Indian J. Plant Prot. 23 :185-187,1995

Effect of Seed Treatment Schedule on Viability of *Sclerospora graminicola* Oospores in Pearl Millet

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Abstract

The effect of seed treatment schedule that comprised of four successive treatments with methyl bromide, mercuric chloride, hot water and metalaxyl was studied in vitro for the first time against oospore germination inhibition of *Sclerospora graminicola*. There was no complete inhibition of oospore germination even after these treatments. The risk involved in the import of pearl millet germplasm is discussed.

Introduction

The movement of pearl millet seed to India from Africa has been effected for several years by the National Plant Protection Training Institute (CPPTI), Rajendranagar, Hyderabad and by the National Bureau of Plant Genetic Resources (NBPGR), Rajendranagar, Hyderabad, Andhra Pradesh, India. After receipt of seed it is treated sequentially with methyl bromide, mercuric chloride, hot water and metalaxyl (Nirula, 1979; Varma and Ravi, 1984). However, it has been a matter of controversy whether the treatment is effective against the oospores carried on seed or not (Williams, 1984). Since no information is available on the effect of this treatment schedule on the viability of oospores of *Sclerospora graminicola*, an experiment was conducted and the observations considered important from the point of plant quarantine are reported in this paper.

Materials and Methods

Oospores of *S. graminicola* stored in plastic, screw capped boxes under laboratory conditions (20-40°C) as dry powder for one year were treated sequentially with methyl bromide, mercuric chloride, hot water and metalaxyl (Ridomil Plus). The treatments were applied as described below.

Fumigation with Methyl Bromide

Oospores were fumigated with methyl bromide under sustained vacuum in 0.283m^3 chamber (model 10 CFT. The Laxmi Engineering Works, Bombay-14) at the rate of 32 g/m^3/4hr.

Treatment with Mercuric Chloride

After fumigation, the oospores were soaked in 0.1 per cent mercuric chloride for 10 min followed by three washes in distilled water.

Hot water Treatment

After washing, the oospores were suspended in distilled water (55°C) in test tubes and placed in a hot water bath at 55°C for 12 min.

Treatment with Metalaxyl

After hot water treatment, the water was drained off and the oospores were dried for 24 hr at 35-40°C after which they were soaked for 10 hr in 0.3 per cent metalaxyl.

Immediately after metalaxyl treatment, the oospores in one set were subjected for germination test as described by Panchbhai *et*

al., (1991), while in another set, the oospores were spread out on plastic plate and placed in a circulating air chamber (29- 31°C). The oospores were turned at intervals till they dried (approx 48 hr) prior to germination test. Unfumigated oospores and oospores treated with distilled water as the case may be were used as checks. Each of the four treatments were tested singly and also in different combinations. Observations on per cent oospore germination were recorded by examining 400-500 oospores for each test tube of the three replications in each treatment. The data were analysed statistically.

Results and Discussion

The data presented in Table 1 show that none of the treatments either singly or in combinations could completely check oospore germination. However, treatment with mercuric chloride followed by hot water ($HgCl_2$_HW), and fumigation with methyl bromide followed by treatment with mercuric chloride and hot water (MBr + $HgCl_2$ + HW) gave significantly ($p = 0.05$) less germination than control. Similar results were obtained in both dried and non dried treated oospores. In all other treatments germination was at par with control.

Table 1. Effect of different treatments on the germination of *Sclerospora graminicola* oospores

Treatment	Percent oospore germinination				Mean
	Dried		Not Dried		
	Treated	Control	Treated	Control	
Methyl Bromide (MBr) @32gm/m3/4hr	43.61	48.34	45.52	48.54	46.25
Mercuric Chloride ($HgCl_2$) @0.1%/10min	44.62	47.94	45.88	49.05	46.87
Hot Water (HW) @55°C/12min	51.26	48.46	51.02	48.62	49.84
Metalaxyl (R) @0.3%/10hr	42.13	45.65	25.97	25.87	34.91
MBr + $HgCl_2$	44.24	48.08	46.13	50.30	47.19
MBr + HW	46.23	48.60	48.19	49.35	48.09
$HgCl_2$ + HW	43.04	48.33	45.30	50.94	46.92
MBr + R	46.30	48.52	25.96	27.25	37.01
$HgCl_2$ + R	43.09	46.06	25.91	28.30	35.84
HW + R	43.63	43.94	26.01	27.21	35.20
MBr + $HgCl_2$ + HW	42.13	48.32	44.71	50.33	46.37
MBr + $HgCl_2$ + R	42.73	43.67	25.96	27.38	34.94
MBr + HW + R	44.61	46.82	26.15	27.04	36.15
$HgCl_2$ + HW + R	43.20	46.70	26.12	27.75	35.94
MBr + $HgCl_2$ + HW + R	43.65	47.88	26.45	30.71	37.17
Mean	44.30	47.15	37.68	37.78	–

	Treatments	Methods	Treatments X
SE +	1.30	0.67	2.59
LSD at P 0.05	2.57	1.33	5.13

The absence of the pearl millet pathotype of *S. graminicola* in the Americas, the occurrence in West Africa of Strains of this pathogen with considerably greater virulence than in India (Williams, 1984) and the viability of the oospores even after treatment with methyl bromide 32g/m^3/4 hr + mercuric chloride 0.1 # / 10 min + hot water 55°C/12 min + metalaxyl 0.3% / 10 hr (a recommended treatment schedule) in the present study indicate the danger involved in the international movement of pearl millet germlasm. Therefore, further investigations are needed to eliminate oospore inoculum carried on or with the seed and to avoid risk of introducing new pathogenic races.

Acknowledgement

The authors are grateful to Director, NPPTI, Hyderabad for providing necessary facilities. The senior author thanks the ICAR, New Delhi for a research fellowship during the investigation (1986-1989).

References

Nirula K.K. 1979. Quarantine regulations of seed imports at the International Crops Research Institute for the Semi-Arid Tropics. *FAO Plant Protection Bulletin.* 27: 119-122.

Panchbhai S.D., Reddy M.S. and Singh S.D., 1991. A repeatable method of germination of oospores of *Sclerospora graminicola* and its significance in downy mildew disease. *Indian Journal of Plant Protection* 19: 101-103.

Varma B.K. and Ravi U., 1984. Plant quarantine facilities developed at ICRISAT for export of germplasm. *Plant Protection Bulletin.* 36: 77-93.

Williams R.J. 1984. Downy mildews on tropical cereals. *Advances in Plant Pathology Vol. 2* (eds. Ingram, D.S. and Williams, P.H.). Academic press London. pp. 1-103.

Received : 20-04-1995