BRIEF COMMUNICATION

Induction of parthenocarpy in *Rosa canina* and *Diospyros lotus* by the application of growth regulators

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Abstract

The effect of indole-3-acetic acid (IAA) and gibberellic acid (GA_3) applications on parthenocarpic fruit set in *Rosa canina* and *Diospyros lotus* was investigated. GA_3 induced parthenocarpic fruit set in both plants, but IAA only in *D. lotus*. Maturation of seedless fruits was earlier than the seeded fruits. GA_3 caused a decrease in the fresh mass and size of both fruits. IAA induced an increase in the fresh mass and size in parthenocarpic fruit of *D. lotus*.

Additional key words: dog rose, indole-3-acetic acid, gibberellic acid, parthenocarpy, persimmon.

Rosa canina L. (dog rose) grows in nature and its fruits contain a great amount of vitamin C. *Diospyros lotus* L. (persimmon) is a deciduous fruit-tree (globe fruits, 1.5 - 2 cm in diameter, bluish-black when mature).

Application of synthetic plant growth regulators in the production of seedless (parthenocarpic) fruits was investigated in many plants (*e.g.* Gustafson 1939, Mukhopadhyay 1982, Beech 1983, Tafazoli 1991, Talon *et al.* 1992, Kim *et al.* 1992). The main advantage of parthenocarpy is that fruit set is not dependent upon weather conditions and insect or hand pollination. Prosser and Jackson (1959) reported that parthenocarpy may be induced in the *Rosa rugosa*, *R. spinosissima* and *R. arvensis*. But no studies on the parthenocarpic fruit set of *Rosa canina* and *Diospyros lotus* have previously been reported.

This study was carried out to examine the effect of GA_3 and IAA on producing seedless fruits of *Rosa canina* and *Diospyros lotus*.

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The experiment was conducted in 1996 and 1997 in Giresun, Turkey. Ten *Diospyros lotus* trees and *Rosa canina* shrubs were used. Parthenocarpic fruits were induced by spraying of 50 flowers of uniform development on each plant by solution of growth regulators (0.6 or 1.5 mM GA_3 and 0.06 or 0.6 mM IAA) containing 0.1 % Tween-80. Distilled water was applied to flowers of control trees. The hormone treatment was repeated 3 times at 5 d intervals.

The fruits (25 fruits per tree) were harvested and fresh mass, size and number of seeded and seedless fruits were determined.

Rosa canina hipanthium fresh mass and thickness significantly decreased by the application of 1.5 mM GA_3. The hipanthium diameter was similar in all treatments. However, hipanthium length increased in the parthenocarpic fruits (Table 1).

Table 1. Effect of growth regulators on hipanthium characters in *R. canina*. Mean within each column followed by the same letter are not significantly different at 5 % (thickness and diameter) and at 1 % (mass and length) of probability (Duncan's Multiple Range Test); $n = 50$.

Treatments	Fresh mass [g fruit^{-1}]	Thickness [mm]	Diameter [mm]	Length [mm]	Colour
Control	1.1 ± 0.3 b	3.0 ± 0.6 b	11 ± 1.1 ab	11 ± 0.9 a	red
0.60 mM GA_3	1.0 ± 0.3 b	2.6 ± 0.5 a	10 ± 2.6 a	13 ± 3.5 a	orange
1.50 mM GA_3	0.5 ± 0.1 a	2.6 ± 0.5 a	12 ± 1.3 b	19 ± 0.0 b	orange
0.06 mM IAA	1.0 ± 0.3 b	3.3 ± 0.6 b	10 ± 0.7 a	11 ± 1.0 a	red
0.60 mM IAA	1.1 ± 0.3 b	3.0 ± 0.8 b	11 ± 0.9 ab	11 ± 0.7 a	orange

Treatment with 0.6 and 1.5 mM GA_3 gave 100 % parthenocarpic fruits. Similar as in other *Rosa* species (Jackson and Blundell 1964, Prosser and Jackson 1959), IAA-treated plants had the same seed number as controls. But Prosser and Jackson (1959) reported that parthenocarpy may be induced in *R. rugosa* and *R. spinosissima* by other auxins such as α-naphthalenacetic acid, α-naphthaleneacetamide and 2,4,5-trichlorophenoxyacetic acid. Fruit fresh mass and fruit size (diameter) was significantly decreased by GA_3 application, especially by 1.5 mM GA_3. The length of

Table 2. Effect of growth regulators on fruits characters in *Rosa canina*. Mean within each column followed by the same letter are not significantly different at 5 % (fruit number) and at 1 % (the other characters) of probability (Duncan's Multiple Range Test); $n = 50$.

Treatments	Seedless fruits [%]	Fresh mass [g fruit^{-1}]	Fruit number [hipanthium^{-1}]	Fruit size [mm]	Pedisel length [mm]
Control	0	1.2 ± 0.2 c	20 ± 1.6 b	3.0 ± 0.5 c	13 ± 2.1 a
0.60 mM GA_3	100	0.6 ± 0.2 b	23 ± 3.3 c	2.0 ± 0.5 b	45 ± 9.0 b
1.50 mM GA_3	100	0.3 ± 0.1 a	20 ± 2.2 b	1.0 ± 0.0 a	44 ± 7.3 b
0.06 mM IAA	0	1.2 ± 0.2 c	20 ± 1.8 b	4.0 ± 1.3 d	13 ± 2.0 a
0.60 mM IAA	0	1.1 ± 0.3 b	19 ± 1.3 a	3.0 ± 0.6 c	11 ± 2.1 a

fruit pedicel significantly increased at GA_3 application (Table 2). Similarly when parthenocarpic fruits in tomato were induced by GA_3, fruit pedicels were elongated (Bangerth and Sjuit 1978, Sjuit and Bangerth 1984).

In *D. Lotus* treatment with 0.6 and 1.5 mM GA_3 and 0.06 and 0.6 mM IAA gave 100 % parthenocarpic fruit set. The increased IAA concentration caused an increase in fruit fresh mass and fruit size. 1.5 mM GA_3 induced smaller parthenocarpic fruits than the control. At harvesting, different fruit color was observed (Table 3). The ripening of fruit was earlier in GA_3 and IAA-treated plants than in control plants (Table 3).

Table 3. Effect of growth regulators on fruits characters in *Diospyros lotus*. Mean within each column followed by the same letter are not significantly different at 5 % (mass) and at 1 % (size) of probability (Duncan's Multiple Range Test); $n = 50$.

Treatments	Seedless fruits [%]	Fresh mass [g fruit^{-1}]	Size [mm]	Colour	Ripening Time
Control	0	1.0 ± 0.1 a	14 ± 1.5 b	dark yellow	late
0.60 mM GA_3	100	0.9 ± 0.2 a	11 ± 1.3 a	light yellow	early
1.50 mM GA_3	100	0.9 ± 0.2 a	10 ± 2.0 a	light yellow	early
0.06 mM IAA	100	0.9 ± 0.1 a	16 ± 2.7 c	yellow	early
0.60 mM IAA	100	1.6 ± 0.3 b	17 ± 0.7 c	yellow	early

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