6-2021

Physicochemical characterization of hydrothermally treated starch from various botanical sources of starch

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MANIPAL
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Physicochemical characterization of hydrothermally treated starch from various botanical sources of starch

Project report submitted in partial fulfilment of the requirements for the degree of

Bachelor of Science

in

Biotechnology

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June 2021

Abstract: This study involves the characterization of native starch along with enzymatically hydrolyzed starch incubated with α-amylase with varying conditions, using an Optical microscope. After extracting the starch from rice grains by using the Alkali extraction method, amylose content was determined for rice, corn, and potato starch. The results indicated that potato has the highest amylose content, whereas rice has the lowest amylose content. This information can be also linked with the Resistant starch (RS) amount as high amylose content determines high RS content. Carbohydrate determination reported that potato has the highest carbohydrate content, whereas corn starch has the lowest. Upon calculating the degree of starch hydrolysis for potato, rice, and corn starch incubated with 150U of α-amylase for varying time of incubation (2hrs, 6hrs, 12hrs, and 24hrs), it was seen that as the incubation time increased, the degree of starch hydrolysis also increased for all the samples. Potato had the lowest degree of hydrolysis. This is due to the compact structure of potato starch and its high amylose content, which indicates a high RS value, which limits starch hydrolysis. This concluded that a higher concentration of enzyme is required for potato starch to hydrolyze. The optical images for this test determine that as the time of incubation was increased, there was an increase in the appearance of fissures and pores on the granule surface, aggregation of granules, and change in the shape of the granules. The results for degree of starch hydrolysis with varying concentration of enzyme (5U, 10U, 50U, 100U, 150U, 200U, 250U, and 300U) for rice and corn starch samples incubated for 24hrs indicated that as the concentration of enzyme increased, an increase in the degree of starch hydrolysis is also seen. The highest enzymatic activity is seen at 150U of enzyme for 24hrs. All these parameters are useful to the food industry that wishes to control the release of reducing sugar from starch to limit the chances of increasing the blood glucose levels, hence modifying native starch to use in food products.