Moisture sorption isotherms of edible insects flours

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Edible insects have been recently studied as interesting sources of protein, fats, and dietary fiber. Their promising nutrimental and prebiotic components make them suitable for a daily consumption. Sorption isotherms are a potentially useful tool to analyze edible insects' flours stability since hygroscopic properties of food materials highly depend on their protein and dietary fiber content. Mathematical models are commonly used to describe and analyze water sorption properties of materials. Among the models, theoretical, semi-empirical and empirical expressions can be found in the current literature. In many cases, standard statistical criteria such as R^2 is not sensitive enough to determine the best model to describe experimental data. In such cases, Akaike Information Criteria (AIC) can be used to evaluate the fit while penalizing the use of parameters. Iglesias & Chirife, GAB, Oswin, Peleg, and Khün mathematical models have been used to describe the moisture sorption isotherms (25°C) of *Tenebrio molitor*, *Zophoba morio*, and *Acheta domesticus*. Specific surface area of sorption, hysteresis and relative water sorption changes were also determined. The studied edible insect's flours showed a typical BET type III, although different water adsorption and desorption capacity were observed in all samples. This type of isotherm is closely related to the chemical composition of the flours. In addition, AIC differences identified Iglesias & Chirife and Peleg as the best model alternatives to describe experimental moisture isotherms for adsorption and desorption, respectively. In terms of techno-functionality, *A. domesticus* and *T. molitor* flours showed the lowest and the highest water adsorption capacity, respectively, at the evaluated temperature. This has an important impact when dealing with stability and storage behavior, where flours with the highest retention are considered the less stable. The same behavior was observed during desorption, although these isotherms are useful for drying processes design. The hygroscopicity behavior of these samples reflects some useful techno-functional applications when used as ingredient in food formulations. Further research is needed to completely understand these sources that are currently trends in the food industry field.