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Thi-Thao Vo, Changsu Lee, Sang-Il Han, Jee Young Kim, Sok Kim, Yoon-E Choi

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Effect of the ethylene precursor, 1-aminocyclopropane-1-carboxylic acid on different growth stages of *Haematococcus pluvialis*

Thi-Thao Vo[1], Changsu Lee[2], Sang-Il Han[3], Jee Young Kim[3], Sok Kim[3], and Yoon-E Choi[3]*.

Department of Bioactive Material Sciences, Chonbuk National University[1]
Department of Bioprocess Engineering, Chonbuk National University[2]
Division of Environmental Science & Ecological Engineering, Korea University[3]
(1) and (2) contributed equally to this study
*Corresponding author. Tel: +82 2 3290 3042, Fax: +82 2 3290 3040,
E-mail: yechoi@korea.ac.kr

Abstract

In this study, we explored the effects of ACC on other stages of *H. pluvialis*. Interestingly, even though ACC displayed a dose-dependent effect on astaxanthin production, it is evident that astaxanthin production could be facilitated whenever the cells were treated at the early red stage. The transcriptional levels of *BKT, CHY*, *SOD*, and *CAT* genes supported enhanced astaxanthin biosynthesis upon ACC treatment at the early red stage. The combinatorial synergistic effect of ACC and light intensity was also confirmed. Finally, two-step application of ACC at the vegetative phase to increase biomass production and at the early-red stage to promote astaxanthin biosynthesis was proposed to maximize the efficiency of ACC treatment.

Keywords: *Haematococcus pluvialis,* astaxanthin, 1-aminocyclopropane-1-carboxylic acid, two-step applications