

# Effect of *Melanospora* sp. on vigour index of maize seeds and biodeterioration of floral style\*

K. Wadhvani, S.K. Srivastava & S. Chatterjee

*Mycology Laboratory, Botany Department, Lucknow University, Lucknow-226 007*

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During the isolation of fungi from floral parts of *Zea mays* (maize) a species of *Melanospora*, *M. caprina* (Fr.) Sacc. was isolated repeatedly from the style and ovary of mature maize cobs, but was not obtained from the freshly harvested seeds. The fungus was tested for its vigour index on three varieties of *Z. mays*, viz. Jaunpuri-yellow, Jaunpuri-white and Ganga-5. The decrease in vigour index was 472.46, 443.06 and 233.84, respectively for 100 seeds. The fungus was also studied for its cellulase activity, the styles of three plants *Z. mays*, *Pennisetum typhoideum* and *Sorghum vulgare* were used as substrate. The maximum cellulase activity (after 120 min) was observed on *P. typhoideum* followed by *Z. mays* and *S. vulgare* in decreasing order.

**Key-words:** Seed health testing, *Melanospora caprina*, *Zea mays*, *Pennisetum typhoideum*, *Sorghum vulgare*.

## INTRODUCTION

*MELANOSPORA CAPRINA*, an ascomycetous fungus, was isolated abundantly and repeatedly from the styles of mature cobs of *Zea mays* but not from the freshly harvested seeds. Species of *Melanospora* have been reported from flowers, fruits, seeds, leaves and dead culms and glumes of some crop plants (Bilgrami *et al.*, 1979), but nothing is known about its biological activity. Present paper deals with the effect of *M. caprina* on the vigour index of three varieties of maize (Jaunpuri-yellow, Jaunpuri-white and Ganga-5) and the biodeterioration of its floral style, for latter two allied plants *Pennisetum typhoideum* and *Sorghum vulgare* were undertaken for comparison.

## MATERIAL AND METHOD

The vigour index of three varieties of *Z. mays* was studied on blotters (Neergaard, 1977), using fungal mycelium and its metabolites, for the former two cm<sup>2</sup> of 7 days old fungal mycelium was rolled around the wet, surface sterilized seeds, while for the latter the seeds were soaked for 48 hrs in 7 days old culture filtrates. The controls were in glass distilled water. The vigour index

was calculated following Abdual-Baki and Anderson (1973).

The endoglucanase (Cx) production was studied by measuring the percent loss in viscosity (Reese *et. al.*, 1950) upto 120 min, at an interval of 30 minute of 10, 20 and 30 days old cultures, taking styles of *Z. mays*, *P. typhoideum* and *S. vulgare* as substrates.

## RESULT AND DISCUSSION

The vigour index of seeds of three varieties of *Z. mays* with fungal mycelium and its metabolites along with test weight (in gms.) prior to germination is tabulated in Table-1. The vigour index is directly related to percent seed germination and seedling length (on fungal mycelium/filtrate), maximum being in Ganga-5 (939.6/1040.4) followed by Jaunpuri-yellow (532.2/739.7) and Jaunpuri-white (483.8/728.9). The decrease in index vigour with fungal biomass and its metabolites in three varieties was approximately 20 and 13% (Ganga-5), 46 and 25% (J. yellow) and 45 and 18% (J. white) clearly indicating thereby that fungal biomass affected seedling vigour more than its metabolites.

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Table 1: Effect of *M. caprina* on seed germination test weight and vigour index in different maize varieties.

|     | Varieties       | Test weight (gms.) | Germination (percent) | Seedling length (cm) | Vigour index (Percent germination seedling length) |        |
|-----|-----------------|--------------------|-----------------------|----------------------|--|--------|
| (A) | Fungal mycelium | Ganga-5            | 22.6                  | 67.6                 | 13.9   | 939.6  |
|     |                 | Jaunpuri-yellow    | 20.4                  | 45.1                 | 11.8   | 532.2  |
|     |                 | Jaunpuri-white     | 20.1                  | 43.2                 | 11.2   | 483.8  |
| (B) | Fungal filtrate | Ganga-5            | 22.8                  | 70.3                 | 14.8   | 1040.4 |
|     |                 | Jaunpuri-yellow    | 20.4                  | 53.6                 | 13.8   | 739.7  |
|     |                 | Jaunpuri-white     | 20.1                  | 54.4                 | 13.4   | 728.9  |
| (C) | Control         | Ganga-5            | 22.6                  | 76.2                 | 15.4   | 1173.5 |
|     |                 | Jaunpuri-yellow    | 20.2                  | 69.8                 | 14.1   | 984.2  |
|     |                 | Jaunpuri-white     | 20.3                  | 67.3                 | 14.0   | 886.2  |

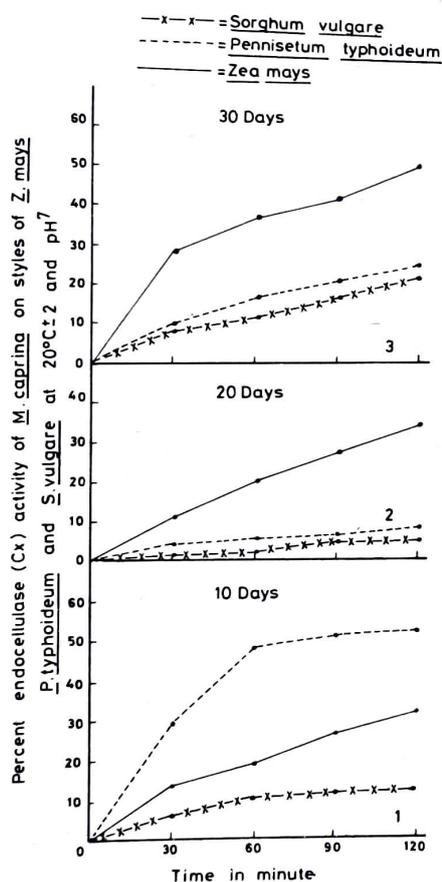


Figure 1.

The endoglucanase (Cx) activity of *M. caprina* on styles of three plants at 20°C ± 2°C at pH 7.0 upto 120 min (at an interval of 30 min) upto 30 days at an interval of 10 days is expressed in figure 1. While, in *Z. mays* the enzymic activity exhibited an increase with incubation

time and age of the culture, the trends were different in other two plants. With *P. typhoideum*, the Cx production was very high on the 10th day (53% after 120 min), then it decreased as low as 8.0% on the 20th day again increasing upto 25%, on the 30th day. The same trend was observed with *S. vulgare*, but Cx production was not as high as on *P. typhoideum* (53%) which was only 13.0% in *P. typhoideum*.

It is clear from these results that vigour index is directly related to weight of seeds and percent seed germination. The enzyme endoglucanase (Cx) also appeared to play an important role in the biodeterioration of floral styles of all the three plants being on maximum *Z. mays* with a continuous increase upto 30 days. The dip in the Cx activity from 10th to 20th day was due to the accumulation of celobiose as the end product, acting as a competitive inhibitor by binding the enzyme at active site (Deacon, 1988).

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