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International Journal of Current Research
Vol. 7, Issue, 01, pp.11395-11397, January, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

ALLELOPATHIC POTENTIAL OF *LEUCAS ASPARA* (WILLD.) LINK. ON GERMINATION AND SEEDLING GROWTH OF *CAJANUS CAJAN* (L.) MILLSP.

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ARTICLE INFO

Article History:
Received 07th October, 2014
Received in revised form
07th November, 2014
Accepted 10th December, 2014
Published online 23rd January, 2015

Key words:
Allelopathy, Germination, Seedling growth, Extracts.

ABSTRACT

The effect of different concentrations of aqueous extracts of leaf, stem, and root of *Leucas aspera* L. on seed germination and seedling growth of *Cajanus cajan*. The result revealed that the aqueous leachates of leaf, stem and root of high concentrations significantly inhibited germination, growth and fresh weight of seedlings. But at low concentrations (5%, 10 and 15%) the same leachates promote both germination and seedling growth of *Cajanus cajan*. The inhibitory effect of various concentrations of aqueous leachates was found to be concentration dependent. Hence it is known that the weed, *L. aspara* naturally growing in crop fields of *Cajanus cajan* has some influence over the germination behavior and seedling growth of crop.

INTRODUCTION

Allelopathy has been refer to biochemical interactions between all types of plants including microorganisms. Many investigators stated that a large number of metabolites occur in different plant parts which are inhibitory or stimulatory effect on seed germination and seedling growth of other plants (Avers and Goodwin 1956 and Bansal and Bhan1993; Ashrafi *et al*., 2007: Ahmad *et al*., 2011). These metabolites under suitable conditions may release into the environment either by withering, leaching, exudation and volation (Jalageri *et al*., 2010). Most of the weeds are responsible for producing allelopathic compounds which when in contact with crop plants inhibit their growth. Additionally some weeds interfere with crop plants through allelochemicals which influence crop growth and germination (vaithiyanathan *et al*., 2014; Batish *et al*., 2007; Qasem and Foy, 2001). The present study was conducted to evaluate the allopathic effect of *Leucas aspera on* germination and seedling growth of *Cajanus cajan*.

MATERIALS AND METHODS

The bioassay study was conducted to study the allelopathic effects of different concentrations of aqueous leachates of leaf, stem and root of *L. aspara.* Fresh samples were collected from the crop fields and considered as donor plant. The leachates were prepared by soaking 25 gm of chopped parts from every organ in 100 ml of distilled water (25%) for 24 hours.

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Then the leachates were filtered thorough whattman no 1 filter paper and was further diluted to various concentrations (20, 15, 10 and 5%) with distilled water. Each time twenty-five seeds of *Cajanus cajan* were treated with 0.1 % mercuric chloride and washed thoroughly with distilled water and dried on filter paper to eliminate fungal attack. Then the seeds were soaked in various concentrations of leachates separately for 3 hours. Later the seeds were thoroughly washed with sterile distilled water and arranged in sterile petriplates (25 cm diameter) with filter paper pads. Seeds soaked in distilled water for the same time served as control. The filter papers were kept moist with distilled water and the petriplates were placed inside seed germinator (YORCO seed germinator) and maintained at a temperature of 25 ± 1°C and humidity 80%. The seed germination, radicle and plumule growth were recorded at 7 days after sowing. The data was analyzed statistically. Treatments were replicated three times.

The germination percentage was calculated using the following formula

$$\text{Germination \%} = \frac{\text{No. of seeds germinated}}{\text{Total no. of seeds sown}} \times 100$$

RESULTS AND DISCUSSION

The results obtained from the present investigations have been discussed in the following sub heads.

Seed germination

Aqueous leachates of fresh leaf, stem and root of *Leucas aspera* inhibited the germination in *Cajanus cajan* at high concentrations, but at low concentrations like 5%, 10 and 15% promote the germination (Figure 1). The inhibition observed in germination and seedling growth of test crops was directly dependent on the concentration of the extract, perhaps it may be due to the entry of water soluble allelochemicals into the seed, which retards the germination and growth (Suseelamma and Venkataraju 1994).

quite potent in inhibiting the germination and growth of *Cajanus cajan*. The decrease in inhibition with the dilution of aqueous extracts shows clearly the impact of weed material in the field and the moisture in the soil to dilute the released inhibitors on the germination of seeds and growth of seedlings.

In a column, means followed by a common letter are not significantly different at the 5% level by DMRT.

Table 1. Influence of aqueous leachates of *Leucas aspara* on germination, seedling growth and fresh weight *Cajanus cajan*

Treatments	Leachates concentration	Root length (cm)	Shoot length (cm)	Fresh weight (gm)
Control		5.57^{a} ± 0.14	8.03^{a} ± 0.46	0.36^{a} ± 0.53
	5%	5.78^{a} ± 0.42	9.83^{b} ± 0.52	0.43^{b} ± 0.33
Leaf leachates	10%	5.57^{a} ± 0.59	9.78^{b} ± 0.20	0.41^{c} ± 0.21
	15%	4.82^{b} ± 0.24	8.29^{a} ± 0.51	0.40^{c}± 0.18
	20%	4.78^{b} ± 0.14	7.67^{d} ± 0.36	0.36^{a} ± 0.44
	25%	4.35^{c} ± 0.24	7.49^{e} ± 0.64	0.33^{d}± 0.80
Stem leachates	5%	6.25^{d} ± 0.33	9.89^{b}± 0.61	0.43^{b} ± 0.22
	10%	6.10^{d} ± 0.63	9.50^{c}± 0.54	0.37^{a}± 0.84
	15%	5.42^{ab} ± 0.62	9.17^{ab}± 0.44	0.36^{a}± 0.24
	20%	5.00^{bc} ± 0.48	8.00^{a} ± 0.32	0.35^{d}± 0.64
	25%	3.85^{e}± 0.41	7.96^{d}± 0.40	0.34± 0.33
Root leachates	5%	6.10^{d} ± 0.22	9.82^{b}± 0.53	0.41^{b} ± 0.22
	10%	5.64^{a} ± 0.42	9.07^{ab}± 0.25	0.40^{c} ± 0.19
	15%	5.50^{a} ± 0.72	8.46^{a} ± 0.42	0.38^{c} ± 0.62
	20%	5.03^{b} ± 0.62	7.92^{d}± 0.49	0.35^{a} ± 0.21
	25%	4.05^{e} ± 0.32	7.01^{e}± 0.61	0.34^{a} ± 0.28

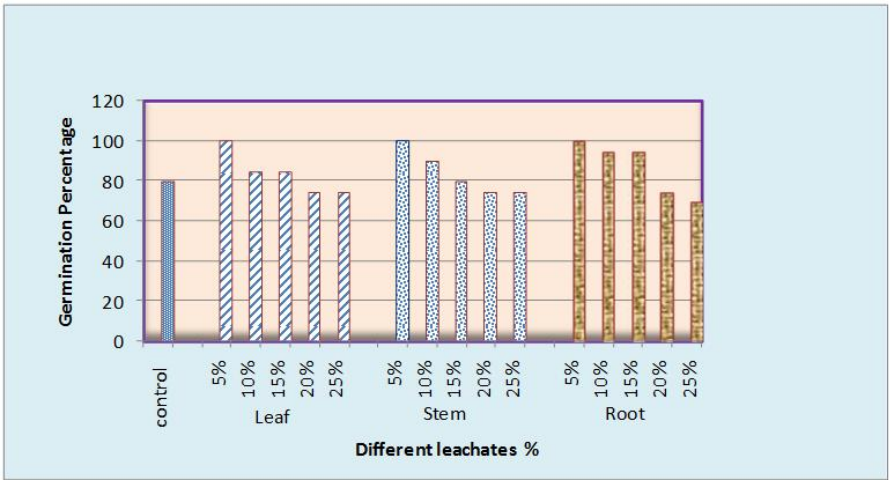

Fig. 1. Allelopathic effect of various concentrations of leachetes of *Leucas aspera* on Germination of *Cajanus cajan*

Seedling growth

The aqueous leachates from leaf, stem and root effect the growth performance of the seedlings and there is a decline in length and fresh weight of the seedlings, when measured after 7 days of incubation. The higher concentration significantly inhibited the root and shoot length as well as fresh weight, while stimulation was observed with 5 and 10% concentration (Table 1). This variablity in inhibition may be due to the presence of different concentrations of inhibitors (Rice 1977). Observations regarding the seedling growth of *Cajanus cajan* correlate with the findings of Suseelamma and Venkata raju (1994) on groundnut , Beres and Kazinczi (2000) in field crops and Sasikumar *et al* (2002) in pulse crops. It is evident that the allelopathy associated with the plant parts of *Leucas aspera* is

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