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Effect of *Macrophomina phaseolina* on seed germination and seedling rot in *Phaseolus mungo*

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Macrophomina phaseolina, a dominant pathogenic seed borne fungus in pulses was studied for its effects on seed germination and seedling mortality in different cultivars of black gram. Surface sterilized and unsterilized seeds dressed with the fungus showed reduced germination over control. In surface sterilized seeds the percentage of seedling rot varied between 4-8% in Sarala and T-9 varieties, while it was 53 3% in Local seeds. Seeds, both surface sterilized and unsterilized, dressed with *M. phaseolina* show high percentage of seedling rot in Sarala and T-9 cultivars but in Local the fungus cosiderably reduced the rotting in surface sterilized seeds.

Key words : *Macrophomina phaseolina*, seedling mortality black gram, cultivars Local, Sarala, T-9, antagonism

INTRODUCTION

Black gram, an important pulse crop in india, is rich in protein and carbohydrates. It is an arid and semi arid crop cultivated both in kharif and rabi seasons throughout the state of Orissa. Similar to many other pulse crops, seeds of black gram carry a high incidence of *Macrophomina phaseolina* (Rath and Mishra, I978 ; Reddy, 1980 ; Saxena and Gupta, 1978) that causes loss in germination and seedling rot besides causing diseases to plants. During studies on seed borne fungi of different pulse crops. it was observed that its abundance on

seed coats and cotyledons varied between different cultivars of black gram and showed antagonistic effect to certain other seed borne fungi. The present paper reports the effects of *M. phaseolina* on seed germination and seedling mortality in different cultivars of black gram.

MATERIALS AND METHODS

Pure line seeds of Local, Sarala and T-9 cultivars of black gram were obtained from District Agriculture Office, Berhampur. About one thousand healthy seeds of each variety were surface sterilized with 0.1% $HgCl_2$ for 2 minutes, rinsed in sterilized distilled water for several times. Half of it was used for germination study and other half was treated with spores of *M. phaseolina*. Similarly the unsterilized seeds were also processed. To dress the seeds with the fungus, the seeds were soaked with sterilized distilled water for 12 hr and rolled over the 10 days old pure culture of the test fungus several times and then incubated on moist blotter paper (ISTA, 1966). With every set a control set, without fungus treatment, was run taking equal number of seeds. For each set forty petriplates (15 cm), each carrying 10 seeds equidistantly placed, and sufficiently moistened were incubated for 10 days at $25 \pm 5°C$. The plates were intermitantly watered for proper moisture and studied. Percentage for germination and seedling rot were recorded regularly from second day onwards till 10th day.

RESULTS AND DISCUSSIONS

Records of the observations are given in Table 1. In general, the seeds dressed with the test fungus caused loss in percentage of germination compared to untreated but the difference was not significant in seeds of Local variety. Surface sterilized seeds gave better germination than unsterilized ones. Percentage of germination was found less in Local cultivar than Sarala and T-9. It was evident from the results that seed borne fungi including *M. phaseolina* caused loss in germination of mung seeds. This is in conformity with earlier reports on various seeds (Singh and Prasad, 1988 ; Srivastava and Gupta, 1981 : Pangtey *et al.*, 1982).

In seedling, rotting was mostly in radicle than plumule. Rotting in radicle of unsterilized seeds was found on 3rd or 4th day of incubation while it was mostly on the 2nd day in surface sterilized seeds. Rotting in plumule was found only after 5th day of incubation. Seedlings of surface sterilized seeds (sss) showed 4.2% and 8.2% of rotting in Sarala and T-9 cultivars respectively, but it was 53.3% in Local. Such seeds (sss) when treated with *M. phaseolina*, the rate of rotting enhanced to 62.8% and 74.5% in Sarala and T-9 cultivars respectiveiy, but reduced to 19% in local. It clearly indicated that the sub-surface fungi that caused rotting in Local seedlings was antagonised by the test fungus thereby

Table 1 : Percentage of seed germination and seedling rot in three cultivars of back gram after 10 days

Observation (%)	Seed varieties											
	Local				Sarala				T-9			
	NS		S		NS		S		NS		S	
	C	T	C	T	C	T	C	T	C	T	C	T
Germination	58	56	60	52	80	70	94	86	98	80	98	94
Plumule rotting	31	25	3.7	0	27.3	39.4	0	35.9	25 6	63.9	4.2	69
Radicle rotting	34.5	29.5	53.3	19.2	40	65.7	4.2	62.8	26	69.2	6.1	74.5
Total rotting	34.5	31	53.3	19.2	40	65.7	4.2	62.8	30	69.2	8.2	74.5

NS : Nonsterilized seeds

S : Surface sterilized seeds

C : Control (Seeds not treated with *Macrophomina phaseolina*)

T : Treated (Seeds treated with *Macrophomina phaseolina*).

reducing pathogenicity. Further, it was evident that the rotting in Local variety was not due to *M. phaseolina*. Seeds, not surface sterilized, when treated with *M. phaseolina* also increased the seedling mortality in Sarala and T-9 cultivars.

It was concluded from the study that *M. phaseolina* that was not isolated at high frequency from seed surfaces of Local variety was not causing seedling rot rather it reduced the seedling rot by antagonising with the sub-surface fungi of the seeds including the rot organism.

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