

学位論文全文に代わる要約 Extended Summary in Lieu of Dissertation

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Name

学位論文題目 : New processing technologies for the enhancement of antioxidant and
Title of Dissertation antiallergic activities of Thai and Japanese sweet potatoes
(タイ産及び日本産さつま芋の抗酸化活性並びに抗アレルギー活性
の増加を促す新加工技術)

学位論文要約 :
Dissertation Summary

The color of flesh in sweet potatoes is due to the accumulation of phytochemicals. The difference of phytochemicals in colored sweet potatoes can be served on various health-promoting effects such as antioxidant activity, antiallergic activity, anticancer, and anti-obesity. Thermal processing of colored Thai sweet potatoes may affect the amounts of phytochemicals and their biological activity.

Chapter 2: The effect of processing of colored sweet potato powders (yellow, orange, and purple color) on extractable polyphenols and antioxidant activity (DPPH and TBA assays) was investigated. In this study, conventional (hot air-dried) powder and pre-gelatinized powder made from four cultivars of Thai sweet potatoes (Khai, Orange, Torperk, and Purple) and Japanese sweet potato (Naruto Kintoki) were compared the amounts of extractable polyphenol and antioxidant activity, using the same extraction technique, QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) method. All pre-gelatinized powders exhibited the higher extractable phytochemicals content and greater antioxidant activity than conventional hot air-dried powders. Pre-gelatinized Thai purple sweet potatoes showed the strong antioxidant activity due to the high amounts of anthocyanins. The increase of potent antioxidant substances of colored sweet potatoes during pre-gelatinization provided opportunity for health promotion and stimulation to food industry.

Chapter 3: The importance of suitable thermal processing on antiallergic activity of Naruto Kintoki variety among 13 sweet potatoes grown in Thailand and Japan was emphasized in this chapter. Thus, three conventional cooking methods (boiling, microwaving, and baking) of Naruto Kintoki peel were compared the antiallergic activity with the raw one using RBL-2H3 mast cells and β -hexosaminidase release rate. Chemical structure of four antiallergic substances in cooked Naruto Kintoki peel was determined using a UPLC/ESI-Q-TOF-MS analysis, and ^1H - and ^{13}C -NMR measurements. The great conversion of thermally unstable flavonoid sulfates to their aglycons during 3 cooking methods, especially baking, significantly increased antiallergic activity of Naruto Kintoki peel. This study is the first report of two flavonoid sulfates' identification in the sweet potato peel as potent antiallergic substances. These results emphasize the importance

of thermal processing techniques and then provide a useful tool for further development of several target substances in sweet potatoes for health benefits.

Chapter 4: As the summary of this study, I can provide the information of phytochemicals, antioxidant substances and antiallergic substances, in sweet potatoes and also enhancement of their biological activity by increasing the amounts of extractable anthocyanins. These thermal processing technologies led to a strong antioxidant activity in pre-gelatinized Thai purple sweet potatoes and also to a strong antiallergic activity in Naruto Kintoki sweet potato as shown in Figure 1. Moreover, conversion of flavonoid sulfates to their aglycons led to a great antiallergic activity in baked and microwaved Naruto Kintoki. The processing and cooking techniques can serve as the useful tool for new development of functional foods and their components such as antioxidants, antiallergic substances or nutraceuticals from sweet potatoes and other foods in future.

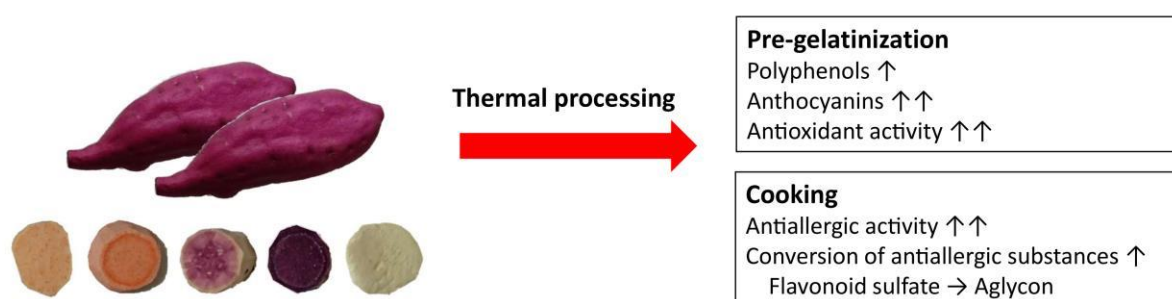


Figure 1. Importance of thermal processing techniques for gaining more functional factors of sweet potatoes

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