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Research Article

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Study the Role of Host Susceptibility on Oospore Density of *Sclerospora graminicola*

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ABSTRACT

Pennisetum glaucum (L.) R Br. is commonly known as pearl millet in English and bajra in Hindi and Marathi. It is the robust, quick growing, most drought tolerant warm-season cereal crop grown as staple food grain and source of feed and fodder .15 cultivars were used to know the relationship between downy mildew incidence and oospore production. The highest number of oospore is found in 7042S(87.8) followed by P7-4 (31.8), ICMP451 (23.2), 7042R (22.4), 852 B (17.4), DMRBL-17-8 (14.6), 863B-22B (11.6), HR 17-1(10.6), IP 20715-1 (9.2), JBV-3 (8.2), R15148 (7.4), 411A (6), 411B (5.6), JMSB 2590(5.2) and the least number of oospore found in 86M86 (4.8)

Keywords: *Bajra, Food, Cereal crop, Pennisetum glaucum,*

INTRODUCTION

Pennisetum glaucum (L) R Br. is commonly known as pearl millet in English and bajra in Hindi and Marathi. It is the robust, quick growing, most drought tolerant warm-season cereal crop grown as staple food grain and source of feed and fodder on about 30 M ha in the arid and semi-arid tropical regions of Asia and Africa. In India, it is popularly known as Bajra grown for grain and fodder purposes in *kharif* season. In the country the crop is cultivated of 71.29 lakh ha area with the production of 80.6 lakh tonnes and productivity of1132 kg/ha during 2016 (Anonymous, 2016).Major Pearl millet growing states are Rajasthan, Gujarat, Maharashtra, Uttar Pradesh and Madhya Pradesh. Madhya Pradesh ranks 7th in area 2.67 million hectares with the production of 61.87 million tonnes and productivity of 2315 kg/ha (Anonymous, 2016).

The mineral content in pearl millet is higher than other cereals. The sodium, magnesium and copper in pearl millet are reported to be at par with wheat whereas potassium, phosphorus and iron are higher than wheat.

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Calcium content of pearl millet varieties ranges from 10.0 to 80.0 mg/100gand phosphorus content ranges from 185 to 990 mg/100 g, respectively. Iron content of pearl millet as reported by various studies varies from 4.0 to 18.0 mg/100g (Sehgal & Kawatra, 2006).

Downy mildew of Pearl millet incited by *Sclerospora graminicola*, (Sacc.) is one of the most important biotic constraint at global level. The pathogen is soil borne and its resistance is govern by single dominant gene, due to these the disease can be managed through resistance breeding programme, which have resulted in the development of a large number of downy mildew resistant hybrids.

METHODS AND MATERIALS

Moderately susceptible, susceptible and resistant cultivars were taken into account to study the oosporic density (*Sclerospora graminicola*). One gram powder of infected leaves of respective cultivars containing oospores was poured in 100ml of distilled water and kept for 24 hours. Thereafter, 0.01 ml suspension from respective flask was taken for the counting of oospores numbers. From each 100 ml solution, 5 samples was taken. The mean oospore numbers represent the presence of oospore density in 0.01 ml suspension and after calculation the number of oospores present in 100 ml was calculated. Thus the number of oospores in 1 gram infected leaves was estimated.

RESULT

Correlation of disease incidence of different pearl millet genotype with oospore density was established. The disease incidence (%) was computed for 15 different pearl millet genotypes at 60 DAS after sowing.

The incidence of downy mildew was correlated with oospore density and the data have been presented in (Table-1).The downy mildew incidence showed a highly positive correlation with oospore density against each genotypes (0.773).which reveals that with increase disease incidence the oospore density also increases. The number of oospore produced on cultivars ranged from 4.8 (86M86) to 37.8 (7042S) per mg leaf powder. The high amount of oospore production was found in highly susceptible cultivar 7042S(32.8) followed by P7-4(31.8), ICMP 451(23.2), 7042R(22.4), 852 B(17.4), DMRBL-17-8(14.6), 863B-22B(11.6), HR 17-1(10.6), IP 20715-1(9.2), JBV3(8.2), R15148(7.4), 411A(6), JMSB 2590(5.2) and 411B(5.6) with the minimum amount of oospore in 86M86(4.8).

Table 1: Oospore density in downy mildew infected leaves of different genotypes

S.No.	Genotype	*Oospore density(y)	DM% (X)
1	86M86	4.8	1.2
2	7042R	22.4	61.2
3	ICMP 451	23.2	23.3
4	JBV 3	8.2	4.8
5	JMSB 2590	5.2	18.8
6	411A	6	10.5
7	P7-4	31.8	28.9
8	IP 20715-1	9.2	9.5
9	HR 17-1	10.6	8.3
10	DMRBL-17-8	14.6	1
11	852 B	17.4	38.5
12	411 B	5.6	4.5
13	863B-22B	11.6	20
14	R 15148	7.4	5.3
15	7042S	87.8	97.2

***Oospore density is mean of five replication**
r - 0.773
** Sig. at 1% level of significance

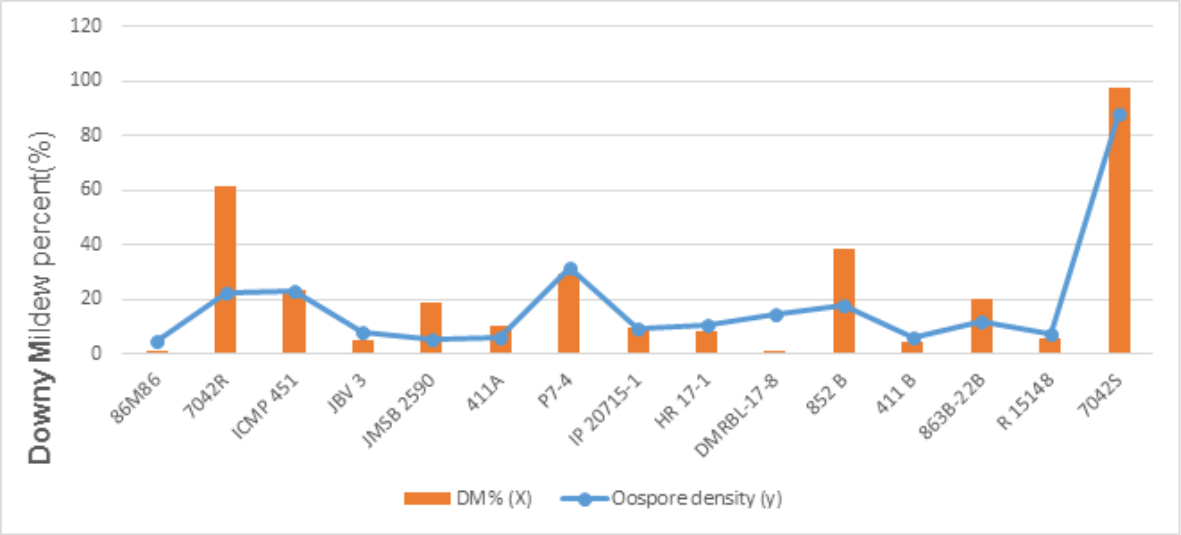
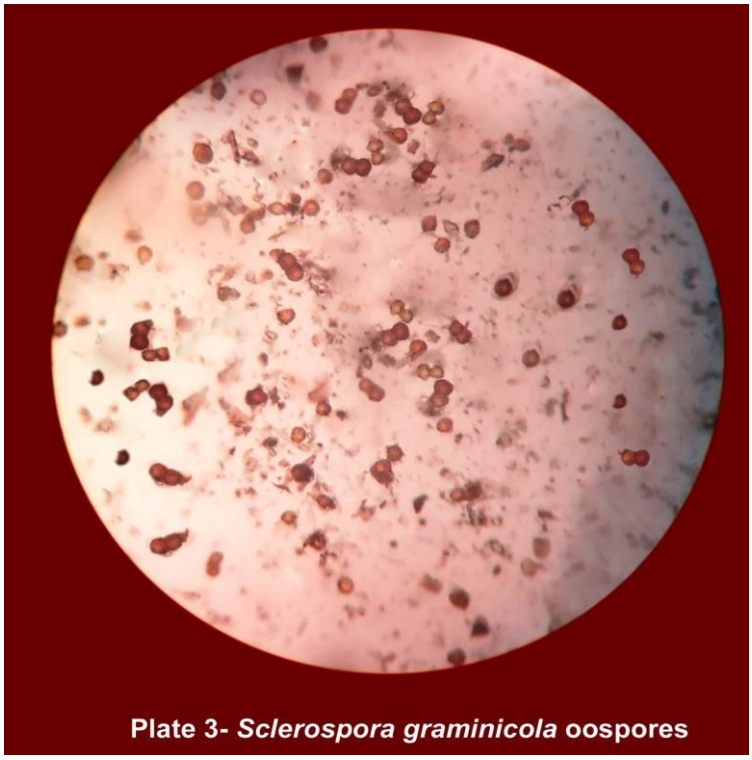


Fig. 1: Oospore density in downy mildew infected leaves of various pearl millet genotypes



DISCUSSION

Among the 15 genotypes the relation between downy mildew incidence and oospore density was observed. The highest density of oospores are found in 7042S(87.8) followed by P7-4(31.8), ICMP451(23.2), 7042R(22.4), 852 B(17.4), DMRBL-17-8(14.6), 863B-22B(11.6), HR 17-1(10.6), IP 20715-1(9.2), JBV-3(8.2), R15148(7.4), 411A(6), 411B(5.6), JMSB 2590(5.2) and the least number of oospore found in 86M86(4.8). All the genotype showed variation in both disease incidence and oospore density. The genotype 7042S had high downy mildew incidence corresponding with high oospore production as well. The oospores production in a particular genotypes depends on the level of suspeptibility, excistence of opposite mating types of spores in the right frequency. (Pushpavati, 2003)

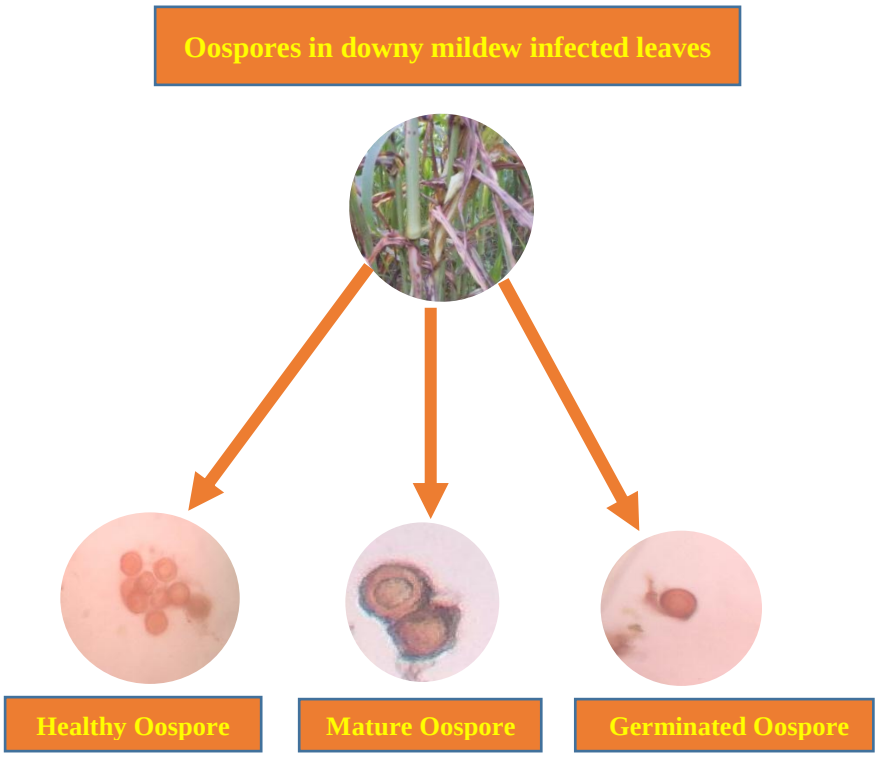
Mature necrotic tissues support more oospore production than younger tissues. The cultivars that show high disease incidence and

support high oospore production would allow the establishment of *S. graminicola* isolate much faster than those that show low disease incidence and low oospore production. In this study some of the cultivars supported high oospore production. This would lead to buildup of initial inoculum in the fields and would allow rapid establishment of DM on new crop during the next season. It would be useful to investigate the influence of oospore density on DM incidence in the next season crop and this information might contribute to the development of a disease forecast model.

Subramanya et al. (1983) studied on biology of systemic Infection by zoospores. It was reported that in the infection process, the zoospores first adheres, encyst on the host cell wall, germinate to produce a germ tube and develops an appresorium within an hour. The contents of zoospores migrate to the appressorium which subsequently produce free needle –like infection peg and penetrate the epiblema cell wall within 4 hr. The infection peg develops a stout primary vesicle at the tip within the infected cell and produce secondary vesicle within 48 hr of penetration from which intercellular hyphal threads originate. In the host tissue, the hyphae produces forked or knob like houstoria and the disease symptoms were observed 5 days after entry of the pathogen into the host.

Lukose and Dave (1995) have observed that oospores can survive for 14 years under laboratory conditions but their viability is reduced after 4 years of storage. Different types of germination of *S. graminicola* oospores have been observed, which included germination by vesicle- like structures, by both vesicles and germ tubes, by typical irregular structures different from germ tubes and vesicles, by germ tubes and germination by extrusion of small round bodies/sporangia-like Structures.

Gilijames and Jeger (2002) revealed that initial infection of plants is caused by oospores which are thick-walled resting spores, produced at end of the growing season when conditions are unfavourable for crop growth. Oospores are incorporated in the soil where crop rotation is not practiced. During the growing season, secondary infection in possible by asexually produced sporangia when relative humidity exceeds 95%. In the drier regions like Sahel, oospores are probably not only the initial but also main source of infection.



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