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Effect of Systemic Fungicides on Germination, Seedling Growth, DNA, RNA and Phenolic Content of *Brassica compestris* L.

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Abstract

Application of systemic fungicides viz. benlate and bayleton showed significant decrease in germination as compared to control. Bayleton more adversely affected on shoot growth as compared to root growth while benlate showed greater inhibition in root growth. Total DNA and RNA contents were decreased by the application of systemic fungicides. An increase in total phenolic content was also recorded in test specie.

Introduction

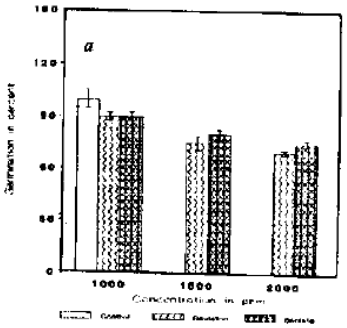
A key feature of crop protection in the 1990s is the decreasing use of pesticides, which aim to decrease the environmental impact of pesticides, cost of weed , pest and disease control. Benlate (benomyl) and Bayleton (tridernefon) are systemic fungicide used for control of various diseases such as downy mildew, brown patch, leaf spot, rust and smut (Singh, 1991). There are several investigations suggested that extensive use of systemic fungicide (benomyl) produced chorosis and irregular depression at the marginal and central portion of saffron leaves (Reyes, 1975). Triarimol reduced germiability and leaf expansion of *Phseolus valgaris* (John and Sisler, 1976). Likewise, carbendazim induced chromosomal aberration in somatic and reproductive cell pearl millet and sunflower (Harichand *et al*., 1991).The present study was, therefore, undertaken to examine the effect of systemic fungicide viz. benlate and bayleton on germination, seedling growth, RNA, DNA and phenolic content of *Brassica compestris* L. specie.

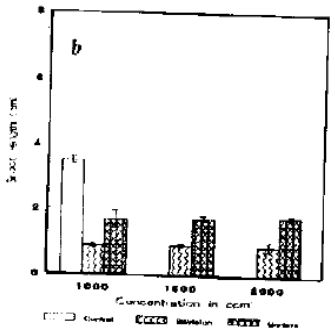
Materials and Methods

Brassica compestris L. seeds obtained from the National Institute for Agriculture and Biology (NIAB) Faisalabad were used. Seeds after surface sterilized with 0.1 percent mercuric chloride for 10 min. were washed and soaked in solution of benlate and bayleton at 1000, 1500 and 2000 ppm respectively while untreated seeds served as control. Fifteen seeds were placed in each 9 cm diameter petri plates containing whatman No. 3 filter paper soaked in bayleton and benlate solution for 10 min separately. Filter paper soaked in distilled water was kept as control. There were 3 replicates of each treatment and control, placed in a growth chamber at $28 \pm 2°C$. Germination of seeds, shoot and root length were recorded after ten days. RNA and DNA content of whole seedlings were measured by the method of Hutchison and Munro (1961) and phenolic content (Swain and Hillis, 1959).

Results and Discussion

Benlate used at 2000, 1500 and 1000 ppm respectively showed 75, 80 and 90 percent seed gemination as compared to control (Fig. 1a). Bayleton however showed 60, 70 and 80 percent when used at 2000, 1500 and 1000 ppm respectively. Bayleton at 2000 ppm showed greater phytotoxic effects than benlate reducing growth of seedling (Fig. lb, 1c). Shoot growth was more adversely affected than root growth. Whereas benlate showed greater inhibition in root growth as compared to shoot growth. Application of systemic fungicides viz. benlate and bayleton showed significant decrease in RNA and DNA content over control (Fig. 1d) Both fungicides responded differently with respect to concentration. However, maximum decrease was found when plants were treated with benlate at 1000 ppm. An increase in total phenol was recorded in test species. However, maximum increase was measured in plant treated with bayleton at 2000 ppm.





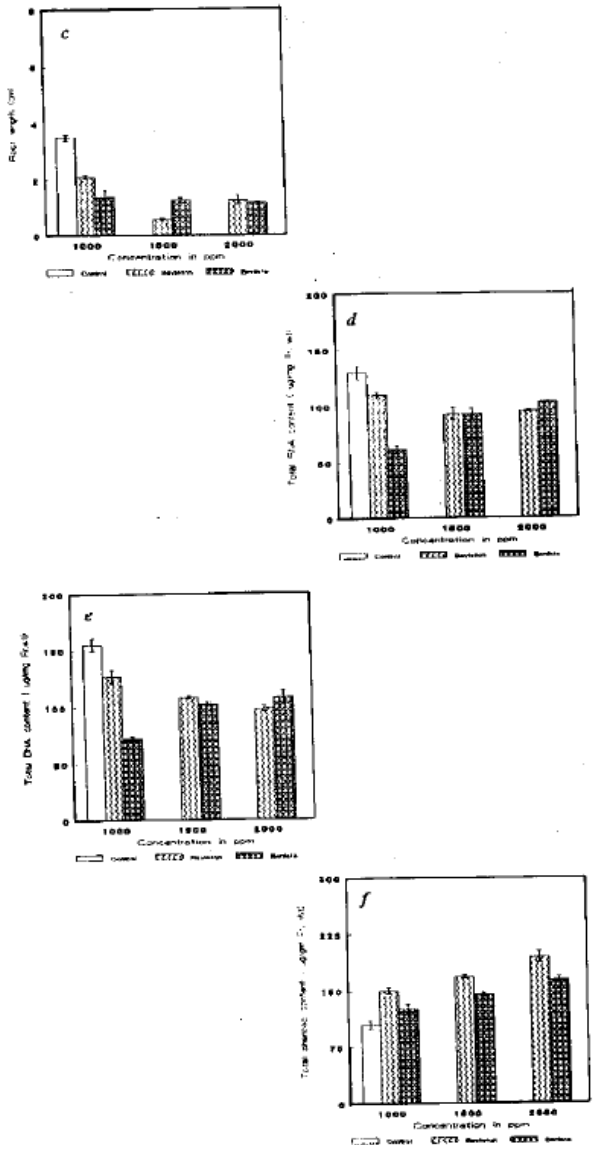


Fig. 1: Effect of systemic a) germination b) shoot growth, (c) root growth (d) RNA (e) DNA (f) phenolic content of *Brassica compestris* L.

The results of present findings reveal that systemic fungicides viz. benlate and bayleton adversely affected on germination, seedling growth, RNA and DNA content However, increase in total phenolic content usually indicates stress condition produced by the application of benlate and bayleton. It has been reported that plant treated with systemic fungicide suffer from chemical straight condition (Siddiqui *et al*., 1979) phenolic compound produced as a result of this stress may act as protective compound against pest (Friend, 1979). Phytotoxin in form of phenolic compound inhibited germination, seed growth, limiting cell division, nodulation, photosynthe respiration, protein and chlorophyll synthesis (Datta and Sinha-Roy, 1975; Einhely and Graig, 1980; Macias et 1992; Heisy, 1990; Siddiqui *et al*., 1997), Conseque it may be suggested that germination, seedling gro DNA and RNA content would also be affected by application of benlate and bayleton.

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