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Suppressive Effects of Aqueous Extracts of Neem (*Melia Azadirachta* L.) on Some Initial Growth Parameters of Cow Pea & Horse Gram

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ABSTRACT

The suppressive effects of different concentrations of aqueous leaf extracts of Neem (*azadirachta* L.) on cow pea (*Vigna unguiculata* L.) and horse gram (*Dolichos biflorus* L.) experiment was conducted in sterilized petridishes with a photoperiod of 24 hours on an average temperature. The result showed that aqueous leaf extract of *Melia azadirachta* caused significant inhibitory effect on seed germination, root and shoot elongation and fresh & dry weight of seedlings. The effect was proportional to the concentrations of the extracts and higher concentration had a stronger inhibitory effect. The study also revealed that inhibitory effect was much pronounced in shoot development than the root of cow pea. Likewise root development was greatly inhibited than the shoot of horse gram.

Keywords: *Melia azadirachta*, suppressive effect, cow pea, horse gram, aqueous extract, inhibition.

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INTRODUCTION

Neem (*Melia azadirachta* L.) belongs to the family Meliaceae, originates from the Indian subcontinent and grown in the dry regions of more than 50 tropical countries around the world. Modern science has identified hundreds of active compounds, from various parts of the plant with pesticidal, nematocidal, fungicidal, bactericidal, anti-inflammatory, anti-tumor and other properties. These have found applications in the pesticide, medical, health care and cosmetic industries all over the world. Agroforestry species remain a part of the agro-system for a longer period and often produce large amount of litter. The accumulation of such litter on the soil under agroforestry system of farming does not only mean a nutrient enrichment, but can also have negative effects on the agricultural crops due to the release of the toxic substances. These toxic substances may be released by rain or through decomposition of litter. Consequently, the release of allelochemicals into the soil inhibits seed germination and establishment of certain crops (Rice, 1979). Although much researches have been done on Neem in different aspects such as manure and soil conditioner (Ahmed and Grainage, 1986); genetic improvement and uses (Nehra *et al.*, 1987) but few researches have been done on the allelopathic aspect of Neem (Alam, 1990; Joshi and Prakash, 1992).

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So the purpose of the present study was to elucidate the allelopathic potential of different concentration of *Melia azadirachta* leaf extracts on cow pea and horse gram. Cow pea (*Vigna unguiculata* L.), is an annual legume and commonly referred to as southern pea. It is cultivated over more than nine million hectares in all the tropical area of the world (Guigaz, 2002). It is a source of relatively low cost, high quality protein which contained adequate levels of most essential amino acids for pre-school children and all essential amino acids for adults. Their digestibility is higher than the other legumes (Alessandra *et al.*, 2004). It can be used at all stages of growth as a vegetable crop. It is also used as a green manure crop, a nitrogen fixing crop, or for erosion control. Horse gram (*Dolichos biflorus* L.), is an annual legume and commonly referred to as Kollu. It is cultivated widely throughout the world. The seeds as well as the vegetative parts are rich in vitamins. In traditional Siddha medicine, horse gram is considered as food with medicinal qualities. It is prescribed for persons suffering from jaundice or water retention, and as part of a weight loss diet. It is considered helpful for iron deficiencies, and is considered helpful for maintaining body temperature in the winter season. In the present investigation an effort was made to study the effect of different concentration of aqueous extracts of Neem (*Melia azadirachta* L.) leaves on seed germination, root & shoot length and fresh & dry weight of cow pea (*Vigna unguiculata*) and horse gram (*Dolichos biflorus*).

MATERIALS AND METHODS

The Neem (*Melia azadirachta* L.) was considered as the donor plant and the receptor plants were cow pea (*Vigna unguiculata* L.) and horse gram (*Dolichos biflorus* L.). The aqueous extracts were prepared from fresh leaves of Neem plant. 100 grams of fresh leaves were soaked in 100ml of distilled water and kept at room temperature. After 24 hours, the aqueous extract was filtered through the sieve. The filtrate was designated as stock solution of 100% concentration. From this stock solution, other concentrations such as 5%, 10%, and 25% were prepared by diluting it with distilled water and the control contained only distilled water. The data were recorded on seed germination percentage, root length (cm), shoot length (cm), fresh weight (mg) and dry weight (mg) of test plants.

Germination

The germination test was carried out in sterile petridishes of 12cm in size placing a Whatman No.3 filter paper on petridishes. The extract of each concentration was added to each petridish of respective treatment daily in such an amount just to allow the seed getting the favourable moisture for germination and growth. 10 seeds of test plants were placed in petridish replicating three times. The experiment extended over a period of 7 days to allow the last seed germinated. The seed was considered as germinated when the radical emerged and the germination was recorded daily. The results were determined by counting the number of seeds germinated.

$$\text{Germination percentage} = \frac{\text{Number of seeds germinated} \times 100}{\text{Total number of seeds sown}}$$

Seedling Growth

The root and shoot length were taken from the 3rd day to seventh day after sowing for each treatment. The root & shoot length were measured randomly by selecting 5 seedlings from all the treatment. The average value was recorded in cm/plant.

Fresh and Dry weight

Five seedlings were selected randomly from the control as well as the experimental set up. They were weighted with the help of a balance. The average value for each treatment was recorded as mg/plant. The seedlings were then kept in hot air oven at 80° C for 24 hours to obtain a constant weight. The dry weight was calculated as mg/plant.

RESULTS AND DISCUSSION

The effect of aqueous extracts of Neem (*Melia azadirachta*) on germination percentage of test plants was depicted in Table-1. Neem aqueous extract slightly inhibited seed germination of cow pea (90, 70 and 60%) over control, whereas very little or no significant effect on germination of horse gram. These results are in accordance with other studies that reported that allelopathy may vary among plant (Chon and Kim, 2002). Root and Shoot elongation of test plants seedlings was more adversely affected than seed germination due to the allelochemicals Table-2. *Melia azadirachta* aqueous extracts significantly inhibited the root and shoot elongation of test plants. Root elongation of horse gram was reduced about 3.7cm by Neem extracts respectively. Root elongation of cow pea was more adversely affected about 3.4cm than horse gram due to the allelochemicals. The aqueous extracts exhibited highest inhibition of shoot elongation (3.2cm) in cow pea. About 3.6cm reduction in horse gram by Neem aqueous extract was recorded. Shoot elongation in cow pea was more adversely affected by the aqueous extracts as compared to horse gram seedlings. Pandya (1975) reported that the effect of *Cyperus rotundus* leaf extract on seedling growth of both shoots and roots of wheat were found. Their results indicate that root growth may have been affected more than shoot because roots were in continuous contact with the extracts. The effect of *Melia azadirachta* aqueous extracts on fresh and dry weight of the test plants showed in Table-1. The extract concentrations of 5%, 10% and 25% decreases both fresh and dry weight of given seedlings. Significant effect was noted in both the seedlings at all concentrations. The interaction showed direct relationship between concentration and decrease in fresh and dry weight. This indicates that the given seedlings affected by *Melia azadirachta* aqueous extracts can tolerate stress upto some extents, but as concentration increases, significant reduction in fresh & dry weight. Similar results were obtained by Yang *et al.*, (2002) after treatment of rice plant with three allelopathic phenolics.

Table 1: Effect of different concentrations of *Melia azadirachta* L. aqueous extracts on germination percentage, fresh & dry weight of cow pea and horse gram

Treatment	Germination percentage		Fresh weight(mg)		Dry weight(mg)	
	Cow pea	Horse gram	Cow pea	Horse gram	Cow pea	Horse gram
Control	90	100	340	170	70	30
5%	90	100	320	160	50	25
10%	70	90	250	150	40	20
25%	60	70	170	110	30	10

Table 2: Effect of different concentration of *Melia azadirachta* L. aqueous extracts on root and shoot length of cow pea and horse gram.

Treatment	Cow pea		Horse gram	
	Root length cm/ plant (Mean ± SD)	Shoot length cm/ plant (Mean ± SD)	Root length cm/ plant (Mean ± SD)	Shoot length cm/ plant (Mean ± SD)
Control	3.2±1.21	2.6± 0.8	5.1 ± 1.44	6.7 ± 0.93
	4.04 ±1.19	3.4± 0.85	5.2 ± 1.22	6.9 ± 0.77
	5.0 ±1.20	4.2± 0.81	5.5 ± 1.16	7.2 ± 0.79
	5.9±1.51	4.9± 0.78	5.6 ± 1.09	7.6 ± 0.87
	6.5±1.70	5.6± 0.82	6.4 ± 1.83	8.0 ± 1.10
5%	2.6±0.92	1.9± 0.55	2.1 ± 0.85	3.8 ± 0.53
	3.1±1.05	2.4± 0.61	2.2 ± 0.79	4.1 ± 0.49
	3.9±1.03	2.9± 0.63	2.7 ± 0.81	4.6 ± 0.20
	4.4±1.04	3.6± 0.74	2.9 ± 0.87	4.8 ± 0.18
	5.0±1.09	4.3± 0.82	3.2 ± 0.97	5.2 ± 0.28
10%	2.0±0.56	1.5± 0.29	2.3 ± 0.54	3.2 ± 0.58
	2.4±0.49	2.0± 0.39	2.6 ± 0.76	3.3 ± 0.52
	2.9±0.64	2.5± 0.45	2.8 ± 0.79	3.5 ± 0.45
	3.5±0.72	3.1± 0.50	3.3 ± 0.75	4.8 ± 0.18
	4.0±0.66	3.6± 0.52	3.7 ± 0.76	5.2 ± 0.28
25%	1.8±0.31	1.3±0.24	2.3 ± 0.80	2.8 ± 0.28
	2.1±0.33	1.7±0.33	2.7 ± 0.83	3.0 ± 0.31
	2.5±0.37	2.1±0.39	3.0 ± 0.83	3.3 ± 0.36
	3.0±0.40	2.6±0.44	3.2 ± 0.88	3.4 ± 0.34
	3.4±0.40	3.2±0.12	3.7 ± 0.80	3.6 ± 0.27

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