

**ALLELOPATHIC EFFECTS OF AQUEOUS EXTRACT OF *CHROZOPHORA TINCTORIA* A. JUSS. ON SEED GERMINATION IN *CICER ARIETINUM* L.**Kumbhar B. A.<sup>1</sup> and Dabgar Y. B.<sup>2</sup><sup>1</sup>Lecturer, Dept. of Biotechnology, Sheth M.N. Science College, Patan (Gujarat) India.<sup>2</sup>Principal, R.R. Mehta College of Science and C.L. Parikh College of Commerce, Palanpur (Gujarat) India.  
bharat\_bot@yahoo.co.in**ABSTRACT**

Allelopathic effects of extract of stem, root, leaf and inflorescence of *Chrozophora tinctoria* A. Juss. very strong allelopathic properties was studied on *Cicer arietinum* L. (Chana) during seed germination. Aqueous extract of the stem of *Chrozophora tinctoria* A. Juss. was showing most inhibitory, only 2.75cm root length reported at 6% concentration in *Cicer arietinum* L. as compared to the control (7.26cm) after 10<sup>th</sup> days, followed by those of the inflorescence, leaf and root. Only 0.0cm shoot length showing at 6% concentration in inflorescence aqueous extract of *Chrozophora tinctoria* A. Juss. After 5<sup>th</sup> day, 10<sup>th</sup> day and 15<sup>th</sup> days followed by those of the stem, leaf and root. The present work was carried out to evaluate the allelopathic effect of weed on seed germination in *Cicer arietinum* L.

**Key words:**-Allelopathic, *Chrozophora tinctoria* A. Juss., Weed, *Cicer arietinum* L.

**INTRODUCTION**

Allelopathy is defined as the direct or indirect, harmful or beneficial effects of one plant part on another through the production of chemical compounds that escape into the environment (Rice, 1984). Allelopathic chemical may present in any part of the plant. They can be found in leaves, stem, root, flowers and fruits. They can also be found in surrounding soil. These substances are called allelochemicals. The allelochemicals inhibited the growth of some species at certain concentration, might stimulate the growth of same or different species at lower concentration (Oudhia and Tripathi, 1998, 1999). Even reduction in photosynthetic rate due to reduced leaf may also lead to reduction in root length and shoot length (Meissner *et al.*, 1979). The effect of aqueous extracts of various parts of the *Chrozophora tinctoria* A. Juss. has been studied on the root length and shoot length of *Cicer arietinum* L. *Chrozophora tinctoria* A. Juss. included in Euphorbiaceae family. It is an annual, prostrate herb, entire plant densely clothed with stellate hairs.

**MATERIALS AND METHODS**

Aqueous extracts of the inflorescence, leaf, stem and root were prepared by digesting 10 gm of air dried plant material in 100 ml of distilled

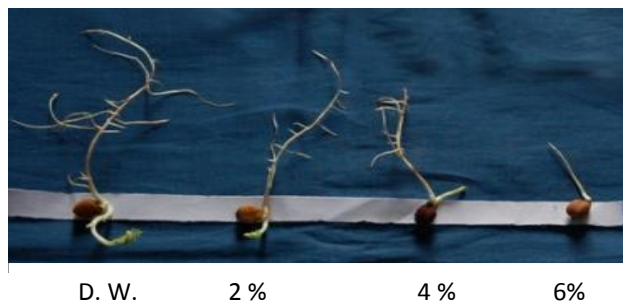
water (D.W.) for 24 h at 25°C±3°C. It was filtered through Whatmann filter paper no. 1 of the volume of the filtrate made to 100ml (Dhawan and Narwal, 1994). Different dilutions such as 2%, 4% and 6% of the extract were prepared from this stock solution. Glass petridish (9.0 X 1.5 cm) were used to study the allelopathic effect of aqueous extract and distilled water as a control on the germination and seedling growth in the form of root length and shoot length.

The seeds of *Cicer arietinum* L. (Gujarat-4) were sterilized by dipping in the solution of 0.1% HgCl<sub>2</sub> (Mercury chloride) for 1 min followed by 3-4 washing under running tap water to remove residues of HgCl<sub>2</sub> and dried in folds of ordinary filter papers in each Petridish containing Whatmann no. 1 filter paper was kept at the bottom and there after 10 seeds arranged at equal distance on the top of the filter paper. The Petridishes were covered with glass covering. The whole set of experiment was kept undisturbed at room temperature of 25°C± 5°C. Treatments were arranged in a completely randomized design with four replications.

**RESULTS**

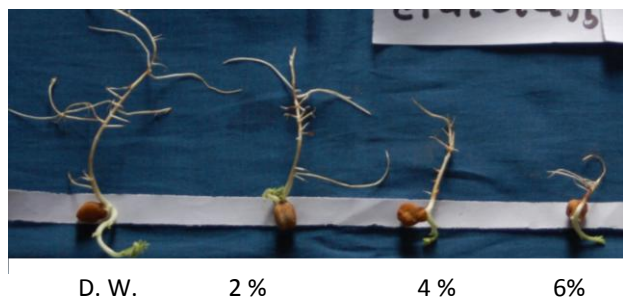
Effects of different concentrations of *Chrozophora tinctoria* A. Juss. extracts on shoot and root length were studied in *Cicer arietinum* L.

In *Cicer arietinum* L. 6.19cm root length was reported in control medium while in 2%, 4% and 6% concentration of root extracts of *Chrozophora tinctoria* A. Juss. the root lengths were 6.03cm, 5.92cm and 4.53cm respectively after 5 days. 1.12cm shoot length was reported in control medium while shoot length was not reported in 2%



**Plate 1: Effect of DW and aqueous Root extract on seedling growth in *Cicer arietinum* L.**

The stem and leaf extracts of the weed of *Chrozophora tinctoria* A. Juss. have profound effects on the seed germination of the *Cicer arietinum* L. Using a concentration of the 2% of the stem and leaf extract an enhancement in the shoot



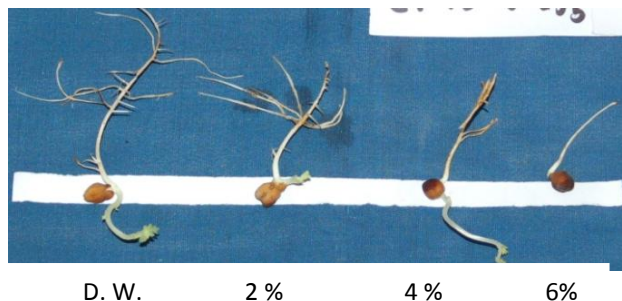
**Plate 3: Effect of DW and aqueous leaf extracts on seedling growth in *Cicer arietinum* L.**

A similar trend was noticed on the usage of the inflorescence extract of this weed. Decreases in the concentration of the extract have significant effect on the seedling growth to control. But an increase in the concentration of the extract to 4% and 6% a gradual reduction in the growth was resulted on the 5<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days (Table-1, Plate-4).

#### DISCUSSION

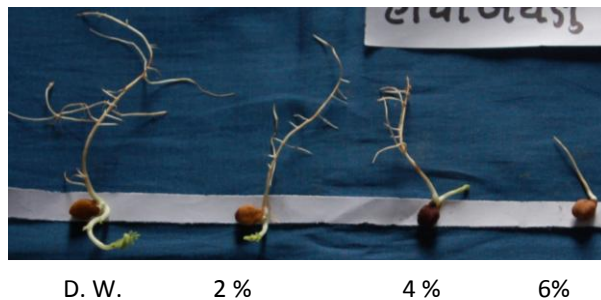
Extracts from fresh *Chrozophora tinctoria* A. Juss. plant root, stem, leaf and inflorescence extracts showed inhibitory effects on seed germination. The

and 6% respectively, while only 1.00cm shoot length was reported in 4% root extract after 5 days. It concludes that when the increasing concentration of weed extracts the shoot and root lengths were decreases. Similar results were observed after 10<sup>th</sup> and 15<sup>th</sup> days (Table-1, Plate-1).



**Plate 2: Effect of DW and aqueous stem Extract on seedling growth in *Cicer arietinum* L.**

and root lengths were noticed on the 5<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days. On increasing the concentration of the extract to 4% and 6%, a gradual reduction in the root and shoot lengths were noticed (Table-1, Plate-2, 3).



**Plate 4: Effect of DW and aqueous inflorescence extracts on seedling growth in *Cicer arietinum* L.**

degree of inhibition increased with the extract concentration. At the highest extracts concentration (6%), all aqueous extracts significantly reduced, root and shoot lengths compared with control (Table-1). This finding is supported by Turk *et al.* (2003) in black mustard on growth of alfalfa and congress grass on crop plants (Dhawan, 1995).

Aqueous extract of the stem showing was most inhibitory in root length and shoot length, while aqueous extracts of inflorescence was most inhibitory on shoot length of the *Cicer arietinum* L.

The probable reason may be the presence of higher number of trichome and higher concentration of allelochemicals present on the stem of *Chrozophora tinctoria* A. Juss. as compare to root, leaf and inflorescence.

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#### LITERATURE CITED

**Dhawan SR, 1995.** Effect of aqueous extracts of congress grass on seed germination in some crop plant. *Acta Botanica Indica*, **23**:113-114.

**Dhawan SR and Narwal SS, 1994.** Critical assessment of allelopathy bioassays in India. Proc. Int Symp. *Allelopathy in sustainable agriculture, Forestry and environment*. New Delhi: Indian society of Allelopathy, IARI.

**Meissner R, Nel PC and Smith NH, 1979.** "Proc. 3<sup>rd</sup> Natl. Weed Conf." S. Africa pp. 39-52.

**Oudhia P and Tripathi RS, 1998.** Allelopathic effect of *Parthenium hysterophorus* L. on kodo, mustard and problematic weeds. In:proc. First. Int. Conference on *Parthenium management*, (Vol-2). UAS, Dharwad. P. 136-139.

**Oudhia P and Tripathi RS, 1999a.** Allelopathic effects of *Parthenium hysterophorus*, *Lantana camera*, *Blumea lucera*, *Datura stramonium* and *Ageratum conyzoides* on germination and seedling vigour of wheat and selected rabi weeds, in: Abstract II *World Congress on allelopathy. Critical Analysis and future prospects* (Ed. A.U. Mallik), Thunderbay, Ontario, Canada: lakehead University, August 1999: p. 142.

**Rice EL, 1984.** *Allelopathy*. Academic press, orlando, Florida, USA