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Original Research Paper

Allelopathic Effects of the plant *Celosia argentea* L. on Seed Germination and Seedling Growth of *Vigna mungo* L.

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Celosia argentea L.
Vigna mungo L.

ABSTRACT

Allelopathy generally refers to the inhibitory effects of plant species (the donor) on the germination, growth or development of another plant species (the recipient). Chemicals with allelopathic activity are present in different plant parts including leaves and fruits which have a potential as herbicides. The donor plants release allelochemicals into the environment through decomposition of plant residues, root exudates, leachates and volatilization. Accumulation of more allelochemicals from weeds in fields causes soil sickness and autotoxicity resulting in loss of crop yield. The present study has been conducted to examine the allelopathic effects of *Celosia argentea* L. on seed germination and seedling growth of *Vigna mungo*.

INTRODUCTION

Allelopathy means one plant harms the other with specific biomolecules. It is the opposite of symbiosis. Biomolecules specifically termed as allelochemicals are produced by plants and released into the environment (Rice 1984). These allelochemicals subsequently influence the growth and development of neighbouring plants. Allelopathic interactions between plants play a crucial role in both natural and manipulated ecosystems.

Celosia argentea is a predominant weed of leguminous crop fields and has been reported to reduce the yield of pearl millet, maize and pulse legumes. It was, thus, thought that the reduction in yields of these crops was not due to only competition but also because of allelopathic inhibition of growth and development of these crop plants.

MATERIALS AND METHODS

Mature seeds of *Vigna mungo* were procured from agricultural field. They were surface sterilized with 0.1% $HgCl_2$ followed by washing with distilled water and used for the study of seed germination and seedling growth.

To prepare phytoextract, healthy plants of *Celosia argentea* were collected and washed with distilled water. The fresh plant material of roots, inflorescence and leaves was crushed using distilled water. Different dilutions of root, leaves and inflorescence extracts were prepared in distilled water. Surface sterilized seeds of *Vigna mungo* were kept in sterilized petri dishes containing Whatman No.1 filter paper moistened with these dilutions with 10 mL distilled water serving as control. Each petri dish containing 25 seeds of *Vigna mungo* were kept at room temperature in a germination chamber.

RESULTS AND DISCUSSION

Effect of phytoextracts on seed germination: The phytoextracts of *Celosia argentea* inhibited seed germination of *Vigna mungo* over the control (Table 1, Fig. 1). The highest concentration of root, inflorescence and leaf extract significantly inhibited the seed germination. The maximum delay in seed germination was observed by root and leaf extract. Sannigrahi & Chakrabortty (2005) observed inhibition of seed germination by the aqueous extract of leaves of *Cynodon dactylon* in tomato seeds. Oudhia & Tripathi (1997) observed similar results with *Parthenium hysterophorus* and *Lantana camera*. Chickpea seed germination was inhibited by extract of *Solanum nigram* and *Matricaria chamomilla* (Kadioglu et al. 2005).

Effect of plant extract on seedling growth: The extracts of leaf, inflorescence and root of *Celosia argentea* caused adverse effects on the seedling growth of *Vigna mungo* (Table 2, Figs. 2, 3). The decrease in root and shoot length was observed as per increase in concentration of root, inflorescence and leaf extracts. The detrimental effects were caused more by leaf extract treatments as compared to root and inflorescence extract treatment. The fresh and dry weights also decreased at higher concentration of root inflorescence and leaf extracts over control. Aqueous shoot extract of *Amaranthus viridis* and *Parthenium hysterophorus* caused most inhibitory effect to shoot length of seedling of maize, rice and wheat. Aqueous shoot extracts of *Amaranthus* inhibited germination of sunflower and soyabean (Ambika & Jaychandra 1980, Kanchan 1975). *Tridax procumbens* affected seedling growth of *Lactuca sativa* (Krautmann et al. 2001). Leaf leachates of *Eucalyptus globules* significantly reduced the shoot length and seedling dry matter (Djanaguiraman et al. 2005).

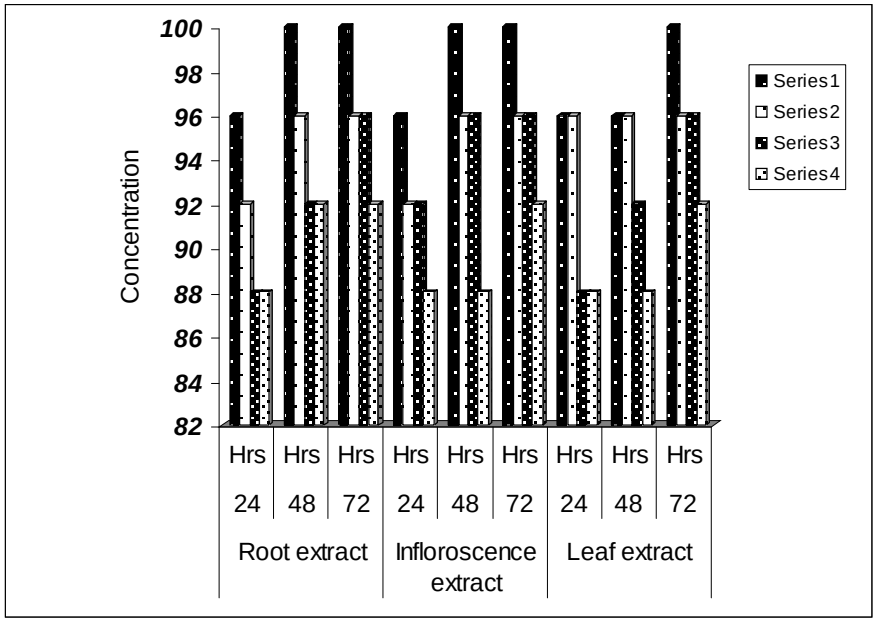

Fig. 1: Effect of the phytoextrct of *Celosia argentea* on seed germination of *Vigna mungo*.

Table 1: Effect of phytoextract of *Celosia argentea* L. on seed germination of *Vigna mungo* L.

Concentration	% Germination								
	Root extract			Inflorescence extract			Leaf extract		
	24hrs	48 hrs	72 hrs	24 hrs	48 hrs	72 hrs	24 hrs	48 hrs	72 hrs
Control	96	100	100	96	100	100	96	96	100
20%	92	96	96	92	96	96	96	96	96
40%	88	92	96	92	96	96	88	92	96
60%	88	92	92	88	88	92	88	88	92

Table 2: Effect of phytoextract of *Celosia argentea* on seedling growth, fresh weight and dry weight of *Vigna mungo*.

Concentration of phytoextracts	Root extract				Inflorescence extract				Leaf extract			
	RL (cm)	SL (cm)	FW (g)	DW (g)	RL (cm)	SL (cm)	FW (g)	DW (g)	RL (cm)	SL (cm)	FW (g)	DW (g)
Control	3.57	4.39	2.42	0.33	3.98	4.7	2.43	0.28	4.99	4.56	2.53	0.36
20%	1.26	2.72	1.99	0.38	2.81	3.46	1.79	0.24	1.04	2.18	2.10	0.35
40%	0.98	2.64	1.81	0.36	1.26	2.41	1.56	0.30	0.49	1.61	1.91	0.33
60%	0.50	1.41	1.59	0.34	0.66	2.22	1.36	0.26	0.21	1.16	1.70	0.34

(RL-Root length, SL-Shoot length, FW-Fresh weight, DW-Dry weight)

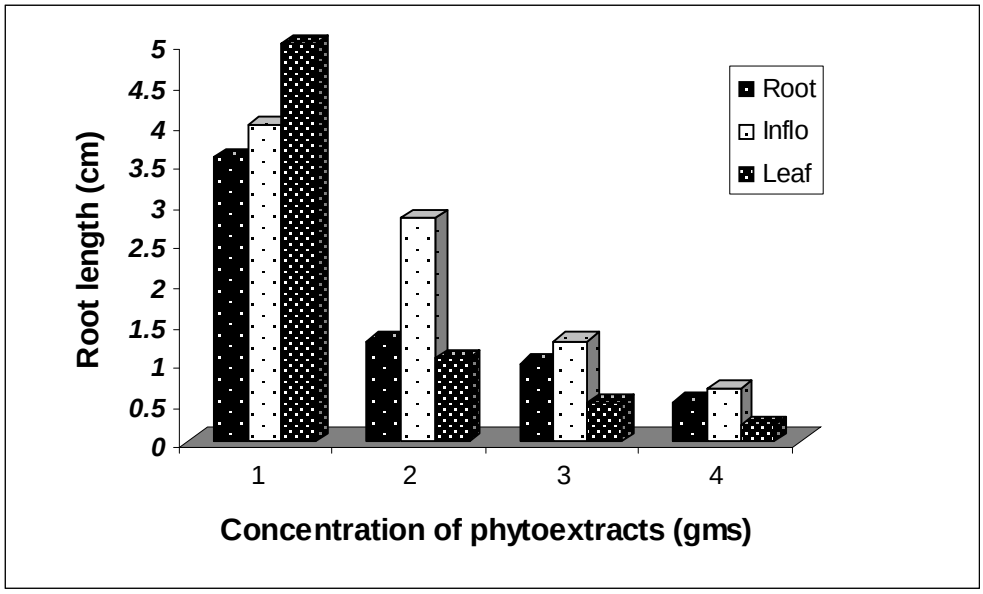

Fig. 2: Effect of phytoextract of *Celosia argentea* on root length of *Vigna mungo*.

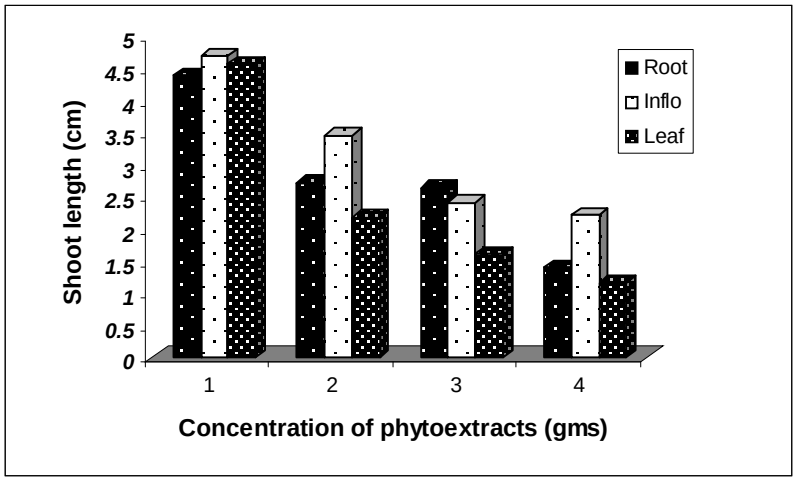

Fig. 3 Effect of phytoextract of *Celosia argentea* on shoot length of *Vigna mungo*.

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