The Pharma Innovation Journal 2023; 12(10): 476-478

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(10): 476-478

www.thepharmajournal.com
Received: 07-08-2023
Accepted: 12-09-2023

Monika Bhanwariya
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Sutanu Maji
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Sarjesh Kumar Meena
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Tendul Chouhan
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Krishna Jat
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Corresponding Author:
Sutanu Maji
Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India

Effect of various concentrations of n-6-benzyl aminopurine (BAP) on the growth of shoots in dragon fruit explants

Monika Bhanwariya, Sutanu Maji, Sarjesh Kumar Meena, Tendul Chouhan and Krishna Jat

Abstract
The experiment was carried out to see the effect of N-6-Benzyl Aminopurine (BAP) on the successful shooting induction of dragon fruit explants. Six levels of N-6 Benzyl aminopurine (BAP) were applied for shoot multiplication of dragon fruit explants which were 0, 5, 15, 25, 35, and 45 µM. The treatments were executed in the laboratory with four replications with ten samples each and laid out in completely randomized design (CRD). Results of the experiment showed that control MS media and MS supplemented with BAP (5 and 15 µM) had maximum 100% survivability. Explants cultivated with 15 µM BAP produced shoots earlier than those in other treatments. Controlled and 5 µM BAP-containing media produced maximum (100 percent) shoot development. The maximum number of shoots per explant (5.5) was observed at the 5 µM BAP level. Explants grown in controlled and 5 µM BAP medium produced the longest shoots (2.09 cm and 1.705 cm, respectively). In the presence of 15 and 5 µM BAP, the maximum fresh weight (1.955 g and 1.94 g) was recorded.

Keywords: N-6 Benzyl aminopurine, BAP, shoot multiplication, dragon fruit, explants

Introduction
Dragon fruit, pitaya, or strawberry pear (*Hylocereus* spp. and *Selenicereus* spp.) is emerging as a super crop even for marginal land owing to its health and medicinal benefits worldwide. It is a climbing cactus vine native to Central and South America. Because of its beauty, the flower is known as "Noble Woman" or "Queen of the Night". Fruits are good in taste and have nutritional values like vitamin C, vitamin B_2, vitamin B_3, protein, dietary fibres, and minerals (Fe, P, and Ca). It can grow in a wide range of agro-climates, including areas with high temperatures and water scarcity, because it is a Crassulaceae acid metabolism (CAM) plant with xerophytes' characteristics.
Commercial cultivation of the dragon fruit is possible up to a height of 1700 metres, with rainfall ranging from 500 to 1500 mm. Its shallow roots (40 cm) make it less picky in terms of soil requirements, and it may be grown in a wide range of soils without excessive wetness. However, for the commercial development of dragon fruit orchards, slightly acidic (pH 5.5-6.0) loamy soil rich in organic matter and air temperatures ranging from 20 to 30 °C are preferred. As a result, in the last two decades, dragon fruit has grown in popularity in tropical Asian countries, with commercial cultivation beginning around the world (Sanoamuang, 2019) [12].
Tissue culture *in-vitro* propagation technology is able to assist in the production of high-quality, large-scale plantlets. There are very few current studies on tissue culture in dragon fruit, according to Castillo *et al.* (2003) [2] and Le Bellec (2004) [7]. Abdul Razak (2017) [1] created an *in vitro* regeneration and mass propagation methodology. Stem explants were cultivated on MS media with varied concentrations of BAP. Trivellini *et al.* (2020) [14] addressed a number of factors that could help with the development of dragon fruit micropropagation. However, stem cutting is the most common practice, but for quality planting materials and mass multiplication, thr micropropagation technique may be a good alternative.

Materials and Methods
The experiment was carried out at the Laboratory of the Department of Horticulture at Babasaheb Bhimrao Ambedkar University in Lucknow (Uttar Pradesh) during the period from 2021 to 2022. The agro-climatic situation of the area is humid subtropical.

The experiment was laid out in a completely randomized design (CRD) with four replications. Six concentrations of BAP were used as treatments, which were 0, 5, 15, 25, 35, and 45 µM. The total number of explants was 10 in each treatment per replication. Murashige and Skoog media was used as a basal medium, and the stem portion of dragon fruit was used as a source of explants (Murashige and Skoog, 1962) [9]. Within four weeks of culture, observations were recorded for survival percentages, days to induce the first shoot, and shoot formation percentages. At twelve weeks, observations were recorded for the number of shoots per explant (determined by counting the shoots that were produced from each treatment), average shoot length (three shoots were measured to determine), and fresh weight (g) of the shoots (assessed using a digital balance). The analysis of variance was performed to test the significance of the difference among the treatments for all the observations based on the following fixed effect statistical model as suggested by Panse and Sukhatme (1985) [10].

Results and Discussion

The effects of N-6 benzyl aminopurine (BAP) levels on all the observations of dragon fruit explants are presented in Table 1. It showed that the survival percentage of the explant for shooting was significantly decreased by applying different treatments of BAP. Control MS media and MS supplemented with BAP (5, 15 µM) had maximum 100% survivability, while high doses of BAP (25, 35, and 45 µM) decreased survival percentages. Similar results were also found by Strosse *et al.* (2008) [13], who found that raising cytokinin concentrations in bananas decreased survival. Explants cultivated in MS medium supplemented with 15 µM BAP produced shoots earlier than those in other treatments. It indicates that BAP levels influence days to the first shoot initiation of the explant. According to Jafari *et al.* (2011) [5], benzyl aminopurine (BAP) decreases apical dominance and induces both axillary and adventitious shoot initiation in banana meristematic explants. As a result, it's possible that BAP levels influence explant first shoot initiation culture. Controlled and 5 µM BAP-containing media produced 100 percent distal shoot development, followed by 99.995 percent from 15 µM BAP medium. Explants with a minimum shoot formation percent of 45 µM BAP were observed. Giusti *et al.* (2002) [4] and Khalafalla *et al.* (2007) [6] also found similar results related to the effect of BAP concentration on shoot formation. At 45 µM BAP medium, the lowest number of shoots (2.5) was found, and this finding (Figure 1) was supported by the publications of Pickens *et al.* (2006) [11] and Mohamed *et al.* (2007) [8]. Explants grown in controlled and 5 µM BAP medium produced the longest shoots (2.09 cm and 1.705 cm, respectively), while those grown in 45 µM BAP medium produced the shortest shoot (0.67 cm) (Figure 2). It's reasonable to infer that as BAP levels rise, the length of the shoots decreases. Castro-Concha *et al.* (1990) [3] also found similar results for *Agave species.* In the presence of 15 and 5 µM BAP, the maximum fresh weight (1.955 g and 1.94 g) was recorded, followed by 0.6575 g in the presence of 25 µM BAP. In 45 µM BAP-containing medium, the minimal fresh weight (0.28 g) was attained. The medium augmented with 15 µM BAP produced the most shoots.

Table 1: Effects of N-6 benzyl aminopurine (BAP) levels on all the observations of dragon fruit explant:

Treatment	BAP (µM)	Survival percentage	Days to induce first shoot	Shoot formation %	Number of shoots per explant	Shoot length (cm)	Shoot fresh weight (g)
T_1	0	100	19.75	100	3.5	2.09	2.13
T_2	5	100	17	100	5.5	1.705	1.94
T_3	15	100	14.5	99.995	3.75	1.2275	1.955
T_4	25	99.06	15.75	99.1875	3.5	1.03	0.6575
T_5	35	98.39	19	98.655	3.25	0.88	0.445
T_6	45	95.17	18.25	97.675	2.5	0.67	0.28
Mean		99.225	17.375	99.252	3.666	1.267	1.234
LSD (0.05)		0.241	1.184	0.101	0.966	0.057	0.055
SE(m)		0.081	0.395	0.034	0.323	0.019	0.018
SE(d)		0.114	0.559	0.047	0.456	0.027	0.026
CV%		0.163	4.550	0.068	17.604	2.987	2.974

Fig 1: Effect of different levels of N-6 benzyl aminopurine (BAP) on no. of shoot per explant of dragon fruit crop at 12 weeks after culture.

Fig 2: Effect of different levels of N-6 benzyl aminopurine (BAP) on shoot length of dragon fruit crop at 12 weeks after culture

Conclusion
All the above results indicate that it's possible that the survival percentage of the explant for shooting was significantly decreased by applying different treatments of BAP. Control MS media and MS supplemented with BAP (5, 15 µM) had a maximum 100% survivability, while high doses of BAP (25, 35, and 45 µM) decreased survival percentage. BAP levels influence the days leading up to the first shoot initiation of the explant. Explants cultivated in MS medium supplemented with 15 µM BAP produced shoots earlier than those in other treatments. The increase in BAP concentration reduced the shoot formation. Controlled and 5 µM BAP-containing media produced maximum (100 percent) shoot development. The effects of BAP levels on the number of shoots per explant were considerably different for shoot multiplication. The maximum number of shoots per explant (5.5) was observed at the 5 µM BAP level. The increase in BAP concentration reduced the shoot length. Explants grown in controlled and 5 µM BAP medium produced the longest shoots (2.09 cm and 1.705 cm, respectively). BAP levels influence the shoot's fresh weight. In the presence of 15 and 5 µM BAP, the maximum fresh weight (1.955 g and 1.94 g) was recorded.

Reference

1. Abdul Razak UNA. Tissue Culture, Histological and Pigment Analysis of *Hylocereus polyrhizus* (Weber) Britton and Rose; c2017.
2. Castillo RM, Livera MM, Alicia E, Brechú FJ, Guzmán M. Compatibilidad sexual entre dos tipos de *Hylocereus* (Cactaceae), Revista de Biología Tropical. 2003;51:699-706.
3. Castro-Concha L, Loyola-Vargas VM, Chan JL, Robert ML. Glutamate dehydrogenase activity in normal and vitrified plants of *Agave tequilana* Weber propagated *in vitro*. Plant Cell Tissue and Organ Culture. 1990;22:147-151.
4. Giusti P, Vitti D, Fiocchetti F, Colla G, Saccardo F, Tucci M. *In vitro* propagation of three endangered cactus species. Scientia Horticulture. 2002;95:319-332.
5. Jafari N, Othman RY, Khalid N. Effect of Benzylaminopurine (BAP) Pulsing on *in vitro* Shoot Multiplication of *Musa acuminata* (Banana) cv. Berangan. African Journal of Biotechnology. 2011;10(13):2446-2450.
6. Khalafalla M, Abdellatef E, Mohameed-Ahmed MM, Osman M. Micropropagation of cactus (*Opuntia ficus indica*) as strategic tool to combat desertification in arid and semid arid regions. International Journal of Sustainable Crop Production. 2007;2:1-8.
7. Le Bellec F. Pollinisation et fecundation d'Hylocereus undatus et d'H. Costaricensis àl'île dela Réunion, Fruits. 2004;59:411-422.
8. Mohamed MF, Mohamed MAA, Ahmed AM. Differential axillary bud proliferation responses of two sweet potato cultivars to benzyladenine and thidiazuron. Assiut University bulletin environment Research. 2007;10(2):21-30.
9. Murashige T, Skoog F. A revised medium for rapid growth and bioassays with tobacco tissue cultures; c1962.
10. Panse VG, Sukhatme PV. Statistical Method for Agricultural Workers. ICAR Publication, New Delhi; c1985. p. 97-151.
11. Pickens KA, Cheng ZM, Kania SA. Effects of colchicine and oryzalin on callus and adventitious shoot formation of *Euforbia pulcherrima* 'Winter Rose'. Horticultural Science. 2006;41:1651-1655.
12. Sanoamuang N. The challenges and experiences of dragon fruit farming and the difficulty of marketing channel for growers. FFTC Agricultural Policy Platform; c2019. p. 1-4.
13. Strosse J, Andre E, Sagi L, Swennen R, Panis B. Adventitious shoot formation is not inherent to micropropagation of banana as it is in maize. Plant Cell Tissue and Organ Culture; c2008. p. 95.
14. Trivellini A, Lucchesini M, Ferrante A, Massa D, Orlando M, Incrocci L, *et al*. Pitaya, an Attractive Alternative Crop for Mediterranean Region. Agronomy. 2020;10:1065.