



## IN VITRO CALLUS INDUCTION IN CELOSIA ARGENTEA L.VAR.ARGENTEA

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### ABSTRACT

*Celosia argentea* L. is herbaceous plant from family Amaranthaceae. Traditionally the plant material is used for the treatment of jaundice, gonorrhoea, wounds and fever. The leaves are also used for the treatment of inflammations, fever and itching. The seeds are bitter, useful in blood diseases, mouth sores. They are efficacious remedy in diarrhea. Hence, in vitro studies for multiplication of *Celosia argentea* was carried out using shoot tip as an explant. During present piece of work callus with different colour was reported on MS medium using various combinations of BAP, KIN and IAA.

**KEYWORDS** : *Celosia argentea*, Multiplication, Callus, MS media.

### Introduction:

*Celosia argentea* L.var.*argentea* is herbaceous plant from family Amaranthaceae. It is annual erect herbs, 30-150 cm tall; stem strongly ribbed, green or red. Leaves alternate, oblong-lanceolate to linear-lanceolate, acute or acuminate, green or tinged with red; petioles 0-2cm long. Flowers in solitary or paired, terminal, cylindrical spikes 2-20cm long, with conical apex; peduncles 2-20cm long. Bracts and bracteoles are ovate to oblong, 3-7mm long, pellucid, 1 nerved, persistent. Perianth of 5 distinct tepals, 6-10mm long, at first pink, withering white. Stamens 5; filaments united at base, pseudo-staminodes minute. Style purple, 3- 5mm long. Fruits obovoid to globose, 3-3.5mm in diam., rounded at apex. Seeds are 2-9, 1-1.5mm in diameter, biconvex, shining black, minutely tubercled (Naik, 1998).

### Medicinal properties:

*Celosia argentea* is used traditionally for the treatment of gonorrhoea, jaundice, wounds and fever. The leaves are used for the treatment of fever, inflammations and itching. The seeds are bitter, useful in blood diseases, mouth sores. They are efficacious remedy in diarrhea (Kirtikar, 1935). Based on ethno botanical practice the plant was investigated for anti-inflammatory (Patil et al., 2003), anti-pyretic (Bhujbal et al., 2006) anti diabetic, (Thangarasu et al., 2002), anti bacterial and diuretic properties (Patel et al., 1993). Plant is also found to be useful in cancer. Decoction of roots is said to be effective on kidney stone and other urinary troubles (NaikV.N.1998). Even though plant is considered as weed but it is seasonal. Looking towards its medicinal properties it was decided to undertake in vitro studies to regenerate callus from various explants in *Celosia argentea*.

### Material and methods:

#### Preparation of Explants:

*Celosia argentea* was collected from campus of Dr. Babasaheb Ambedkar Marathwada University campus and Over-Jatwada area of Aurangabad, Maharashtra. The explants were washed carefully in running tap water for 5 minutes and followed by distilled water for 5 minutes. Explants were surface sterilized for 5 minutes with 0.3% mercuric chloride, followed by three subsequent rinses with sterilized double distilled water, in a laminar air flow. Explants were dissected into small pieces and inoculated aseptically in culture vessel and test tube on sterilized MS medium.

Culture media: Murashige and Skoog (1962) media was supplemented with various concentrations of auxins and Cytokinins. MS medium was fortified with 3% sucrose and gelled with 2.5% Clerigel. Medium pH was adjusted up to 5.8, after addition of growth regulators. The media were autoclaved under 15 psi and 121° C for 20 minutes. After autoclaving, the vessels containing the media were transferred to laminar air flow for inoculation.

### Culture conditions:

After inoculation, culture tubes and vessels were transferred to culture room under a 10 h photoperiod supplied by cool white fluorescent tube lights and 25 ± 20C temperatures. At least five replicates were raised for each treatment.

### Data record:

Data was recorded after 30days. Mean ( $\mu$ ) values with the standard error (S.E.) were calculated from five replicates each for callus induction.

### Result and discussions:

Tissue culture is useful in producing multiple copies of a plant species within minimum time and space and callus culture is the primary mean for the indirect organogenesis. Most of the genetic engineering technique needs good quality callus production with optimum quantity for transformation and regeneration. Callus or cell suspension culture also could be utilised for large scale plant cell culture where the bioactive compounds could be extracted (Nikam, 2014). No callus was recorded when explants were cultured on control MS. All combination of growth regulators were found more or less potent for induction of callus. Results obtained during the studies are represented in observation table 1.

**Table 1: Effects of different concentration of PGR's on Callus Induction of *Celosia argentea* L. var. *argentea* by using various explants.**

Growth regulators (mg/L)			Frequency of callus induction	Color of callus	Texture of callus
BAP	KIN	IAA			
-	-	-	-	-	-
-	-	0.5	-	-	-
0.5	-	-	+	White	Compact
1	-	-	++	Green	Compact
1.5	-	-	+++	Red	Compact
2	-	-	++++	Red	Compact
3	-	-	++	Yellow	Compact
-	0.5	0.5	+	White	Compact
-	1	-	+	White	Compact
-	1.5	-	++	Green	Compact
-	2	-	+++	Green	Compact
-	3	-	+	Yellow	compact

-No callus produced, + low callus produced, ++ medium callus produced, +++ high callus produced, ++++ profuse callus produced. IAA: Indole 3-acetic acid, KIN: Kinetin, BAP : benzylaminopurines

From the recorded results it could be stated that, callus develops from stem explant. There is variation in colour of the callus. White coloured callus develops on MS medium fortified with 0.5mg/lit BAP and 0.5 mg/lit IAA (Plate.1). Increase in concentration of BAP results in green coloured callus (Plate.2). Further increase in concentration, the callus was profuse and colour noted was pink (Plate.3).

The concentration of BAP was further increased and noted that the colour of the callus is Yellow (Plate.4). Similar kinds of results were noted with growth regulator KIN and IAA. Green profuse callus was noted on MS fortified with 2 mg/lit KIN along with 0.5.mg/lit of IAA. MS fortified with 1.5 mg/lit KIN along with 0.5.mg/lit of IAA, the color of the callus was also green but it was comparatively small in size. Further increase in amount of KIN, callus developed was yellow and small in size.

Plant pigments play vital role in metabolism of the plant. Yellow color is an indication of presence of carotenoid in the callus, whereas pink colour is indication of presence of flavonoids which acts as antioxidants. Green colored callus is enriched with carotenoids. Regeneration of callus was reported in *Solanum nigrum* by Pandhure et al, (2010). Green colour of callus was reported by Pandhure and Shete (2016), in *Solanum virginianum*. Similar type of different coloured callus was also reported by Tupe and Pandhure (2015) in medicinal plant *Aerva lanata*. Further it could be stated that, plant pigments play a vital role in plant metabolism. This property of formation of pigments through callus could be exploited for the production of metabolites such as flavonoids,  $\beta$ -carotene etc.

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Plate 1: White Callus



Plate 2: Green Callus



Plate 3: Pink Callus



Plate 4: Yellow Callus

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