

EFFECT OF SYSTEMIC FUNGICIDES ON SEED GERMINATION, SEEDLING GROWTH AND PHENOLIC CONTENT OF *VIGNA RADIATA*

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Abstract

Bayleton showed adverse effects on seed germination of *Vigna radiata* as compared to Topsin-M. Fungicides also affected root growth as compared to shoot growth. An increase in phenolic content of seedling was also recorded.

Introduction

Systemic fungicides viz. Bayleton and Topsin-M are used for the control of plant diseases such as smut, grey mold, brown patch, downy mildew, powdery mildew and rust in wheat (Thomson, 1985). Despite its enormous application concern has been expressed on the potential phytotoxic effect caused by systemic fungicides. There are reports where chlorophyll formation was stimulated after the application of Benomyl (Pellisier *et al.*, 1971). Topsin-M showed an increase in chlorophyll, protein and phenolic contents in *Capsicum annum* and *Hibiscus esculentus* (Ahmed & Siddiqui, 1995). Benomyl has also been found phytotoxic resulting in irregular depression and chlorosis at the marginal and central portion of saffron leaves (Reyes, 1975). Alchor and Metaxyl induced sharp decrease in cell division (Coman *et al.*, 1990). Benzimidazol-N-sulfonamide interfered electron transport system (ETS) by combining with NADH or Succinate (Pillonel, 1993). Studies were therefore carried out to compare the phytotoxic effects produced by two systemic fungicides viz., Bayleton and Topsin-M on germination and seedling growth of *Vigna radiata*. Phenol was selected as an indicator for the stress developed due to presence of fungicides.

Materials and Methods

Vigna radiata seeds obtained from the National Institute for Agriculture and Biology (NIAB) Faisalabad were used. Seeds after surface sterilization with 0.1% mercuric chloride for 10 min. were washed and soaked in distilled water for 30 min. The seeds were placed in 9 cm diameter Petri plates containing Whatman No.3 filter paper soaked in Bayleton (Triadimefon) and Topsin-M (Methyl thiophenate) @ 1000, 1500 and 2000 ppm for 30 min. Filter paper soaked in tap water was kept as control. There were 3 replicates of each treatment. Germination of seeds, shoot and root length were recorded after 7 days. Phenolic content of whole seedling was determined by the method of Swain & Hillis (1959).

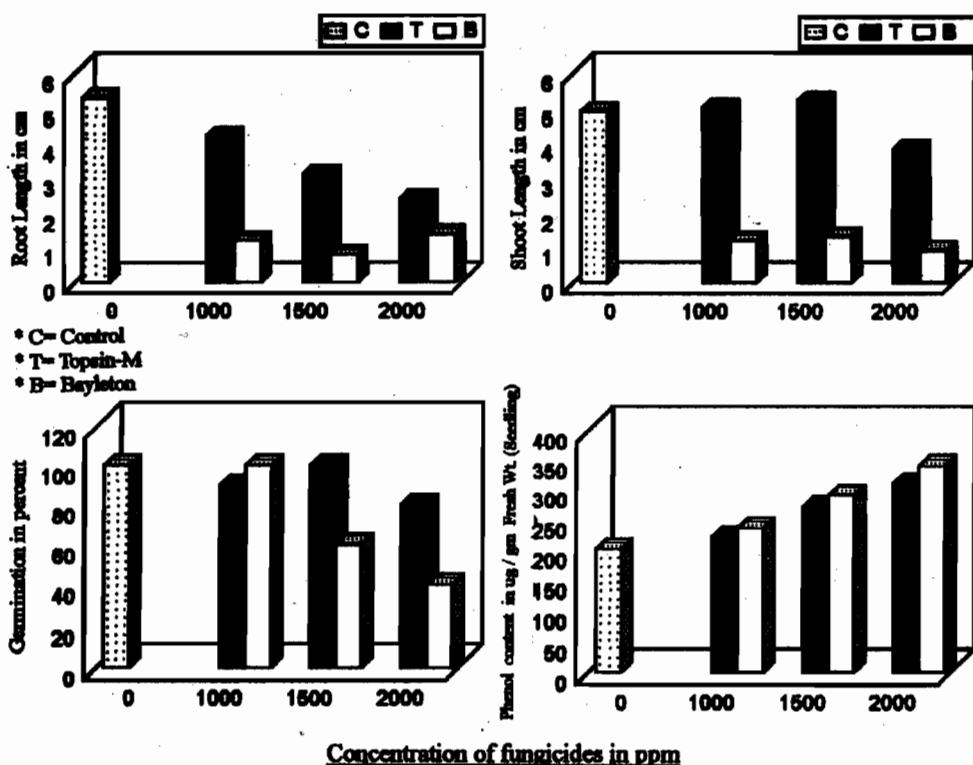


Fig.1. Effect of Bayleton (B) and Topsin-M (T) on germination, shoot, root length and phenolic content of *Vigna radiata*.

Results and Discussion

Topsin-M used @ 2000, 1500 and 1000 ppm respectively showed 80, 90 and 100% seed germination as compared to control (Fig.1). Bayleton however showed 40, 60 and 100% germination when used @ 2000, 1000 and 1500 ppm, respectively. Bayleton @ 2000 ppm showed greater phytotoxic effects than Topsin-M reducing growth of seedlings. Slight increase over control in shoot length was recorded where Topsin-M @ 1000 and 1500 ppm was used. An increase in phenolic content of seedling was observed, where Bayleton showed higher phenolic content as compared to Topsin-M over control with maximum increase in phenolic content observed @ 2000 ppm in both Bayleton and Topsin-M treatment.

It has been suggested that plants sprayed with systemic fungicide suffer from chemical stress and phenolic compound produced as a result of stress may act as protective compound against pathogenic fungi (Friend, 1977; Ahmed & Siddiqui, 1995). Stress condition caused abnormalities in biochemical pathway due to which toxic phenolic compound like flavones are formed (Reid *et al.*, 1992). Compound produced by chemical stress are potential inhibitor of germination and seedling growth (Heisy,

1990). The phytotoxicity of phenolic compound decreased germination as well as seedling growth (Datta & Sinha Roy, 1973; Freidman *et al.*, 1977; Einhely, 1980; Shaukat *et al.*, 1983). Phytotoxin in the form of phenolic compound are responsible for limiting cell division, respiration, photosynthesis and disruption of cell membrane (Macias *et al.*, 1992). In the present studies Bayleton was found more toxic than Topsin-M. A preferential use of Topsin-M over Bayleton could therefore be suggested for plant disease control.

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