Expression of Flavonoid and Stilbene Synthesis Genes in Grape Berries is Affected by High Temperature

우수1

Different Vegetative Growth Stages of Kimchi cabbage (*Brassica rapa* L.) Exhibit Specific Glucosinolate Composition and Content

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This study aimed to simultaneously investigate the changes in growth characteristics and glucosinolate (GL) content during different growth stages in Kimchi cabbage. Two Kimchi cabbage cultivars 'Chuweol' and 'HwiparamGold' were grown in the field and plant characteristics such as leaf length, number and fresh weight, and GL contents were measured weekly from 2 to 9 weeks after transplanting (WAT). The only significant difference between the two cultivars for either plant growth or GL content was observed for GL contents during 3 and 7 WAT. Leaf length increased until 4 WAT and then remained unchanged, exhibiting logarithmic growth. The fresh weight and number of leaves increased linearly until 9 WAT. Five GLs (two aliphatic GLs: progoitrin and gluconapin, two indole GSLs: glucobrassicin and neoglucobrassicin, and one aromatic GL: gluconasturtiin) of the nine GLs investigated in this study (glucoiberin, progoitrin, glucoraphanin, sinigrin, gluconapin, glucobrassicin, gluconasturtiin, 4-methoxy glucobrassicin and neoglucobrassin) were detected in the two cultivars. The contents of these five GLs were similar in the two cultivars during 2 WAT, but gluconapin and gluconasturtiin increased more dramatically than the others. The increasing pattern of total GL more closely resembled the leaf growth pattern than the fresh weight. Our results suggest that the change in total GL content positively correlates to leaf length, and the increase in total GL content is attributed to the increase in the amount of gluconasturtiin and gluconapin during the autumn growing season.

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우수2

Expression of Flavonoid and Stilbene Synthesis Genes in Grape Berries is Affected by High Temperature

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Increased temperatures caused by climate change inhibit berry skin coloration during the ripening season of grape cultivation. In this study, we analyzed the expression patterns of flavonoid synthesis genes involved in color and stilbene compound synthesis genes at the transcript level in 'Campbell Early' grapes subjected to different temperatures. The expression of *chalcone isomerase* (*CHI*), *leucoanthocyanidin dioxygenase* (*LDOX*), and *trans-cinnamate 4-monooxygenase* (*CYP73A*) genes increased in all temperature conditions; however, their expression was lower at 30 – 35°C than 25°C, and was much lower at 35°C. Indeed, the expression of most tested genes was lower at 35°C than other temperatures. Additionally, subjecting grapes to high temperatures in the initial stage of veraison significantly reduced the synthesis and accumulation of anthocyanins. Moreover, the expression of the *resveratrol synthase* (*STS1*) gene was gradually induced at all temperature treatments, but decreased at 48 h and the expression at 25°C was inhibited when compared to expression at 35°C. Expression of *stilbe synthase1a-1* (*STS11*), *STS1a-2* (*STS12*), and *STS1a-3* (*STS13*) genes had similar expression patterns at all temperatures, which decreased with increasing temperature and was suppressed at 35°C compared to 25°C. These results can be used to understand the response mechanisms of grapes to high temperature stress at the molecular level, as well as to provide information for grape breeding programs and viticulture to overcome obstacles caused by high temperatures associated with global climate change.

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