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Jasmonates Improve Flowering at the expense of Runner Production in Strawberry

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ABSTRACT: Now a days, hydroponically strawberry production in greenhouse is noticeably increasing in Iran, however there are several problems including low yield, low fruit quality, misshaped fruits and susceptibility to environmental stresses. Using of plant growth regulators is a important means to ameliorate above mentioned problems. Therefore, in this research the effect of foliar application of Jasmonic Acid(JA) at the rate of 0, 0.5, 1, 1.5 and 2 mM and Methyle Jasmonate(MJ) at the rate of 0, 0.25, 0.5, 1 and 1.5 on flowering, and runner production of strawberry cultivars (Paros and Selva) was investigated. Results indicated that both JA and MJ at the rate of 1.5 mM produced the greatest number of flower and inflorescence per plant. JA at concentrations of 1.5 and 2 mM and MJ at 1.5 mM significantly decreased the number of runners.

Keywords: *Fragria ananassa* Duch., Jasmonic acid, Methyle Jasmonate, Runnering.

INTRODUCTION

Strawberry (Fragaria x ananassa Duch.) is a dicotyledonous plant belongs to Rosaceae family. According to FAO, high portions of strawberry production comes from United states, Spain, Japan, Poland, Italy and south korea (FAO, 2006). Strawberry production under hydroponic conditions in greenhouse is an ever increasing industry. Although there are some problems such as low yield, poor quality and sensitivity to indoor conditions (Eshghi and Jamali, 2009). Production of fruits with high quantity and quality is among the general goals of growing strawberry in greenhouse. Usage of plant bioregulators such as Jasmonic acid (JA) has been the subject of many studies, for improving the yield and quality of fruits in different species but literatures on strawberry are relatively limited. So the aim of this investigation was to evaluate the effect of JA on vegetative and reproductive growth of 2 strawberry cultivars: ' Paros' and 'Selva'.

MATERIALS AND METHODS

For assessing the effect of JA on 2 cultivars of strawberry including 'Selva' and 'Paros', the present study was carried out in a completely randomized design. Rooted daughter plants for each cultivar, were potted in plastic pots filled with 1:1:1 vermiculite and perlite, grown in greenhouse under hydroponic conditions and fertigated with Melspray solution. After their establishment the treatments were foliar applied and replicated at the time of flowering. Treatments included: methyl jasmonate at 0, 0.25, 0.5 and 1.5 mM and Jasmonic acid at 0, 0.5, 1, 1.5 and 2 mM concentrations. For each experiment there were 4 replications, each of which had 3 pots with a plant. The number of runners, fruits, flowers and inflorescences per plant were calculated during the experimental period by counting them twice a week the data were analyzed by SPSS 16 software using the LSD test for comparing the means.

RESULTS AND DISCUSSION

The effect of JA and methyl jasmonate on number of runners, fruits, flowers and inflorescences of 'Paros' and 'Selva' strawberry.

The effect of JA and methyl jasmonate was not similar in both cultivars. As it has been indicated in table 1, number of runners decreased after JA and methyl jasmonate treatments. Low concentrations of both compounds did not affect this parameter in 'Selva' strawberry but increased parameters in 'Paros'. Staswick (1992) reported and inhibitory effect of JA on the growth of roots and stalks of plants. Norastehnia (2007) showed a reduction of growth in maize after methyl jasmonate application. JA at 1.5 mM had the highest effect on the number of flowers and fruits, and caused the plants to bear more flowers and fruits in comparison to methyl jasmonate.

Table 1: Number of runners and fruits of 'Paros' and 'Selva' strawberry as affected by jasmonic acid and methyl jasmonate of different concentrations.

	Runners			Fruits		
	Paros	**Selva**	**Average**	**Paros**	**Selva**	**Average**
$JA_{0.5}$	1.3B	0.31cd	2.27ab	20.95BC	15.7a-d	3.2f
JA_1	1.2B	0.27d	2.13ab	21.1BC	16.3a-c	5.2ef
$JA_{1.5}$	1.05B	0.13d	1.79ab	13.7BC	17.3ab	10b-f
JA_2	0.86B	0.10d	1.62ab	17.5A	20.2a	14.8ad
$MJ_{0.25}$	2.22A	2.25ab	2.19ab	4.2A	7.1c-f	1.3f
$MJ_{0.5}$	1.75AB	1.31bc	2.18ab	7.1BC	9.8b-f	4.4ef
MJ_1	1.68AB	1.31bc	2.04ab	11.9BC	15.2a-d	8.6b-f
$MJ_{1.5}$	0.92B	0.06d	1.77ab	10BC	13.3a-e	6.7def
Control	2.34A	2.36a	2.3ab	3C	2f	3.9f
Average		B 0.89	A 2.02		A 12.9	B 6.4

Means followed by the same latter within cultivars and columns are not significantly different at 5% probability using LSD test.

Table 2: Number of flowers and inflorescences of 'Paros' and 'Selva' strawberry as affected by jasmonic acid and methyl jasmonate of different concentrations.

	Flowers					Inflorescences
	Selva	**Paros**	**Average**	**Selva**	**Paros**	**Average**
$JA_{0.5}$	11.45c-e	11.73a-c	11.6A	10.75b-e	10.56c-f	**10.65A**
JA_1	11.71abc	11.19b-e	11.44AB	10.77b-f	10.41d-f	**10.58A**
$JA_{1.5}$	12.46a	10.81c-e	11.63A	11.33ab	10.19ef	**10.76A**
JA_2	12.31ab	10.63c-e	11.47AB	10.92a-c	10.25c-f	**10.59A**
$MJ_{0.25}$	11.2de	10.52de	10.86AB	10.31C-f	10.19bf	**10.25A**
$MJ_{0.5}$	10.81c-e	10.56de	10.68AB	10.33c-f	10.21d-f	**10.27A**
MJ_1	11.46a-d	10.73c-e	11.12AB	10.45c-f	10.79b-d	**10.62A**
$MJ_{1.5}$	11.73abc	10.77c-e	11.25AB	11.42a	10.27d-f	**10.85A**
Control	10.72cde	10.09e	10.41B	10.29d-f	10.16 f	**10.26A**
Average	A 11.53	B 10.78		A 10.73		**B 10.34**

Means followed by the same latter within cultivars and columns are not significantly different at 5% probability using LSD test.

'Selva' had more flowers and fruits than 'Paros'. Pérez *et al* (1997) indicated that methyl jasmonate caused a 55% higher growth of strawberry fruits when compared with control samples.

As it has been shown in table 2, the greatest effect of the both compounds occurred when they were applied at 1.5 mM concentration and 'Selva' had had a higher number of inflorescences than the other cultivar.

In conclusion, our results suggest that exogenously applied JA and methyl jasmonate may increase the number of inflorescences, flowers and fruits and inhibitory on the growth of roots and stalks of plants.

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