

## OPTIMIZING NUTRITIONAL AND BIOACTIVE RETENTION IN SWEET POTATO THROUGH DIFFERENT DRYING TECHNIQUES

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### Abstract

Sweet potato (*Ipomoea batatas*) is a vital food security crop globally recognized for its high nutritional value, adaptability, and versatility. To promote sustainable food applications, this study evaluated four different drying techniques such as freeze drying, cabinet drying, microwave drying, and oven drying, on the proximate composition and bioactive properties of sweet potato. Freshly cleaned sweet potatoes were dried using each drying technique, and the resulting dried powders were nutritionally characterized, with statistical analysis performed using R software (version 4.2.1). The fresh sweet potato showed a moisture content (MC) of  $70.64 \pm 0.70\%$ , ash content (AS) of  $2.48 \pm 0.02\%$ , crude protein (CP) of  $0.58 \pm 0.25\%$ , crude fat (CF) of  $0.12\%$ , crude fiber (CFI) of  $1.66 \pm 0.34\%$ , total phenolic content (TPC) of  $37.64 \pm 1.44$  mg gallic acid equivalents (GAE)/100 g, and total flavonoid content (TFC) of  $1.64 \pm 0.06$  mg quercetin equivalents (QE)/100 g (wet basis). After drying, MC was reduced to  $4.00 \pm 0.69\%$ ,  $5.13 \pm 0.21\%$ ,  $6.72 \pm 0.37\%$ , and  $8.52 \pm 0.39\%$  for freeze dried (FD), microwave dried (MD), cabinet dried (CD), and oven dried (OD) sweet potato samples, respectively. Among the different drying methods (dry basis), AS was highest in OD samples ( $4.43 \pm 0.24\%$ ) and lowest in CD samples ( $2.71 \pm 0.01\%$ ), with no significant differences ( $p > 0.05$ ) between MD and FD. The CP was highest in FD ( $4.08\%$ ) samples and lowest in CD ( $2.77\%$ ) samples ( $p < 0.05$ ). The FD samples showed the highest CF ( $0.74\%$ ) content, while CD showed the lowest ( $0.35\%$ ) ( $p < 0.05$ ). No significant differences ( $p > 0.05$ ) were observed in CFI content among different drying methods studied. The MD samples showed the highest value for both TPC and TFC ( $67.58 \pm 7.39$  mg GAE/100 g and  $3.3 \pm 4.39$  mg QE/100 g, respectively ( $p < 0.05$ )). Overall, microwave drying proved to be the most efficient drying technique, ensuring superior retention of bioactive compounds and nutritional quality, thereby supporting sustainable, health-oriented sweet potato innovations.

**Keywords:** sweet potato powder; drying techniques; proximate composition; bioactive properties

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