23-24
Dod.	10	04	12	0.0	2	4.0	0	0.0	0	0.0
Saw.	16	04	14	4.0	0	2.0	0	0.0	2	0.0
Kudal	14	02	16	4.0	2	4.0	2	0.0	2	0.0
Kank.	10	06	10	0.0	4	0.0	4	0.0	0	0.0
Vaib.	18	00	10	0.0	6	2.0	2	0.0	2	0.0
Veng.	12	08	10	6.0	6	4.0	2	8.0	2	8.0
Deog.	14	02	14	4.0	2	2.0	4	4.0	2	0.0
Malvan	10	04	10	4.0	6	0.0	0	0.0	0	2.0
Aver.	13	3.75	12	2.75	3.5	2.25	1.75	1.5	1.25	1.25

Table 8: Comparative study of PDI of major disease of mango during the last two years during rainy. (JUNE-22 TO SEPT-22) and (JUNE-23 TO SEPT-23).

Locations	Anthracnose		Red rust	
	2022-23	2023-24	2022-23	2023-24
Dodamarg	4.0	0.8	6.4	0.0
Sawantwadi	5.2	0.8	5.2	1.2
Kudal	5.2	0.4	7.6	0.8
Kankavali.	2.8	1.6	4.8	0.0
Vaibhavwadi	5.2	0.0	2.8	0.0
Vengurla	4.8	1.6	2.8	1.2
Deogad	5.2	0.4	4.4	0.8
Malvan	3.2	1.2	2.8	0.8
Aver.	4.45	0.85	4.6	0.6

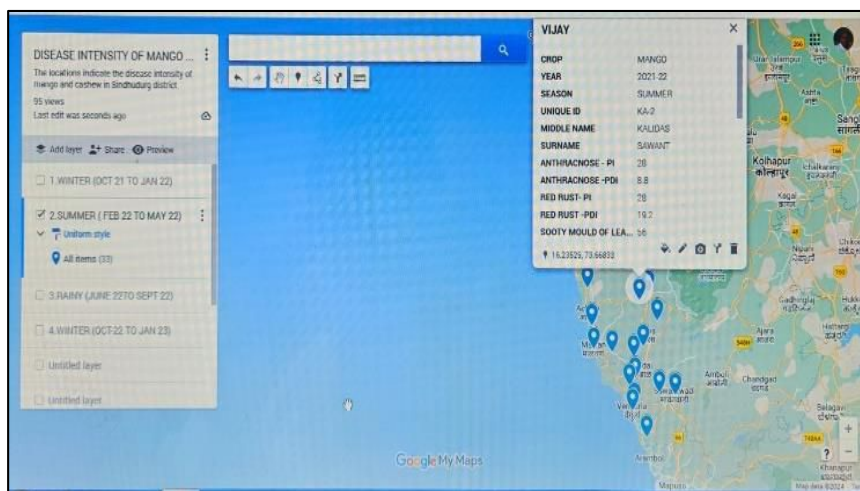


Photo 1: The photograph showing the digital map of mango disease in Sindhudurg district during summer (2021-22).

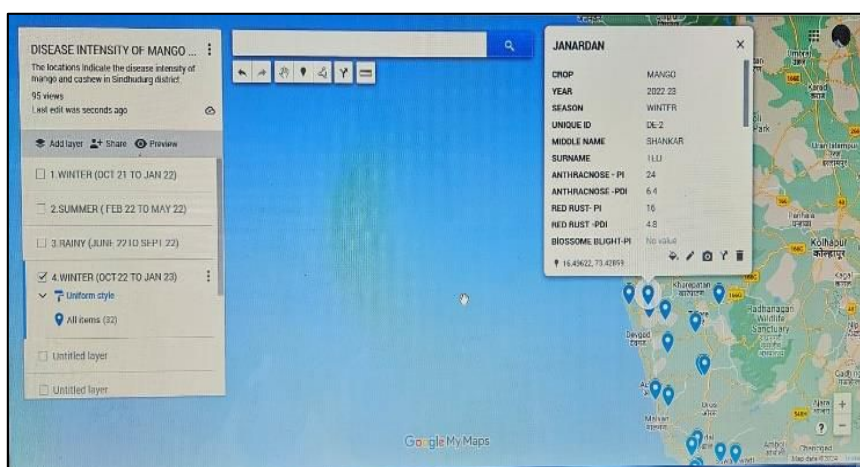


Photo 2: The photograph showing the digital map of mango disease in Sindhudurg district during winter (2022-23).

Results and Discussion

During the year 2021-22, the Kankavali Tehsil recorded, high percent disease index of mango disease such as anthracnose (PI:78, PDI:43.2), blossom blight (PI:66, PDI:38.4), Sooty mould of leaf (PI:36, PDI:18.4), sooty mould of panicle (PI:46, PDI:25.6) and pink disease (PI:6) during winter. However during summer it recorded higher Anthracnose (PI : 24, PDI : 8.8), powdery mildew (PI:64, PDI:36.8) and pink diseases (PI:4). In Kudal Tahsil the red rust (winter : PI: 18 PDI: 6.4, Summer: PI:28 PDI: 19.2) was found higher during both season. The sooty mould of leaf (PI:46, PDI: 22.8) and panicle (PI: 48, PDI: 23.2) was higher in Vaibhavwadi during summer. The Tahsil, Deogad recorded higher branch dying (Winter: PI:10, Summer: PI:8) and black banded disease (Winter: PI:6, Summer: PI:4) during both winter and summer season. The branch dying was higher (Winter: PI: 6, Summer: PI: 4) in Vaibhavwadi Tahasil. There is no new emergence of the disease. All these collected data was compiled and formatted in to virtual image on computer by producing map which gives accurate information of disease status in the Sindhudurg district during 2021-22 of summer and winter season.

During the year 2022-23, the Vaibhavwadi Tehsil recorded, high Percent incidence (18) and percent disease index (5.2) of mango disease such as anthracnose and branch dying 6 & 10) during rainy and winter season. The kudal tehsil recorded highest red rust percent incidence (16.00) & percent disease index (7.6) during rainy season. The tehsil Malvan recorded highest percent disease index of blossam blight

(PI:12 & PDI:3.6) and sooty mould (PI:0.65, PDI:1.75) during winter season. However during summer season, almost all the tehsil recorded the different disease. The Highest Anthracnose disease intensity (PI:14 PDI:2.8) was found in Malvan tehsil. The Kudal tehsil recorded highest red rust disease. Whereas the Sawantwadi tehsil recorded sooty mould and black banded diseases. There is no new emergence of the disease. All these collected data was compiled and formatted in to virtual image on computer by producing map which gives accurate information of disease status in the Sindhudurg district during 2022-23 of rainy winter and summer season.

The comparative data indicating that In case of Mango there is decrease in percent disease index of Anthracnose, Blossom blight, Sooty mould (leaf), Sooty mould (Panicle) and Branch dying disease (Except Red rust) during winter (2022-23) as compared to the last year Winter season (2021-22).

Conclusion

There is a seasonal variation in the disease intensity of major diseases of mango was found in Sindhudurg district. It is also observed that there is no new emergence of disease. The comparison between 2021-22 and 2022-23 clearly shown that the major diseases such Anthracnose, Red rust get decreases. However the minor disease such as branch dying increases which can be major disease of mango in future. The data which is digitalised in the form of digital mapping of major and minor disease of mango gives an instant information for the various farmers across the

Sindhudurg district. After getting instant information at one location by farmer or expert or researcher through internet mode, he will immediately take precaution of the crop at his farm. This digital mapping will help him for early detection and diagnosis of disease for timely applications of foliar fungicides to avoid devastating losses. The quick information about the rapid diagnosis of plant pathogens is also critical because some fungicides cannot be applied after a certain stage in plant's maturity.

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