

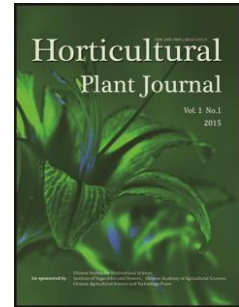
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1 Modulation of Sex Expression in Four Forms of Watermelon by 2 Gibberellin, Ethephon and Silver Nitrate

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10 Abstract

11 There has been no systematic research on the effect of plant growth regulators and silver
12 nitrate treatments on the control of sex expression in watermelon. In this study, we tested sex
13 expression responses of four watermelon forms (monoecism, gynoeism, andromonoecism, and
14 hermaphrodite) to gibberellin, ethephon and silver nitrate treatments. As results showed, in
15 monoecious plants, gibberellins (GA₃) and ethephon treatments reduced the percentage of female
16 flowers and delayed the occurrence of the first female flower, while silver nitrate induced the
17 formation of bisexual flowers. In gynoeious plants, both ethephon and silver nitrate treatments
18 transformed some female flowers into bisexual flowers, and treatment with ethephon resulted in a
19 mass of abnormal flowers, while no obvious effect of treatment with GA₃ was observed. In
20 andromonoecious plants, ethephon and GA₃ treatments delayed the occurrence of the first bisexual
21 flower, and GA₃ reduced the percentage of bisexual flowers, while no distinct effect for silver
22 nitrate treatment was observed. In hermaphroditic plants, ethephon treatment induced the
23 appearance of numerous abnormal flowers, while no obvious effects for GA₃ and silver nitrate
24 treatments were observed. We analysed the transcription levels of all the expressed
25 aminocyclopropane-1-carboxylic acid synthase (ACS) homologues in two gynoeious mutants
26 and their wild types. We also tested the gene expression of *CitACS4* which had been recognized
27 as the andromonoecious gene in all treatments. All these results suggested that the best
28 masculinizing treatment for breeding of the gynoeious line is silver nitrate, which repressed the
29 expression of *CitACS4* and induced many bisexual flowers for use in self-fertilization
30 subsequently.

31 **Keywords:** watermelon; sex expression; gibberellins (GA₃); ethephon; silver nitrate

33 1. Introduction

34 The plant sexual form is the result of the presence/absence and distribution pattern of male,
35 female and bisexual flowers on an individual plant (Dellaporta and Calderon-Urrea, 1993;
36 Tanurdzic and Banks, 2004). Watermelon [*Citrullus lanatus* (Thunb.) Matsum. & Nakai] is a
37 major cucurbit crop and an important vegetable crop. The flowering pattern of watermelon

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