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Survey of ergot disease of pearl millet caused by *Claviceps fusiformis* (Loveless). in Marathwada region district of Chh. Sambhaji Nagar (MH)

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Abstract

A random survey of pearl millet growing farmer's field was conducted in the Chh. Sambhaji Nagar district i.e nine tehsil and twenty seven village during *Kharif* 2023-2024 for recording the prevalence of ergot on pearl millet.

It revealed that the disease was extensively distributed. In Chh. Sambhajnagar districts in the Marathwada revenue division of Maharashtra state, the disease was widely distributed and commonly occurred in mild to severe cases, according to a survey done to determine the prevalence of the disease at varied 9 tehsils and 27 villages. Nevertheless, in the district of Chh. Sambhaji Nagar, the prevalence of ergot varied from 5.50 to 22.00% in the district of Chh. Sambhaji Nagar. Kannad tehsil had the highest recorded ergot incidence of (22.00%), while in Phulambari tehsil it had the lowest disease incidence (5.50%).

The findings also revealed the average ergot disease incidence on the pearl millet cultivars / varieties planted by farmers during the kharif 2023-2024 ranged from 8.04 (Pioneer 86M38) to 16.33 percent (Local), However maximum average disease incidence was recorded on Local (16.33%) this was followed by Mahodya318 (15%), NHB-4 (13.20%), ABH1200fe (11.20%), Samrudhi (7.75%), and the least average disease incidence was recorded on Pioneer86M38 (8.04%). The mean ergot of pearl millet incidence was recorded to the tune of 13.19 percent.

Keywords: Ergot disease, *Claviceps fusiformis*, pearl millet, Kharif 2023-2024, Chhatrapati

Introduction

Pearl millet *Pennisetum glaucum* (L.) R. Br. is the Fifth most important staple cereal crop in the world. It is staple crop also provides good quality fodder to cattle in the arid and semi-arid tropical regions and recognized as valuable forage crop because of its robust and fast growth habit. Its stalk is used for fuel and thatching.

It grains also called "Balvardhak" because it contains fiber which helps to the better digestion and reduces indigestion, gasses and acidity. The low amount of carbohydrates in grain, control to the cholesterol and reduce heart diseases. It is also saving from the danger of high blood pressure. The use of Bajra grains control to the blood sugar. The grains use of Bajra strengthened to the bones due to high amount of calcium. Jinu *et.al* (2023) [1].

Pearl millet suffers from a number of fungal, bacterial, and viral diseases, witch weed (*Striga asiatica*), and nematodes. Diseases that are considered economically important, in order of their loss causing potential, are downy mildew (*Sclecropora grtmrinila* Sacc. Schroet.) ergot (*Claviceps fusiformis* Loveless) smut (*Tolyposporium penicillariae* Bref.), and rust (*Puccinia penniseti* Zimm).

Marathwada region comprising Beed, Jalna and Aurangabad is the major pearl millet growing area of the state as these three districts jointly contribute more than 80% share in area and production of this crop in the state. Marathwada region occupies 0.137 M ha with an annual production 1.22 MT and productivity of 994 kg ha⁻¹.

The ergot of Bajra (pearl millet) was first reported from south India. The first report of its occurrence in epidemic form was made in 1956 from south 'Satara' area of Maharashtra. Severe epidemics of the disease are known to occur in Delhi, U.R, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, A.R, and Haryana.

Natarajan *et al.* (1974) ^[6] estimated the average incidence to be about 62.4% with grain loss of about 58%.

Materials and Methods

A random survey was conducted in different locations of Farmers fields in Chh. Sambhaji Nagar district during *kharif* 2023-24 at flowering and soft dough stage of crop and the incidence of ergot was recorded.

The infected samples of pearl millet showing the symptoms of ergot (Honeydew) was collected from the farmer's field of Chh. Sambhaji Nagar district and brought to the laboratory for further studies. In each field 1m² quadrat areas is select randomly and in that total number of disease infected plants was counted based on prominent visual symptoms only. From this data, the percentage of disease incidence was calculated by using the following formula.

Following proforma was utilized during survey.

GPS location: _____
 District/Block: _____
 Name of the village: _____
 Stage of the crop: _____
 Variety/hybrid: _____
 Disease incidence: _____

The data obtained on Ergot of pearl millet incidence and intensity were computed for estimation of the percentage incidence by following formula.

$$\text{Disease Incidence (\%)} = \frac{\text{No. of diseased plants}}{\text{Total No. of plants assessed}} \times 100$$

Disease severity was recorded on a standard 0-8 disease rating scale 0 to 8 scale of (Thakur and king 1988) ^[5].

Rating scale Table

Rating scale	Symptoms and lesions	Disease reaction
0	No ergot infected florets in the panicle	Highly Resistance
1	1% ergot infected florets in the panicle	
2	>1-5% ergot infected florets in the panicle	
3	>5-10% ergot infected florets in the panicle	Resistant
4	>10-20% ergot infected florets in the panicle	Susceptible
5	>20-35% ergot infected florets in the panicle	Highly Susceptible
6	>35-40% ergot infected florets in the panicle	
7	>50-75% ergot infected florets in the panicle	
8	100% ergot infected florets in the panicle	

(Thakur *et al.* 1988) ^[5]

Results and Discussion

1. Occurrence and distribution of ergot disease

In Chhatrapati Sambhajnagar districts, an extensive random survey was carried out in the *kharif* 2023, close to the blooming to soft dough stage of bajra crop growing farmer's fields. The goal of the survey was to determine the prevalence of *Claviceps fusiformis* caused pearl millet ergot in a total of 27 villages distributed in 9 tehsils. The ergot of pearl millet was seen to change between locations, most likely as a result of varying soil types, cultivars employed, cultivation techniques, environmental factors, etc.

2. Ergot disease incidence

The result presented in (table. 1) indicated that ergot disease was recorded in the range of 5.50 to 22.00 percent in Chhatrapati Sambhajnagar district. With overall average mean of 13.19 percent or %.

In Chhatrapati Sambhajnagar districts, the highest disease incidence of (22.00%) was noticed at village Pimpri Kh (Kannad Tehsil), and the least (5.50%) disease incidence was recorded at Pathri (Phulambari Tehsil).

3. Variety-Wise disease incidence

The findings displayed in Table 2 and Fig 1 demonstrated that the average ergot disease incidence of the pearl millet cultivars and varieties planted by farmers during the *kharif* 2023–2024 ranged from 8.04 Poineer86M38 to 16.33 (local) percent. However, maximum average disease incidence was recorded on local (16.33%); this was followed by hybrid Mahodya318 (15%), NHB-4 (13.20%), ABH1200 (11.20%), Samrudhi (7.75%), and the least average disease incidence recorded on Poineer86M38 (8.04%). The mean average of

ergot of pearl millet incidence was recorded to the tune of 11.64 percent.

4 Tehsil– wise disease incidence

The data presented in table 3 and Fig 2 clearly indicated that the incidence of ergot of pearl millet across the all tehsils was observed varied from 16.00 (Vaijapur) to 8.00 (Phulambari Tehsil) percent with the average mean of 13.19 percent.

The maximum ergot incidence was observed in Vaijapur tehsil (16.00%) followed by Paithan (15.33%), Kannad (14.50%) and Gangapur (14.63%) and the least in Phulambari tehsil (8.00%).

Similarly, The results present study on the prevalence of ergot disease of pearl millet caused by *Claviceps fusiformis* recorded are in consonance with the earlier reports of several workers, viz., Poonam Kumari *et al.* (2022) ^[4], the present investigation on “sclerotia status of pearl millet seed samples in *Kharif* 2019 in Rajasthan.” The maximum mean sclerotia percent (on a weight basis) was found in Alwar tehsil (3.44 percent), and the minimum was found in Phulera tehsil (1.20 percent). The overall mean sclerotia percent recorded was 2.63 percent. Lubadde *et al.* (2014): Conducted disease survey of ergot in 2012 in the farmers' fields in the predominantly pearl millet growing districts of Kumi and Katakwi in northern Uganda in terms of incidence ergot (*Claviceps fusiformis*) it was observed (62.98%). Moreover, Kumar *et al.* (1997) ^[2] conducted field survey for prevalence of ergot in Haryana and reported the 9-16% prevalence of disease with average mean of 12.50% resulting with significant yield loss.

Table 1: Record of ergot disease prevalence of pearl millet in farmer's field growing areas of Chh. Sambhaji Nagar during *Kharif* 2023-2024.

Sr. No	Tehsil	Village	Stage of crop	Variety	Soil type	PDI (%)
1	Chh. Sambhaji nagar	Dhopteshwar	Flowering	Local	Light soil	16.00
2		Borwadi	Milky and Dough	Mahyco 401	Light soil	10.00
3		Gadhejalgaon	Flowering	ABH1200	Black soil	11.20
4	Khultabad	Tisgaon	Flowering	Local	Black soil	15.00
5		Khultabad	Flowering	Samrudhi	Medium soil	14.00
6		Khultabad	Soft and Dough	Pioneer86M38	Light soil	10.00
7	Paithan	Babulgaon	Flowering	Local	Light soil	20.00
8		Chincholi	Flowering	Local	Light soil	14.00
9		Shekta	Soft and Dough	Samrudhi	Medium soil	12.00
10	Sillod	Amtana	Flowering	mahodaya318	Medium soil	19.00
11		Bojgaon	Flowering	Pioneer86M38	Light soil	9.00
12		Bharadi	Flowering	NHB-4	Black soil	14.00
13	Gangapur	Chinchwan	Flowering	mahodaya318	Light soil	11.00
14		Ambegaon	Soft and Dough	Local	Medium soil	19.00
15		Bolegaon	Flowering	NHB-4	Light soil	12.40
16	Kannad	Chinchkheda	Flowering	Local	Light soil	12.50
17		Mohadi	Flowering	ABH1200	Black soil	11.20
18		Pimpri Kh	Flowering	Local	Light Soil	22.00
19	Vaijapur	Dahigaon	Flowering	Local	Light soil	10.30
20		Hinoni	Flowering	Local	Heavy Soil	20.00
21		Pathri	Flowering	Mahodya 318	Light Soil	12.00
22	Phulambari	Pathri	Soft and Dough	Pioneer86M38	Medium soil	5.50
23		Ganori	Flowering	Samrudhi	Heavy Soil	10.00
24		Dhamangaon	Soft and Dough	Pioneer86M38	Black Soil	8.50
25	Soygaon	Jarandi	Soft and Dough	Pioneer86M38	Heavy soil	7.20
26		Malkheda	Flowering	Local	Black Soil	14.50
27		Faradpur	Flowering	Samrudhi	Medium Soil	13.20
					Overall Mean	13.19

*PDI: Percent Disease Incidence

Table 2: Variety wise percent disease incidence of pearl millet ergot in Chh. Sambhaji Nagar districts during *kharif* 2023-2024.

Sr. No	Variety	No. of Location	Average incidence (%)
1	Local	10	16.33
2	Mahyco -401	1	10.00
3	ABH1200	2	11.20
4	Samrudhi	4	07.75
5	Pioneer86M38	5	8.04
6	Mahodaya318	2	15.00
7	NHB-4	2	13.20
	Mean		11.64

Table 3: Tehsil – wise percent disease incidence of pearl millet ergot in growing areas of Chh. Sambhaji Nagar districts during *Kharif* 2023 - 2024.

Sr. No	Name of Tehsil	Average ergot incidence (%)
1	Chh. Sambhaji nagar	12.40
2	Khultabad	13.00
3	Paithan	15.33
4	Kannad	14.50
5	Sillod	13.25
6	Gangapur	14.63
7	Vaijapur	16.00
8	Phulambari	08.00
9	Soygaon	11.63
	Overall Average	13.19

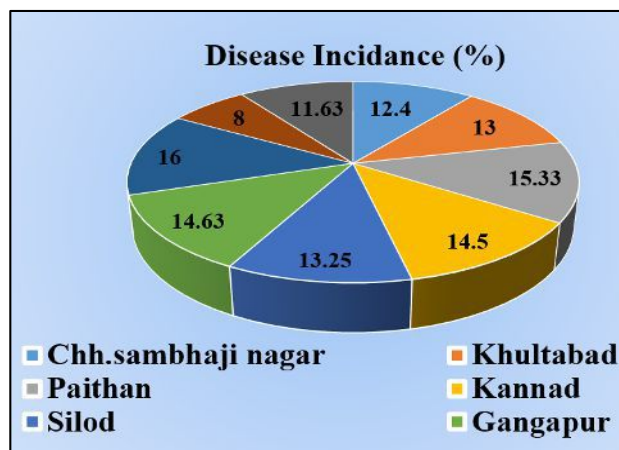


Fig 1: Average percent ergot of pearl millet disease incidence in different tehsil of Chh. Sambhaji Nagar district.

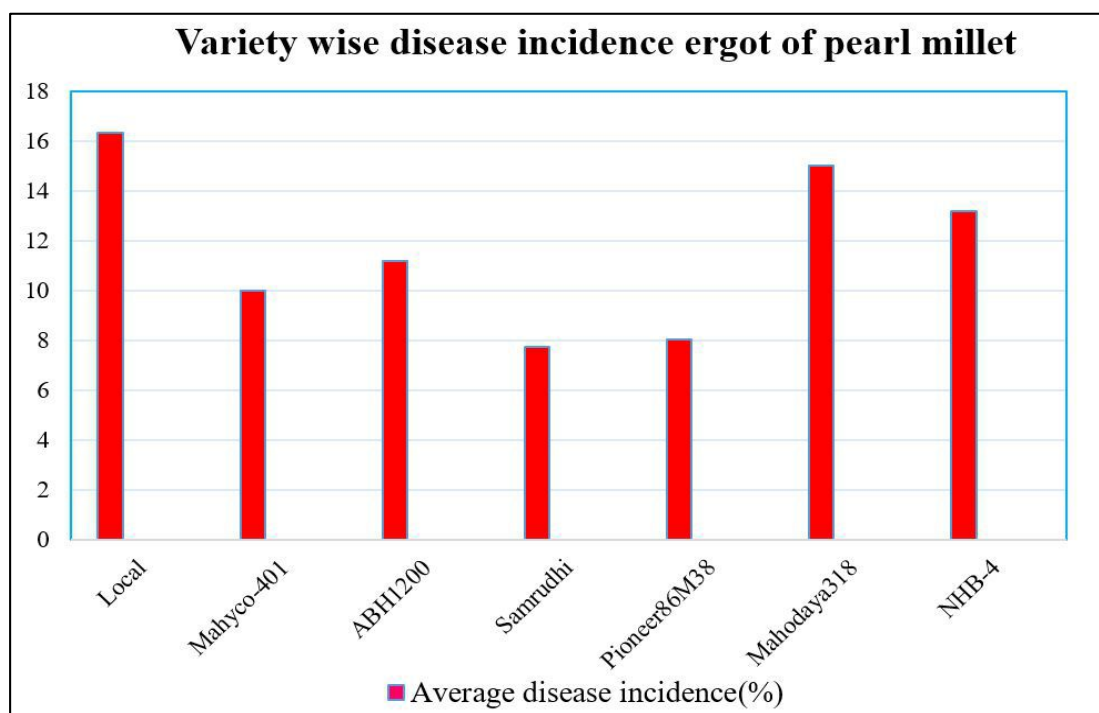


Fig 2: Variety wise disease incidence ergot of pearl millet in chh. Sambhaji Nagar districts during Kharif 2023.

Conclusion

The survey conducted in Chhatrapati Sambhajnagar district during kharif 2023 revealed significant variability in the incidence of ergot disease (*Claviceps fusiformis*) in pearl millet crops across different villages, tehsils, and varieties. The overall disease incidence ranged from 5.50% to 22.00%, with an average mean of 13.19%. The highest disease incidence was recorded in Pimpri Kh village (22.00%), while the least was observed in Pathri village (5.50%). Local varieties exhibited the highest susceptibility, with a 16.33% disease incidence, whereas Poiner86M38 showed the lowest (8.04%). Tehsil-wise, Vaijapur recorded the maximum incidence (16.00%), and Phulambari had the least (8.00%). These findings align with previous studies on ergot prevalence, underscoring the need for targeted management strategies to reduce disease impact.

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