

INFLUENCE OF WATER HARVESTING AND SOIL MOISTURE ON DOWNY MILDEW INCIDENCE IN PEARL MILLET

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Downy mildew [*Sclerospora graminicola* (Sacc.) Schroet.] or pearl millet [*Pennisetum glaucum* (L.) R.Br.], is primarily a soil borne disease. Most soil borne diseases are favoured by high soil moisture but a few are favoured by low soil moisture (Cook and Papendick, 1972). In the absence of information on this aspect for *Sclerospora graminicola*, investigations were undertaken to find the effects of soil moisture on downy mildew in pearl millet.

A field experiment was conducted during 1984 kharif crop season with three conditions of seed bed: flat bed (control), slope on one side of seed bed and slope on both sides for water harvesting. Randomised Block Design with six replications was used. To give slopes (for micro-catchments), in each plot (5 m x 7 m), 10 cm of top soil was removed from 50 cm wide strips to give one or two sided slopes. Thus a catchment of 50 cm width was obtained when the slope was on only one side of the seed bed (trench) and it was of 25 cm width when the slope was on either sides. The slopes were compacted with a stone roller to obtain maximum amount of run off water from the rains. Pearl millet cv BJ 104 was sown in trenches in 40 cm apart paired rows. In the flat beds (normal planting) 50 cm apart rows were kept. Data on soil moisture (determined gravimetrically) up to 30 days of sowing, per cent disease incidence (PDI) at 40 DAS and at dough stage, infection index (%), and grain yield were statistically analysed.

There were significant differences in PDI at 40 DAS and infection index (%) at dough stage, between all the treatments (Table-1). The PDI were significantly reduced by 39.94% and 53.61% and infection indices by 25.70% and 37.50% in the crops raised in beds having one sided and both sided slopes, respectively, over flat beds (control). At dough stage, however, the differences between the treatments were not significant for PDI owing to fast secondary spread of the disease.

The soil moisture in plots receiving harvested water was significantly higher than in flat beds. Relatively high available soil moisture (ASM), 47.00 and 51.60% in water harvested plots during the 30 days of sowing, probably reduced the downy mildew severity. Low soil moisture (31.70% of ASM) in flat beds appeared to have favoured the severity of the disease in those plots. Balasubramanian (1974) also observed that downy mildew of sorghum (*Perenosclerospora sorghi*) was suppressed considerably at ASM of 76 to 79% but was favoured at ASM of 44 to 47% during 16-day period after

Table 1. Effect of water harvesting and soil moisture on the incidence of downy mildew (*Sclerospora graminicola*)

Treatments	Soil moisture upto 30 days of sowing (%)	PDI at 40 DAS	Infection index (%) at dough	PDI at dough	Systemically infected plants with no productive heads (%)	Grain yield (g/plant)
Flat Bed	4.16 (31.70)	51.95	60.40	84.80	50.00	6.05
One sided slopt	5.15 (47.00)	31.20	40.90	85.50	34.10	7.43
Both sided slope	5.45 (51.60)	24.10	37.75	83.00	29.40	8.03
CD 5%	0.34	4.51	5.41	ns	6.68	0.90

Figures in parentheses are available soil moisture (ASM)
PDI = Per cent disease incidence.

seeding. High soil moisture appears to be unfavourable for some soil borne pathogens (Gupta and Gupta, 1986).

Correlation studies revealed a high negative correlation of the soil moisture up to 30 days of sowing with PDI at 40 DAS ($r = -0.95^{**}$) and per cent infection index ($r = -0.90^{**}$). The PDI at 40 DAS was positively correlated with infection index (%) at dough ($r = 0.93^{**}$). The PDI at dough was neither correlated with soil moisture up to 30 days of sowing nor with PDI at 40 DAS and infection index (%). Thus it appears that the PDI at 40 DAS is ultimate indicator of severity of disease at dough.

It both types of the water harvested plots, grain yield was significantly higher (22.8 to 32.7%) than that from the flat bed. Such an increase was due to significant reduction in systemically infected plants having no productive heads and high soil moisture resulting in low disease severity in water harvested plots. However, the grain yields to the two water harvested plots were at par.

The study indicated that downy mildew incidence on pearl millet could be reduced considerably by proper management of the initial soil moisture level.

REFERENCE

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