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Research Article

ALLELOPATHIC EFFECT OF AQUEOUS EXTRACT OF SOME MEDICINAL PLANTS ON SEED GERMINATION AND SEEDLING LENGTH OF MUNG BEAN (*VIGNA RADIATA* (L.) WILCZEK.)

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ABSTRACT
The allelopathic potential of aqueous leaf extract of three different plant species namely *Azadirachta indica* A. Juss, *Murraya koenigii* (Linn.) Spreng and *Paederia foetida* Linn. were observed on Mungbean (*Vigna radiata* (L.) Wilczek.) seed germination and seedling growth. The experiment was conducted in sterilized Petri dishes for 24 hrs, 48 hrs and 72 hrs time intervals for seed germination and 48 hrs and 72 hrs for root growth. During the experiment, seed germination on account of allelopathic inhibition was found in all levels of leaf extract. Seed germination and radicle length results indicated that the inhibitory effect was proportional to the concentration of the extract and that the inhibitory effect was much pronounced in root growth rather than germination. These results provide preliminary evidence of allelopathic potential of said species on seed germination and radicle growth of Mung bean.

Key Words: *Allelopathy, Aqueous Extracts, Seed Germination, Radicle Growth, Medicinal Plants*

INTRODUCTION
The word allelopathy has been derived from two Greek words "Allelon" meaning "each other" and "Pathos" meaning "to suffer", i.e. injurious effect of one plant upon another. The term allelopathy generally refers to the detrimental effect of higher plants of one species on the germination and growth of the other species. Allelopathy appears to be an important component of plant interference capability in a variety of natural and man-made ecosystems. Allelopathy is a phenomenon where a plant species chemically interfere with the germination, growth and development of other plant species and has been known for over 2000 years. A variety of crop and weed species have been reported to possess allelopathic activity on the growth of other plant species (Rice, 1974). Compounds with allelopathic activity are present in many plants and in many plant organs including leaves, stems, fruits and buds (Mahall and Callaway, 1991; Indrajit, 1996 and Ashrafi *et al.,* 2007). Al-Charchafchi *et al.,* (2007), Md. Abdus & Noguchi (2010) suggested about the allelopathic effect of Neem (*A. Indica*) plant on many other plants especially during their germination and seedling growth. There are many other such plants which are traditionally used for their medicinal value shows some allelopathic effect also, like Basil (*Ocimum basilicum* L.) on some crops (Verma *et al.,* 2012), Eucalyptus on some seed plants (Lisanework & Michelen, 1993; Ejaz *et al.,* 2003) and many more.
Keeping the above in view, in the present work some observation were made on the allelopahic potential of some locally available plant species i.e. *Azadirachta indica* A. Juss, *Murraya koenigii* (Linn.) Spreng and *Paederia foetida* Linn. on the germination and growth of mung bean seeds, which is an economically important pulse and can be grown easily in laboratory condition. Above said plant species also have great medicinal potential and not at all harmful to human in any form.

MATERIALS AND METHODS
The study was conducted during the month of May, 2013 in the college laboratory of DHSK College, Dibrugarh, Assam.
Collection of plant material: From some preliminary survey and from the review of prior works by other workers, it was noted that leaf extract had the strongest allelopathic effect on seed germination, thus leaves were selected for the present experiment as the experimental plant part. Fresh leaves of three

medicinal plants namely *Azadirachta indica* A. Juss, *Murraya koenigii* (Linn.) Spreng and *Paederia foetida* Linn. were collected in their vegetative growth stage from the nearby agricultural fields. For the germination experiment, the seeds of mung bean were procured from commercial suppliers.

Preparation of Aqueous extracts from leaves of the donor plants: 5gms of fresh leaves were grounded separately, mixed with 50 ml distilled water, aqueous extract was obtained as filtrate. This gave 10% aqueous extract. This extract was diluted again with distilled water to get 5% and 1% aqueous extracts.

Seed germination and root growth: germination tests were performed for the aqueous extract of donor plants. Healthy and uniform sized seeds were selected and pre-soaked in distilled water for 2 hrs and then soaked in different concentration of aqueous extract for 3 hrs and control was treated as double distilled water. Seeds were eventually placed on two layer of filter paper in sterilized Petri dishes. The Petri dishes were placed in a dark place at room temperature (about 25^0c). Each treatment has three replicas and one was run as controlled with distilled water. Germination was determined by counting the number of germinated seeds at 24 hr intervals over a four day period. The lengths of the radicle of germinated seed were measured by using a slide calliper.

RESULTS AND DISCUSSION

The effect of aqueous leaf extract of three test plants on the germination and seedling growth of mung bean seeds were shown in the table 1. Significant differences in seed germination in each setup were observed. It was also seen that the control (distilled water) showed maximum germination rate among all the setups and after 72 hrs, controlled showed 100% germination. Among the leaf extracts, 10% solution showed maximum effect whereas 1% solution showed that of minimum. This result revealed that, the inhibitory effect of said leaf extract was proportional to the extract concentration and higher the concentration, higher was the inhibitory effect. This result was in corroboration with some earlier works by Bora *et al.,* (1999), Siddiqui *et al.,* (2009a, 2009b), Salam and Noguchi (2010).

During the present study, among the donor plants, highest allelopathic effect on seed germination was showed by *Murraya koenigii* with 70%, 76.7% and 90% after 72 hrs in 10%, 5% and 1% extract solution respectively. Whereas, lowest was showed by *Paederia foetida* with 76.7%, 93.3% and 96.7%. The effect of aqueous extract of the three test plants on the radicle length was also observed and measured in each case (graph1). The table showed highest radicle length in case of control (3.12 cm) and that of lowest in 10% extract solution of Neem (0.82 cm). Other solution showed results in between these two extremes. Paederia foetida showed a very little suppression of radicle growth in comparison to control. The effect of plant extract on radicle growth was studied by Lisanework and Michelson (1993) and Khan *et al.,* (2004) with eucalyptus plant, Siddique *et al.,* (2009) with *Prosopis juliflora*, Haque *et al.,* (2003) with *Acacia species* and many more. The result of the present work also supported the finding of above workers who found a significant decrease of radicle growth in many crop and garden plants.

During the study, it was observed that the allelopathic effect of the donor plants is more prominent in the observation of radicle growth. This showed that germination was less sensitive than seedling growth in mung bean. Similar conclusion was also obtained by Verma *et al*., (2012), Emeterio *et al.,* (2004), Suman *et al.,* (2002) in different other plants.

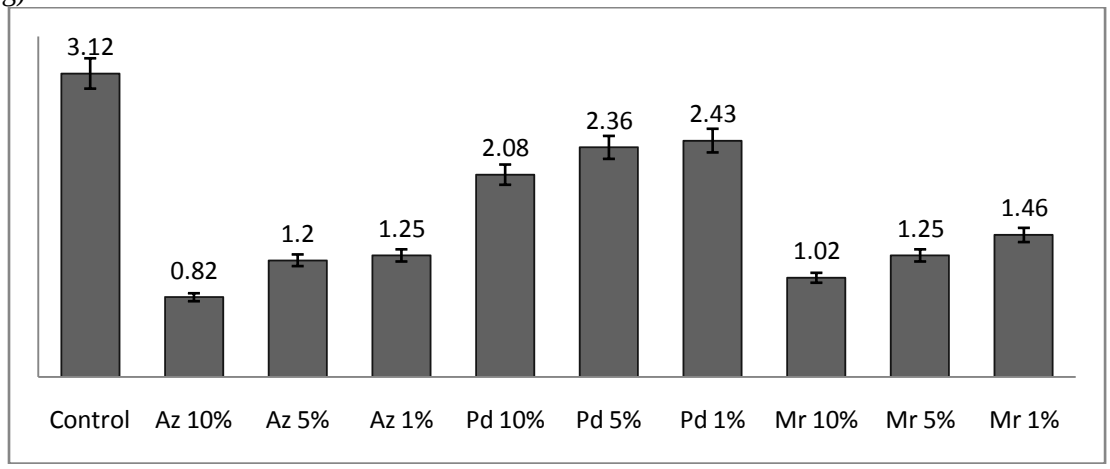
From the present study another very interesting outcome was noticed as though the plant leaf extracts inhibit the germination and seedling growth process, but it accelerated the function of root hair growth in the extract treated seeds. Control seeds did not showed any significant root hair growth during 72 hrs of experimental period, but in the leaf extract setups, majority of seeds showed profussed root hair growth and most commonly it was observed in case of *Paederia foetida*.

Therefore, the present experiment showed that the aqueous leaf extract of *Azadirachta indica* A. Juss, *Murraya koenigii* (Linn.) Spreng and *Paederia foetida* Linn. inhibited the germination and the seedling growth process in Mung bean seeds in one hand, on the other it accelerated the growth of root hairs therein.

Table1: Effect of aqueous leaf extract of test plants on the germination of Mung bean seeds

Time	Control	*Azadirachta indica*			*Paederia foetida*			*Murraya koenigii*		
	Distilled water	Az 10%	Az 5%	Az 1%	Pd 10%	Pd 5%	Pd 1%	Mr 10%	Mr 5%	Mr 1%
24 hrs	80 %	6.7%	20%	26.7%	23.3%	33.3%	36.7%	10%	26.7%	30%
48 hrs	96.7%	33.3%	50%	53.3%	43.3%	70%	80%	43.3%	50%	63.3%
72 hrs	100%	73.3%	80%	86.7%	76.7%	93.3%	96.7%	70%	76.7%	90%

(Az --- *Azadirachta indica* A. Juss, Pd --- *Paederia foetida* Linn., Mr --- *Murraya koenigii* (Linn.) Spreng)



Graph1: Effect of aqueous extract of three test plants on the 10adical length of Mung bean seeds
(Az --- *Azadirachta indica* A. Juss, Pd --- *Paederia foetida* Linn., Mr --- *Murraya koenigii* (Linn.) Spreng)

Conclusion

Our present research revealed that seed germination and seedling growth of Mung bean seed was suppressed by different concentration of leave extract of *Azadirachta indica* A. Juss, *Murraya koenigii* (Linn.) Spreng and *Paederia foetida* Linn. Among these three donor plants, Neem exhibit strong phytotoxicity and allelochemicals to suppress other plant species. This can be used as important source of natural herbicides to control weeds in crop fields. Other two plants can also be used for same purpose as they inhibit seedling growth to some extent. To identify the growth inhibitory substances from aqueous extract of donor plants it need to be worked out before they are considered for the same.

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