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## ONE FOR ALL: INSECT-BASED FUNCTIONAL INGREDIENT FOR GLOBAL NUTRITION

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*Tropomyosin, allergens, T. molitor, novel food*

Insects are increasingly considered as commonly acceptable as a suitable protein source for humans and domesticated livestock in industrialized Countries. The economic attention paid to insects as a protein source is due to their high nutritional value but also to the increasing conventional cost of other protein sources such as meat, fishmeal, and soybean meal. Furthermore, the consumption of insects as a protein source has a lower environmental impact than the protein source of vertebrates. Tenebrio molitor L. belongs to the family Tenebrionidae of the Coleoptera order. Recently, EFSA published a scientific opinion on the safety of dried cornmeal (T. molitor larva) considering its use as novel food to produce snacks, energy bars, and pasta. On the other hand, like most protein-containing foods, insects can induce immunoglobulin E (IgE)-mediated food allergies. The major allergen has been identified in tropomyosin, a muscle protein. This molecule belongs to a family of highly conserved proteins with multiple isoforms found in both muscle and non-muscle cells of all vertebrate and invertebrate species. Allergenic tropomyosins are found in invertebrates such as crustaceans (shrimp, lobster, crab, spiny lobster), arachnids (dust mites), insects (cockroaches), and mollusks (e.g. squid), while vertebrate tropomyosins are non-allergenic.

The T. molitor Tropomyosin_1 gene sequence is not currently available. Its characterization could provide important new information useful to ensure consumer safety. Starting from the coding sequence (CDS) of the T. molitor tropomyosin 1 gene (855 bp) available on NCBI, BLAST research was performed. This analysis led to the identification of a very similar gene

sequence (87.60%) corresponding to the messenger RNA of tropomyosin-1 of Tribolium castaneum (Herbst) (AN: LOC656904). Seven primer pairs distributed over the T. castaneum sequence were designed. DNA was extracted from T. molitor larvae and the fragments obtained from three pairs of primers, for which the expected amplification products were obtained, were sequenced. The whole gene sequence will allow us to validate the predicted gene CDS and design the real-time primers. Subsequently, Tropomyosin_1 gene expression in T. molitor larvae exposed to different growth conditions will be evaluated. Our work will allow the identification of the Tropomyosin_1 gene sequence of Tenebrio molitor for the first time, the evaluation of any possible differences in gene expression in larvae, and the study of the role of Tropomyosin_1 as an allergen.