Development of curcumin/rice starch films for sensitive detection of hypoxanthine in chicken and fish meat

ABSTRACT

Food freshness monitoring, which is reflected in the quality of the product at the time of use, remains a significant challenge for both consumers and the food industry. This paper presents an experimental study on the development of a biodegradable, film-based curcumin, incorporated with modified rice starch, that may be used to detect hypoxanthine in chicken and fish. The physicochemical properties of the films were characterized and analyzed through several different approaches, including moisture content, water absorption, and water solubility. The morphology characteristics were analyzed using an SEM. The nanocomposite of the films showed excellent physical and chemical properties that bettered the control film used in the study. The deprotonation of curcumin occurs when the indicator is exposed to a pH level of 9 and above, where the indicator's color changes from yellow to a reddish-brown or wine-red color, which can be seen by the naked eye. The thickness of the films increased as the concentration of curcumin rose to 3%, showing that they were more stable than other films. The stability of the films increased when they were kept at a lower temperature (4 ◦C). Under optimum conditions, the detection limit of the film was found to be at 38.63 μM, with a limit of quantification of 128.75 μM, and the linear working range was determined to be from 0 to 100 μM. The concentration of hypoxanthine in chicken meat and fish was determined to be 30.25 μM and 52.84 μM, respectively. The recovery rate of the technique used was from 99.94 to 104.11%.Therefore, these results encourage the use of curcumin films as active packaging material in monitoring the freshness of various meat products.