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Effect of ceresan (dry) on seed germination, seedling growth, fruit size and chlorophyll content in a cultivar of *Brassica nigra*

S. K. ROY AND M. MAJI[1]
Department of Botany, T.D.B. College, Ranigunj, Burdwan, West Bengal
[1]Department of Biochemistry, Burdwan Institute of Management and Computer Science, Burdwan, West Bengal

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During cultivation of black mustard (*B. nigra)* in field, different qualities of fungicides and pesticides are often sprayed to combat against fungal diseases and insect attack. The present investigation deals with the evaluation of functional effect of ceresan (dry) on different growth parameters and chlorophyll content of a cultivar of black mustard. Diffrent concentrations of ceresan were prepared and were applied to the tested seeds at the time of germination. The data of the present investigation revealed a significant inhibitory effect of ceresan on germination index (G.I.) and seedling growth of *B. nigra.*

Key words: Ceresan (dry), germination index (G.I), seedling growth, chlo-rophyll content.

INTRODUCTION

Black mustard (*B. nigra* L.) is the most laxuriant source of vegetable oil. It's oil production is also significantly higher. Above all, mustard oil is very popular due to it's unique taste and flavour. During cultivation in field, these oil producing plants are attacked by several pests including fungi even at the very begining stage of germination resulting significant losses in yield. Earlier workers have revealed certain degrees of inhibition on growth characters and chlorophyll level due to fungicidal action. Sinha *et al.* (1992) have reported that aflatoxin B_i can restrict the overall growth of plants by inhibiting seedling germination. Similar type of findings have been provided by Mehan (1974) during his studies on groundnut seedlings. In 1970 Kang has reported significant deterioration in several growth characters on pathogenesis in groundnut. Dasgupta (1988) has claimed that several systemic fungicides are absorbed by the host plant surface and these chemicals get their entry into the metabolic pathways of the plants and thereby inhibit different physiological functions. The present investigation has been undertaken to evaluate the inhibitory effects of the said fungicide on germination index and several growth characters of seed.

MATERIALS AND METHODS

Primarily, the healthy and disease free seeds of black mustard (*B. nigra*) were collected and selected for present investigation. A stock solution of ceresan (dry) an organomercurial was prepared in 10 ml ethanol and from the stock solution 0.05%, 0.1% and 0.2% solutions were made by dilution method. Before use, the selected seeds were allowed to dry in sunlight for 12 hrs to activate germinability. After sun drying, the seeds were soaked in distilled water for two hrs and the soaked seeds were transferred to the ceresan solution of diffrent concentrations (0.05, 0.01%, 0.02%) for 24 hrs. For each treatment 50 seeds were considered and all parameters were done in triplicate. Now the seeds were placed on moist cotton (absorbent) followed by moist and sterilized blotting paper in Petriplates. Finally the Petriplates were kept in an incubator for germination at a temperature of 27^{0}C + 2^{0}C. On the 7th day, germination index (G.I) of seeds was measured by the following formula : GI=Total no. of seeds germinated / Total no. of seeds tested x 100.

On the 10th day, the root and shoot length (cm) of germinating seeds were measured in triplicate.

Other growth parameters leaf-size and fruit size (length in cm) were also considered in triplicate. In every cases a control / standard was taken without any fungicide treatment.

Estimation of chlorophyll content (leaves)

The chlorophyll content of newly emerged green leaves of both untreated plan (control set) and treated plants were estimated following the method of Aron (1949) and Davis (1969). One gram of leaf tissue was extracted in 10 ml of 80% acetone. The extraction was repeatedly done for 2-3 times using another 10 ml of 80% acetone. Now green extract of leaf tissue for each treatment was centrifuged separately at 8,000 rpm. Only the supernatant was taken and the basal green sediment was rejected. Finally the volume of the supernatant was made to 100 ml by adding requisite amount of 80% acetone. The optical density (OD) of the supernatant for each treatment was recorded and studied in a spectrophotometer at 645 and 663 nm against a blank solution (i.e. 80% acetone). Then the quantitative assay of chlorophyll of the supernatant was done with the help of the following formula and a reference curve was prepared by using a sample of chl-a (EM) and acetone as solvent. The amount of Chl-a present in the extract was expressed in terms of mg/g of leaf tissue.

Chl-a present in mg/g tissue = 12.7 ($D–66_3$)–2.69 ($D–64_5$) x V / 1000 x W

where, :

D=Spectrophotometric Optical Dencity (OD) at specific wave–length, V=Final Volume of the supernatant (green extract + 80% acetone) W=g of tissue (fresh weight) extracted.

RESULTS AND DISCUSSION

The results obtained during the present investigation were highlighted in the Table 1, Fig. 1 and Fig. 2. From the data obtained (Table 1 & Fig. 1) it was evident that germination index (G.I) was significantly higher in control set where no fungicide was added. In other sets (0.05%, 0.1% and 0.2%), there was a progressive inhibition of germination index exerted by ceresan. Similarly the said fungicide was also found to produce its inhibitory effect on shoot-length and root-length of immature seedlings (Table 1).

The data also revealed that this inhibitory influence was more promoting to the increased concentration of fungicide. At a concentration of 0.2% (ceresan) the inhibitory effect was found to be maximum in every parameters of present investigation. This fungicide had also some detrimental effects on leaf development and leaf size, although it's effect was not very promising on fruit size. The findings on chlorophyll content (chl-a) of leaves (Table 1) revealed that there also existed a gradual and slow rate of inhibition on chlorophyll content produced by the tested fungicide.

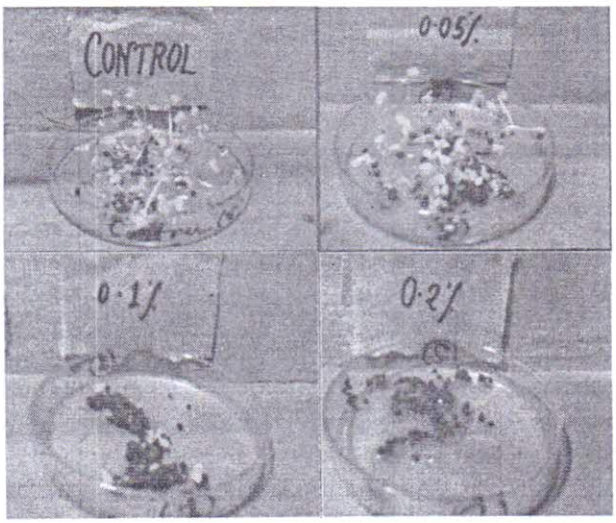

Fig. 1 : The figure(s) show the percentage of germination of *B. nigra.* at different concentrations of ceresan

Table 1 : Effect of ceresan (dry) on different growth parameters, fruit size and chlorophyll content of leaves of *B. nigra.* L.

Items	Control	Concentration of Cresan (%)		
		0.05	0.1	0.2
Germination Index (G.I) Mean value (%)+ SE	85± 1.71	72± 1.91	45± 1.69	9± 1.67
Shoot lengtg (cm) Mean value ±SE	4.56± 0.17	3.1± 0.21	0.8± 0.21	0.27± 0.009
Root length (cm) Mean value ±SE	3.6± 0.19	3.06± 0.17	0.93± 0.17	0.26± 0.13
Leaf size (cm) Mean value ±SE Bottom leaf	2.75± 0.18	2.45± 0.18	2.35± 0.17	1.95± 0.21
Top leaf	2.35± 0.12	2.1± 0.08	1.85± 0.11	1.55± 0.17
Fruit size (cm) Mean value ±SE	4.73± 0.20	4.46± 0.16	4.40± 0.18	4.3± 0.15
% of chlorophyll-a Mean value ±SE	0.6876± 0.006	0.6303± 0.005	0.5729± 0.005	0.4757± 0.001

Similar type of findings had been provided by Crisan (1973) and Prasad *et al.* (1996) when they worked

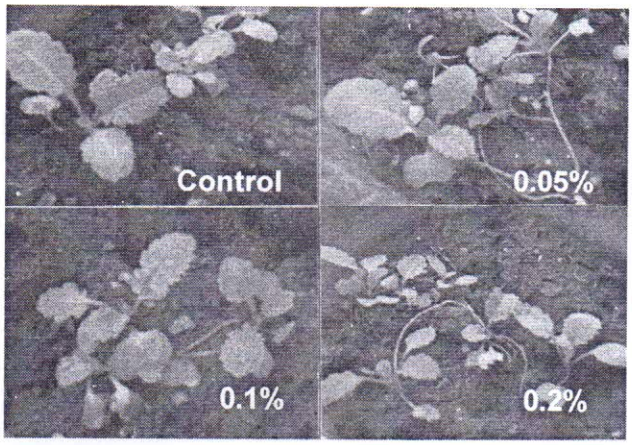

Fig. 2 : The figure(s) show the effect of ceresan on leaf size of *B. nigra.* at control and different concentrations of ceresan

separately on lettuce and maize plants. All these crops had been shown to be inhibited by the treatment with diffrent concentrations of aflatoxins. In the same context, Biswas *et al.* (2006) evaluated the efficacy of certain fungicides like Captan, Samarth, Dithinone etc. on the diseases of tomato. They obsrved that most of the fungicides had some side effects which are exerted on the growth physiology of host plants. Exceptionally, Samath treated plants exhibited laxuriant growth. Similar type of observations had been provided by Siddiqui and Zaman (2004) when they studied the effect of Benlate (a systemic fungicide) on seed germination, seedling growth, biomass and phenolic content in two cultivars of *Zea mays.* They claimed that seeds dressing with benelate showed enhanced rate of seed germination with greater effects on shoot and root growth as compared to the control set. Considering the present observations, it can be opined that ceresan not only exerted to fungicidal action but also expressed some effects on mustard plant.

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