Original article

Effect of Benzyl Amino Purine (BAP) concentration on in vitro shoot proliferation of Banana (*Musa* spp.)

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Abstract

The present investigation was undertaken to study the effect of different concentrations of BAP on shoot induction and shoot proliferation in Banana cultivar *Pisang Jayee*. Explants obtained from sword suckers were inoculated on MS medium supplemented with different concentrations of BAP (5,10,20 and 30 mg/L) and the cultures were incubated at 25±1⁰C with a 16 hr photoperiod (2000 lux) provided by cool white florescent tubes. The pH of medium was adjusted to 5.7 prior to autoclaving. The cultures were sub cultured at 30 days interval on the same fresh medium to produce multiple shoots. The best result was obtained at 20μM BAP concentration.

Key words: Banana, Cultivar Pisang Jayee, Shoot induction, Shoot proliferation, Sword suckers, MS medium, BAP.

Introduction

Bananas account for approximately 22% of the fresh fruit production and are ranked as the second most important fruit crop. For commercialization, it is important that consistent supplies of good quality bananas are produced. This could be achieved through clonal planting materials obtained through tissue culture propagation technique. This technique provides high rates of multiplying, genetically uniform, pest and disease free planting materials. Propagation of banana through *in vitro* techniques has been reported by several workers using different explants sources and methods [1, 2, 3, 4, 5, 6, 7]. In tissue culture, plant growth regulators (PGR) are critical media components in determining the developmental pathway of the plant cells. Cytokinins such as benzyl amino purine (BAP) and Kinetin are generally known to reduce the apical meristem dominance and induce both axillary and adventitious shoots formation from meristematic explants in banana [8]. The most established banana shoot-tip culture system was achieved by using BAP as a supplement to basal media [9]. The effectiveness of BAP over other cytokinins in inducing multiplication of shoot tip cultures has been reported in different cultivars of bananas [9, 10,11,6]. BAP has a marked effect in stimulating the growth of axillary and adventitious buds and foliar development of shoot tip cultures [12, 13]. With view of the above said things, the present investigation was mainly aimed to study the effect of different concentrations of BAP along with MS basal medium and optimize its dose level in the shoot induction and shoot proliferation of the banana cultivar studied.

Materials and Methods

Plant material

Sword suckers of banana cv. *Pisang Jayee* obtained from “National Research Center for Banana (NRCB), Trichy were used as explant sources and the shoot tips about 3 – 5cm length were excised, each having meristem, young leaves and node. These shoot tips were finally brought to the size of 5 – 10mm with the base and shoot apex and they were washed thoroughly with a solution of Tween-20. Then they were repeatedly washed under running tap water for 4 – 5 times and finally with distilled water. These shoot tips were treated with 0.1 per cent HgCl₂ solution for 5 minutes and rinsed with sterile distilled water under aseptic condition. All the explants were inoculated on MS medium with different concentrations of BAP as shown in the table no.1.

All cultures were incubated at 25±1⁰C with a 16hr photoperiod (2000 lux) provided by cool white florescent tubes. The pH of medium was adjusted to 5.7 prior to autoclaving. The materials were sub – cultured at 30 days interval in the same fresh medium to produce multiple shoots.

Results and discussion

In This study the effects of different concentrations of BAP on bud initiation and shoot
multiplication were investigated. The results of shoot induction and multiple shoot formation with the implementation of different concentrations of BAP along with MS basal medium were presented in table2.

Table - 1. Different concentration of BAP along with MS basal medium

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Concentration (µM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS+BAP</td>
<td>5 µM</td>
</tr>
<tr>
<td>MS+5 µM BAP</td>
<td>10 µM</td>
</tr>
<tr>
<td>MS+10 µM BAP</td>
<td>20 µM</td>
</tr>
<tr>
<td>MS+20 µM BAP</td>
<td>30 µM</td>
</tr>
</tbody>
</table>

Table – 2. Results of different treatments of BAP along with MS in Shoot proliferation.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>No. of shoot (Mean)</th>
<th>Shoot length (mm) (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.83</td>
<td>1.33</td>
</tr>
<tr>
<td>MS+5 µM BAP</td>
<td>2.37</td>
<td>1.98</td>
</tr>
<tr>
<td>MS+10 µM BAP</td>
<td>4.50</td>
<td>3.83</td>
</tr>
<tr>
<td>MS+20 µM BAP</td>
<td>5.18</td>
<td>6.68</td>
</tr>
<tr>
<td>MS+30 µM BAP</td>
<td>4.32</td>
<td>5.36</td>
</tr>
</tbody>
</table>

Apart from the influence of genotypes, shoot proliferation rate and elongation are affected by cytokinin types and their concentration. Adenine-based cytokinins are used in several Musa spp. For in vitro propagation N\(^6\)-benzylaminopurine (BAP) is the most commonly preferred cytokinin [15, 16].

The concentration of exogenous cytokine appears to be main factor affecting multiplication. For example, Wong (1986) stated that when 11.1µM BAP is supplemented in the medium, each of the explants produces as average of 2.4 shoots, while increasing the BAP concentration to 22.2 µM and 44.4 µM, they resulted in 2.6 and 4.3 shoots per explant respectively. However, the recommended optimum BAP concentration is 20 µM for banana micropropagation [14]. In this study also it is confirmed as 20µM BAP showed good results when compare to its low and high concentrations in shoot induction and shoot proliferation. Hence, the BAP concentration 20µM can be recommended as optimum level for in vitro shoot induction and proliferation of banana cultivars in general and the cultivar studied in the present investigation.

References


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