

**Title** Effect of different preharvest and postharvest treatments on glucoraphanin content and quinone reductase inducer activity in broccoli florets

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### **Abstract**

Broccoli contains a high level of glucoraphanin (4-methylsulfinylbutyl glucosinolate), the precursor of sulforaphane. As a chemoprotective isothiocyanate, sulforaphane is a rich source of inducers of phase 2 detoxication enzymes, such as quinone reductase (QR), and therefore contributes to the anticarcinogenic activity of broccoli. This study evaluated the effects of nitrogen fertilization, cooling, and controlled atmosphere (CA) treatments on glucoraphanin content and QR inducer activity in minimally processed broccoli florets. The results showed that 1) Both the glucoraphanin content and QR inducer activity decreased with the increase of nitrogen application (0, 100, 200, 300 and 400 kg N ha<sup>-1</sup>). 2) The glucoraphanin content and QR inducer activity increased during the initial 6 days of immediate cooling at 0°C, 5°C and 10°C and then decreased markedly at different temperatures. Immediate cooling at 0°C and 5°C could preserve the glucoraphanin content and QR inducer activity for up to 12 days, while, at 10°C, these levels were only maintained for 6 days. 3) CA treatments with elevated CO<sub>2</sub> (air + 10% CO<sub>2</sub>, air + 20% CO<sub>2</sub>) were found to increase the glucoraphanin content and QR inducer activity for the first 5 days of storage at 5°C, while CA treatments with reduced O<sub>2</sub> concentration (1% O<sub>2</sub>, 1% O<sub>2</sub> + 10% CO<sub>2</sub>) led to a steady decrease of glucoraphanin content and QR inducer activity during 20 days of storage at 5°C. Therefore, air + 10% CO<sub>2</sub> was the best CA method to maintain the visual quality, glucoraphanin content, and QR inducer activity of broccoli florets for up to 20 days.