THE EFFECT OF MATURITY AND HOLDING TIME ON THE CONCENTRATION OF PHENOLICS IN SAGO (*METROXYLON SAGU*) STARCH SLURRY DURING PROCESSING

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Introduction

Browning is one of the major problems faced by the food industry. This effect is brought about by the oxidation of phenolic compounds by the polyphenol oxidase enzyme. Sago being one of the leading sources of starch in Malaysia also undergoes browning. Beginning as soon as the tree is cut, the browning of the sago pith leaves an intense impact on the starch. This attributes the low price that it fetches at the market. Thus, this study focuses on the profile of the phenolic compounds and factors that influence it. The fate of these substances throughout the life span of the sago palm tree was also investigated.

Materials and Methods

Sago logs of three maturity stages (young, premature and mature) were obtained from Batu Pahat, Malaysia. The extraction of phenolics were carried out using methanol and ethyl acetate. Identification of individual phenolics were carried out on a Waters HPLC system at 280nm. Colour development of the extracts after browning was monitored using the Hunter Lab System. All experiments were carried in triplicates.

Results and Discussion

The results of the study in sago logs of three stages of maturity revealed the presence of catechin, epicatechin, 4-methylcatechol, catechol and minute amounts of pyragallol. The highest concentrations of the total phenolics were found to be confined to the young sago log with a concentration of 55.53 μg/g sago pith followed by the mature log with 35.67 μg/g and the premature log with 11.49 μg/g. When comparing the individual phenolics, the catechins were the highest in concentration in the young (38.26μg/g), mature (11.6 μg/g) and the premature (5.48 μg/g). The determination of phenolics after browning showed a decrease in concentration with time. The colour of the extract after browning when measured with the Hunter Lab System showed a decrease in the L values with time, which measure the lightness of the sample. The young sample exhibited the greatest decline in L value when compared to the mature and premature log with an average reduction/24 hours of 13.52, 9.95 and 6.11 respectively. However, the (redness) value increased with the holding time of the slurry. Similarly, the young log showed a greater ascend (8.68) compared to 4.41 of the premature log and 4.31 of the mature log suggesting that the oxidation of phenolic compounds has taken place significantly in the former. These results correspond well with the total amount of phenolics being reduced in the slurry by 34.78 μg/g in the young, 5.98 μg/g in the premature log and 2.88 μg/g in the mature log. From this, it is evident that with the increase in holding time, the phenolics are reduced in concentration as they are oxidised (Anthonysamy et al. 1998). The increase in the redness and yellowness of the extract shows that oxidation has taken place intensively and the amounts of quinone-based substances have increased (Anthonysamy et al. 1999).

Conclusions

The results of this study reveals the presence of 4 major browning compounds in sago, namely the catechins, epicatechins, 4-methylcatechol, and catechol. These substances however were found to decrease with the increase in maturity. The phenolic compounds also decreased with the increase in holding time and gave rise to quinone-based products. The total phenols were found to influence the rate of browning and the intensity of the colour produced.

References

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