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Detection of artificially ripened bananas

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Bananas are a main source of vitamins and minerals among various kinds of tropical fruits. However, its consumption is becoming less due to intentional chemical usage for artificial ripening which causes serious health hazards. Ripening is normally a natural process through which the fruits gradually become sweet, colored, soft and palatable. Fruit sellers artificially ripen the fruit to meet customers' demand and to overcome transportation and distribution issues.

Ethylene is the major ripening agent produced naturally within the fruits which initiates the process of ripening. However, ethanol, methanol, ethylene glycol, ethephon and calcium carbide are used to ripen fruits artificially. The use of calcium carbide has been banned in many countries due to its high toxicity. Ethephon has been used in Sri Lanka for artificial ripening of mostly bananas, papaw and mangoes. When ethephon (2 chloroethylphosphoric acid) is used for ripening of fruits, ethylene gas is released which helps to accelerate ripening. Ethephon is hazardous and there are no reliable methods to detect such chemically treated fruits in the Sri Lankan market.

This research proposes a design of an electronic device which will automatically carry out the detection process and provide an indication of the concentration of the applied chemicals. The detection is done electronically by measuring the conductivity of the water in which the banana is rinsed. The design consists of three main units, detection unit, controller unit and power supply unit. In the testing, the banana sample is rinsed with distilled water and the conductivity of the rinsed water is measured by using a conductivity sensor. The reading is then displayed on a digital screen with the indication on the presence of chemicals to assess whether chemically treatment has been carried out. The testing process is automated by using a microcontroller.

The preliminary testing was conducted for two types of artificially ripened bananas (Ambul and Suvandel) with known ethephon solutions. Significant differences were recorded in comparison with the readings obtained for naturally ripened bananas. The detection method can also be extended to other fruits to investigate the use of ethophone or artificial ripening. It is expected that the proposed device would be useful for inspectors of food and consumer safety for detecting illegally ripened bananas without destructing of the fruit.

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