



Allelopathic Effect of Leaves Extract of *Cyperus rotundus* L. weed on Seed Germination and Seedling growth in Alfalfa (*Medicago sativa* L.)

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ABSTRACT

Allelopathy means the direct influence from a chemical released from one plant on the development and growth of another. Allelopathic substances, if present in crop varieties, may reduce the need for weed management, particularly herbicide use. Present study was conducted to evaluate the allelopathic effect of aqueous leaf extract of *Cyperus rotundus* L. on seed germination, root, and shoot length and vigour index growth of commonly cultivated fodder such as Alfalfa. The data indicated that aqueous extracts of leaves of *Cyperus rotundus* L. greatly inhibited the seed germination and vigour index and radicle growth of Alfalfa. The inhibitory effect was studied at 5%, 10%, 15%, 20% of aqueous solution and distilled water (control). The results showed that the leaf extracts of *Cyperus rotundus* L. showed negative allelopathic activity due to the presence of several phytochemicals, by inhibiting the plant growth parameters.

Keywords: Allelopathy, Weed, seed germination, Alfalfa.

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INTRODUCTION

Allelopathic compounds may be released into the environment from plants by means of root exudation, leaching, volatilization and decomposition of plant residues in the soil. Allelopathic substances, if present in crop varieties, may reduce the need for weed management, particularly herbicide use [1, 2]. Allelopathy alone may not be a perfect weed management technology but it may be a supplementary tool for weed control. It is extremely difficult to demonstrate allelopathy in nature because of the complexity of plant interference which includes positive, negative and neutral effects on each other [10]. The allelochemicals are mostly secondary metabolites and by product of primary metabolic processes. These chemical inhibit root growth, shoot growth, fresh weight dry weight uptake of photosynthesis etc. [5]. The production of allelochemicals is widely influenced by genetics as well as environmental factors at different growth stages. *Cyperus rotundus* L. is the world's worst noxious weed of agricultural fields of different economically important crops which is native to India. Its rapid growth tendency and extensive underground rhizome or tuber system makes it extremely difficult to control. Although this weed also produces seeds but it mostly spreads by tubers [12]. Alfalfa is a common sight in many temperate grassland of the world. Alfalfa belong to pea family (Fabaceae). Alfalfa is often grown in fields by farmers for pasturage and forage. With respects to the nutritional properties and information of Alfalfa plant is rich in calcium, sodium, potassium, carotene, zinc, iron and vitamins such as A, C, B₁, B₆, E and K as well as proteins. It is extensively cultivated in Maharashtra as a fodder crop and also having a medicinal value. [8].

MATERIAL AND METHODS

The healthy plants of *Cyperus rotundus* L. were collected from agriculture fields near by college campus. The collected plant were separated in the form of shoot and rhizome. This plant washed with tap water remove the soil, dirt material and dry with blotting paper and air dried in shade for a week in a laboratory. The prepare powder with the help of mixer grinder and then sieved by mesh. The powder of the weed part is separately packed in polythene bags and store at room temperature, before used for

experiment to prevent it from moisture and contamination [3]. The shade dried plant parts were finely powdered with mixer and placed in polythene bags. The aqueous extracts (w/v) were prepared by extracting 10g of powder with 100ml distilled water for 24 hours. It was filtered through muslin cloth and filtrate wash and collected extract by again filtered through whatman paper and filtrate wash [9]. The collected extract makes a final volume 100ml this filtrate used as a stock solution. This water soluble filtrate of each plant parts was used as *Cyperus rotundus* L. plant extract viz; leaves extract of different concentration[6].

The seeds of Alfalfa (*Medicago sativa* L.) were obtained from wild variety near by the local area. The seeds were surface sterilized with 0.1% HgCl₂ for 2 minute and repeatedly washed with distilled water and blotted dry. The seeds of *Medicago sativa* L. then these seeds were soaked for overnight in different concentration of 5%, 10%, 15%, 20% of this respective plant extract (viz; rhizome) and seeds were soaked only in distilled water as control. The seeds were allowed to germinate in germination paper [7]. The sets were arranged that each germination paper. The germination paper is soaked in fungicide. Then contained 50 seeds per papers respectively in three replication. These samples were placed in Laboratory at a temperature of 25°C the seed germination was counted after first count in 4 days and second count 10 days. To study the effect of plant part leaves extract on germination and early seedling growth in Alfalfa, between paper methods was used (ISTA Rules, 1966). The experiment was conducted in triplicates and the result were averaged in order to get better results. Distilled water treated set was considered as control.

RESULT AND DISCUSSION

Effect of different concentration of *Cyperus rotundus* L. leaves extract on shootlength and root length of the Alfalfa seedling are presented in Table 1.a) The result showed that, the 5% concentration showed the root length 5.85 cm and 20% concentration showed 5.45 cm as compared to control (6.48cm). It means that the different concentration (5, 10, 15 and 20%) of leaves extract greatly affected the shoot length that is increase the concentrations of leaves extracts decreases the shoot length of Alfalfa.

Table no.1a) Allelopathic Effect of *Cyperus rotundus* L. leaves Extract on Root, Shootlength of *Medicago sativa* L.

ExtractConc.	Rootlength(cm)	Shoot length(cm)	Total
Control	6.53	6.48	13.01
5%	5.85	5.25	11.1
10%	5.74	5.43	11.17
15%	5.53	5.38	10.91
20%	5.45	5.44	10.89

The treatment of leaves extract at concentration of 5%, 10%, 15%, and 20% was significantly decreased the root length and shoot length as compared to control. The result of this experiment reveals that treatment with *Cyperus rotundus* L. leaves extract significantly reduced the shoot and root length of Alfalfa seedlings value. Graph (1b) also shows that the root length and shoot length in concentration were decreases as compared with control. These results are similar to the finding of Dadar *et.al.*, [4], that found the shoot extract of *Cyperus rotundus* L. were inhibitory to the seed germination and seedling length of tomato. In another study Zoheir *et.al.*, [12] that aqueous extracts of *Cyperus rotundus* L. and *Echinochloa crus-galli* greatly inhibited the seed germination and plumule and radicle growth of Barley.

Table no. 2a) Allelopathic Effect of *Cyperus rotundus* L. leaves extract on germination percentage of *Medicago sativa* L.

Extract Concentration	Germination percentage
Control	90.66%
5%	82.66%
10%	79.33%
15%	74.33%
20%	70.33%

Result from Table 2 a. reveals that, percent seed germination in Alfalfa seeds shows different results with various concentrations. There is decreased in percent seed germination 82.66% and 70.33% was

observed in 5% and 20% concentration of leaves extract of *Cyperus rotundus* L. as compared to control (90.66%). It means that increase the concentration of leaves extract decrease the percent seed germination of Alfalfa. In present investigation the percent seed germination in concentration is decrease as compared with control. Verma *et.al.*, [11] reported that the seed germination (%) was decreased in all the varieties of soybean with *S. nigrum*, and it was in four in both *C. dactylon* and *P. hystrophorus*, and three in *A. conyzoides*.

Table no. 3a) Allelopathic Effect of *Cyperus rotundus* L. leaves Extract on vigour index in *Medicago sativa* L.

Extract Concentration	Vigour index
Control	1179.48
5%	917.52
10%	886.11
15%	810.94
20%	765.89

Result revealed that from Table (3a) shows decrease in seed vigour index as compared to control. The extracts not only decreased the shoot and root length of *Medicago sativa* L. seedlings but also reduced the seed vigour index. The seed vigour index was best criteria to study the seed germination and early seedling growth. The different concentration (5, 10, 15 and 20%) of leaves extract with decreased the seed vigour index as compared to the control. The 5% concentration observed the seed vigour index 917.52 and 20% concentration showed seed vigour index with 765.89 as compared to control showed 1179.48. The concentration increased with the seed vigour index decreased. The leaves extract of the *Cyperus rotundus* L. is inhibited the vigour index of Alfalfa seed (*Medicago sativa* L.) In present investigation the seedling vigour index in various concentration was decreases as compared with control (Graph 3b).

CONCLUSION

The present investigation showed that the allelopathic effect of aqueous leaves extract concentration increases then the rate of germination as well as seedling growth of alfalfa decreases. The effect of various concentration of aqueous leaves extract of *Cyperus rotundus* L. at higher concentration has more conspicuous inhibitory effect on germination and seedling growth of alfalfa compared with control. There is a high need to carry out such type of studies to test the efficacy of these weed extracts under field conditions. Therefore, the cited weeds must be taken into better care and should be avoided in seed bed for growing Alfalfa seedlings. Furthermore, the allelochemicals responsible for germination and growth reduction of different crops should be isolated and identified.

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