

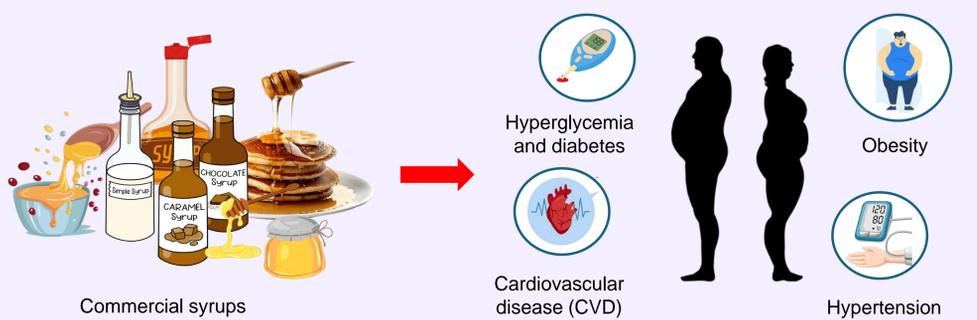
## ABSTRACT

Syrups are important ingredients in beverage preparation. Most commercial syrups are instant glucose and fructose syrups which are easily soluble, thus being convenient and time-saving. However, excessive consumption of these syrups may lead to health problems, such as hyperglycemia and non-communicable diseases. Therefore, the development of low-energy syrups is an attractive option for health-conscious consumers. Longan is an economic fruit in Thailand, and its main sugar component is sucrose, which can be used as a raw material for the production of fructooligosaccharide. Sucrose can be converted into fructooligosaccharides through enzymatic methods. Inulosucrase is the key enzyme capable of converting sucrose into 1-kestose, the shortest-chain fructooligosaccharide which in turns can be acted as a sweetener. This research aimed to prepare a prebiotic syrup containing 1-kestose from longan using enzymatic methods. Longan juice was extracted, and its sugar composition was analyzed by high-performance liquid chromatography. The longan juice contained 160.3 g/L sucrose, 29.6 g/L fructose, and 30.1 g/L glucose, indicating a suitable substrate for 1-kestose production. It was prepared to have initial sucrose concentrations of 400 g/L using a vacuum evaporator. To investigate optimal conditions for bioconversion of concentrated longan juice into 1-kestose. The concentrated longan juice was varied to initial sucrose concentrations of 200 and 400 g/L. Effect of inulosucrase dosages on 1-kestose production was investigated by subjecting different dosages of inulosucrase (1, 5, and 10 U/g sucrose) to 200 g/L and 400 g/L of concentrated longan juice. The reaction was carried out on a 150 rpm-rotary shaker incubator at 45°C for 6 h. The optimal conditions were as follows: initial sucrose concentration of 200 g/L, temperature of 45°C, agitation speed of 150 rpm, reaction time of 3 h. Under optimal conditions, the resulting product consisted of 1-kestose 94.0 g/L, glucose 94.9 g/L, fructose 28.9 g/L, and sucrose 55.0 g/L. The product was evaporated at 50°C until reaching a final total solid of more than 90%. The final product appeared dark brown in color with longan flavor and had a L\* value of 61.02, a\* value of 21.24 and b\* value of 64.37. Its viscosity was 24323 centipoise and had a water activity value of 0.64.

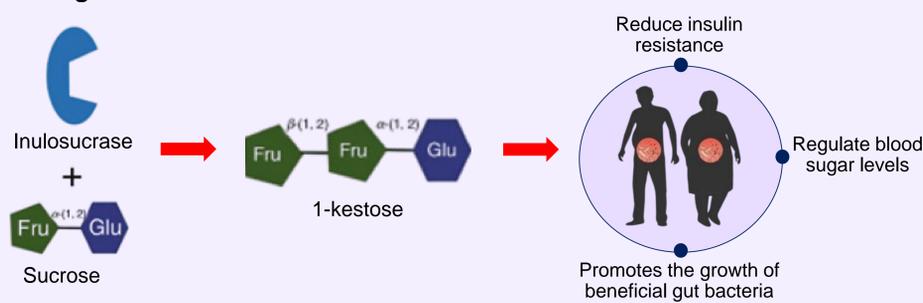
**Keyword:** Prebiotic syrup, Inulosucrase, 1-kestose, Longan

## RESULTS

### BACKGROUND



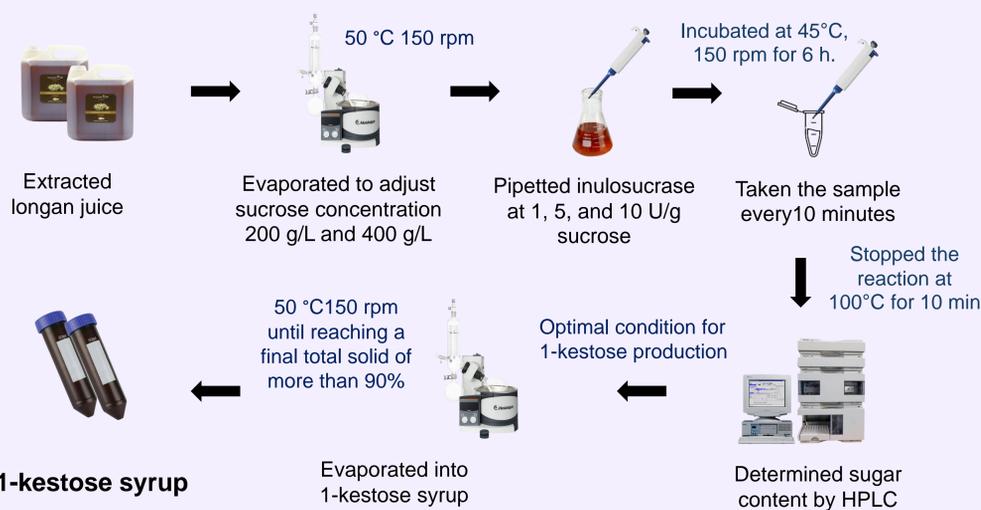
**Fig. 1.** The risk and health effects of non-communicable diseases



**Fig. 2.** The benefits of 1-kestose as a prebiotic

### METHODS

#### 1. Optimization of conditions for 1-kestose production

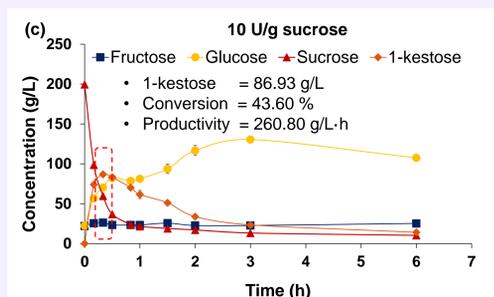
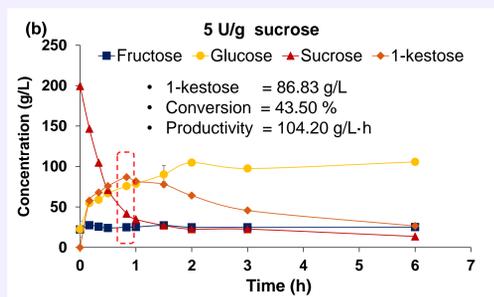
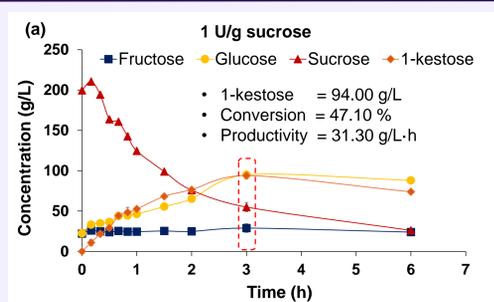


#### 2. Determination of physicochemical properties of 1-kestose syrup

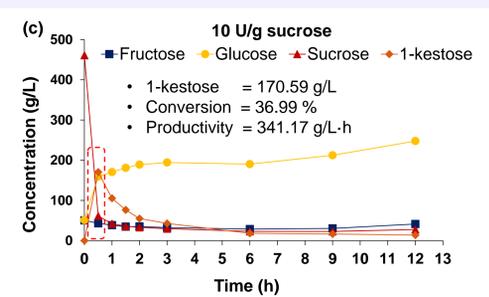
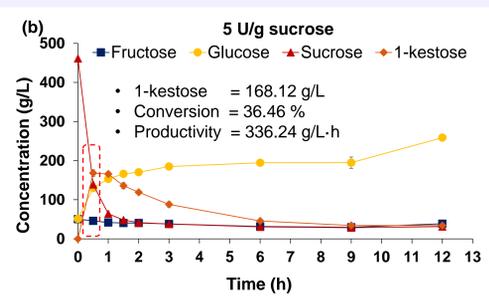
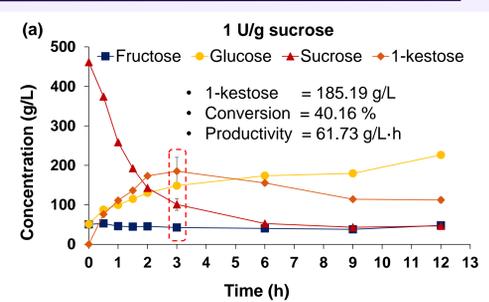
- Color
- Viscosity
- Total solid
- Water Activity (Aw)

### ACKNOWLEDGEMENT

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**Fig. 3.** Time course of 1-kestose production from longan (200 g/L sucrose) catalyzed by 1 U/g sucrose (a), 5 U/g sucrose (b) and 10 U/g sucrose (c) of inulosucrase



**Fig. 4.** Time course of 1-kestose production from longan (400 g/L sucrose) catalyzed by 1 U/g sucrose (a), 5 U/g sucrose (b) and 10 U/g sucrose (c) of inulosucrase

**Table 1.** Sugar content and estimated glycemic index of 1-kestose syrup

Sugar content (g/L)				eGI
Fructose	Glucose	Sucrose	1-kestose	
118.79	363.04	249.58	437.42	46.4

**Table 2.** Physicochemical properties of 1-kestose syrup

Color parameters			Total solid (%)	Aw	Viscosity (cP)
L*	a*	b*			
61.02	21.24	64.37	91.21	0.64	24323

## CONCLUSION

- The optimal conditions for 1-kestose production were initial sucrose concentration of 200 g/L, Inulosucrase 1 unit/g, and a reaction time of 3 h
- The physicochemical properties of 1-kestose syrup are likely similar to those of table syrup

## REFERENCE

- Watanabe, Ayako, et al. (2021). Supplementation of 1-kestose modulates the gut microbiota composition to ameliorate glucose metabolism in obesity-prone hosts. *Nutrients*. 13(9):2983.