ELSEVIER

Plant Science 163 (2002) 533–541

PLANT SCIENCE

www.elsevier.com/locate/plantsci

Root promoting compounds detected in olive knot extract in high quantities as a response to infection by the bacterium *Pseudomonas savastanoi* pv. *savastanoi*

P.A. Roussos *, C.A. Pontikis, E. Tsantili

Laboratory of Pomology, Department of Crop Science, Agricultural University of Athens, Iera Odos 75, Botanikos, Athens 118 55, Greece

Received 15 February 2002; received in revised form 14 May 2002; accepted 28 May 2002

Abstract

Olive knot crude extract has been found to promote rooting in vitro of Koroneiki olive explants. The analysis of this extract revealed the presence of the naturally occurring auxins indole-3-acetic acid (IAA) and indole-3-acetonitrile (IAN) in high quantities. Both auxins were found in higher amounts in the knots, formed in olive shoots after the infection by the bacterium *Pseudomonas savastanoi* pv. *savastanoi*, than in healthy shoots. Further research showed that the knots were rich in phenolic compounds and *o*-diphenols, as well as that they contained higher amounts of oleuropein (an *o*-diphenol) and another unidentified compound in contrast to healthy shoots. The analysis of polyamines showed higher concentrations of putrescine in the knots than in the healthy shoots, while it was not possible to detect any traces of spermidine or spermine in the olive knot extract. The results suggested a possible role and collaboration of auxins, phenolic compounds and polyamines, such as putrescine, in the root induction procedure of olive explants in vitro. Furthermore, a possible defense mechanism of olive tree against the bacterium was postulated, through the increased production of possible anticipins, like IAN and the unknown phenolic compound.

Keywords: Auxins; Olive knot extract; Phenolic compounds; Polyamines; *Pseudomonas savastanoi* pv. *savastanoi*; Root promoting capacity

1. Introduction

During the first decades of in vitro culture of plant species, many extracts of unknown chemical synthesis were used to promote growth during the various stages of the in vitro culture. The improvements in the techniques of analytical chemistry have allowed the detection of various substances, even in picomole amounts, in these extracts. The above has lead to the use of chemically pure substances, which have replaced the more complex extracts, giving repeatable, equally or even better results.

Auxins, phenolic compounds and polyamines have been found to promote rooting in the in vitro culture of many plant species [1–5]. Auxins are the plant growth regulators, that can be added in the medium in order to promote rhizogenesis [1]. Phenolic compounds have been shown to have slight auxin like action [6] and some of them have been used in the rooting stage in vitro [4,7]. Furthermore, it has been shown that some phenolic compounds may induce rooting in mung bean cuttings during the mung bean assay [5] and their endogenous level is influenced by various treatments with auxins or polyamines during rhizogenesis [8].

Polyamines have been used in vitro, mostly in combination with auxins, in order to promote rhizogenesis [2]. Putrescine, a polyamine, has been found to promote rhizogenesis of explants of various olive varieties in vitro [3,9] as well as rooting during the mung bean assay [8]. Furthermore, the increase of endogenous putrescine concentration is one of the main factors needed for root differentiation of tobacco subepidermal cells [10].

In the present study, the levels of some rooting promoting substances in healthy and by the bacterium *Pseudomonas savastanoi* pv. *savastanoi* infected 'Kor-

* Corresponding author. Tel.: +30-1-529-4611; fax: +30-1-529-4592

E-mail address: roussosp@aua.gr (P.A. Roussos).

0168-9452/02/$ - see front matter
PII: S0168-9452(02)00157-7