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Mini Review

# Allelopathic Potentiality of Celosia *argentea* L Review

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**Abstract**

Weeds are a mostly unwanted unplanted redundant plant that grows in crop fields and interfere the crop sociability, cause damage to natural resources and loss in yield. Although, they are an integral component with crop and enjoy lucrative business expressing that a natural phenomenon of one plant releases substance which affect the growth of other plant sharing the same habitat called allelopathy and chemical substance known as Allelochemicals. These Allelochemicals have ability to disturb metabolic functions including photosynthesis, respiration, mineral nutrition and such others through Allelopathic mechanism. They often affect germination and growth dynamics of crop plants. Allelopathy signifies either negatively or positively, resulting in inhibitory or stimulatory potential on neighboring plants. The weed, *Celosia argentea* L is predominately interfere in crop fields of cereals and legumes therefore, plant parts such as leaves, roots and inflorescence are showing their Allelopathic effects on seed germinations physiology and metabolisms of various crop plants. In this connection, the Allelopathic effect of C argentea is not studied extensively by workers; very few records are available so attempt has made to compile the Allelopathic influence of C argentea on various crop plants in this review.

**Keywords:** Allelopathy; Allelochemicals; *Celosia argentea* L

## Introduction

Weeds are a mostly belligerent redundant plant that grows in superfluous places, upheaval the crop sociability and cause wastage of natural resources and loss in yield. Although, they were grown as an integral component with crop and enjoy lucrative business which crop receive and simultaneously release some chemical compounds. These compounds interfere with crop metabolism thereby reducing crop yield, change their sociability through embracing local weed races and become dominant. This phenomenon was termed as Allelopathy by Molisch [1], meaning "mutual harm", expressing that a natural phenomenon of one plant releases inhibitory substance which inhibits the growth of other plant sharing the same habitat. Majority of weeds hamper the growth of main crop through escaping chemical substances, that present almost in all parts of plant [2] called as Allelochemicals [3]. They often affect germination dynamics and growth of crop [4]. These Allelochemicals have ability to slow down vital metabolic functions like photosynthesis, respiration, seed germinations and mineral nutrition [5] through Allelopathic mechanism [6]. Allelopathy signifies the interaction between the plants either negatively or positively, resulting either inhibitory or stimulatory potential on neighboring plants. The weed, *Celosia argentea L* is an exotic flowering herb belonging to Amaranthaceae predominately interfere in crop field of cereals and legumes [7]. Therefore, plant parts of C. *argentea* such as leaves, roots and inflorescence showing their Allelopathic effects on seed germinations physiology and metabolisms of various crop plants [8] were studied by many researchers. The review on Allelopathic potentiality of C. *argentea* has not done earlier so attempt has made to compile literatures on the Allelopathic influence of C. *argentea* on various crop plants performed by various workers. The details are described here with in this review article.

## Morphology

C. *argentea* L (family Amaranthaceae) is an erect annual herb having 1- 3 feet height (Figure 1). The stem is erect, simple or

ascending, ridged, glabrous and branches grooved. The leaves are linear or linear lance late, alternate, simple, glabrous and innately veined, short petiole or sessile and without stipules. Inflorescence is slivery to pink in ornamental forms completely or partly sterile. Flowers are at earlier pinkish later on white, crowded, small, bisexual, regular five merous, tepal free, narrowly elliptical-oblong, 6-10mm long, stamen fused at base, ovary superior, 1- celled, style filiform up to 7mm long, stigma 2- 3,very short. Fruit is an ovoid to globose capsule 3-4mm long, seeds 4-8 subreniform, compressed.

**Figure 1:** Celosia argentea L. Plant.

## Classifications

i. Kingdom: Plantae

ii. Subkingdom: Tracheobionta

iii. Super division: Spermatophyta

iv. Class: Magnoliopsida

v. Subclass: Caryophyllidae

vi. Order: Caryophyllales

vii. Family: Amaranthaceae

viii. Genus: Celosia

ix. Species: *argentea* L.

## Allelopathic Effect of *Celosia argentea L.* on Various Crops Plants

Following are some reviews explained the effect of C. *argentea* on various crop plants. Pandya [9] demonstrated inhibition in shoot and root growth of bajra after treatment of aqueous extracts of fresh leaves, stems and roots of C. argentea. He found that root and leaf extracts were inhibitory than stem extracts. After this experiment, Ashraf & Sen [10] evaluated the Allelopathic effect of same weed against bajra. Similarly, Celosia *argentea* exerts Allelopathic influence on seed germination and seedling growth of Jowar [11]. Soni & Mohnot [12] investigated the effect of aqueous extract of C. *argentea* leaves on chlorophyll and carotenoid synthesis in seedlings of Sorghum vulgare. It was indicated that below the lowest concentration of 0.05% of the extract showed stimulation in synthesis of chlorophyll a, chlorophyll b and carotenoids, however inhibition was noticed at greater concentration. It is evident that the Allelopathic complex associated with the leaves of C. *argentea* is quite potent in inhibiting the synthesis of chlorophyll pigments.

Inamdar & Kamble [7] reported herbicides potentiality in C. *argentea* and examine the Allelopathic effects of C. *argentea* on seed germination and seedling growth of Vigna mungo. They recorded that the highest concentration of root, inflorescence and leaf extract significantly inhibited the seed germination in Vigna mungo. The maximum delay in seed germination was observed by root and leaf extract. The extracts of leaf, inflorescence and root of C. *argentea* caused adverse effects on the seedling growth of *Vigna mungo,* the decrease in root and shoot length was observed with increase in concentrations of root, inflorescence and leaf extracts. The detrimental influences were caused more by leaf extract treatments as compared to root and inflorescence extract treatment. The fresh and dry weights also decreased at higher concentration of root inflorescence and leaf extracts over control.

Saswade & Dhumal [13], had underwent investigation to find out the Allelopathic effects of the weeds, C. *argentea* on germination and early seedling growth of crop plants mungbean (Vigna radiata), chickpea (Cicer arietinum) and sorghum (Sorghum bocolar). The aqueous leaf extracts was tested against the seed germination and seedling growth of selected crops. They recorded the stimulation at low concentrations (1:4%) treatment, but higher concentrations (1:1%) were most inhibitory to test crops. The higher concentrations of extracts were co-related to both seed germination and seedling growth.

Saritha & Sreeramulu [14] conducted experiments to investigate the Allelopathic effects of different concentrations of C. *argentea* weed on seed germination and seedling growth of Sorghum *bicolor, Phaseolous aureus, Arachis hypogaea, Dolichos lab* and *Vigna unguiculata*. They noticed decreased the percentage seed germination and seedling growth of crop plant with concentration of leaf extracts. They concluded that the reduction of germination percentage may be due to the presence of Allelochemicals contain hyaluronic acid, celosianin, betanin and isocelosianin.

Saritha [15] studied sociability of C. *argentea* to understand Allelopathic influence on surrounding crop plant seed germination & on microorganisms.

Shagufta et al. [16] were identified 12 compounds through HPLC as 4-hydroxycinnamic acid (p-coumaric acid), 4-hydroxybenzoic acid, protocatechuic acid, caffeic acid, m-coumaric acid, gallic acid, 4-hydroxybenzaldehyde, m-hydroxybenzaldehyde, 2,4-dihydroxybenzoic acid, pyrogallol, 3,5-dihydroxybenzoic acid,

and genetic acid. The mass confirmation of identified compounds was achieved by LC-MS. Similarly, the physiochemical analysis of C. *argentea* aqueous extract showed the presence of various constituents such as phenols, flavonoids, tannins, and glycosides. They have proved as C. *argentea* may effective as a substitute of herbicides to control the weeds like Lepidium sativum and to protect the environment from the health hazard effects of herbicides.

Patil & Khade [17], tested photosynthetic pigments of *Vigna aconitifolia* L and *Trigonella foenum graecum* L. after treatment of *Celosia argentea L.* leaf extract. This study indicated that the higher concentration of leaf extract of *Celosia argentea L.* i.e. 20% was more inhibitory than control. An increased concentration of extract decreased the photosynthetic pigments in *Vigna aconitifolia* L. and *Trigonella foenum graecum* L. The C. *argentea* L. shows Allelopathic effect on photosynthetic pigment.

Patil & Khade [18] have scrutinized for Allelopathic potentiality C. *argentea* against carbohydrate content of guar. They reported that the 5% inflorescence and root leachates of C. *argentea* showed slightly increased total sugar in guar. All other treatments ranging from 20 to 80% aqueous leachates of inflorescence and root act detrimentally. The all treatments of aqueous leachates caused detrimental effect on carbohydrate contents indicated that Allelochemicals are present in plant parts of C. argentea. The same authors [19] were also found positive correlation between the aqueous leachate and activity of alpha amylase. The activity of amylase was increased in germinating seeds of guar after treatment of aqueous leachates of all plant parts. The activity of alpha-amylase was more pronounced in leaf leachate treated seedlings as compared to other leachate treatments. It indicated that Allelochemicals are more in leaf than other plant parts.

Kengar & Patil [8], scrutinized Allelopathic potentiality against lentil (*Lens culanaris Medic.*). They reported positively correlation between the aqueous leachate and activity of α-amylase. The activity of enzyme amylase was increased in germinating seeds of lentil after treatment of aqueous leachates of C. *argentea* L. plant parts. The treatment of 40 to 80% aqueous leachate of inflorescence, leaf and root were recorded doubled α-amylase activity as compared to control in germinating seeds. The activity of α-amylase was more pronounced in leaf leachate treated seedlings as compared to other leachate treatments.

## Conclusion

Many agriculture researchers have agreed that Allelopathic potentials are present in the weed plant, C. *argentea* L. Many researchers have depicted its influence on metabolism of various crop plants. The impact of this review will highly positive and it will make possible to analyze Allelopathic potentiality of C. *argentea* L against different crops from field. This study opens new area for further quantifications of Allelochemicals their within and other weeds also.

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