

## **Determination of Acrylamide Formation with Different Frying Temperatures in Potato (*Solanum tuberosum*), Cassava (*Manihot esculenta*) and Sweet Potato (*Ipomoea batatas*)**

M.A.S. Rangana<sup>1\*</sup>, C.M. Peris<sup>1</sup>, R.U.W.M.C.B. Rambukwella<sup>1</sup> and K.G.C. Senarathna<sup>2</sup>

<sup>1\*</sup>Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

<sup>2</sup>Department of Biosystems Technology, Uva Wellassa University, Badulla, Sri Lanka

Acrylamide is a carcinogenic toxic compound formed during the frying process at high temperatures by the reaction of asparagine and reducing sugars. Due to the high consumption of fried tubers in the world, it is worthwhile to detect and quantify the acrylamide in fried foods to reduce the detrimental effects on human health. This study aimed to analyze the effect of temperature and the available nutrient content on the formation of acrylamide in three selected tuber species named as potato (*Solanum tuberosum*), cassava (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*). Fried tuber samples were prepared by deep frying at 160°C, 180°C and 200°C separately using coconut oil until they reach the standard colour based on the colour chart recommended by the United States Department of Agriculture. Proximate analysis was carried out to determine the nutrient content of raw and fried tubers before analyzing the acrylamide. Gas Chromatography-Mass Spectrometry (GC-MS) was used to detect the acrylamide and quantification was proceeded according to a calibration curve of acrylamide standard ( $R^2 = 0.8535$ ). Among the varieties, the potato was recorded the longest frying time and sweet potato was recorded the shortest time duration in all three different temperatures to obtain the recommended colour. Further, the highest amount of protein content was observed in potato and the lowest protein content was observed in sweet potato in raw form and the protein content reduced in all varieties dramatically with the increment of temperature. Similarly, the highest acrylamide concentration was found in potato ( $1125.65 \mu\text{gkg}^{-1}$ ) fried at 200°C and lowest acrylamide concentration was detected in sweet potatoes fried at 180°C which was  $84.36 \mu\text{gkg}^{-1}$ . Acrylamide was not detected in raw samples. Results revealed that acrylamide formation was increased with the increment of temperature and there is a significant effect of the protein content of tubers on the development of acrylamide ( $P < 0.05$ ).

**Keywords:** Acrylamide, Frying temperatures, Tubers, GC-MS