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RESEARCH ARTICLE

Studies on changes in growth pattern and histopathology of *Brassica nigra* cv. MAHI GOLD due to infection caused by some seed borne fungi

■ KANAK SHAHI AND S.R. YADAV

SUMMARY

The present communication deals with the effect of some seed borne fungi by *Alternaria brassicae*, *Fusarium oxysporum* and *Pythium aphanidermatum* on leaf area ratio , leaf weight ratio, hight of seedlings, Biomass and histopathological studies of the plant on an oil crop *Brassica nigra* cv. MAHI GOLD at Faizabad district of eastern U.P. during 2008 – 2009.

Key Words : *Brassica nigra*, Seed borne fungi, Growth pattern, Histopathology

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Since the beginning of the civilization man has been trying to improve the quality and field of the agricultural, horticultural and other plant products to meet the food requirements of the growing population. In this direction better quality of the seeds, more resistant varieties, seeds free from patehogens and high yielding varieties have been introduced from time to time. Fungi associated with tree seeds in different host species in different regions and times have been studied. All seeds carry spores of various microscopic fungi either on the surface or with in the seed. *Brassica nigra* is a major source of oil and loss of its production due to fungal infection is a great loss to the agriculturists and to the notional economy. Thus study of physiological aspects of the infected plants will give an idea of actual way of losses incurred and suggestions for effective control measures .

The losses incurred due to fungal infection in the field of *Brassica nigra* crop has been assessed by studying various parameters of growth and histopathological.The histopathological studies will give an idea about the location of fungal hyphae, their fruiting bodies and abnormalities caused by the pathogens.

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
KANAK SHAHI, Department of Botany, K.S. Saket P.G. College, Ayodhya, FAIZABAD (U.P.) INDIA

Address of the Co-authors:
S.R. YADAV, Department of Botany, K.S. Saket P.G. college, Ayodhya, FAIZABAD (U.P.) INDIA

MATERIAL AND METHODS

Seeds of particular plant *Brassica nigra* cultivar Mahi gold were procured from the reliable sources. All the three fungal species namely *Alternaria brassicae*, *Fusarium oxysporum* and *Pythium aphanidermatum* were isolated from different host plants and identified strains were cultured on particular medium Potato Dextrose Agar (PDA medium). Sterilization of seeds was done by washing the seeds surface with 0.1% mercuric chloride solution to ensure that seeds are free of any fungal contamination Different sets of sterilized seeds were inoculated either by rolling the seeds along the colonies developed on the culture medium or inoculated with needle and allowed to germinate on whatman‘s filter paper No.1. Leaf area ratio was calculated any instant of time (t) is the ratio of total assimilatory surface to whole plant dry weight . it was represented as $cm^2\ g^{-1}$, L A R can be determined by applying the formula given below :

$$\mathbf{LAR} = \frac{(A_2 - A_1)\ 2.303\ (\log_{10} w_2 - \log_{10} w_1)}{(W_2 - W_1)\ 2.303\ (\log_{10} A_2 - \log_{10} A_1)}$$

L A R is the product of leaf weight ratio and specific leaf area :

LAR = LWR x SLA (LWR = leaf weight ratio)
(SLA = Specific leaf area)

Leaf weight ratio is the of dry weight of leaves to whole plant dry weight which is commonly represented as (gg^{-1}). LWR can be determined applying the formula given here under.

$$\mathbf{LWR} = \frac{\mathbf{WL}}{\mathbf{W}} \left[\begin{array}{l} \mathbf{WL = drywtofleaves} \\ \mathbf{W = plantdryweight} \end{array} \right]$$

Specific leaf area is commonly represented as (cm^2g^{-1}). It was determined by applying the formula given below :

$$\mathbf{SLA} = \frac{\mathbf{Leaf\ area}}{\mathbf{leaf\ dry\ weight}}$$

Height of seedling and length of germ tube were measured with the help of measuring scale and recorded in cm. Biomass (fresh and dry Weight) of the whole plant were recorded (grams) with the help of physical balance and expressed in grams.

In histopathological studies thin and fine sections passing through infected plant parts were taken and stained in cotton blue and mounted in lactophenol. The sections were observed under high power of microscope to locate the mycelia and fruiting bodies present there in .

RESULTS AND DISCUSSION

The results obtained are listed in the Table 1to 6. The salient features of the findings are as under. Some of the well known internally seed borne fungi include species of *Alternaria brassicae*, *Fusarium oxysporum* and *Pythium aphanidermatum* . These cause deterioration of seed quality and pre-post emergence mortality of seedlings. (Quinones, 1987).

Maximum decrease on leaf area ratio was found in the plants inoculated with *Pythium aphanidermatum* and minimum in those infected with *Fusarium oxysporum* .

Maximum decrease in leaf weight ratio was observed in the plants infected with *Alternaria brassicae* and minimum in *Fusarium oxysporum* .

Specific leaf area was measured and expressed as $cm^2\ g^{-1}$. Specific leaf area was found in the plants infected with *Fusarium oxysporum* and minimum in those infected with *Alternaria brassicae* .

Table 1: Length of germ–tube (cm) of *Brassica nigra* (CV. MAHI GOLD) inoculated with different fungal species at different intervals

Sr. No.	Days after inoculation	Fungal species			
		A. brassicae	*F. oxysporum*	*P. aphanidermatum*	Control
1.	2	0.5	1.0	0.5	1.5
2.	4	2.0	1.5	1.0	2.6
3.	6	3.0	2.0	1.5	3.5

Table 2 : Length of seeding (cm) of *Brassica nigra* (CV. MAHI GOLD) raised irom the seeds inoculated with different fungal species at certain time intervals

Sr.No.	Days after inoculation	Fungal species			
		A. brassicae	*F. oxysporum*	*P. Aphanidermatum*	Control
1.	12	12	11	11	15
2.	24	18	18	15	24
3.	36	18	18	15	26
4.	48	30	36	20	40
5.	60	35	38	25	40
6.	72	38	38	30	48
7.	84	40	43	35	50
8.	96	45	48	40	50
9.	108	45	55	45	58
10.	120	50	55	48	60

Table 3: Leaf area (cm2g-1) of the host plant, *Brassica nigra* (CV. MAHI GOLD) infected with different fungal species at certain time intervals

Sr.No.	Days after Inoculation	Fungal species			
		A.brassicae	*F. oxysporum*	*P.Aphanidermatum*	Control
1.	60	0.10	0.12	0.08	0.16
2.	120	0.13	0.14	0.11	0.18

Table 4: Leaf weight ratio (gg-1) of the host plant, *Brassica nigra* (cv. MAHI GOLD) raised from the seeds inoculated with different fungal species at certain time intervals

Sr.No.	Days after inoculation	Fungal species			
		A. brassicae	*F. oxysporum*	*P. Aphanidermatum*	Control
1.	60	0.20	0.50	0.25	0.60
2.	120	0.30	0.80	0.45	0.90

Table 5: Specific leaf area (cm2g-1) of host plant, *Brassica nigra* (cv. MAHI GOLD) raised from the seeds inoculated with different fungal species at certain time intervals

Sr.No.	Days after inoculation	Fungal species			
		A. brassicae	*F. oxysporum*	*P. Aphanidermatum*	Control
1.	60	0.55	0.23	0.33	0.70
2.	120	0.61	0.30	0.45	0.85

Table 6 : Biomass (g) of whole plant of *Brassica nigra* (cv. MAHI GOLD) infected with different fungal species at the end of the experiment (after 120 days)

So. No.	Biomass	Fungal species			
		Alternaria brassicae	*Fusaruim oxysporum*	*Pythium aphanidermatun*	Control
1.	Fresh weight	508	400	335	835
2.	Dry weight	275	310	225	490

Biomass of whole plants was recorded after 120 days using an ordinary balance which was expressed in grams. There was an overall decrease in fresh and dry weight of diseased plants. The infection caused by *Pythium aphanidermatum* was most effective in reducing the fresh as well as dry weight of the plants Fig. 3.

Histopathological studies revealed that mycelia of *Fusarium oxysporum* were located around the vascular bundles of the stems however, no plugging of xylem vessel was observed. *Pythium aphanidermatum* mycelium was observed in the section passing through the diseased stem and conidia of *Altanaria brassicae* were observed in infected leaves of the host plants. Conidia were large, multicellular muriform and *conical in outline*. Fig. 1, 2 and 3.

Fig. 2: T.S. of stem of *Brassica nigra*, mycelium of *Fusarium oxysporum* lacalised in the vascular region of the stem

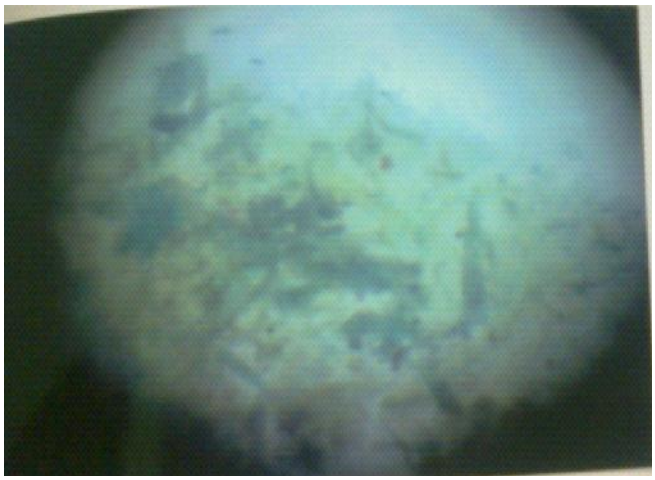

Fig. 1: Conidia of *Alternaria brassicae* isolated from infected plant *Brassica ingra* cv. MAHI GOLD

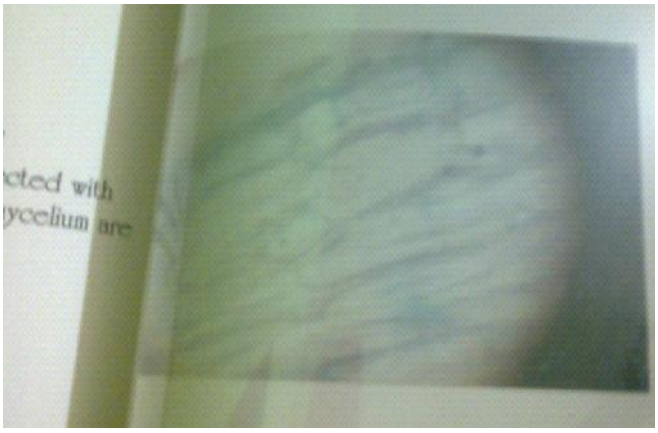

Fig. 3: Stem cells of Brassica nigra infected with *Pythium aphanidermatum* fungal mycelia present in the cells

In the present investigation different growth parameters such as height of seedlings, leaf area ratio, leaf weight ratio, specific leaf area, biomass and histopathology were studied in infected as well as healthy plants. The aforesaid growth parameters were decreased in the infected plants. Similar results were found by Prasad *et al.* (1994) who isolated total 24 fungal species from six seeds samples of cabbage and cauliflower. *Fusarium moniliforme* was detected from all the seed samples which caused rotting of the seed and curling, stunting, wilting, yellowing and defoliation .

Decrease in the biomass (fresh and dry weight) of whole plant was found in all the infected plants but decrease was more pronounced in the plants infected with *Pythium aphanidirmatom*. Similar result were found by Sokhi *et al.* (1997) who reported the toxic effect of A*lternaria brassicae* on the mustard plant which resulted a decrease in fresh weight of the plant.

Histopathological study carried out in the present study revealed that mycelia of *Fusarium oxysporum* were located around the vascular bundle of stem. However, plugging of xylem cells was not observed. Intracellular mycelia of *Pythium aphanidermatum* were seen in the sections passing through the infected stem. Mature conidia of *Alternaria brassicae* were present in infected leaves of the plants. Conidia were large, multicellular and muriform. Similar results were found by Seema *et al.* (2004) who observed the presence of mycelia in the vascular region and the plugging of vascular cells in rice plant infected *Fusarium oxysporum.*

Thus, the seed borne fungi, *Fusarium oxysporum*, *Pythium aphanidermatum* and A*lternaria brassicae* were able to reduce the overall growth and biomass of the host plant, *Brassica nigra*. The histopathological study revealed that the mycelia were wells established in the internal cells of the host plant. Out of the three pathogenic fungi. *Pythium Aphanidermatum* effectively reduced the growth and biomass of the host plant, *Brassica nigra* .

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REFERENCES

Armstrong , G. M. and Armstrong, J.K. (1958). Ground wilt caused by *Fusarium solani* by root inoculation method. *Phytopathol.*, **48** : 341.

Bisht , G. S., Joshi, C., Bisht, P. and Khulbe, R.D. (1997). Distribution and pathogenicity of *Pythium species* from tomato Indian. *Phytopathol.*, **50** (1) : 83-97.

Chauhan, S.K. (1965) . Interaction of certain soil conditions in relation to the occurrence of *Fusarium* wilt of gram (*Cicer arietinum*). *Indian J. Agric. Sci.*, **35** : 52-56.

Raj, H., Sharma, N.K. and Gupta, V.K. (1995). Effect of soil solarization on population of *Fusariun solani*, *Biol and cult. Tests Control Plant Diseases*, **10** : 55.

Singh, R.S. (1987). *Disease of vegetable crops* . Oxford and I.B.H. Co Pvt., Ltd. NEW DELHI, INDIA, 362p.