

BLEACHING OF BROWNE D WATER YAM (*DIOSCOREA ALATA*) WITH RUBBER (*HEVEA BRASILIENSIS*) SEED LIPOXYGENASE

M.N. Anokwulu*, O.U. Njoku and I.C. Ononogbu
Lipid and Lipoprotein Research Unit, Department of Biochemistry,
University of Nigeria Nsukka, Enugu State, Nigeria.

Submitted: 29 October 2003 Accepted: 30 December 2005

Anokwulu, M.N., Njoku, O.U. and Ononogbu, I.C. (2005). Bleaching of browned water yam (*Dioscorea alata*) with rubber (*Hevea brasiliensis*) seed lipoxygenase. *Natural Rubber Research*, 18 (2): 154-160.

Lipoxygenase was extracted from rubber (*Hevea brasiliensis*) seed, purified and used to bleach the polyphenols in water yam (*Dioscorea alata*) tubers. There was increase in the percentage bleaching of polyphenol extracts (31.43 ± 0.11 to 89.43 ± 0.58) as the enzyme concentration and time of reaction increased. The polyphenol content in the browned yam cubes were observed to decrease (26.94 ± 0.08 to $19.52 \pm 0.04 \mu\text{g/g}$) as the enzyme concentration was increased (0.13 to 0.78 unit/ml). The concentration of rubber seed lipoxygenase required for complete bleaching of the browned yam cubes was 3.1 unit/ml.

Key words: Bleaching, Linoleic acid, Lipoxygenase, Polyphenols, Rubber seed, Yam.

INTRODUCTION

Yam constitutes a staple carbohydrate food in many tropical countries (Rasper and Coursey, 1967). West Africa produces more than 95 per cent of the world yam requirement and Nigeria alone accounts for 78 per cent of the total yam production (Asiedu, 1989). According to Onwueme (1978), water yam (*Dioscorea alata*) is the most widely distributed species in the tropics. In West Africa, its extent of cultivation is next to *Dioscorea rotundata* (white yam). Pounded yam (yam *fufu*) is the most popular and traditional form in which yam is consumed in West Africa (Onwueme, 1978). Water yam is usually preferred for the preparation of fried yam balls because it contains large quantity of binding mucilage (Osagie, 1992). It also yields superior baking flour (Osagie, 1992). Nevertheless, water yam has very high

polyphenols content (Onayemi, 1986).

One of the problems encountered in food processing is browning (Braverman, 1963) of foodstuffs. Darkening of the plant tissues when exposed to air is due to the oxidation of phenolic substances (such as catechol and caffeic acid) to their corresponding o-quinones and its polymerized forms (brown or black in colour) (Mondy and Mueller, 1977; Burda *et al.*, 1990).

The browning causes culinary problems as the brown or grey coloured melanin is associated with off-flavours including bitterness (Onayemi, 1986). Processed yam flour which contains black fragments becomes off-flavour when prepared as yam *fufu* and therefore is unacceptable. Yam *fufu* prepared from white yam is more acceptable (Onayemi, 1986).

Sulphur dioxide and its derivatives,

*Correspondence: M.N. Anokwulu