

# Changes of phytochemicals and antioxidant capacity of banana peel during the ripening process; with and without ethylene treatment

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## Abstract

Banana peel is a by-product from the food industry, which is rich in dietary fiber and phenolic compounds. It is hypothesised that physicochemical and antioxidant properties of banana peel are significantly changed through different ripening stages. Ethylene treatment for fastening ripening is presumed to influence the changes in physicochemical and antioxidant properties of the peel. As such, this study investigated the impact of ripening stages with and without ethylene treatments on the changes of phytochemicals and antioxidant properties of banana peel. Green bananas were ripened with ethylene (1 ppm and 16 ppm) and without ethylene. The peel was then evaluated for the colour changes, chlorophylls, carotenoids, flavonoids, proanthocyanidins, total phenolic contents, and antioxidants capacity. As the fruit colour changed from green to yellow, chlorophyll was degraded by approximately 90%, while carotenoids and flavonoids increased by approximately 50% and 27%, respectively. In addition, levels of phenolics, proanthocyanidins, and antioxidant capacity also increased as the fruit continued to ripen. However, the overripe fruit peel lost up to 21% of its antioxidant capacity and up to 44% of its phytochemicals. Though statistically not significant, the peel without ethylene treatment had a relatively higher phenolic content and antioxidant power than those of the peel treated by ethylene at stages 5–7. Overall, the banana peel at ripening stages 5–7 has the highest levels of physicochemical and antioxidant properties and thus the peel at these stages is recommended for recovery of phenolic compounds for further applications. Additionally, the PCA biplot shows that the ripening stages could be characterised by the clustering behaviour of certain phytochemicals. Therefore, it is suggested to consider phytochemical changes when evaluating the ripening stages of banana.