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# ENVIRONMENTAL FACTORS INFLUENCE THE PROTECTIVE EFFICACY OF *BRASSICA OLERACEA* EXTRACTS ON INTESTINAL AND HEPATIC HOMEOSTASIS IN ZEBRAFISH

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The cross-kingdom relationship between environmental adaptation of dietary sources and consumer health represents a key area of interest in modern biology. This study investigates how different cultivation temperatures of broccoli microgreens (*Brassica oleracea* var. cymosa) influence their ability to modulate intestinal and hepatic morpho-functional properties in a zebrafish (Danio rerio) model. Microgreens were grown under high-temperature (HT: 38/33 °C) and low-temperature (LT: 12/7 °C) regimes. The resulting extracts were tested in zebrafish feeding trials using a diet-induced inflammation model. Our analysis focused on the structural integrity of the digestive tract and liver, alongside the expression of inflammatory (TNF-α) and oxidative DNA damage (8-OHdG) markers. Our findings revealed that while HT-stressed plants accumulate metabolites like isoferulic acid and hydroxyproline, they fail to provide protective effects in the consumer. Conversely, LT-derived extracts, characterized by a distinct enrichment in glucosinolates and catechins, demonstrated a significant capacity to restore intestinal morphology and suppress pro-inflammatory signaling. Specifically, a 20% dietary supplementation with LT extracts effectively counteracted tissue dysregulation and oxidative DNA damage. These results demonstrated that LT cultivation optimizes the phytochemical profile of broccoli, enhancing its functional role in maintaining tissue homeostasis. This study highlights the importance of environmental factors in shaping the bioactivity of functional foods and underscores the zebrafish as a sensitive model for cross-kingdom biological investigations.