

## Management of *Celosia argentea* L. in Non-cropped Lands in Alfisols

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**ABSTRACT:** Weed control is an activity proved to be labour intensive than any other activity in crop production. Weed composition and management is solely dependant on the persistence of weeds in soil. *Celosia argentea* (L.) is one of the most persistent weeds with faulty management. By applying different management techniques before they come to flowering, it is possible to control it since it is a seed propagated weed. Hence, an experiment was conducted by using the implements like Garden sword and hedge cutter to cut them back before they come to flowering. However, the growth pattern and reproductive stages were observed in order to assess the effectiveness of the management practice. Regrowth was observed with 2-3 days after cutting back irrespective of the height at which they were cut. All plants have come to flowering at the same time indicating its season bound nature. Further, all the inflorescences put on by the plant after the cut back were small (5 cm in length) and did not produce any seed. This practice may be practically feasible in non-cropped lands since it not only helps in controlling the seed production but also adds green matter to the soil. In due course of time, the weed seeds deposition gets reduced leading to less weed number and improved soil fertility.

**Key words:** Non-cropped lands, Regeneration, *Celosia argentea* (L.)

Prudent weed management is an important economic proposition for farm management. Farm manager has to take an important decision of proceeding with the varied approaches like chemical and non-chemical, cultural and mechanical. Because of the germination delaying factors as the dormancy-non-dormancy continuum (Baskin and Baskin, 1985), seeds of annual species can persist in soil for years, resulting in a reservoir of viable seeds of various ages from which future generations develop. Mostly the weed problem faced by the farm managers might be due to the continuous negligence of weeds in non-cropped areas, which increase the weed seed bank in the soil of cropped areas. The persistence of weed seeds in the non-cropped areas would cause infestation of croplands due to mismanagement through the implements (Hoffman et al. 1998). As per Zimdahl (1980),

weed species present in a disturbed (cropped) community are a secondary effect of weed management. Intensive cropping systems give rise to weed communities that are products of not only the cropping pattern and weed management system but also the result of faulty management of non-cropped lands as well. Hence, the understanding of weed ecology and weed biology and agronomic practices to manipulate these factors to obtain better weed management and more crop productivity is essential. *Celosia argentea* L. is considered one among such weeds. If mismanaged, it leads to an enormous problem due to its persistence, as it is a prolific seed producer. One of the weed management strategies is to control these weeds before they come to flowering. Hence, a study has been planned and conducted in the non-cropped lands following the above strategy.

### Weed ecology and biology

Before the experiment is planned, knowledge of weed biology and ecology are essential in order to organize the management practices. *Celosia argentea* L. is commonly known as Cock's comb, a common weed of dryland Alfisols of Telangana Region of Andhra Pradesh. The plants are usually annual herbs, with taproot system. Leaves are alternate, oblong, lanceolate. Inflorescence is dense, terminal spikes, elongate and pinkish white. Fruit two seeded utricle, dehiscent and black. It is an annual dicot weed propagating through only seed. Each plant produces around 300-500 seeds per season and the seeds are very small and black (Shetty, 1978). With the onset of the monsoon, seeds at the surface of the soil will germinate and these seedlings start dominating from August onwards and by the month of October and November, they come to seed setting and complete the life cycle (Figure 1).

### Materials and Methods

A table representing the composition of different weeds and the dominance of *celosia* in the existing composition in the non-cropped lands is mentioned in Table 1. Garden sword and hedge cutter are the two different hand implements used in cutting back *Celosia* in non cropped lands. The principle of controlling these plants before flowering is to reduce the seed set and utilize the preanthesis green matter produced by the plant for the soil fertility.

The implements were used at different heights to slash off the *celosia* plants in order to observe the time required to cut back, its regrowth, time of attainment of the reproductive stage and the seed producing ability of the plant. In order to use garden sword, the plant needs to be grown up to a certain height of around 25-30 cm. However, the same is not the case with the hedge cutter. Different heights were taken into consideration while using the hedge cutter.

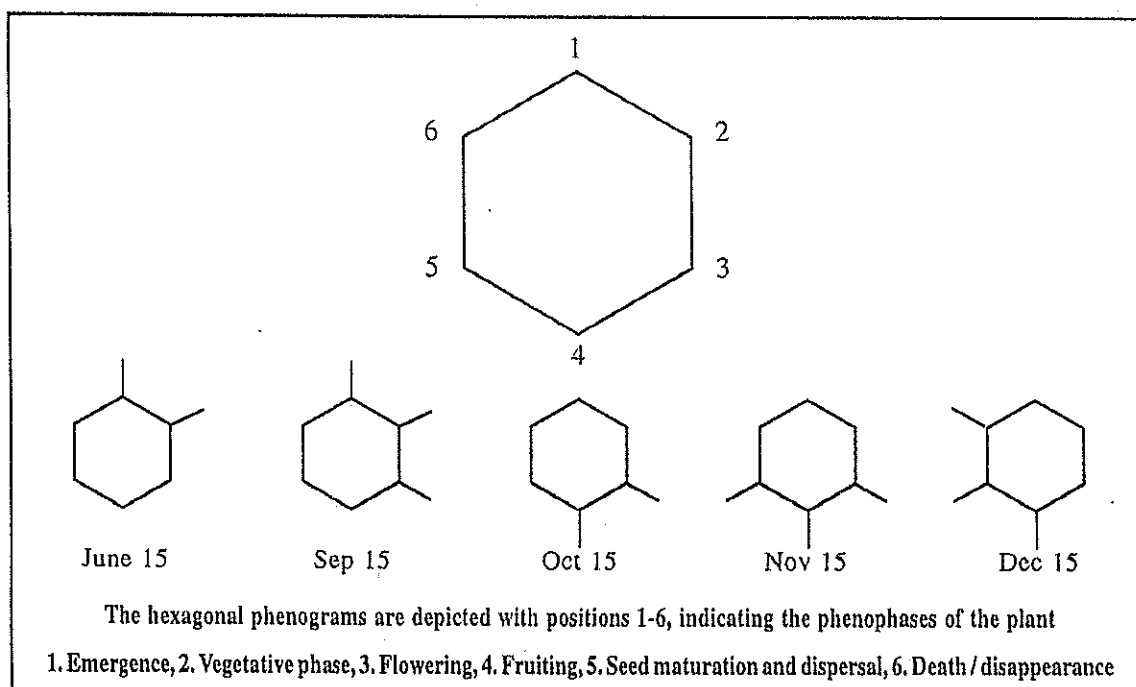


Fig. 1. Phenological stages of *Celosia argentea* (L.)

**Table 1. Weed composition of non-cropped field in Alfisols of Telangana region (mean of three years data)**

Time of sampling	Grasses		Sedges		Celosia		Total No. m <sup>2</sup>
	No. m <sup>2</sup>	%	No. m <sup>2</sup>	%	No. m <sup>2</sup>	%	
First fortnight of July	29.6	45.3	20.3	31.1	15.4	23.6	65.3
Second fortnight of July	44.25	8.8	190.5	37.9	268	53.3	502.75
First fortnight of August	23	7.9	97.6	33.1	174	59	294.9
Second fortnight of August	15.63	9.7	39.63	24.8	104.8	65.5	160.06
First fortnight of September	31	16.2	-	-	160.9	83.8	191.9

The heights of celosia were fixed at 20-25 cm and 40-60 cm. The average plot size was 2 x 5 m. The plot was infested with 125 plants of Celosia m<sup>-2</sup> on an average. This was replicated thrice. The means of the parameters were considered for interpretation. Time taken for the operation was noted and indicated in the Table 2. The stubble left in the field was measured and days for regeneration were noted down. The green matter added was collected and weighed and mentioned in g m<sup>-2</sup>. The inflorescences developed after the cut back did not produce seed at all and they were termed as "infertile" in this experiment. The additional advantage is that the voluminous quantity of green matter generated was added to the soil both as mulch cum manure.

### Results and Discussion

On an average, celosia was observed in 126 No. Per m<sup>2</sup> which is about 56% of the total weed composition and adds about 65-85 g m<sup>-2</sup> depending upon the time and stage of sampling. Initially a little domination was observed with regard to grasses. However, this trend got reversed over time and Celosia started dominating the existing weed composition from end of July onwards. Of the total weed composition, Celosia constituted about 23.6% in the first fortnight of July extending to 83.8% by the end of the first fortnight of September. However, the number of sedges observed was almost same from the start of July to end of September (Table 1).

**Table 2. Effect of cutting back of Celosia on regeneration and the green matter added to the soil**

Hand tool used	Height of Celosia (cm)	Stubble height (cm)	Time taken for operation (min/10 m <sup>2</sup> )	Green matter added (g/m <sup>2</sup> )	Status of Inflorescences after cutting back	Days to regenerate
Garden Sword	30-35	10	5	75	No seed setting	2-3
Hedge cutter	40-50 (just before the inflorescence was visible)	10	8	83	was observed in the regenerated inflorescences	
Control (Hedge cutter)	50-60	40-45	5	45		
Hedge cutter	20-25	10	15	30		

*Celosia* was cut at different heights using the hand tools. The expected mean minimum height to be attained by the weed plant is around 20-35 cm, so that the use of hand tools is possible especially for the hedge cutter. The average stubble height left after the use of the hand tools in the field was around 10 cm. Since, *Celosia* is a seasonal weed, it is bound to complete its life cycle before the season comes to end. This has been reflected in the observations as all plants have come to flowering at the same time. The time taken to cut the *celosia* at different heights in a plot of 2 x 5 m was recorded. Garden sword took less time (5 minutes) for cutting compared to the hedge cutter. Further more, the hedge cutter when used for the plants at a height of 20-25 cm took longer time (15 minutes) and it decreased with increase in height of the plant (8 minutes). For control plot where the inflorescences were just initiated, it took only 5 minutes to cut. The inflorescences appeared after the cut back did not set the seed irrespective of the pruned heights. Hence, in addition to the hindrance created in seed setting, it is essential to utilize the voluminous biomass generated by the weed plant as well for recycling. On an average a single *Celosia* plant produces about 500 seeds and this practice reduces seed production and addition to the soil.

Some rituals and customs also are helping in containing the flowering and seed setting (Shetty and Krantz, 1980). For instance, a local festival-Bathukamma in Andhra Pradesh, coincides with the peak flowering stage. The inflorescence is extensively cut for decoration and thus seed setting of the first flowering is eliminated. This effectively helps to check the first seed setting on the plants.

Thus, it can be concluded through this experiment that this practice through weed biology

management (Bantilan et al. 1974) is a trial to shift the balance in favour of crops. This may be practically feasible since it not only helps in controlling the seed setting but also adds green matter to the soil as mulch cum manure especially in non-cropped lands and bunds. In due course of time, the weed seeds deposition gets reduced leading to less weed number per unit area. All plants have come to flowering at the same time irrespective of the heights at which they were cut indicating its season bound nature. Further, all the inflorescences were small (5 cm in length) and seedless once they were cut back. Regrowth was observed within 2-3 days after cutting back.

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