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ALLELOPATHIC INFLUENCE Of *Alternanthera sessilis* (L.)R.Br.exDc.and *Eclipta alba* (L.) Hassk. GERMINATION AND GROWTH OF *Pennisetum typhoids* (Burm.f.)St.&Hubb

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ABSTRACT

The present study was aimed to determine the Allelopathic influence of two common crop field weeds *Alternnanthera sessilis* (L.) R.Br.exDc. and *Eclipta alba* (L.) Hassk. on the seed Germination, growh and Protein content of the of Pearl millet (*Pennisetum typhoides* (Burm. f.) St. & Hubbwere studed.Various concentrations (5.10, 15, and 20%) aqueous extracts prepared from entire parts of two weed species *E.alba* and *A. sessillis.* in the germination study, the healthy, uniform seeds of pearlmilletselected and the experiments were conducted by the application of differentconcentration of weed extracts to then pot culture.The germination percentage, root and shoot length, and protein were adversely inhibited by Pearl millet seedlings with increasing the concentration of weed extract. But the effect was more intense in *A. sessillis*than*E. alba*that of *A. sessillis* extract treatment of pearlmillet.

Keywords:*Alternanthera sessilis, Eclipta alba,*Germination ,Growth**,***Pennisetum typhoids***

1.INTRODUCTION

The term allelopathy from two Greek words, where allelon means 'to each other' and pathos means 'to suffer' (Molisch 1937). Allelopathy generally refers to the detrimental effects of higher plants of one species (the donor) on the germination, growth or development of plants of another species (the recipient) (Narwal, 1994). The term allelopathy from two Greek words, where allelon means 'to each other' and pathos means 'to suffer' (Molisch 1937).In natural or man managed agroecosystems, neighbouring plants may interact with the growth and development of other species. Muller (1969) suggested the term interference for the overall influence of one plant (including microorganisms) on another.

Allelopathy is an important mechanism of plant interference by the addition of plant-produced phytotoxins to the plant environment. Many of the phytotoxic substances suspected of causing germination and growth inhibition have been identified from plant tissue and soil. These substances are termed allelochemics or allelochemicals (Whittaker and Feeny, 1971).Allelopathy is of two types, one is true allelopathy and other is functional allelopathy. True allelopathy is the release of substances that are toxic, in the forming which they are produced in the plant. Functional allelopathy is the release of substances that are toxic as a result of transformation by microorganisms (Witt, 1999).

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Allelopathic interactions have been demonstrated to play a crucial role in natural as well as man-made forests. Such interactions are pivotal in determining the composition of the vegetation growing as understory and in understanding the forest regeneration problems. Results obtained so far have shown that almost all types of plants (viz., angiosperms, gymnosperms, lower plants like ferns and microorganisms, including mycorrhizae) present in forests indulge in allelopathic interactions (Pellissier, 2000).

Allelochemicals refer mostly to the secondary metabolites produced by plants and they have no physiological function essential for the maintenance of life (Nor These chemicals are produced in above or below ground plant parts or in both to cause allelopathic effects in a wide range of plant communities(Narwal, 1994). Rice (1984) indicated that allelopathic agents influence the plant growth through following physiological process: cell division and cell elongation, phytohormone induced growth, photosynthesis, respiration, protein synthesis and changes in lipid and organic acid metabolism, stem conductance of water and internal water relations and miscellaneous mechanisms. These processes that contribute significantly to mode and mechanism of action have been also reviewed by Einhelling (1986).In the current work the effects of aqueous whole plant extracts of

Alternanthera sessilis (L.) and *Eclipta alba* (L.) Hassk. R.Br.exDc .on the seed germination and growth of Peral millet (*Pennisetum typhoides* (Burm. f.) Stapf & C. E. Hubb.)

2.MATERIALS AND METHOD

The weed species *E.alba* and *A. sessilis* were collected freshly from the post harvest pearl millet and rice fields of Annamalai Nagar , from in the premises of faculty of agricultural, Annamalai university and were evalvated their allelopathic effect on germination and seedlings growth of pearl millet. All the experiments were conducted in the Department of Botany Annamalai University, The weeds were washed thoroughly and cut in to small pieces. Each of the chopped 20g samples was ground in a pestle and mortar with distilled water aqueous extracts theirs obtained were filtered through muslin cloth and the volume was made up to 100ml with distilled water. Form this stock solution 20%, 15%, 10%, and 5% solution were prepared by adding distilled water. The extracts were stored in a deep freezer until they were used.Earthen pots were used for the germination of pearl millet seeds. Three kilogram of normal garden soil used as a medium for the bioassay experiments. Each pot was irrigated uniformly by different concentrations of weed extracts and the distilled water was used for control. The experiments were carried out with five replicates. The extracts water were irrigated to the pots in alternative days up to 12^{th} day form the day of seed sown. Germination percentage was recorded on 3^{th} day while root and shoot length, and protein content were recorded on 12^{th}day after treatment(Lowry*et al* 1951). The obtained mean values from five replicates were analyzed – statistically to find out the significance of the treatments on the crop.

3.RESULTS AND DISCUSSION

The aqueous whole plant extracts of the *Eclipta alba* (Linn.) Hassk. and *Alternanthera sessilis* (Linn) R.Br.exDc.strongly reduced the germination of Pearl millet over control and the magnitude of reduction differed depending upon the concentration of the extracts employed. The aqueous whole plant extract of two weed species showed an identical pattern of adverse effect in Pearl millet. Of the two weeds of the study, the maximum inhibition of germination was caused by *A. sessilis*extract than *E. alba*.(Table.1& Fig.1)

Five per cent concentration of both the weed extracts marginally decreased the germination ofPeralmillet. But all other concentrations (10, 15 and 20%) were reduced, drastically on the germination percentage. *A. sessilis*extract had more inhibitory effect on germination of Pearl millet than that of*E. alba* extract treatment. The similar results were reported by by the application of *Eucalyptus* leaf extract on cowpea, sorghum, pearl millet, wheat, barely, potato, groundnut, maize, sunflower, and mustard (Igboanugo, 1987, ; Roa and Reddy, 1984; Puri and Khara, 1991; Puri, 1992; del Moral and Muller, 197l; Jayakumar *et al.*, 1990; Suresh and Raj, 1987.) The higher concentrations of aqueous leaf leachates of *E.globulus* depressed the seed germination and sprouting in *Costus speciousus* (Konar and Kushare, 1995). The present study definitely suggests that the addition of aqueous extracts of these weed species strongly affects the germination efficiency and growth characters of pearl millet compared to the control.

From the five different concentrations extracts of *E. alba* and *A. sessilis*significantly reduced the root and shoot length of test crop over control. The magnitude of reduction differed depending upon the concentration of the extracts employed.(Table 2.&Fig.2) As the concentration increased from 5 to 15% the inhibitory effect increased and a maximum inhibitory effect was caused by 20% aqueous extracts. Ghodake *et al*., (2012) studied the allelopathic effect of *Euphorbia* species on the germination of Wheat and exhibited inhibition in germination percentage and root-shoot length. The aqueous extracts of root and shoot of *Amaranthus viridis* and *Parthenium hysterophorus* significantly inhibited the seed germination and seedling growth of maize, wheat and rice (Ali *et al*. 2005). Various bioassay studies have also proved that different plant parts release toxic metabolites into the soil that effect adversely germination and growth of food crops (Quasem 2002).

The aqueous whole plant extracts of *E. alba* and *A. sessilis*caused a decrease in the protein content in the seedlings of *P. typoides*over control. As the concentration of the extracts increased from 5 to 20% the protein content of the seedlings decreased and a maximum inhibition was caused by 20% of both the extracts (Table 3 and Fig 3). Mandal *et al* (2005) Similar result were regarding the leaf extract of *Populus deltoids* adversity inhibited seedling growth and reduction in the content of sugar, proteins in three varieties of green gram.The results of Saeid Abu-Romman *et al*.(2010) revealed that the*Euphorbia hierosolymitana* leaf lechates significantly reduced root and shoot length, fresh, dry weights and decreased the amount of total chlorophyll and protein contents of wheat seedlings.

All the concentration of *A. sessilis* and *E. alba*extracts affected the germination parameters and physiological development, reflecting the severeity of the weeds in growth of pearl millet crop. Clearance of weeds could be the remedy againstthe allelopthic influence of seed germination and growth. Field trials would further help in understanding the role of weeds and crop production.

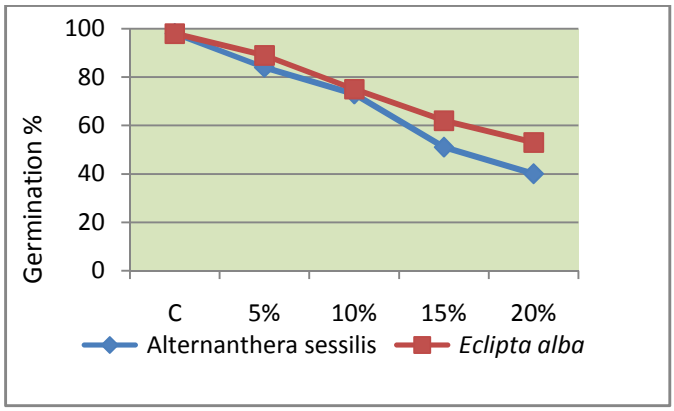

Fig. 1. Effect of aqueous extracts of two weed species on germination (%) of pearl millet (3DAS)

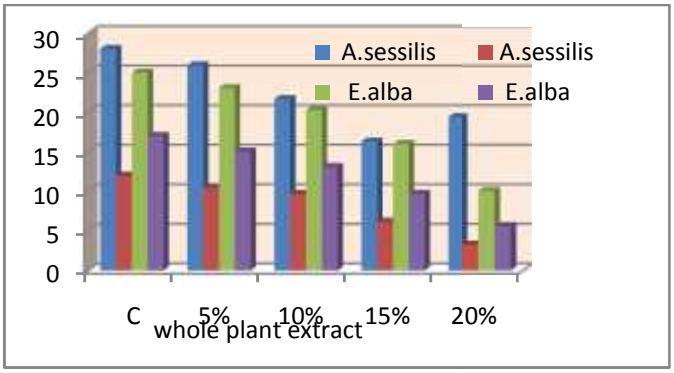

Fig. 2. Effect of aqueous extracts of two weed species on shoot and root length (cm/plant) of pearl millet (12DAS)

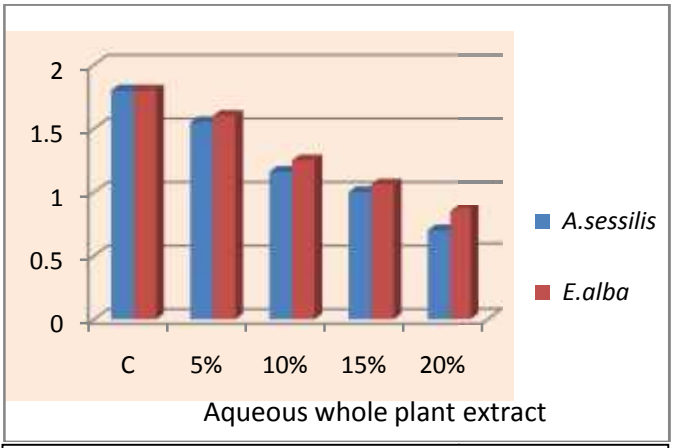

Fig. 3.. Effect of aqueous extracts of two weed species on protein content (mg/g f. wt)of pearl millet(12 DAS)

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