# Allelopathic effect of *Calotropis gigantea* on seed germination and seedling vigour of *Triticum aestivum* variety GW- 273.

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## Abstract

***Calotropis gigantea* weed belongs to *Asclepiadaceae* family,is a shrub growing on the wasteland and along the boundaries of wheat fields .It is world widely distributed but mostly abundant in tropical and sub-tropical countries .It contains the (alkaloids,falvanoids,glycosides ,uscharins) the present study is to evolving the allelopathic interaction of *Calotropis gigantea* on wheat (GW-273) seed germination and seedling vigor. The wheat (GW-273) variety is obtained from wheat research station Gujarat agricultural university vijapur and is mainly cultivated in central zone (M.P). The whole aerial plant part of *calotropis gigantea* were collected ,washed ,dried ,crushed and diluted, different concentration of extraction were prepared ,the extraction effected on the seed germination and seedling vigour of the wheat.**

**Key words***: Calotropis gigantea extract, wheat, allelopathic interaction*

## Introduction

Allelopathy produces marked impacts in diverse terrestrial and aquatic ecosystems including influences on plant succession and patterning, inhibition of nitrogen fixation and nitrification, and inhibition of seed germination and decay. Existence of weeds in crop fields causes chemical competition which is referred as allelopathy. Allelopathic plants release allelochemicals which are secondary plant metabolites which affect the nearby plants .due to the action of allelochemicals a large number of physiological functions and biochemical reactions are affected such as seed germination cell division cell elongation membrane permeability and ion uptake (orteage et al.,1988 tomita-yokotanie et al; 2005 setia et al.,2007).

Intensive scientific research on the effect of weeds on crops, crops on weeds, crops on crops has only occurred over past few decades. Several researchers have studied the impact of allelochemicals on different plants in crop and agroforestry systems, such as Fenten and Habtemariam (1989), Narwal *et al*; (1994),Oudhia,Tripathi and sharma (1996), Rawat *et al*; 1998, Rizivi *et al*; (1999)

the *calotropis gigantea* is a perennial shrub belonging to the *ascelpiadeaceae* family found cheafly in wastelands throughout the India , in comparatively drier and warmer areas ,up to an altitude of 1050 meters .It is called Ruvi in maratie and madar in Hindi flowers are regular ,bisexual, arranged in simple or rarely compound cymose. It contains glycosides, alkaloids, calotropin. Allelopathic effects of *Calotropis gigantea* on different agricultural crops have not been well studied. Extracts of different plant parts viz. root, stem, leaf, and stem and leaf of *Calatropis gigantea* affect germination and seedling vigor of many agricultural crops have been reported (Oudhia and Tripathi 1997, 1999; Oudhia et al. 1997, 1998a, b).

The wheat variety Gw-273 is recommended for the agricultural ecology of central zone (M.P) it is a certified variety and is resistant to the leaf and stem rust which are major diseases in the central zone .it produced good yield within a short growing season of about 113 days.

**Materials and methods**

Aerial part of calotropis gigantea were collected from the nearby locality areas of the wheat fields, washed with tap water then it is cutted in to small pieces these pieces were dried in to the hot air oven at 80°c for about 24 hours .After this these dried pieces were crushed with the help of motor and pistil till a powder form is formed. This powder were put in to the beaker and add distilled water to it, lay as it in water bath for about 72 hours at a constant temperature 25°c so that chemicals will come out in to distilled water and an extract will be formed. The extract were filtered through what man's filter paper no.1,serial dilutions were prepared in the ratio of 1:10,1:20,1:30,1:40 w/v(1 one gram powder of calotropis plant in 10 ml of double distilled water others of 1 in 20ml,1in 30 and 1in 40 ml of double distilled water respectively) selected number of seeds of wheat (GW-273) were surface sterilized with 1% mercuric chloride then these seeds were washed with double distilled water for atleast3-5 times so that no chemical will remain on the seeds, these seeds were put for soaking for about 24 hours in D.wated ,after it 10 no. of selected seeds were kept on the filter paper which is rinsed with the extracted dilutions in the Petri plate (five Petri plates were taken in each Petri plate different concentrated dilutions were put such as 1:10,1:20,1:30,1:40 w/v respectively ) each petri plate has three replicate ,after fifteen day the plant seedlings were taken and there fresh weight were calculated, there root shoot lengths were measured, all root and shoot were cut and oven dried at 70°c for 48 h to get

dry weight of root and shoot, total seedling biomass was calculated as the biomass of root and shoot.

**Results and discussion**

Allelopathic activity of *calotropis gigantea* was confirmed on wheat variety GW- 273. The seed germination and growth were effected and results are given in the following table. The present study reports about 100% inhibition of seed germination of wheat seeds and was recorded at 1:10, 1:20 w/v water extract concentrations of the plant *Calotropis gigantea* and minimum at the 1:40 which is 23.41%. The weed plant Calotropis gigantea showed stimulatory effects towards the lower concentration extracts (1:40) by which the length of shoot and number of the of secondary adventitious roots considerably were higher when compared with that of the control replicates.but the root length of the controlled were more than that of treated ones (1:40) Also the fresh shoot weight in treatment concentration (1:40) was high than that of the control replicates similar type of research work has been done in the past by Oudia (1998, 1999) in which he found that *Calotropis gigantea* leaf extracts produced comparable germination with control at 3 days, after 5 days 71% of germination was witnessed in control and 0 % in *calotropis gigantea* leaf extract. In experiments conducted at IGAU, Raipur, Calotropis stem extract of 264 hours and leaf extract of 216 hours was identified as promising extracts whereas stem extract of 216 hours was identified as most harmful extract (Oudhia et al., 1997e).

| S.no | treatm. calotropis water (w/v) | Statistical parameters. | Mean germination* Days after sowing (DAS) | | | | | | | Germ %age | Dead & black seed %age. | Seed survival %age after 15 days |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3 | 5 | 7 | 8 | 10 | 12 | 15 | | | |
| 1. | T□(control) | $\bar{X}$ | 5.00 | 7.34 | 7.66 | 7.66 | 9.00 | 9.33 | 9.33 | 93.29 | | 93.29 |
| | | SD | ±2.16 | ±1.24 | ±0.93 | ±0.93 | ±0.81 | ±0.47 | ±0.47 | | | |
| | | SER | ±1.24 | ±0.71 | ±0.54 | ±0.54 | ±0.47 | ±0.27 | ±0.27 | | | |
| 2. | T□(1:10) | $\bar{X}$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | SD | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| | | SER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 3. | T□(1:20) | $\bar{X}$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | SD | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| | | SER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| 4. | T□(1:30) | $\bar{X}$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 1.00 | 9.99 | 3.33 | 6.66 |
| | | SD | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | ±0.47 | ±0.81 | | | |
| | | SER | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | ±0.27 | ±0.47 | | | |
| 5. | T□(1:40) | $\bar{X}$ | 1.00 | 5.33 | 5.66 | 6.66 | 6.66 | 7.33 | 7.66 | 76.59 | 10.00 | 66.59 |
| | | SD | ±0.81 | ±0.46 | ±0.46 | ±0.33 | ±0.33 | 0.46 | ±0.47 | | | |
| | | SER | ±0.47 | ±0.27 | ±0.27 | ±0.19 | ±0.19 | 0.26 | ±0.27 | | | |

Table 1.1 depicting Mean values ($\bar{X}$), standard deviation (SD), and standard error (SER).

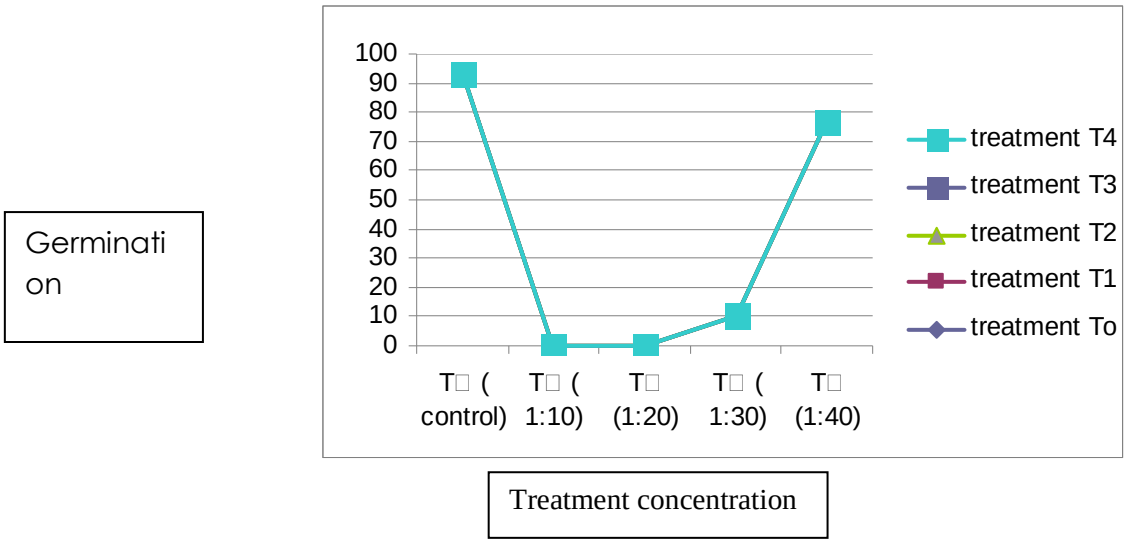


Figure 1.1 showing germination percentage verses treatment concentration.

## Conclusion

The allelochemicals present in *calotropis gigantea* showed the degree or percentage of inhibition with which the seedlings got affected so this is a matter of concern and steps have to taken like evacuation of weeds before sowing the seeds in the cultivating fields. The weed plant

*Calotropis gigantea* should not be grown near the cultivating fields because the allelochemicals may be leached out by the roots and falling of aerial parts of the plant which inturn will cause serious loses to the growers and crop specie.

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