

# Plant Compensatory Growth in Aspen Seedlings: The Role of Frequency and Intensity of Herbivory and Resource Availability

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## Abstract

Plant ecologists have debated the mechanisms used by plants to cope with the impact of herbivore damage for more than a century. During that time, plant resistance mechanisms, which reduce the amount of herbivore damage before and during herbivory, have received most of the attention, while plant tolerance mechanisms, which may minimize the impacts of damage after herbivory, have been less studied. The aim of this presentation is to bring the topic of plant compensatory responses, especially compensatory growth, to the front of research in plant ecology and plant-herbivore interactions. We conducted a greenhouse experiment to evaluate how carbon sink-source relationships and compensatory plant growth operate under different intensities and frequencies of simulated defoliation of aspen seedlings, with or without N-enriched media. We found large variations in plant responses, ranging from undercompensatory to overcompensatory growth, depending on the resource availability and defoliation intensity and frequency. We developed a new predictive model, the Frequency and Intensity of Herbivory and Resource Availability (FIRA), based on carbon sink-source relationships. Our model incorporates the interactions between frequency and intensity of herbivory and resource availability as modulators of plant compensatory responses. We concluded by discussing the results of this and earlier studies in the context of the FIRA model, and elaborated the intricate relationship between resource availability and compensatory growth following herbivory.

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