Ph.D. THESIS TITLE

Nutritional Biology of Synanthropic Mites (Acari: Acaridida)

ABSTRACT

Several attempts to describe the nutritional biology of acaridid mites were undertaken, however full understanding of these processes remains incomplete. The objective of this Ph.D. thesis was to expand our knowledge concerning digestive physiology of stored product and house dust mites and to apply this knowledge to their nutritional biology. The research approach adopted in this Ph.D. thesis includes *in vitro* characterization of enzymatic activity in whole mite extracts (WME) and spent growth medium extracts (SGME), evaluation of the enzyme activities with respect to the gut physiological pH, enzyme inhibition experiments, *in vivo* localization of enzyme activities in the mite gut, determination of effects of nutrient or antifeedant additives in experimental diets on mite population growth and determination of the feeding preferences of synanthropic mites as assessed by *in vitro* and *in vivo* analyses. The gut contents of twelve species of synanthropic acaridid mites were determined to be within a pH range of 4 to 7 and showed a pH gradient from the anterior to the posterior midgut. The pH in digestive tract of synanthropic acaridid mites corresponds to the activity of proteases, α-glucosidases, α-amylases and bacteriolytic enzymes. The activity of these enzymes represents the major digestive activity in mites; however, different mite species vary in enzymatic activity. The house dust and stored product mites are capable of utilizing bacteria as a food source. They are also adapted to digest sucrose, starch-type substrates and proteins. *In vivo* enzymatic results showed that bacteria, starch and most of protein digestion were localized mainly in ventriculus and caeca; however, some enzyme activities were localized in posterior midgut. The enzymatic activity corresponds to the presence of food and the elevated enzymatic activity can affect the metabolic needs of mites. The findings also underline the importance of ecological interactions between mites and other microorganisms. Because the digestive enzymes present in mite feces are major human allergens, the medical and economic aspects of digestive enzymes are also discussed. The results section of the Ph.D thesis comprises five peer-reviewed articles.