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## Effect of Systemic Fungicide (Topsin-M) and Insecticide (Dimecron) on Germination, Seedling Growth and Phenolic Content of *Pennisetum Americanum* L.

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### Abstract

Insecticide-Dimecron (Phosphamidon) showed adverse effect on seed germination and seedling growth of *Pennisetum americanum* as compared to systemic fungicide topsin-M (Methyl thiophenate). Root growth was more adversely affected than shoot growth at higher concentration. Combined use of both the insecticide and fungicide reduced phytotoxicity. An increase in phenolic content was recorded in separate and combined treated samples.

### Introduction

Topsin-M (Methyl thiophenate) is a systemic fungicide used for the control of diseases such as powdery mildew, downy mildew, brown rust, smut and rust of wheat similarly Dimecron is an insecticide belongs to group organophosphate containing a.i. 500 g/L phosphamidon used for the control of *Tryporyza*, *Chilo*, *Sesemia*, *Spodoptera*, *Plutella*, *Planococcus* and *Eulecanium* population (Thomson, 1988; Singh, 1991).

There are reports where application of systemic fungicide produce chlorosis and irregular depression at the central and marginal portion of saffron leaves (Reyes, 1975). Alchorol metaxyl induced sharp decrease in cell division (Coman *et al.*, 1990). Carbendazim produced chromosomal aberration in somatic and germ cell of pearl millet and sunflower (Chand *et al.*, 1991). Topsin-M showed significant increase in chlorophyll, protein and phenolic content of *Hibiscus esculentus* and *Capsicum annum* (Ahmed and Siddiqui, 1995) and carbohydrate and phenolic content of *Solanum melongena* and *Avina sativa* (Siddiqui, 1997). Agrochemical such as insecticide, fungicide and fertilizers are suspected to cause distortive affects on many biochemical processes (Hurtado, 1987). It is presumed that metabolic changes induced by fungicide and insecticide will certainly effects the growth and development of non targeted host. This important aspect dealt by only few workers (Berger and Cwiek, 1990). The purpose of present study was to compare the toxicity of Topsin-M and Dimecron on germination, seedling growth and phenolic content of *Pennisetum americanum*. Phenolic content was selected as an indicator for the stress developed due to presence of pesticide.

### Materials and Methods

Seeds of *Pennisetum americanum* obtained from National Institute of Agriculture and Biology (NIAB) Faisalabad were surface sterilized with 2 percent sodium hypochlorite for

5 min and placed at 10 seed/petri plate having 9 cm diameter. Petri plates containing Whatman No. 1 filter paper soaked in Topsin-M (Methyl thiophenate) an Dimecron (Phosphomidon) at 100, 200, 300 ppm and in ratio 3:1, 1:1 and 1:3 for 30 min. Filter paper soaked in tap water was kept as control. Each treatment was replicated thrice. Petri plates were kept in a growth chamber 30 (2°C) with light intensity of 2000 lux and a photoperiod of 14 hr. Germination of seed, root and shoot length were recorded after 8 days. Phenolic content of whole seedling was determined by the method of Swain and Hillis (1959).

### Results and Discussion

Topsin-M used at 100, 200 and 300 ppm respectively showed 60, 70 and 80 percent germination of seed as compared to 90 percent germination in control. While 70, 50 and 20 percent germination were recorded when seed were treated with 100, 200 and 300 ppm Dimecron (Fig. 1a). However, inhibitory effects becomes reduced whe Topsin-M and Dimecron were used in 1:3, 1:1 and 3 ratios (Fig. 1b).

Application of Topsin-M and Dimecron showed significant affect on growth of *P. americanum* seedlings (Fig.1c). However, great reduction was observed where seeds were treated with Topsin-M at 300 ppm while Dimecron showed greater phytotoxic effects than Topsin-M where the reduction in growth was positively correlated with Dimecron. Combine use of Topsin-M and Dimecron showed less in growth as compared to separate use of except the case where the chemical were used in equal concentration (Fig. 1d). An increase in phenolic content was observed in seeds treated with Topsin-M and Dimecron (Fig. 2a). Maximum increase was recorded when the pesticide were used at 300 ppm. A combine use a Topsin-M and Dimecron showed significant increase in phenolic content. However, maximum increase was observed when seeds were treated with Topsin-M an Dimecron in a ratio of 1:1 (Fig. 2b). Increase in phenolic

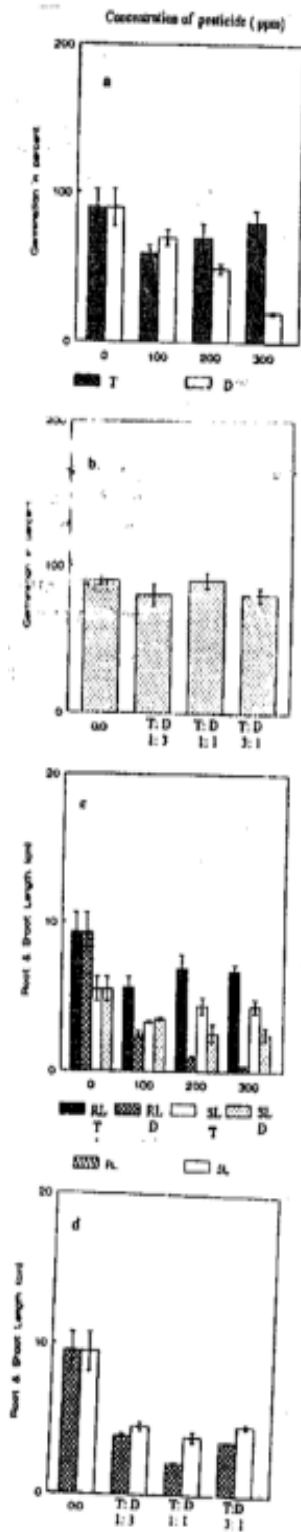


Fig.1: (a and b) Germination; (c and d) Root and shoot length of *Pennisetum americanum* L. Symbol on x axis stand for RL = Root length, SL = Shoot length, T = Topsin-M, D = Dimecron

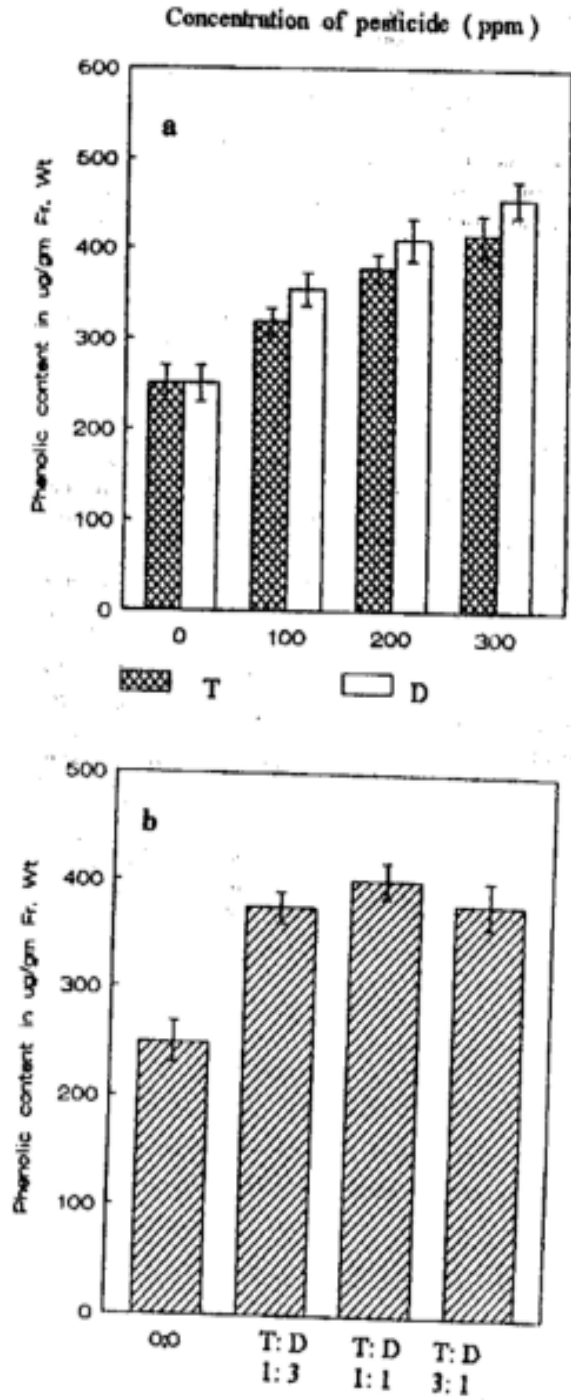


Fig. 2: (a and b) Phenolic contents of *Pennisetum americanum* L. Symbol on x-axis stand for T = Topsin-M, D = Dimecron

content usually indicates the stress condition developed by the use of agrochemical. It has been suggested that plant treated agrochemicals such as insecticide and fungicide

**Siddiqui et al.:** Systemic fungicide, insecticide, germination, growth, phenolic contents

suffer from the chemical stress (Siddiqui, 1997) and phenolic content produced as a result of stress may act as protective compound against pathogenic fungi and insects (Friend, 1979). Compound especially phenolic compounds produced by chemical stress can inhibit germination and seedling growth (Heisey, 1990; Datta and Sinha-Roy, 1975; Friedman et al., 1977; Colton and Einhellig, 1980; Siddiqui and Ahmed, 1996). It has also been reported that phenolic compounds are responsible for limiting growth, respiration, photo-synthesis and disruption of cell membrane (Macias et al., 1992). The results of the would suggest that a combined use of both the systemic fungicide and insecticide could be less toxic to plant as compared to their separate use.

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