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Optimization of Plant Growth Regulators for Rapid *Chrysanthemum Morifolium* Shoot Multiplication

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ABSTRACT

Chrysanthemum morifolium is a perennial herb. In the present study, efficient shoot multiplication was standardized using *in vitro* shoot explants of *Chrysanthemum morifolium* cv. YelowBanglow using different concentrations of BAP and NAA. Results indicated maximum frequency of explants produced axillary shoot and the highest number of shoots per explant (4.050±0.188) were obtained when MS fortified with BAP (3.0 mg/l) and NAA (0.01 mg/l).

KEYWORDS: Explant, *in vitro*, shoot multiplication, plant growth regulators

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INTRODUCTION:

The Chrysanthemum is one of the most beautiful flowering plants commercially grown in different parts of the world. It is propagated vegetative either through root sucker or terminal cuttings. Micro propagation is being accepted as an efficient tool over conventional methods.Micro propagation through *in vitro* can enhance multiplication many folds. In addition, plants produced *in vitro* are uniform and high quality. Due to high popularity and demand for Chrysanthemum, it becomes one of the commercial targets for micro propagation.[1] Ben-Jaacov and Langhans described *in vitro* chrysanthemum microprpagation from shoot tips and shoot-initiated.[2] Bhattacharya et al. reported rapid mass propagation of *Chrysanthemum morifolium* through callus derived leaf and stem explants.[3] Through the use of tissue culture, it is possible to obtain a large number of plants from one explant .[4]

The modern approaches of plant propagation based on cell and tissue culture. Techniques are able to increase the efficiency of breedingprocesses.[5]They offer opportunities for rapid clonal propagation of some unique, superior genotypes.[6-7] The unconventional techniques permit the multiplication and maintenance of these genotypes.

So the present work has been carried out to standardize the various combinations of BAP and NAA for efficient shoot multiplication in *Chrysanthemum morifolium*cv. YelowBanglow

MATERIAL AND METHODS:

This work is part of project work done in fulfilment of Master Degree. The explants were collected from field. Stem cuttings were rinsed thoroughly with tap water and sterile distilled water. Nodal segment were cut into appropriate size. The collected explants were washed with a solution containing 3-4 drops of liquid detergent Teepol. Thereafter, the detergent was completely drained out from the explants by 3-4 washings with vigorous shaking by hand. For surface sterilization of explants to treatment were given Bavistein (0.1%) ±8HQC(200 ppm) for 3-4 hours and was shaken regularly. Thereafter, the solution was completely drained out from the explants by 3-4 washing with vigorous shaking by hand. Second treatment of mercuric chloride (0.1%) for 3-4 minutes and washed again sterile distilled water.

The surface sterilized axillary buds were cultured on MS medium supplemented with BAP (3.0 mg/l), NAA (0.01 mg/l) and GA_3 (0.5 mg/l) under aseptic conditions and kept for incubation in culture room. The sprouted shoots were taken as explant for standardizing efficient shoot multiplication in

Chrysanthemum morfolium cv. Yelow Banglow using MS mediumsupplemented with various combination of different concentrations of BAP and NAA. (Table-1)

RESULT AND DISCUSSION:

Shoot explants from *in vitro* grown shoots of a particular experiment were taken (Fig 1) and cultured on MS medium supplemented with various combinations of different concentrations of BAP and NAA.

Result of 7 different combinations of these growth regulators are summarized and presented in the Table 2. Among different combinations, best response towards shoot multiplication from *in vitro* stem explants was obtained on MS_6 that in MS supplemented with BAP (3.0 mg/l) and NAA (0.01 mg/l) (Fig. 2). The maximum number of multiple shoots on MS_6 was 4.050±0.188.

MS_4 that is MS containing BAP (2.0 mg/l) and NAA (0.01 mg/l) showed containing BAP (2.0 mg/l) along with a lower concentration showed comparatively good results with 2.557±0.062 multiple shoots. Cytokinins along with auxins also play a vital role in shoot regeneration in chrysanthemum.[8]

Table 1: MS medium supplemented with various combination of different concentrations of BAP and NAA.

Media Code	BAP (mg/l)	NAA (mg/l)
MS_1	0.0	0.1
MS_2	1.0	0.01
MS_3	1.0	0.1
MS_4	2.0	0.01
MS_5	2.0	0.1
MS_6	3.0	0.01
MS_7	3.0	0.1

Table 2:Effect of various combinations of different concetrations of BAP and NAA on *in vitro* shoot multiplication in *Chrysanthemummorifolium* cv. YelowBanglow after 28 days

Media Code	Treatment		Mean no. of shoots per explant ±S.E.
	BAP (mg/l)	NAA(mg//l)	
MS1	0.0	0.0	1.143±0.077
MS2	1.0	0.01	2.070±0.029
MS3	1.0	0.1	1.853±0.069
MS4	2.0	0.01	2.557±0.062
MS5	2.0	0.1	2.400±0.008
MS6	3.0	0.01	4.050±0.188
MS7	3.0	0.1	3.26±0.045

Fig.1: *In vitro* grown from auxiliary bud and further used as shoot explant for multiplication experiment.

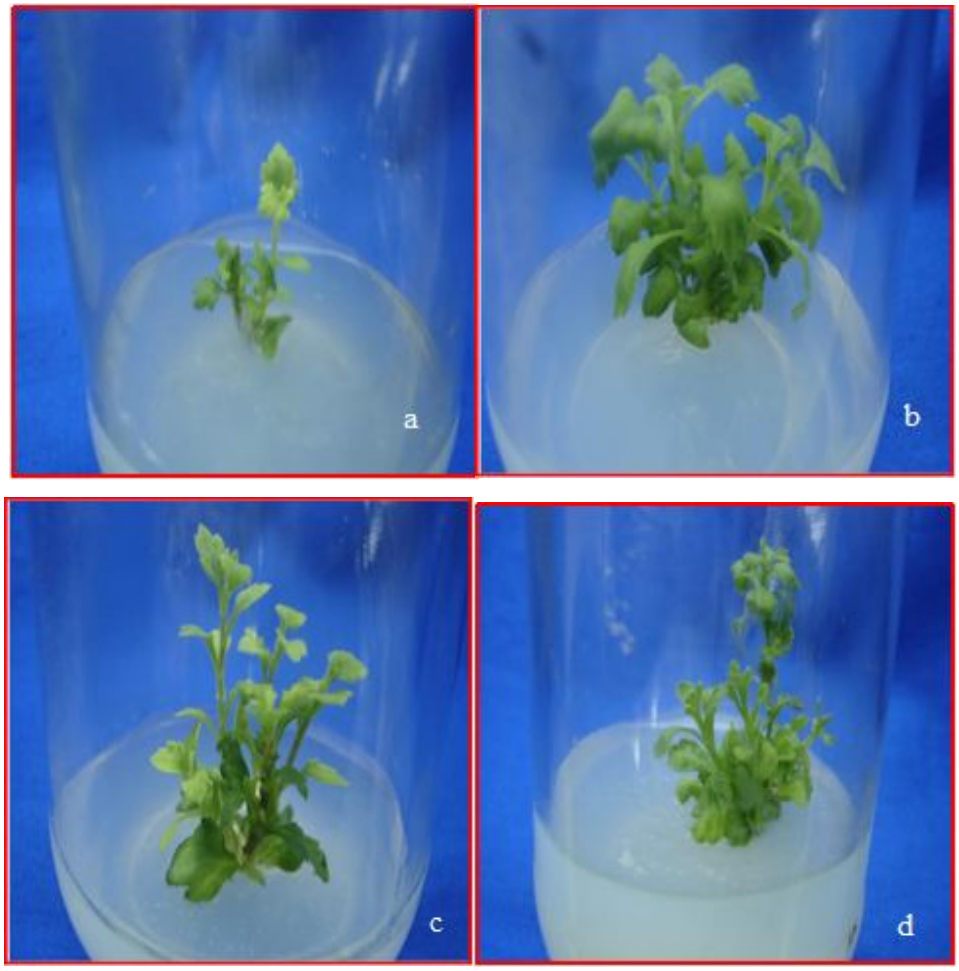

Fig.2:*In vitro* shoot multiplication from shoot explant of *Chrysanthemum morifoliam* cv. YelowBanglow. a: Control b: development of multiple shoot on MS ±BAP(2mg/l) ± NAA (0.01mg/l).c& d: shoot multiplication on MS±BAP(3mg/l) ± NAA (0.01mg/l)

CONCLUSION

The *in vitro* regeneration of Chrysanthemum is notably genotype-dependent. This study provides a protocol for a single cultivar, which will help in an efficient technique for clonal plant production at *Chrysanthemum moriflium* cv. Yellow Banglow. Nonetheless, the experimental design and preliminary data for this cultivar will hopefully spur new and expanded research on other cultivars.

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