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Strawberry fruit quality attributes after application of plant growth stimulating compounds

P.A. Roussos *, N-K. Denaxa, T. Damvakaris

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

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ABSTRACT

Strawberry plants cv. Camarosa were treated with different plant growth stimulators, in order to examine their effect on both yield and product quality. The treatments comprised an untreated control and a mixture of a seaweed extract plus a commercial mixture of nitrophenolates and a commercial mixture of an auxin (phenothiol) plus gibberellic acid at two dose rates. The plant growth stimulators increased marketable yield and fruit size, while they had no significant impact on fruit juice pH, titratable acidity and total soluble solids concentration. Furthermore, they had no significant effect on fruit organic acid and carbohydrate concentration and on fruit color, although they enhanced total anthocyanin concentration. The antioxidant activity of the fruit juice was slightly higher in the fruits of control treatment, which could be the result of their higher total phenol, *o*-diphenol, flavonoid and flavanol concentration. When a taste panel took place, the panelists gave the best score to those fruits deriving from plants treated with the mixture of auxin plus gibberellic acid.

1. Introduction

During the last decades intense interest has been aroused around the effect of a diet rich in fruits and vegetables on the reduced risk of chronic, degenerative and of oxidative stress-mediated diseases, such as cancer, cardiovascular and neurodegenerative diseases (Wang and Lin, 2000; Meyers et al., 2003). Strawberry (*Fragaria* × *ananassa* Dush.) fruits are very popular among berries and are reported to have antioxidant, anticancer, anti-inflammatory and anti-neurodegenerative biological properties. These properties are mainly attributed to high fruit polyphenolic content, especially anthocyanins – the type of polyphenols quantitatively most important in strawberry fruits – as well as flavonoids, phenolic acids and vitamin C (Meyers et al., 2003; Olsson et al., 2004; Cordenunsi et al., 2005). Antioxidant capacity of strawberry fruit extracts was correlated mainly with the total phenol content of the fruit rather with an individual phenolic compound (Rekika et al., 2005; Cheel et al., 2007) or vitamin C content (Cheel et al., 2007). Because of these compounds, strawberry fruits have demonstrated a remarkable high scavenging activity toward chemically generated radicals, thus making these fruits effective in inhibiting oxidation of human low-density lipoproteins (Wang and Lin, 2000). Pre-harvest factors such as the genetic background, the environmental conditions during culture as well as the cultural practices employed, influence the antioxidant capacity of the crop.

The size, the shape, the color, the firmness, the acidity, the sweetness and the overall fruit flavor make strawberry one of the most popular spring and summer fruits. As consumers mainly purchase strawberries for an enjoyable eating experience there are a lot of media reports indicating increasing consumer dissatisfaction regarding the flavor and inconsistent quality of strawberries (Azodanlou et al., 2003). The main objective of the growers is to produce a fruit with appealing appearance (size, color and shape), not necessary accompanied by the same appealing tasteful characteristics (Azodanlou et al., 2003). In order for the farmers to achieve such fruit growth enhancement, they often use plant growth regulating compounds.

Many plant growth regulating compounds (auxins, cytokinins and gibberellins) have been used in various crops in order to achieve larger fruit size (Guardiola and Garcia-Luis, 2000; Stern et al., 2007). Although the efficacy of such product applications is quite easily evaluated based on fruit enlargement, this does not apply for biochemical quality characteristics.

The role of auxin in strawberry fruit development has long been recognized, as it is responsible for the receptacle enlargement and therefore fruit size growth. In strawberry, Nitsch (1950) demonstrated that hormonal compounds produced by the developing

* Corresponding author. Tel.: +30 210 5294596; fax: +30 210 5294592.
E-mail address: roussosp@aua.gr (P.A. Roussos).

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