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The effect of BAP concentration and salt strength of MS medium on the *in vitro* shoot growth and multiplication of *Passiflora edulis* var. Horana Gold

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INTRODUCTION & AIM

The genus *Passiflora*, with approximately 500 species, is the largest in the Passifloraceae family. Among the various *Passiflora* species *Passiflora edulis* (Passion fruit) stands out due to its nutritional, therapeutic, decorative, and commercial importance, as well as because of its phytochemistry and pharmacological qualities.

In Sri Lanka, Passion fruit is grown as a garden crop and in commercial scale as well. One of the obstacles faced during commercial Passion fruit cultivation was, cultivars used at present in here are relatively low yielding and those achieve an average annual of 500 mt nearly. To address the increasing demand for passion fruit, high yielding variety "Horana gold", released from fruit research and development institute, Horana.

However, when it comes to propagation, efficient, cost-effective methods of mass propagation to expand cultivation and satisfy the demand for good quality planting materials of these improved cultivar has been a timely necessity and this research study is focused on that.

METHOD

Apical and axillary shoot tip explants were collected from the Shade-house grown 3.0- to 3.5-month-old healthy plants of *Passiflora edulis* var. Horana gold. Collected explants were surface sterilized (washed for; 30 minutes in running tap water, 1 minute in 70% ethanol, 20 minutes in 25% Clorox, 3 times using sterile, distilled water) were placed in a petri dish containing sterile dry filter paper.

Then explants were trimmed to approximately 0.5 – 1.0 cm in length and cultured on both full strength and half strength (½) MS media supplemented with the Cytokinin growth regulator, 6-Benzylaminopurine (BAP) concentrations of 0.0 mg L^{-1}, 3.0 mg L^{-1}, 4.0 mg L^{-1}, 5.0 mg L^{-1} and 10.0 mg L^{-1}. For each BAP treatment, not less than 15 replicate culture bottles with four shoots per bottle were maintained. Cultures were incubated in the growth room at 25 ± 1°C temperature under a light intensity of 2384.00 ± 1.00 Lux provided by white LED tube lights.

Continuous observations were done to remove contaminants. After 6 weeks of incubation, the shoot height, number of shoots and number of leaves per explant were recorded at the laminar flow hood. For measuring shoot height, a sterilized, laminated graph paper was used.

From the data, the mean number of shoots and leaves per explant and mean height of shoots, were calculated for each treatment. Collected data was statistically analyzed 5% significance level, using Minitab Statistical Software (Version 21).

RESULTS & DISCUSSION

Shoot multiplication is influenced by plant species, growth media and Plant Growth Regulators etc. (Jafari et al., 2017). Many studies have indicated that BAP is essential for in vitro regeneration of Passiflora species, and the response to it varies with species and genotype. This aligns with the observed result which is, significant variations in shoot growth parameter with respect to BAP concentration and MS salt strength in the medium ($p \leq 0.05$).

In terms of both mean shoot height (1.4 - 2.2 cm) and mean number of leaves per explant (1.3 - 4.5), shoots performed better on MS than on ½ MS (1.5 - 1.9 cm, 1.2 - 2.8) and those highest means were recorded from BAP free MS media.

The interaction between BAP concentration and salt strength was not significant ($p > 0.05$) for the mean number of shoots per explant, although concentrations of 3.00, 4.00 and 5.00 mg L-1 of BAP consistently resulted in significantly higher mean shoot numbers per explant on both MS (3.8 - 4.6) and ½ MS (3.0 - 3.5).

Reduction in shoot growth parameters were recorded, irrespective of the salt strength of the MS media, when increasing the BAP concentration from 5.00 mg L-1 to 10.00 mg L-1. This can be explained as Ozarowski & Thiem (2013), emphasized, that the high concentrations of Cytokinins may not always be preferred for in vitro cultures of explants, because it leads to high incidence of indirect organogenesis resulting the genetic instability of the regenerated plants or tissue death.

CONCLUSION

In summary, BAP concentrations of 3.00, 4.00 and 5.00 mg L^{-1} can be recommended for the optimum shoot multiplication of shoot tip culture of *P. edulis* on MS and ½ MS media to obtain cost-effective superior planting materials.

With the interest of obtaining more shoots per explant, use of ½ MS media supplemented with BAP in either 3.00, 4.00 or 5.00 mg L^{-1} concentration can be recommended.

The application of BAP free MS media, as an intermediate media or as the first subculturing media, to obtain a healthy and well grown plantlets with elongated shoots of *P. edulis* can be suggested.

FUTURE WORK / REFERENCES

Conducting more research on this newly developed and commercially valuable Passion fruit variety would be a positive investment for Sri Lankan Agriculture sector.

Jafari, M., Daneshvar, M. H., & Lotfi, A. (2017). In vitro shoot proliferation of Passiflora caerulea L. via cotyledonary node and shoot tip explants. *Biotechnologia*, *98*(2), 113–119. https://doi.org/10.5114/bta.2017.68310

Ozarowski, M., & Thiem, B. (2013). *Rev Bras Farmacogn 23(2013): 937-947 Progress in micropropagation of Passiflora spp. to produce medicinal plants: a mini-review*.