

## AN IMPROVEMENT OF THE HOLLING TYPE III FUNCTIONAL RESPONSE IN ENTOMOPHAGOUS SPECIES MODEL

T. CABELLO\* and M. GÁMEZ<sup>†,‡</sup>

*\*Department of Applied Biology*

*†Department of Statistic and Applied Mathematics  
La Cañadade San Urbano sn, University of Almeria  
04120-Almeria, Spain  
‡mgamez@ual.es*

Z. VARGA

*Institute of Mathematics and Informatics  
Szent István University, Godollo, Hungary*

Received 18 June 2007

Revised 7 August 2007

In this study, we analyze the functional response for a parasitoid-host and a predator-prey system, as a tool of biological control of pests to evaluate the potential of bio-control agents. A possible biological interpretation was given to the adjustment coefficients of type I and II functional response by Hassell.<sup>1</sup> Based on this, we propose new expressions for type III in terms of a new parameter that we call entomophagous potential (parasitoid or predator), providing examples using actual data from trials carried out previously for parasitoid species *Chelonus blackburni* Cameron (Hym.: Braconidae) and predator species *Joppeicus paradoxus* Puton (Het.: Joppeicidae). The novelty of the paper consists in the fact that these new expressions for Holling type III functional response have a biological interpretation, and result in a better fit to data than Hassell's model.

*Keywords:* Functional Response; Parasitoid; Predator; Biological Simulation.

### 1. Introduction

The concept of functional response was defined by Solomon<sup>2</sup> as the relation between the density of prey and the number of prey consumed by a predator individual. The functional response numerically expresses the change of the rate of attacks by the predator, as a function of the change of prey density.<sup>3</sup> Recently, some authors prefer to call it “behavior response,” because it actually describes the predator's searching behavior in space, in a given time interval, corresponding to different prey densities.<sup>4</sup>

<sup>‡</sup>Corresponding author.