

## Induced responses of seaweeds to herbivory

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Terrestrial plants are well-known for their induced responses to herbivores that can strongly affect plant-herbivore interactions and entire plant communities<sup>1</sup>. Despite their prevalence in terrestrial plants and their importance to community structure, induced responses of seaweeds are poorly understood. For example, several previous studies of induced responses in seaweeds used non-standard bioassays, unrealistic damage cues, or limited their scope to studies of one herbivore species interacting with one seaweed species. Standardized studies of seaweed induced responses should lead to a better understanding of seaweed-herbivore interactions and their consequences since seaweeds serve critical roles in several marine communities.

We investigated induced responses in multiple seaweed species (ex: *Fucus vesiculosus* or bladder wrack). Laboratory experiments exposed seaweeds to natural densities of common, co-occurring herbivores including the isopod *Idotea baltica*, common periwinkles *Littorina littorea*, and smooth periwinkles *Littorina obtusata*. Controls consisted of herbivore-free replicates. Effluent from these "upstream" tanks flowed into "downstream" tanks containing seaweed but no herbivores. These tanks allowed for a test of the ability of seaweeds to respond to chemical cues released from neighboring conspecifics under attack. There is some evidence that seaweeds and terrestrial plants can respond to these water- or airborne cues<sup>1,3</sup>. At the end of these induction phases, we measured the relative palatability of treatment and control seaweed tissues to another set of herbivores to determine if seaweed responses were induced. In addition, we measured seaweed phlorotannin concentration to test the hypothesis that these metabolites function as induced defenses in the Phaeophyceae. Previous studies suggest that this class of seaweed metabolites may function as induced defenses but there is debate about their ecological role<sup>2</sup>. Few studies have tested for induced responses of seaweeds in the field. We conducted an experiment in Acadia NP to determine if seaweed responses observed in the lab would also be seen under a more realistic setting. Benthic seaweeds in the field were caged with or without herbivores for 21 days. Cages were checked daily to maintain desired snail densities. In control cages, all herbivores were removed each day. In treatment cages, snails were added or removed as needed.

Preliminary results suggest that seaweeds near the MDIBL do respond to grazers by becoming less palatable to other herbivores compared to control seaweeds. Phlorotannin levels were not significantly different between treatment and control seaweeds. These responses displayed a high level of specificity on multiple levels suggesting that these interactions may be more complex and more common than previously assumed. Furthermore, similar trends were observed in the field but were not as strong as laboratory experiments suggesting that other factors may interact with induced seaweed responses. This research was made possible by a New Investigator Award (Maren Fellowship) and through the *National Parks Ecological Research Fellowship Program*, a partnership between the National Park Service, the Ecological Society of America, and the National Park Foundation. It is funded through a generous grant from the Andrew W. Mellon Foundation.

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