Short communication

Analysis of metal elements of hydrangea sepals at various growing stages by ICP-AES

Yuki Toyama-Kato a, Kumi Yoshida b, Eiji Fujimori c, Hiroki Haraguchi d, Yoshiyasu Shimizu e, Tadao Kondo e,∗

a School of Life Studies, Sugiyama Jogakuen University, Chikusa, Nagoya 464-8662, Japan
b Graduate School of Human Informatics, Nagoya University, Chikusa, Nagoya 464-8601, Japan
c Graduate School of Chemical Engineering, Nagoya University, Chikusa, Nagoya 464-8601, Japan
d Gumma Horticultural Experiment Station, Kashiwakura, Miyagi-mura, Gumma 371-0246, Japan
e Graduate School of Bioagricultural Sciences, Nagoya University, Chikusa, Nagoya 464-8601, Japan

Received 9 July 2002; accepted after revision 10 October 2002

Abstract

Flower color in hydrangea is well known to vary greatly. The blue color might develop with aluminum ion (Al3+) from soil; the blue pigment in sepals is an Al-complex with delphinidin 3-glucoside and 5-caffeoyl quinic acid. To clarify the correlation between blue color development and Al-tolerance, flower color and metal content of the sepals were examined with reference to the reflection spectrum and ICP-AES. Blue sepals were found to contain more than 100 ppm Al, and red ones was less than 50 ppm. Change of several element contents along the flower growing stage was also observed. In blue sepals Al ions increased with maturation, but, in red counterparts the same level was maintained. The content of Fe in blue and red sepals showed a similar behavior to that of Al. However, reconstruction experiments suggested that Al may be responsible for the blue color. Al accumulation and blue color development might reflect a detoxification mechanism for Al in tolerant plants.

© 2003 Elsevier Science B.V. All rights reserved.

Keywords: Hydrangea macrophylla; Color variation; Aluminum; Element analysis; ICP-AES; Anthocyanin