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International Journal of Current Research
Vol. 7, Issue, 03, pp.13734-13737, March, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EFFECT OF DIFFERENT CONCENTRATIONS OF NAPHTHALENE ACETIC ACID (NAA) WITH BAPON MICRO-PROPAGATION OF *MUSA* SP.CV. GRAND NAINE

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ARTICLE INFO

Article History:
Received 28th December, 2014
Received in revised form
15th January, 2015
Accepted 23rd February, 2015
Published online 31st March, 2015

Key words:

Tissue culture, *Musa,*naphthalene acetic acid, 6-benzyl amino purine, Meristematic, Suckers

ABSTRACT

This study was conducted at the tissue culture laboratory of Sudan University of Science and Technology during the period from April to July 2010 to investigate the effect of different concentrations of naphthalene acetic acid (NAA) with 5mg/l 6-benzyl amino purine (BAP) on multiplication of banana (*Musa* sp.) cv. Grand Naine using meristematic stem cuttings ex-plant. MS medium .The highest significant number of shoots was recorded by 0.05 mg/l NAA with 5mg/l BAP this concentration induced also highest length of shoots and maximum number of roots and highest length of roots . Low numbers of shoots wasrecorded by the control and 0.4 mg/l NAA.

INTRODUCTION

Bananas (*Musa* spp.) are important fruit crops cultivated in more than 120 countries throughout the tropics and subtropics, where they make a significant contribution to food security and income (Gosh *et al*., 2009; Shapira *et al*., 2009). According to (FAOSTAT, 2009) the world production of bananas in 2007 was About 86 million tonnes, which were harvested from an area of 5 million hectares, the top five producing countries being India, China, the Philippines, Brazil and Ecuador (FAOSTAT, 2009). In Sudan banana is produced commercially in small scattered gardens along the Nile banks and in small plantations in kassala and in large plantation in Sinnar and Damazine. *In vitro* propagation of bananas provides excellent advantages over traditional propagation, including a high multiplication rate, physiological uniformity, the availability of disease-free material all year round, rapid dissemination of new plant materials throughout the world, uniformity of shoots, short harvest interval in comparison with conventional plants and faster growth in the early growing stages compared to conventional materials (Daniells and Smith 1991; Arias, 1992). In tissue culture, plant growth regulators are important media components in determining the development and developmental pathway of the plant cells. Growth regulators are used in different proportions to break dormancy and enhance shoot formation since it is well demonstrated that the apical dormancy is under control of these growth regulators (Madhulatha *et al*., 2004).

The cytokinins and auxins are of importance in *in-vitro* culture as the later are concerned with root formation, the former is mainly required in the media for shoot formation and growth of buds (North *et al*., 2012). These growth regulators are required in combination in the media as it is always the manipulation and variation of auxins and cytokinins levels that can successfully change the growth behavior of plant cultures (Dixon and Gonzales, 1994). Cytokinins such as benzyl aminopurine (BAP) and kinetin are known to reduce the apical meristem dominance and induce both axiliary and adventitious shoot formation from meristematic explants in banana *(Jafari *et al.,* 2011). The objectives of this study toevaluate the different concentrations of naphthalene acetic acid (NAA) in combination with 5mg/l 6-benzyl amino purine (BAP) on multiplication of banana (*Musa* sp.) cv. Grand Naine.

MATERIALS AND METHOD

Plant material was brought from Horticulture department of Khartoum. All experiment were carried out at the tissue culture Laboratory of Sudan University of Sciences and Technology forevaluate the different concentrations of naphthalene acetic acid (NAA) in combination with 5mg/l 6-benzyl amino purine (BAP) on multiplication of banana (*Musa* sp.) cv. Grand Naine. Suckers were brought from the field. the superfluous tissues was removed by trimming away the outer leaf sheaths,

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leaf bases and corm tissues until a 5 - 7 cm cube enclosing the shoot apex was obtained. The cubes tissue were washed under running tap water for about 1 hour. The cubes were then disinfected under laminar air flow cabinet by soaking for 30 min in commercial bleach (5.25% NaOCl) diluted to 30% (v/v) with two drops of Tween 20 per 100ml. This was followed by rinsing for 3 times autoclaved distilled water (Ganapathi *et al*., 1992). Explants were then placed on sterile petri dishs. All surface brown tissues and outer leaves were removed until the size of explants become a bout 1.5 - 2 cm in length then culture explants in the propagation media (Ganapathi *et al*., 1992). The propagation media used was the recommended medium used at the tissue culture laboratory, University of Sudan. It consisted of full MS basal Salts (Murashige and Skoog, 1962) strength, additional Phosphate (KH_2Po_4 17g/l), full MS vitamins (Murashige and Skoog, 1962) mixture with 30 g/l of sucrose, 7 g/l agar agar, the pH was adjusted to 5.7 ± 0.1 with NaOH acid HCl prior to addition of agar.

1000 lux. Using white cool fluorescent lamps and the culture room temperature was maintained at 25 ± 2 C^0 .To define an explants that is most responsive Grand Nain plants AAA groups were used as explants for culture propagation. Test of NAA concentration with BAP: The following concentrations of NAAwere tested 0 (control) ,0.05,0.1, 0.2 and 0.4 mg/l with 5 mg/l BAP.

RESULTS AND DISCUSSION

Table (1) and Fig (1) and Plate (1) indicates that the maximum number of shoots was recorded by 0.05 mg/l NAA with 5mg/l BAP but this value not significant to the value was recorded by both 0.1 and 0.2 mg/l NAA. Low values was recorded by control and 0.4 mg/l NAA. Also the highest length of shoot and highest length of roots and maximum number of roots was recorded by 0.05mg/l NAA with 5mg/l BAP.

Table 1. The *in vitro*effectofdifferent concentrations of NAA in combination with 5mg/l BAPon banana shoot tip morphogenesis after 6 weeks incubation

NAA concentration (mg/l)	Numberof shoots (per explants)	length of shoot (cm)	Number of roots (per explants)	Length of root (cm)
0	8.33bc	6.67a	4.00d	4.25b
0.05	10.17a	7.83a	14.17a	7.75a
0.1	9.00ab	6.25a	7.17c	4.92b
0.2	9.00ab	7.67a	7.00c	3.92b
0.4	7.00c	7.33a	11.17b	4.92b
LSD	1.390	1.517	2.778	1.087
CV	13.44%	17.85%	22.44%	17.74%

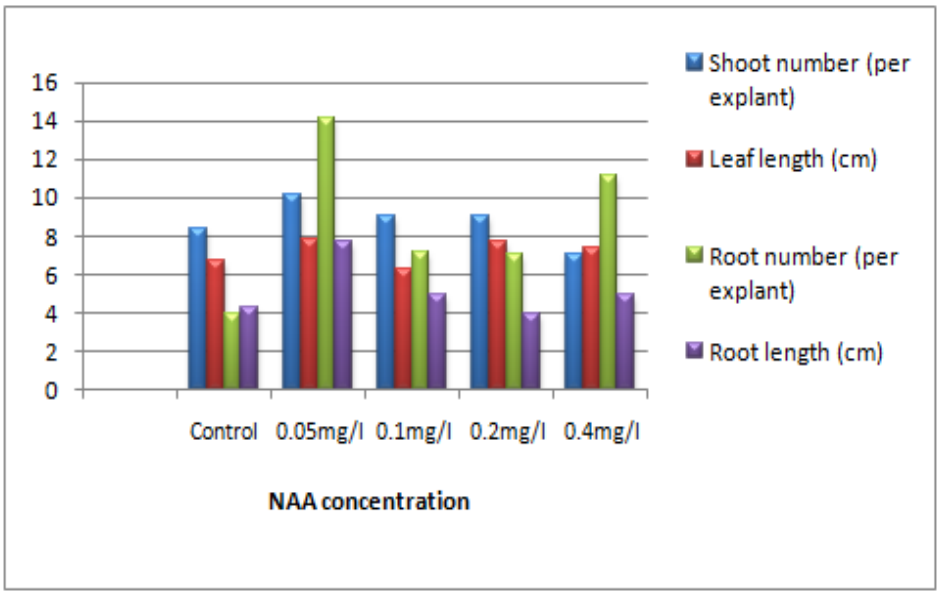

Fig 1. Response of banana explants to different concentrations of NAA plus 5 mg/l BAP after 6 weeks incubation

Media and dishes were sterilized by autoclaving at 121C^0 for 20 min under a pressure of 15 psi (Ganapathi *et al*., 1992). Forceps and dissecting blades dipped in pure ethanol and exposed to flame gas. The laminar Air-Flow cabinet was sterilized by spraying and wiping with 70% Ethanol. It was switched on 15 minutes before use .The U.V lamp in the culture room was switched on during the night. Depending on the objective of the experiment, culture was maintained either in the dark chamber or light under 16 hours light exposure of

This results agree with (Adane, 2013) at BAP concentration but not agree at NAA concentration who found that 5mg/l BAP +0.5mg/l NAA induced good numbers of shoot but who recorded longest shoot by 5mg/l BAP+1.0 NAA. Also (Rahman *et al*., 2004) observed similar result. They obtained longest shoot in 5 mg/l BAP. (Vuylsteke and De Langhe, 1985; Venkatachalam *et al*., 2007; Bairu *et al*., 2008) reported that 5 mg/l (22.2 µM) BAP was the optimum concentration for most

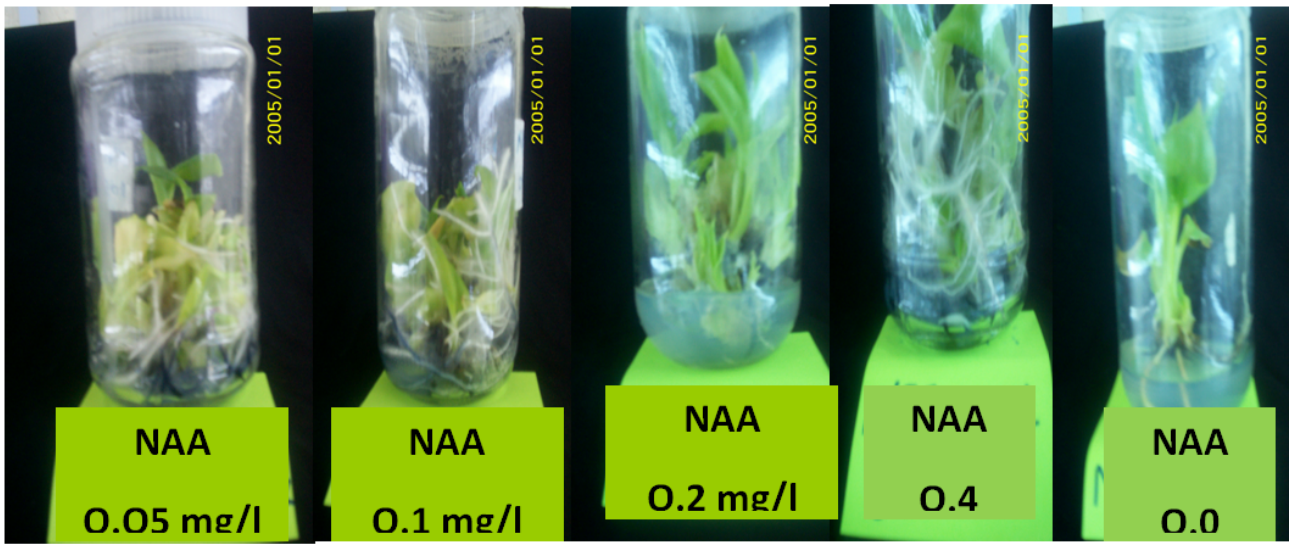

Plate 1. Response of banana explants to different concentrations of NAA plus 5 mg/l BAP after 6 weeks incubation

banana cultivars, and the result not agree with (AL-Amin *et al*., 2009) who found that7.5mg/lBAP+0.5mg/l NAA obtained highest shoot proliferation. This variation might be due to the different species of banana. Means within the same column followed by the same letter(s) are not significantly different at 5% using Duncan Multiple Range Test.

Conclusion

A combination of 0.05mg/l NAA and 5 mg/l BAP enhanced multiplication of banana.

Acknowledgements

Initially my thank to God who gave me the power and patience to wrote this paper. I would like to express my gratitude to my supervisor and to Director of Tissue Culture Laboratory of Sudan University of Science and Technology for facilities and support.

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