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Comparative Study of Effect of Different Tissue Culture Media on the Propagation of Potato

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Short Communication

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ABSTRACT

Tissue culture study on potato was investigated in this paper. MS basal medium supplement with 30 and 40 g/l sucrose, 8 g/l agar and different plant growth regulator were used. Potato was cultured in different ratio of IBA: BAP (10:10, 10:5, 5:10, 5:5 µM) in combination. Development was not identical in all the treatments, cultured tissues were observed in treatments about a week after culture. Results showed that the treatments containing 10 µM IBA in combination with 10 µM BAP is suitable for callus induction. While the tissue formed in 5:5 µM IBA: BAP was found to be delicate, short. Also, the tissue formed in 5:10 IBA: BAP was delicate, short but was higher in density as compared to treatment contained 5:5 µM IBA: BAP.

INTRODUCTION

Routine tissue culture system including callus induction and regeneration is a fundamental requirement for successful genetic transformation [1,2]. It is known that, callus induction and regeneration ability highly rely on genotypes, explants types, carbohydrate sources, plant growth regulators, basal salts of culture medium and culture conditions [3].

Potato is the fourth most important food crop in the world, and is grown in about 140 countries, more than 100 of which are located in the tropics and sub-tropical zones [4]. Some researchers have worked on potato using low concentration of media [5, 6], but utilization of high concentration of media for tissue culture of potato yet to report, therefore, we decided to determinate the best media combination and hormonal treatment for tissue culture of potato.

MATERIAL AND METHODS

Preparation and Sterilization of Plant Materials and Culture Media

Plant material was collected from their natural habitat and cultured to prepare the needed explants. In order to sterilize, plant materials were washed with many drops of dish washing liquid under tap water for about 30 min and then immersed in ethanol. After this stage, plant materials were transferred to 1% sodium hypo chlorite solution in a sealed bottle under sterile condition, gently agitated for 20 min and then rinsed three times with sterile distilled water. Plant materials were transferred on sterile filter papers and cut to culture. MS basal media supplemented with 30 and 40 g/l sucrose, 8 g/l agar and different plant growth regulator was prepared, then autoclaved after adjusting pH.

Table 1. Different Treatment Ratio of IBA and BAP

S. No.	Treatment	Medium callus fresh weight (gm. / petri dish)
1	10 µM BAP + 10 µM IBA	1.67
2	10 µM BAP + 5 µM IBA	1.59
3	5 µM BAP + 10 µM IBA	1.56
4	5 µM BAP + 5 µM IBA	0.45

Tissue Culture of Plant Material

Plant material cultured in Petri dish containing 25 ml MS basal medium supplemented with 30 and 40 g/l sucrose, 8 g/l agar and plant growth regulators. IBA (Indole-3 butyric acid) and BAP (6-Benzylaminopurine) each in different concentration and in combination (5 and 10 µM) were used as auxin and cytokinin sources, respectively. All possible combinations among these levels considered were used as treatments so 04 hormonal treatments were made. Petri dishes were incubated at 25 ± 1ºC in dark. Fresh weights of formed calli were estimated and compared in the third week after culture.

RESULTS AND DISCUSSION

Development was not identical in all the treatments, cultured tissues were observed in treatments about a week after culture. The treatments contained different ratio of IBA: BAP (10:10, 10: 5, 5: 10, 5: 5 µM) in combination were used (Table 1). Results showed that the treatments containing 10 µM IBA in combination with 10 µM BAP is most suitable for the growth. Proliferation rate in these treatments was more than others as well (Figure 1). Minimum growth was observed in the treatments containing BAP or IBA in less concentration. About three weeks after culturing the explants little growth was observed. Generally regeneration performance from petioles was low (approximately 20%). The regenerated shoots were transferred to MS basal medium without any hormones in photoperiod of 16 h light/8 h darkness to more growth. After ten days, green-long shoots were transferred to induction medium. The formed tissue in 5:5 µM IBA: BAP was found to be delicate, shorter than others. Also, the tissue formed in 5:10 IBA: BAP was delicate, short but was higher in density. Generally, 5: 5 µM was found not suitable treatment to induction in compare with the other treatments. In different concentrations and combinations of IBA and BAP different responses were observed. High concentration ratio of IBA and BAP directly enhance the induction following tissue formation; since these plantlets was both long and dense.

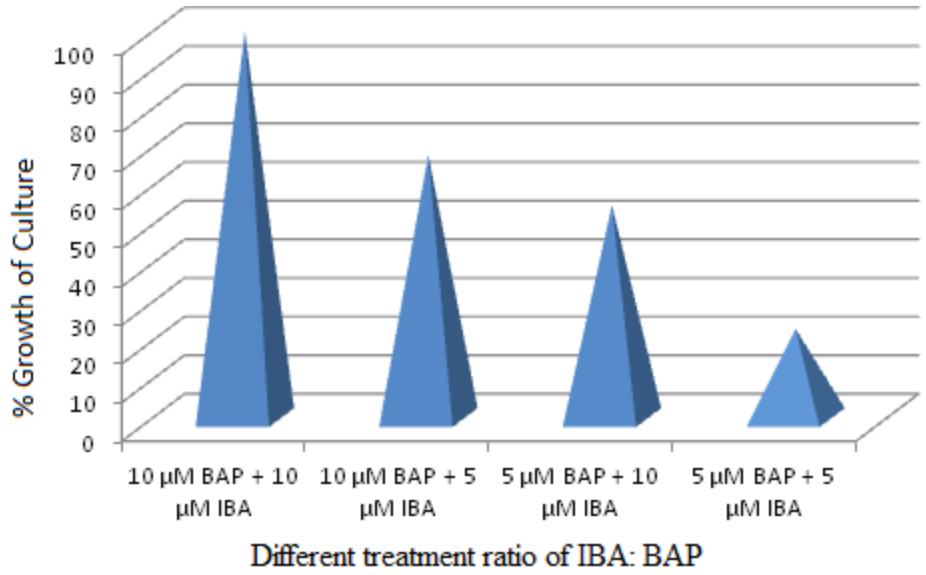

Fig. 1 % Growth of culture with respect to different media treatment

CONCLUSION

Various hormonal treatments and explant sources have been used for induction of cultured tissue growth different plants. Some researchers have used onlys auxins [7, 8] whereas some have used the combinations of auxins and cytokinins together [9, 10]. We used different combinations of BAP and IBA for this purpose. It was found that the presence of BAP not only was necessary to induction from explants of plant but improves proliferation as well. Suitable combination of IBA and BAP also improved tissue formation in culture. Induction of culture of this plant was suitable when BAP with IBA used in higher level. Generally, it can be deduced that in combinations of these hormones tissue induction is suitable when IBA is used in equal level of BAP (Table 1). The results of this experiment revealed that in response to tissue culture approaches, such that different explants or hormonal treatments were suitable to different aims for each type.

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