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Conference Abstract

Turning an Invasion into a Resource: Technical and Nutritional Constraints in the Market-Driven Mitigation of *Callinectes sapidus* and *Carcinus maenas*

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Abstract

The management of invasive decapods, such as the Atlantic blue crab (*Callinectes sapidus*) and the European green crab (*Carcinus maenas*), requires innovative strategies that align ecological removal with economic sustainability. The SoftCrab Project evaluates an "Incentivized Harvest" model based on capturing wild individuals and maintaining them in captivity until molting, testing the technical feasibility of soft-shell crab production as a control method. This case study presents experimental results on nutritional and thermal optimization, identifying the biological bottlenecks that govern this transition from an invasive threat to a commercial resource.

In nutritional trials (Standard Diet, Formulated Feed, and No Feeding), *C. maenas* showed high vulnerability to starvation (78% mortality), a rate significantly higher than those observed in the Standard Diet (25%) and Formulated Feed (44%) groups.

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Conversely, *C. sapidus* demonstrated remarkable robustness and digestive plasticity, maintaining low mortality (5.6%) and high trypsin levels even under food deprivation - traits that likely facilitate its invasive success. Concurrently, thermal trials on *C. maenas* (16ºC, 20ºC, and 24ºC) challenged the hypothesis that higher temperatures accelerate production. While mortality at 16ºC was relatively low (22%), exposure to elevated temperatures (20-24ºC) increased mortality to 59% and penalized post-molt biomass increments without reducing the inter-molt period, which remained excessively long for commercial viability in the tested size classes.

Proximal analysis further validated the resource's value, showing that standard culinary processing preserves nutritional integrity. Results revealed a significant contrast between localized tissue and the whole edible organism: while claw muscle provides a lean protein source (>80% DM; ~2% fat DM), the total soft tissues - simulating the edible profile of a soft-shell crab - offer a lipid-dense and calorie-rich profile (~60% protein DM; 9–14% fat DM).

Our findings conclude that while *C. sapidus* shows superior physiological resilience for captivity, biological "resistance" to molting remains a primary barrier for both species. For market-based mitigation to succeed, management must move beyond simple husbandry toward advanced biotechnological interventions to synchronize molting cycles. This study provides a realistic roadmap for integrating IAS control into the blue economy, emphasizing the need to respect species-specific physiological thresholds.

Keywords

IAS Management, *Callinectes sapidus*, *Carcinus maenas*, Soft-shell crab, Thermal Physiology, Blue Economy.

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Conflicts of interest

The authors have declared that no competing interests exist.