

## Abstract

Diabetes Mellitus (DM) is a growing global concern, currently the eighth leading cause of death due to its strong association with cardiovascular diseases (CVDs), highlighting the requirement of low glycemic index (GI) sweeteners alternatives. Although artificial and low-GI sweeteners offer a solution, many present limitations such as off-flavors, high cost, and limited availability. Palmyra palm (*Borassus flabellifer* L.) sap, traditionally used in brown sugar production, is a promising candidate due to its sweet taste and naturally low GI. However, its high moisture and sucrose contents promote microbial growth, significantly reduces its shelf life. This study aimed to identify an optimal carrier agent for spray drying palm sap to preserve its bioactive compounds while extending its shelf life and assess its effect toward development of low-GI products. Samples with maltodextrin showed higher water activity and hygroscopicity, while inulin-containing samples retained more antioxidant activity. Mixture of maltodextrin, gum arabic, and inulin (45:45:10) was selected for further application in developing a gluten-free, low-GI brownie using D-Optimal mixture design due to its superior characteristics compared to other 3 PPS samples. The optimized formulation, containing 50.23% powdered palm sap (PPS) and 12.77% tapioca starch, achieved a low GI value of 48.66 and demonstrated high consumer acceptance in Chiang Mai, with 97.5% approval and 95% purchase intention by Chiang Mai consumer. The finding proved the effectiveness of the spray drying process to extend the sap shelf life as it is capable of reducing the moisture content by 97.62 - 98.57%, regardless of the carrier agent. Substitution of sugar with PPS also significantly reduces the product GI value while painting its likeness score.

Keywords: Brownies, Glycemic Index, Novel product development, Powdered palmyra sap, Sensory analysis