

Original Research Article

Survey of Safflower Fields to Record the Incidence and Intensity of Dry Root Rot in Districts of Marathwada Region

V. M. Gholve*, S. B. Ghuge, S. V. Pawar and P. N. Gawande

Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani – 431 402, Maharashtra, India

*Corresponding author

ABSTRACT

Keywords

Macrophomina phaseolina,
Incidence,
Carthamus tinctorius,
Intensity, Dry
root rot,
Survey

The survey of 35 farmers' safflower crop fields from four districts (Hingoli, Parbhani, Nanded, and Jalna) of Marathwada region of the Maharashtra state was carried out during *Rabi*, 2014-15 and recorded seasonal disease incidence and intensity of dry root rot of safflower. The disease was predominant in all the districts surveyed. The safflower crops grown in the district of Hingoli were found to be affected more severely with maximum average dry root rot disease incidence (21.70 %) and intensity (17.55 %). This was followed by the districts *viz.*, Parbhani (20.00% and 16.51%), Nanded (17.88% and 11.32 %) and Jalna (16.66% and 12.16) with average dry root rot disease incidence and intensity, respectively.

Introduction

Safflower (*Carthamus tinctorius* L.), commonly known as *Kardi* (Marathi), *Kusube* (Kannada), *Kusum* (Hindi) and *Kusumba* (Telugu), is one of the important *Rabi* oilseed crop of the country originated from Abyssinia and Afghanistan.

The important states growing safflower are Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Gujarat, Orissa and Bihar. In Maharashtra it has occupied an area of 193 lakh ha with a production of 114 lakh tones and productivity of 510 kg/ha (Anonymous 2013-2014).

The diseases of safflower, among these diseases, root rot caused by *Macrophomina phaseolina* (Tassi) Goid is a very

devastating disease of safflower and causes heavy reduction in total yield (Kore and Deshmukh, 1982). It is the major soil borne disease and appears sporadically all over the country (Shambharkar and Indi, 1987).

Occurrence of this disease on safflower in India was first reported by Amarsingh and Bhowmik (1979) from IARI, New Delhi and later on by others from different parts of the country [(Kore and Deshmukh, 1982 and Lukade, 1992) from Maharashtra; Singh *et al.*, 1987 from M.P].

In Maharashtra it is mainly grown in Solapur, Pune, Ahmednagar, Latur, Osmanabad, Parbhani, Hingoli and Jalna districts.

Materials and Methods

A roving survey was conducted in Safflower growing areas during *Rabi*, 2014-15 in the major districts of Marathwada region viz., Hingoli, Parbhani, Nanded and Jalna to assess Dry root rot incidence and intensity.

Observations on Dry root rot incidence and intensity were recorded by applying standard 0-9 grade disease rating scale (Mayee and Datar, 1986) as detailed below.

Per cent disease incidence and intensity of dry root rot was calculated by using formula:

$$\text{Per cent Disease Incidence} = \frac{\text{Number of plants infected by dry root rot}}{\text{Total number of plants observed}} \times 100$$

$$\text{Per cent Disease Intensity} = \frac{\text{Summation of grade of plants observed}}{\text{Total number of plants observed} \times \text{Highest scale grade}} \times 100$$

The survey of 35 farmers' safflower crop fields from four districts (Hingoli, Parbhani, Nanded, and Jalna) of Marathwada region of the Maharashtra state was carried out during *Rabi*, 2014-15 and recorded seasonal disease incidence and intensity of dry root rot of safflower.

Results and Discussion

District-wise seasonal incidence and intensity

Results [Table 1, Fig. 1 & 2 and Plate I (A&B) and II] revealed that during 2014-15 dry root rot average disease incidence and intensity in the four districts surveyed was ranged from 16.66 to 21.70 percent and 11.32 to 17.55 percent respectively. However the safflower crops grown in the

district of Hingoli were found to be affected more severely with maximum average dry root rot disease incidence (21.70 %) and intensity (17.55 %). This was followed by the districts viz., Parbhani (20.00% and 16.51%), Nanded (17.88% and 11.32 %) and Jalna (16.66% and 12.16) with average dry root rot disease incidence and intensity, respectively.

Variety-wise incidence and intensity

In four districts of the Marathwada region surveyed, about 5 safflower varieties were grown by the farmers. The variety wise results obtained on dry root rot disease incidence and intensity are presented in the Table 2 and depicted in the figures 3.

During 2014-15 (Table 2 and Fig. 3) the average dry root rot disease incidence and intensity on the safflower cultivars, varieties grown were ranged from 9.66 (PBNS-12) to 25.33 (Local) per cent to 6.96 (PBNS-12) to 21.84 (Local) per cent, respectively. However, maximum average dry root rot disease incidence (25.23 %) and intensity (21.84%) were recorded on Local cultivar. Other safflower cultivars found more prone to the disease were Bhima with second maximum average dry root rot incidence (18.75%) and intensity (14.78 %), of the disease followed by Tara with incidence (15.10 %) and intensity (10.66 %). The minimum average dry root rot disease incidence and intensity was recorded on Sharda with (15.00%) incidence and intensity (10.14%), respectively.

The results revealed that the per cent disease incidence and intensity varied from location to location and variety to variety. However, the dry root rot disease was found in almost all the safflower fields surveyed. The overall average disease incidence and intensity was more in Hingoli district. This may be due to

the reasons that whichever safflower varieties available for cultivation are mostly prone to dry root rot disease and due to black cotton soils in Hingoli district.

There may be acute water stress at the time of flowering in the safflower, which predisposes the crop to dry root rot disease. Similar observations were recorded by

Singh and Bhowmik (1979); they carried out survey and reported that incidence of charcoal rot of safflower caused by *M. phaseolina* in Karnataka up to the extent of 25 to 30 percent losses. Rao *et al.*, (1997) conducted a survey of the sorghum crop in Parbhani, Latur, Beed, Jalna, Aurangabad and Jalgaon and reported charcoal rot in 20 per cent of the fields surveyed.

Table.1 District-wise incidence and intensity of safflower dry root rot disease during *Rabi*, 2014-15

Districts	Tahsils	Villages	Mungbean Varieties	Incidence (%)	Intensity (%)
Hingoli	Hingoli	Salesura	Local	38	31.11
		Hiwara	Tara	13	9.99
		Nandkheda	PBNS-12	10	8.88
	Kalamnoori	Kalamnoori	Local	30	26.66
	Vasmat	Purna	Tara	14	8.88
		Hatta	Sharda	24	17.77
		Adgaon	Bhima	33	28.88
	Aundha	Aundha	PBNS-12	12	8.88
		Jawla	Local	30	24.44
		Yelgaon	Sharda	13	10.22
Average			21.70	17.55	
Parbhani	Parbhani	Parbhani	Local	25	22.22
		Pokharni	Sharda	16	12.55
		Assola	Tara	22	20.00
		Nandgaon	Sharda	14	8.88
	Purna	Zerophata	Local	28	24.88
	Manwat	Ambegaon	PBNS-12	12	10.22
		Somthana	Local	30	22.22
	Gangakhed	R.Sawargaon	PBNS-12	14	11.11
Average			20.00	16.51	
Nanded	Nanded	Naigaon	Local	28	17.77
		Vishnupuri	PBNS-12	09	4.44
		Igategaon	Sharda	16	10.22
		Takalgaon	Local	21	13.33
	Ardhapur	Ardhapur	PBNS-12	07	4.44
		Dabad	Tara	14	6.22
	Loha	Sonkhed	Sharda	13	5.22
		Malegaon	Local	35	28.88
Average			17.88	11.32	
Jalna	Jalna	Bodkha	Tara	12	8.22
		Kalegaon	Local	25	20.00
	Ambad	Ambad	Local	26	19.33
		Raniunchegaon	Local	25	20.66
	Badnapur	Badnapur	PBNS-12	12	8.88
	Ghansangvi	Pimpalgaon	Sharda	15	10.00
	Manta	Pimpalgaon	Sharda	10	6.66
		Paradh	PBNS-12	08	3.33
Ghanevadi		Local	17	12.44	
Average			16.66	12.16	
Overall Average	Total locations (35)			19.06	14.39

Table.2 Variety-wise incidence and intensity of safflower dry root rot disease in the four districts of Marathwada during *Rabi*, 2014-15

Varieties	No. of locations	Av. Incidence (%)	Av. Intensity (%)
Bhima	04	18.75	14.78
Sharda	07	15.00	10.14
PBNS-12	06	9.66	6.96
Tara	05	15.10	10.66
Local	13	25.23	21.84

In India in year 2012-13, 2013-2014 the area under safflower and production as follows

Location	Year	Area ('000ha)	Production ('000 tons)	Productivity (kg/ha)	Losses
India	2012-13	183.5	109.0	591	25-60%
Maharashtra	2012-13	105.0	58.00	552	
India	2013-14	296.0	180.0	609	
Maharashtra	2013-14	193.0	114.0	510	

(Anonymous 2012-2013, 2013-2014)

Standard disease rating (0-9 grade) scale

Category	Description
0	No incidence
1	Up to 1 % of the plants infected
3	1-10% of the plants infected
5	11-25% of the plants infected
7	26-50% of the plants infected
9	Above 50% of the plants infected

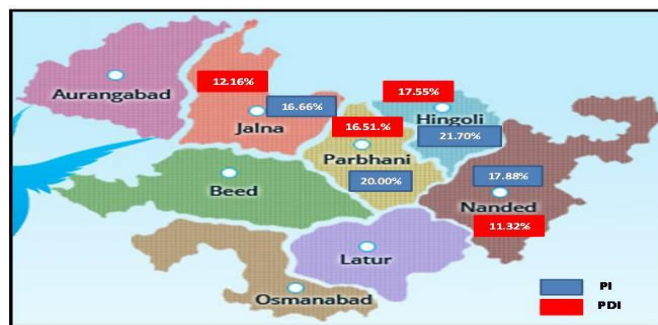


Fig. 1. Map of Marathwada region showing district wise average dry root rot incidence (PI) and dry root rot intensity (PDI) safflower disease during 2014-15

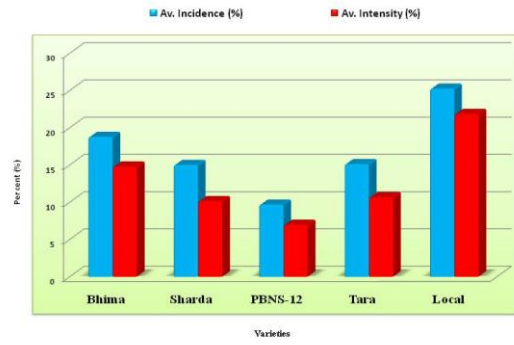


Fig 2.Variety-wise average incidence and intensity of safflower dry root rot disease during *Rabi*,2014-15

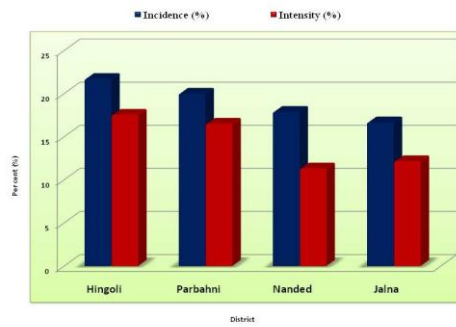


Fig3.District-wise average incidence and intensity of safflower dry root rot disease during *Rabi*,2014-15

PLATE I(A)



Location: Hingoli district



Location: Parbhani district

Overview of safflower fields severely afflicted by dry root rot disease
Cont..

PLATE I(B)



Location:Nashikdistrict



Location:Jalnadistrict

Observations of these fields severely affected by dry root rot disease

PLATE II



Typical symptoms of safflower dry root rot disease

References

- Anonymous, 2013. Safflower. Annual Progress Report of DOR. 3:101-107.
- Kore, S. S., and Deshmukh, R. W. 1982. Charcoal root rot of safflower caused by *Macrophomina phaseolina* (Tassi) Goid Res. Bull. Marathwada Agril. Univerc. 6:43-45.

- Lukade, G. M., 1992. Effect of organic soil amendments on root rot incidence of safflower. Madras Agric. J. 79(3):179-181.
- Mayee, C.D., and Datar, V. 1986. Phytopathometry. Tech. Bull./1MAU, Parbhani. 52.
- Rao, J. N., T.B. Guard, S. Pande, P.M. Rao and R.V. Deshmukh, 1997. Survey of

- diseases of sorghum in Maharashtra during the 1995 rainy season. ISMN 38: 61-62.
- Shambharkar, D. A., and D. V. Indi, 1987. Causal organism of safflower diseases and their importance. AICRP on Oilseeds (Safflower), Solapur, Maharashtra, India. Pp. 181.
- Singh, A., and Bhowmik, T. 1979. Occurrence of charcoal rot of safflower in India. Indian Phytopath. 32:626-627.
- Singh, S. N., S. K. Shrivastav and Khare M. N.1987. Effect of varying nitrogen doses and dates of sowing on the incidence of root rot (*Rhizoctonia bataticola*) and leaf spot (*Alternaria carthami*) diseases of safflower. J. Mycol. Pl. Pathol. 17(3): 351-352.