In Vitro Root Induction and Culture of the Medicinal Plant *Capparis spinosa* L.

Ghada Haroon Abu Khalaf, Rami Arafeh
Supervisor: Rami Arafeh
Biotechnology Research Center
Master of Biotechnology
Palestine Polytechnic University

Introduction

Capparis spinosa L. is one of the known medicinal plants in Palestine which has high pharmaceutical and ecological values [1]. Caper belongs to the genus *Capparis* of the Capparidaceae family. *C. spinosa* has a wide distribution in the Mediterranean region. Caper is a dicotyledonous, spiny medium size perennial bush. It may reach about one meter height [2]. It grows spontaneously in cracks and crevices of rocks and stone walls (Figure 1). Caper has many pharmaceutical uses since it contains a wide range of phytochemicals like alkaloids and flavinoids. Although all parts of caper are pharmaceutically useful, roots are the principle material used in the traditional medicine in Palestine. Roots are mainly used to treat joints inflammations, and also to treat hypertension, arteriosclerosis, gout, rheumatism, and anemia [3].

Figure 1: *Capparis spinosa* grows in old wall.

Objective

For better utilization of *C. spinosa* and to protect it from future overexploitation and genetic erosion, a tissue culture protocol was optimized for the *in vitro* production of roots.

Methodology

Roots were induced from sterilized leaf segments.

Data were reported after six weeks of culture according to rooting percentage, root number and length. For *in vitro* root growth in liquid media, regular measurement of root growth in different treatments was assessed in terms of root growth area at two weeks interval.

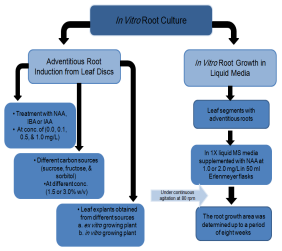

Figure 2: The methodology of *in vitro* root culture.

All experiments were set at the Completely Randomized Design (CRD) and significance in data means was tested by the analysis of variance ANOVA with StatPlus 2007 Professional software.

Results

1. Adventitious Root Induction from Leaf Discs

a. Effect of auxin types and concentrations (Table 1).

Type and Concentration of Auxins (mg/L)	Percentage of Response (%)	Mean of Root Number / Culture (Mean ± SE)	Mean of Root Length / Culture (cm) (Mean ± SE)
NAA (0.1)	56.25	1.19 ± 0.42	0.56 ± 0.18
NAA (0.5)	25.00	0.94 ± 0.49	0.33 ± 0.16
NAA (1.0)	62.50	1.69 ± 0.50	0.87 ± 0.16
IBA (0.1)	18.75	0.25 ± 0.14	0.14 ± 0.09
IBA (0.5)	0	0	0
IBA (1.0)	12.50	0.19 ± 0.14	0.12 ± 0.08
IAA (0.1)	0	0	0
IAA (0.5)	0	0	0
IAA (1.0)	0	0	0
Control	0	0	0

Table 1: Rooting percentage, average root numbers and roots length of *in vitro* root induction from leaves of *C. spinosa* in response to different treatments of auxins.

b. Effect of carbon source types and concentrations (Table 2).

Carbon Source Types and Concentrations	Percentage of Root Induction (%)	Mean of Root Number / Culture (Mean ± SE)	Mean Root Length / Culture (cm) (Mean ± SE)
Sugar Free	0	0	0
Sucrose (3.0% w/v)	41.6	0.67 ± 0.26	0.13 ± 0.05
Sucrose (1.5% w/v)	0	0	0
Fructose (3.0% w/v)	25	0.42 ± 0.23	0.09 ± 0.05
Fructose (1.5% w/v)	8.3	0.17 ± 0.17	0.03 ± 0.03
Sorbitol (3.0% w/v)	0	0	0
Sorbitol (1.5% w/v)	0	0	0

Table 2: Rooting percentage, average root numbers and roots length of *in vitro* root induction from leaves of *C. spinosa* in response to different sugar types and levels.

c. Effect of Explants Source

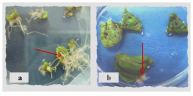

Figure 3: root induction on MS medium supplemented with 1.0 mg/L NAA , (a) *in vitro* leaves, (b) *ex vitro* leaves.

2. Root Growth in Liquid Media

1.0 mg/L NAA added to MS liquid medium gave higher growth area (4.08 ± 1.13 cm^2) than 2.0 mg/L (3.00 ± 0.43 cm^2).

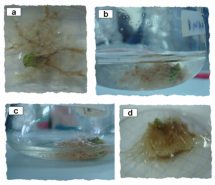

Figure 3: Root growth in MS liquid media supplemented with 1.0 mg/L NAA. (a) at starting day of culture, (b) after two weeks of culture, (c) after six weeks of culture, (d) after eight weeks of culture.

References

[1] I. Musallam, M. Duwayri, and R. A. Shibli, "Micropropagation of caper (*Capparis spinosa* L.) from wild plants", Functional Plant Science and Biotechnology, vol. 5 (Special Issue 1), pp. 17-21, 2011.

[2] M. Basbag, O. Toncer, and S. Basbag, "Effects of different temperatures and auration on germination of caper (*Capparis ovata*) seeds", Journal of Environmental Biology, vol. 30, issue. 4, pp. 621-624. 2009.

[3] H. Sher and M. N. Alyemeni, "Ethnobotanical and pharmaceutical evaluation of *Capparis spinosa* L, validity of local folk and Unani system of medicine", Journal of Medicinal Plants Research, vol. 4 issue. 17, pp.1751-1756. 2010.