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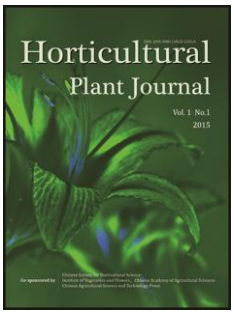

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Iranian Grapevine Rootstocks and Hormonal Effects on Graft Union, Growth and Antioxidant Responses of Asgari Seedless Grape

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Abstract

This research investigated physiological and biochemical changes at rootstock–scion union of graft combinations between Iranian rootstocks and Asgari scion in response to NAA and BAP application. Grafting cuts of scion and rootstock were dipped into NAA (0, 200 and 400 mg·L^{-1}) and BAP (0, 250 and 500 mg·L^{-1}) solutions for 30 min, immediately after the cuttings were grafted using the wedge grafting technique. The highest successful grafting rate (82%) was recorded with Asgari–Asgari combination treated with 200 mg·L^{-1} NAA + 500 mg·L^{-1} BAP. Treating the graft cut–surfaces with 200 mg·L^{-1} NAA + 500 mg·L^{-1} BAP caused the lowest H_2O_2 and MDA contents. Among all the graft combinations, the highest increase in chlorophyll content with a high photosynthesis efficiency occurred in Asgari–Shahani when treated with 200 mg·L^{-1} NAA + 500 mg·L^{-1} BAP. The graft union formation in the presence of 200 mg·L^{-1} NAA + 500 mg·L^{-1} BAP application enhanced CAT and POX activities. In conclusion, treatment of graft zone with 200 mg·L^{-1} NAA + 500 mg·L^{-1} BAP enhanced antioxidant activities and reduced lipid peroxidation in scion leaves. However, several grapevine rootstocks tested in our research were also impacting the scion performance.

Keywords: antioxidant activity; auxin; cytokinin; graft union formation; grapevine; photosynthesis efficiency

1. Introduction

Grapevine (*Vitis vinifera* L.) is one of the oldest and most important perennial crops in the world (Fatahi et al., 2003). Due to the diversified climate of Iran, the grape germplasm is rich and complex and consists of a large number of grapevine cultivars and wild populations (Tafazoli et al., 1993). Grafting is a viticultural technique used worldwide because rootstocks impart resistance to soil-borne pests and diseases as well as enhance tolerance to abiotic stresses (Cookson et al., 2013). Therefore, the grafting process is very important and comprises of complex biochemical and structural changes during the adhesion of the two grafted partners, followed by callus formation and the establishment of a functional vascular system (Nickell, 1984; Hartmann et al., 1990; Cookson et al., 2013). Grafting success is influenced by plant genetics, growth characteristics, physiological and biochemical factors (Youqun, 2011). Differentiation of callus into vascular tissue (xylem and phloem vessels) is a result of a complex developmental process involving structural and physiological changes, aiming to restore the transport system. During this process, lignin is synthesized in cells to become part of the transport system. Several antioxidant enzymes such as peroxidase and catalase activity, are concentrated at the level of the graft union, and are related to the lignification process (Jeffree and Yeoman, 1983; Quiroga et al., 2000; Fernandez–Garcia et al., 2004).

However, graft union formation is influenced by several factors, among them the most important are the rootstock–scion