

**EFFECT OF VITAMINS ON GROWTH AND SHOOT MULTIPLICATION OF *Chlorophytum borivillianum*****K. Menaria\*, S. D. Purohit, R. P. Rajpu<sup>1</sup> and R. K. Tenguria<sup>2</sup>**

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**ABSTRACT**

The nutrient media play an important role in plant tissue culture as it affects the growth and multiplication of the plant. The various standard media *i.e.* MS and White Medium are being used for plant tissue culture. The nutrient requirement of the plant varies with plant species. The effect of various vitamins (Biotin, Riboflavin, Ca- pantothenate, Folic acid and Ascorbic acid) with different concentrations (0,1.0, 2.5,5.0ppm), were studied for growth and multiplication of *Chlorophytum borivillianum*. Among five different vitamins the Biotin @ 2.5 ppm proved to be the best vitamin additive with MS medium for growth and multiplication of *Chlorophytum borivillianum*.

**Keywords:** Vitamins, shoot multiplication and *Chlorophytum borivillianum*.**INTRODUCTION**

*Chlorophytum borivillianum* commonly known as "Safed Musli" is a rare medicinal herb of India (Nayar & Sastry, 1988). The tuberous roots have aphrodisiac properties and form an important ingredient of herbal tonics both in ayurvedic and allopathic system of medicine in India. (Kirtikar and Basu, 1975). The dried roots are sold in the market @ Rs. 1500/- US \$ 30 per Kg. Due to over exploitation and the slow natural regeneration of this herb through tuberous roots made it rare in nature, as the seed germination rate is only 14-16% (Jat and Bordia, 1990).

The medicinal use offers great promise for its economic exploitation by use of tissue culture micro propagation technique for growth and rapid multiplication. The micro propagation technology has been applied for many horticultural plants, but the reports on multiplication of plants the nutritional medium play an important role, this led to the large-scale multiplication on medicinal herbs are only few. For successful large-scale development of standard recipes (Murashige and skoog, 1962; White, 1963). Different plants and even different parts of the same plant may have different nutritional requirement for satisfactory growth (Murashige and Skoog, 1962) they need either some additional nutrients or replacement of one or more nutrients from standard media. Constituent of medium that affects the growth like gelling agents, Carbon sources (Goyal and Arya 1984; Bhat and Chandel 1993), Amino acids (Goyal and

Arya 1984) and Growth regulators (Gupta. and Chandra,1982; Edson *et al.* 1996; Pospisilova, *et al* 1998) have been reported widely, but rare information is available on effect of vitamins (Arrigoni, 1994; Goyal and Arya 1984) which were restricted to only the concentration of the vitamins described in MS medium (Murashige and Skoog, 1962).

Keeping above facts in view the present investigation was carried-out to study the effects of additional vitamins like Ascorbic acid, Folic acid, Biotin, Riboflavin and Ca-pantothenate on growth and multiplication rate of "Safed Musli".

**MATERIAL AND METHODS**

The explants were used from already established culture on medium consisting the basal formulation (Purohit *et al.*1994). Culture conditions were maintained 28±2°C under the 16 h photoperiod (2000-3000 lux) and 40-50% humidity. The five vitamins ascorbic acid, Folic acid, Biotin, Riboflavin and Ca-pantothenate were added to the medium separately in different concentrations *i.e.* 0.0ppm, 0.5ppm, 1.0ppm, 2.5ppm, and 5.0ppm.

The explants were inoculated on experimental medium. The individual shoots separated from clusters were trimmed from the top leaving only 5 mm from the base such shoots were sub cultured on fresh experimental medium supplemented with vitamins as the initial explant and all the experiments were designed with six

**Table - 1: Effect of different vitamins at various concentrations on number of shoots of *Chlorophytum borivillianum***

| Types of vitamins used | Concentration used |          |          |          |          |
|------------------------|--------------------|----------|----------|----------|----------|
|                        | 0.0mg/l            | 0.5 mg/l | 1.0 mg/l | 2.5 mg/l | 5.0 mg/l |
| Ascorbic acid          | 9                  | 5        | 6        | 11       | 5        |
| Folic acid             | 9                  | 7        | 7        | 7        | 6        |
| Biotin                 | 9                  | 15       | 15       | 17       | 16       |
| Riboflavin             | 9                  | 6        | 6        | 6        | 6        |
| Ca-pantothenate        | 9                  | 7        | 7        | 7        | 7        |

**Table - 2: Effect of different vitamins with various concentrations on shoot length of *Chlorophytum borivillianum***

| Types of vitamins used | Concentration used |          |          |          |          |
|------------------------|--------------------|----------|----------|----------|----------|
|                        | 0.0mg/l            | 0.5 mg/l | 1.0 mg/l | 2.5 mg/l | 5.0 mg/l |
| Ascorbic acid          | 2.55               | 2.35     | 2.65     | 3.02     | 2.00     |
| Folic acid             | 2.55               | 2.50     | 2.50     | 2.50     | 2.00     |
| Biotin                 | 2.55               | 3.00     | 3.60     | 4.00     | 3.40     |
| Riboflavin             | 2.55               | 2.00     | 1.50     | 1.00     | 1.00     |
| Ca-pantothenate        | 2.55               | 2.00     | 2.00     | 2.00     | 1.83     |

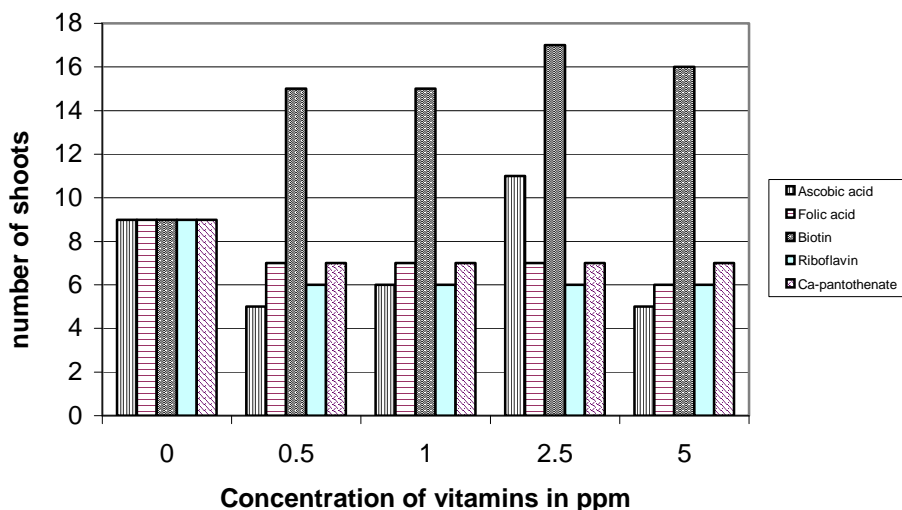
replicates. The culture grown on basal medium was considered as control.

The observations on number and length of shoots were recorded after 21 days up to three subsequent subcultures.

## RESULTS AND DISCUSSION

The effect of different vitamins with various concentrations on number of shoots of *Chlorophytum borivillianum* is presented in Table 1. The data clearly reveal that the highest number of shoots were recorded under Biotin

followed by Ca- pantothenate and lowest under Riboflavin. Addition of vitamins @ 2.5 ppm to the multiplication medium gave the highest number of shoots followed by 1.0 ppm and lowest under 5.0 ppm concentration (Fig. -1). It is interesting to observe that the number of shoots increased with increasing concentration of Biotin from 0 to 2.5 ppm concentrations. The number of shoots reduced by addition of Folic acid, Riboflavin and Ca-pantothenate @0.5ppm over control and remain almost static by further increase in concentration upto 5.0 ppm. In case of Ascorbic acid also the number of shoots reduced upto 1.0 ppm concentration over control and increased at 2.5 ppm

**Fig. - 1: Effect of different vitamins on shoots multiplication of *C. borivillianum***

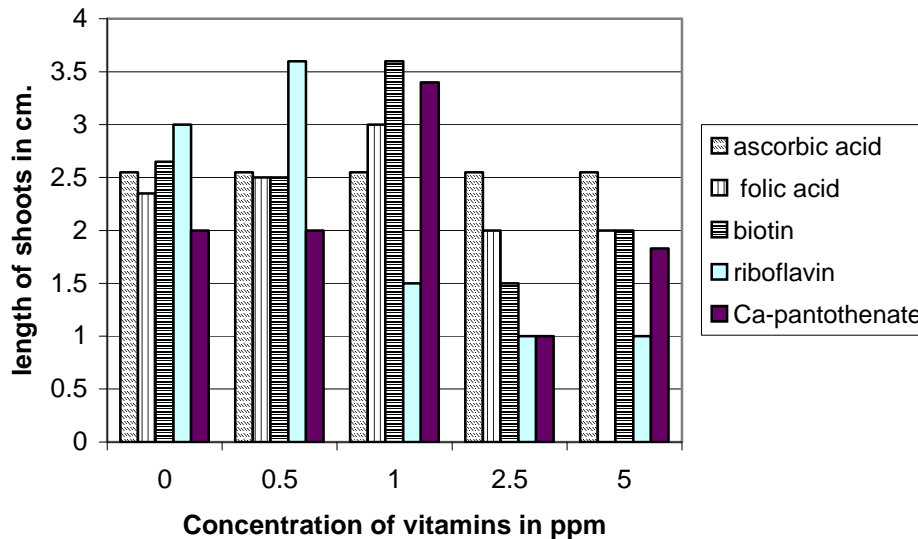


Fig. - 2: Effect of different vitamins on length of shoots of *C. borivilianum*

thereafter it declined at 5.0 ppm. The presence of Riboflavin, Folic acid and Ca-pantothenate to the multiplication medium did not affect the number of shoots positively. This may be attributed to the adverse effect of these vitamins.

The length of shoots as affected by different vitamins at various concentration is presented in Table 2 and depicted in figure 2. It is obvious from data that highest length of shoots is observed by the addition of Biotin followed by Ascorbic acid, Ca-pantothenate and lowest by Riboflavin. Among the various concentrations 2.5 ppm gave highest shoot length and lowest by 5.0 ppm. The addition of Biotin to the multiplication medium @0.5 ppm increased shoot length from 2.55 to 3.0 cm over control. The length of shoots further increased upto 4.0 cm by increasing concentration of Biotin upto 2.5 ppm and thereafter it declined upto 3.60 cm at 5.0 ppm concentration. The shoot length increased by addition of Ascorbic acid @ 1.0 and 2.5 ppm and

declined at 5.0 ppm concentration. The addition of Folic acid, Riboflavin and Ca-pantothenate to the multiplication medium declined the shoot length of *Chlorophytum borivilianum* from 0.5 to 5.0 ppm.

#### CONCLUSION

It is concluded from the present study that an addition of Biotin @2.5 ppm to the multiplication medium significantly improved number shoot length of *Chlorophytum borivilianum*. This concentration just doubled the number of shoots and mean length of shoots as compared to control. Addition of ascorbic acid to the multiplication medium @ 2.5 ppm also gave positive results for growth but the other vitamins declined much below the control. The effectiveness of vitamins is as follows:

Biotin (2.5 ppm), > Ascorbic acid (2.5 ppm), >Control, >Folic acid (0.5ppm), > Ca pantothenate (0.5ppm), >Riboflavin (0.5 ppm).

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