ALLELOPATHIC INFLUENCE OF LEUCAENA LEUCOCEPHALA (LAM.) DE WIT ON ZEA MAYS L

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KEYWORDS

Allelopath
Leucaena leucocephala
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DAS
(Days after Sowing)
Laboratory experiments were conducted to study the effect of aqueous leaf litter leachate of \textit{L. leucocophala} on seed germination and seedling growth of commonly used cultivar in this region of maize – Kanchan K-25. Germi-
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**ABSTRACT**

Laboratory experiments were conducted to study the effect of aqueous leaf litter leachate of \textit{L. leucocophala} on seed germination and seedling growth of commonly used cultivar in this region of maize – Kanchan K-25. Germi-
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**INTRODUCTION**

Allelopathy refers to beneficial or harmful effects of one on another plant, both crop and weed species, by the release of chemicals from plant parts by leaching, root exudation, volatilization, residue decomposition and other processes in both natural and agricultural systems (Ferguson. F. and Rathinasbapathi, 2009). These phytotoxic substances collectively known as allelochemicals, are secondary plant product or waste products of main metabolic pathways of plants (Ashrafi et al., 2007, Bernat et al., 2004, Chon and Kim 2002, Hall and Hender, 1989). These toxin producing plants differ widely in their ability to produce allelopathic effects (Waller and Feng, 1996). There are several ways in which these toxic chemicals are produced. The chemicals thus released inhibit the growth of other plants. These chemicals are absorbed by the plants, mainly by the roots, growing in close proximity. As a result other plants are damaged (An, 1998, Saxena 1990). Recently, several works have been done suggesting that this kind of influence holds great prospect for finding alternative strategies for weed management. Thereby, reliance on traditional herbicides in crop production can be reduced (An, 1998; Keating, 1999; Macias, 1995; Olofsdotter, 1998; Wu, 1999). Allelochemicals may also reduce pollution and decrease detrimental effects of autotoxicity and soil sickness in agriculture and forestry (Waller, 1987). Researches have revealed that there are some plants producing chemicals which are more effective in promoting growth of other plants like gibberellins or IAA (Hasegawa, 1993). \textit{Leucaena leucocophala} is commonly known as subabul in India. This is a miracle tree promoted for re-vegetation, soil and water conservation and animal improvement. It contains a toxic, non-protein, amino acid, mimosine in leaves and foliage that inhibits the growth of other trees but not its own seedlings (Ferguson and Rathinasabapathi 2009).

The purpose of this investigation is to find the implication of the phytotoxicity of leaf leachates of \textit{L. leucocophala} on seed germination and seedling growth of maize, in in-vitro condition.

**MATERIALS AND METHODS**

The donor plant \textit{L. leucocophala} belong to the family Fabaceae (Sub-family, Minosoideae). It contains mimosine which has antimitotic and depilator effect on animals. It is acutely toxic to non-ruminant animals but is normally converted to dihydroxy 4(1H) –pyridone (DHP) upon ingestion. Leaves also contain 2-6% condensed tannins (CT) and phenolic compunds. The recipient plant is \textit{Z. mays}.

**Preparation of leaf leachates**

Leaves fallen from understory of the plants were collected and washed thoroughly with distilled water, kept on blotting paper to absorb water and weighed. For preparing 20% of leaf leachate solution 200 gms of leaves were dissolved in 1000mL of distilled water, left for 72h, filtered using Whatman’s filter paper no. 1. Similarly leaf leachate solution of different concentration 5, 10, 20, 40, 80, and 100% were
made and stored in refrigerator. Seeds were kept in petridish lined with two layered filter paper soaked in distilled water. Five seeds were kept in each for every concentration. Three sets were taken for each treatment and in one set untreated seeds were taken which served as control.

RESULTS AND DISCUSSION

Seed germination of control and pre-treated seeds were scored - 4 Days after sowing (DAS) [1- Control, 2-5%, 3-10%, 4-20%, 5-40%, 6-60%, 7-80%, 8-100%].

Works have been done on the allelopathic influence of Leucaena on other plants. In wheat it was reported to have inhibitory effects whereas on paddy it has stimulatory effect (Ferguson and Rathinasabapathi 2009). The present study suggest the presence of allelochemicals in aqueous extract from leaves. Fig. 1 indicates the results for the effect of L.leucocephala on the germination of Z. mays. In general the concentration of leaf leachates has inhibitory effect on seed germination, maximum inhibitory effect was found at high concentration (100%). Recent work of Khan, (2011) also indicate similar effect on seed germination and seedling growth of maize. However in the present work it was found that at moderate concentration (40% - 50%) there was stimulatory effect (95%) little less than under control (97%).

Seedling growth

Seedling performance of pretreated seeds as well as that of control was measured in terms of radicle and plumule growth. Fig. II - indicates the measurements taken – 7 DAS (days after sowing). [1- Control, 2-5%, 3-10%, 4-20%, 5-40%, 6-60%, 7-80%, 8-100%].

Radicle growth

Growth of radicle of seedlings was found to be more adversely affected than that of plumule. Under control the length was found to be 6.3cm. Whereas at different concentration of leaf leachate it varied from (5.9 – 5.0cm) with the increase in concentration from (5 - 100%)

Plumule growth

It was characterised in that both at low and high concentration of leachate the growth was less but at moderate concentration (50%) it was found to be higher (9.2cm) only little less than that under control (9.5cm). Considering the foregoing result it seems that these is significant allelopathic effect of L. leucocephala on germination and radicle and plumule growth with the leaf leachate extract. These results also support the other works that allelopathy is a concentration dependent phenomena (Ahmed et al., 2007).

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