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Quality and process control in mass-rearing systems for predators of Adelgids

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This project was an effort to establish a model for developing quality and process control in insect rearing systems. We developed a system of quality control (QC) and process control (PC) for mass-rearing programs for *Sasajiscymnus tsugae* (Coleoptera: Coccinelidae) and *Laricobius nigrinus* (Coleoptera: Derodontidae). The QC system consists of several tiers of observation and decision-making: 1) behavioral, 2) biomass and linear measurements, 3) biochemical assessments, and 4) internal morphology. The PC system is based on measurements of 1) diet quality (natural prey and artificial diet supplements), 2) analysis of process variability, and 3) most influential sources of error and deviations from quality goals (Pareto analysis).

In this study, we compared the value of X-bar charts, R charts, and C charts to determine which of these tools were most helpful in QC and PC systems whose goal was to develop the most reliable controls at the most economical, user-friendly, and biological fitness outcomes. We also made extensive use of regression analysis to help us determine objectively which factors most reliably predict desirable quality of mass-reared predators.

Some of the most important quality and process parameters that we discovered were protein content of predators and diet, free-radical scavenging capacity in predators and diets, lipid content, storage carbohydrate content, predator biomass, and predators' internal condition.