

## **Effect of Different Drying Methods on Physical and Antioxidant Properties of Overripe Banana Flours**

Khairul Haziq<sup>a</sup>, Fadhilah Jailani<sup>a\*</sup>

### **Structured Abstract**

**Background:** The overripe banana (flesh and peel) is often considered as waste and discarded, leading to environmental and economic concerns. Despite being a potential source of valuable bioactive compounds and nutrients, these food materials are often overlooked by consumer and food industries. Drying presents a viable solution to overcome the issue of overripe bananas, by transforming them into a healthy food ingredient likes flour. This study aims to determine the effects of different drying methods on the physical and antioxidant properties of overripe banana flours.

**Methods:** Two overripe banana varieties, Cavendish (*Musa acuminata L. cv cavendishii*) and Berangan (*Musa acuminata cv. Berangan*), were dried to produce flour using three different drying methods: freeze drying (FD), foam mat drying (FMD), and cabinet drying (CD). The analysis of the physical properties of overripe banana flour included the assessment of color, water activity, bulk density and moisture content. Moreover, the antioxidant properties of overripe banana flours, including the determination of total phenolic content and antioxidant activity, were also conducted.

**Results:** This study shows that freeze-drying produces lighter flour, followed by foam mat drying while cabinet drying results in darker flour. The dried powder of overripe bananas has a microbiological safety assurance, with all values of water activity below 0.6. Among the drying methods, foam mat drying achieves the highest bulk density, and Cavendish flour has a higher bulk density compared to Berangan. All dried powder of overripe bananas has a moisture content of less than 14%, complying with the commercial standard for flour. The antioxidant properties of the flours were assessed, revealing that Cavendish flour has the higher total phenolic content and percent inhibition, indicating superior bioactive compounds and antioxidant activity compared to Berangan.

**Conclusion:** Overall, although freeze drying stands out as the superior method, foam mat drying can serve as a viable alternative for producing high-quality flour and the Cavendish banana variety exhibits exceptional in terms of quality characteristics. These findings guide researchers in identifying optimal drying methods for overripe banana flours from two varieties, ensuring desired physical and antioxidant properties for use as food ingredients.

**Keywords:** Foam mat drying, freeze drying, cabinet drying, Cavendish, Berangan

\*Correspondence: fadhi478@uitm.edu.my

<sup>a</sup> School of Industrial Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Selangor