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METABOLIC PROFILING AND BIOLOGICAL CAPACITY OF *PIERIS BRASSICAE* FED WITH KALE (*BRASSICA OLERACEA* L. VAR. *ACEPHALA*)

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Abstract

Vegetables of the *Brassica* group are the most commonly grown and consumed worldwide. Food plants with apparent cancer and cardiovascular disease-preventing properties include several varieties of *Brassica oleraceae*. The majority of the herbivorous insect species are specialized feeders, for which the behavioral decision to accept a plant as food or oviposition substrate is mainly related with sensory information. *Pieris* insects (Lepidoptera: Pieridae) are specialist herbivores of cruciferous plants.

This work characterizes phenolics and organic acids profiles of extracts from cabbage white butterfly (*Pieris brassicae* L.) and its host plant (kale; *Brassica oleracea* L. var. *acephala*), assessing possible metabolic relationships and performing bioactivity screenings. Aqueous extracts were prepared from kale leaves and *P. brassicae* materials (larvae fasted for 12h, exuviae, butterfly, and excrements), and their phenolics or organic acids profiles determined by HPLC/UV-DAD/MSn-ESI or HPLC-UV, respectively. It were identified acylated and nonacylated flavonoid glycosides and hydroxycinnamic acyl gentiobiobides (31 in kale vs. 4 in larvae, 2 in common; 25 in excrements, 10 in common with kale and 4 with larvae), sulphate phenolics (0 in kale; 2 in larvae vs. 3 in excrements, 2 in common). No phenolics were identified in butterfly or exuviae. A total of 9 different organic acids were characterized in the materials.

Except for exuviae's, extracts were screened for bioactivity. All exhibited antiradical activity against DPPH and NO, whereas only kale's and excrements' were active against superoxide. All extracts exhibited biological activity on rat intestinal smooth muscle, albeit with distinct relaxation-contraction profiles. Larvae's and butterfly's extracts were more efficacious for intestinal relaxation than kale's, whereas excrements' evoked only contractions, thus evidencing their different composition in bioactive molecules. Here we provide evidence that the larvae sequesters and metabolizes kale's phenolic compounds, namely through deacylation, deglycosylation and sulphating reactions. Moreover, the extract's bioactivities suggest that it may constitute an interesting source of bioactive compounds whose complex chemical structure precludes either synthesis or isolation.

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