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EXTRACTION OF PHYCTOCHEMICALS FROM ONION

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Abstract
Flavonoids are a large and diverse group of polyphenolic compounds with antioxidant effects, and onion (Allium cepa L.) is one of the richest sources of dietary flavonoids. Flavonoid content is affected by endogenous factors—genotype and agro-environmental conditions. Considerable research has been directed toward understanding the nature of polyphenols in different products and the factors influencing their accumulation. This review examines the impacts of pre- and postharvest factors on onions' flavonoid content, highlighting how this knowledge may be used to modulate their composition and the potential use of onion by-products.

Keywords:- (polyphenols, plant foods , Allium cepa, preharvest factors , harvest handling, genotype).

Introduction

Phenolic compounds are responsible for the major organoleptic characteristics of plant-derived foods and beverages, particularly color and taste properties, and they also contribute to the nutritional qualities of fruits and vegetables [1, 2].

Plants present diverse defense mechanisms, including physical and chemical barriers. Phenolic compounds are particularly abundant and play an important role in both strategies, as monomers for the synthesis of lignin and as chemical agents. Flavonoids are one of the most relevant secondary compounds in plants and currently more than 9000 being identified [3]. A most significant function of the flavonoids, especially the anthocyanins, together with flavones and flavonols as copigments, is their contribution to flower and fruit colors. This is important for attracting pollinators and seed-dispersing animals. Phenolics may influence the competition among plants "allelopathy." They act in plant defense mechanisms against herbivores or pathogens, contributing to the disease resistance mechanisms in plants, and act as supporting materials of cell walls as photoprotectors against UV radiation and plant-microbe symbiosis and involved in the repair of wounds and contribute to healing by lignifications of damaged areas. Stress conditions such as excessive UV light, wounding, or infection induce the biosynthesis of phenolic compounds [66, 67].

Plants composition can be affected by pre-harvest factors, including genotype (cultivar and variety), maturity at harvest and tissue distribution, and exogenous factors, including climate, soil micro-environment, and pest and disease attack [4, 5]. Environmental factors have a major effect on polyphenol content. These factors may be pedoclimatic (soil type, sun exposure, and rainfall) or agronomic (culture in greenhouses or fields, biological culture, hydroponic culture, fruit yield per tree, etc.). With the current state of knowledge, it is difficult to determine for each family of plant products the key variables that are responsible for the polyphenol variability. A huge amount of analysis would be required to obtain this information [10].

This paper reviews recent literature on the main factors affecting the flavonoid content in onion, as well as different approaches aiming to increase the accumulation of these compounds in onions, which provide an added functional value.

Occurrence and identity of flavonoids in onions

Onion has been reported as one of the major sources of dietary flavonoids in many countries [6–9], contributing to a large extent to the overall intake of flavonoids [10, 11]. Two flavonoid classes are mainly found in onion, the anthocyanins, which impart a red/purple color to some varieties, and flavonols such as quercetin and its derivatives, responsible for the yellow and brown skins of many other varieties (see Table 1).

Flavonols are the most ubiquitous flavonoids in onions. At least 25 different flavonols have been characterized in onion, being quercetin derivatives the most important ones in all onion cultivars [11]. Quercetin 4′-glucoside and quercetin 3,4′-diglucoside are reported as the main flavonols in onions, accounting for about 80–95% of total flavonols [12–26].