ABSTRACT

The present study deals with tissue culture of *Punica granatum* L. Nodal stem explant was found to be the best explant which gave the highest shoot number (3.8±0.2) on MS medium supplemented with 1.5 g/L BAP, while shoot tip explant (1.9±0.1cm) on MS medium with 2.0 mg/L BAP gave the best shoot height. MS supplemented with 1.5 mg/L BAP was observed to give the highest shoot production (4.1±0.2) with combination of 40 g/L of sucrose in shoot tip explant. Complete plant regeneration was achieved for both shoot tips and nodal stem explants cultured on MS medium supplemented with 1.5 mg/L BAP. In scanning electron microscopy studies, *in vitro* leaf exhibited higher stomata density compared to *in vivo* leaf sample. No irregular characteristics were found in *in vitro* leaf and stem samples when compared to the *in vivo* leaf and stem samples. In callus production from *P.granatum* L., the highest callus weight was obtained from root explants cultured on MS supplemented with 1.5 mg/L BAP and 1.5 mg/L NAA (0.48±0.08g) and the highest callus weight using other auxins and cytokinins (IAA, IBA, 2,4-D and Kinetin) was obtained from stem explants supplemented with 2.0 mg/L IBA (0.26 ±0.01g). The highest percentage of radical scavenging activity was obtained from *in vivo* leaf extract with 67.4% at 100 µg/ml of sample concentration. Peel extract exhibited the highest percentage of radical scavenging activity of all samples (77.6%) and also the strongest IC_{50} value (2.21 mg/ml), at 100 µg/ml of sample concentration. Phytochemical contents that were presence in *in vivo P.granatum* L. sample were also presence in *in vitro* samples such as saponin, tannins, flavonoids and reducing sugar. Between peel and seed extracts of *P.granatum* L., terpenoid was detected but tannins and reducing sugars were detected only in peel extract.

ABSTRAK

Kajian ini melibatkan kultur tisu ke atas *Punica granatum* L. Didapati eksplan batang bernod adalah eksplan yang terbaik dan menghasilkan jumlah pucuk yang tertinggi (3.8±0.2) manakala eksplan pucuk (1.9±0.1cm) memberikan panjang pucuk yang tertinggi. Media MS diperkaya dengan 1.5 mg/L BAP memberikan keputusan terbaik untuk jumlah pucuk tertinggi (4.1±0.2) dengan kombinasi 40 g/L sukrosa menggunakan eksplan pucuk. Regenerasi tumbuhan lengkap didapati apabila eksplan pucuk dan batang bernod dikultur di atas media MS yang ditambah dengan 1.5 mg/L BAP. Di dalam kajian mikroskopi elektron pengimbas, daun *in vitro* telah menunjukkan ketumpatan stomata yang lebih tinggi jika dibandingkan dengan sampel daun *in vivo*. Tiada sifat luar biasa dapat dikesan dari sampel daun dan batang *in vitro* apabila dibandingkan dengan sampel daun dan batang *in vivo*. Dalam produksi kalus daripada *P.granatum* L, berat kalus tertinggi didapati dari eksplan akar apabila dikultur di atas MS media diperkaya dengan 1.5 mg/L BAP dan 1.5 mg/L NAA (0.48±0.08g) dan berat tertinggi kalus dari hormon auksin dan sitokinin yang lain pula diperolehi dari eksplan batang diperkaya dengan 2.0 mg/L IBA (0.26±0.01g). Peratusan cerapan radikal tertinggi di antara kesemua sampel *in vitro* dan *in vivo* diperolehi dari ekstrak daun *in vivo* dengan 67.4% pada 100 µg/ml kepekatan sampel. Ekstrak kulit mempunyai peratusan cerapan radikal tertinggi di antara semua sampel (77.6%) dan juga nilai Setengah Kepekatan Perencatan Maksimum, atau IC_{50} terendah (2.21), pada kepekatan sampel 100 µg/ml. Kandungan fitokimia seperti saponin, tannin, flavonoid dan gula penurun yang wujud di dalam sampel *in vivo* daun dan batang *P.granatum* L. didapati juga di dalam sampel daun dan batang *in vitro*. Di antara ekstrak sampel kulit dan biji benih dari *P.granatum* L., terpenoid dikesan pada kedua-dua ekstrak, manakala tannin dan gula penurun hanya dikesan pada ekstrak kulit.

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ABBREVIATIONS

BAP	- 6-Benzylaminopurine
NAA	- α-Naphthaleneacetic acid
IBA	- Indole-3-butyric acid
IAA	- Indole-3-acetic acid
2,4-D	- 2,4-dichlorophenoxyacetic acid
Kinetin	- 6-furfuryamino purine
cm	- centimeter
m	- meter
ml	- mililitre
g	- gram
g/L	- gram per liter
Mg/L	- milligram per liter
^{o}C	- degree celcius
v/v	- volume per volume
w/v	- weight per volume
NaOH	- Natrium Hydroxide
HCl	- Hydrochloric acid
DMRT	- Duncan's Multiple Range Test
mM	- miliMolar
µM	- microMolar
MS	- Murashige and Skoog
Nm	- nanometer
PVA	- Polivinyl-Alcohol
LDL	- Low-density lipoprotein
DPPH	- 2,2-diphenyl-1-picrylhydrazyl
IC_{50}	- Half Maximal Inhibitory Concentration