Julie Nygard

Agrawal, A. 2000. Overcompensation of Plants in Response to Herbivory and the By-product Benefits of Mutualism. Trends in Plant Science 5: 309-313.

An interesting argument for herbivory as a mutualism.

Anderson, V.J. and D.D. Briske. 1995. Herbivore-Induced Species Replacement in Grasslands: Is it Driven by Herbivory Tolerance or Avoidance? Ecological Applications 5: 1014-1024.

Anderson and Briske used a garden experiment to examine the mechanism by which herbivory impacts species replacement.

Athey, L.A. and E.F. Connor. 1989. The Relationship Between Foliar Nitrogen Content and Feeding by *Odontota dorsalis* Thun. On *Robinia pseudoacaci* L. Oecologia 79: 390-394.

Foliar nitrogen content was manipulated to determine if nitrogen concentration in black locust trees affected levels of herbivory.

Bach, C.E. 1994. Effects of a Specialist Herbivore (*Altical subplicata)* on *Salix cordata* and Sand Dune Succession. Ecological Monographs 64: 423-445.

Bach examines how herbivory and its impacts may play a role in community patterns, in particular succession. Bach used exclusion experiments to assess the changes in species abundance and biomass over a three-year period.

Belsky, A.J. 1986. Does Herbivory Benefit Plants? A Review of the Evidence. American Naturalist 127: 870-892.

Belsky reviews the literature on compensatory growth. She comments on and criticizes many of the studies that have claimed to show compensatory growth saying there are experimental design problems as well as lack of consistency in how compensation is measured. This is one of a handful of back and forth papers between the two camps in the debate on overcompensation.

Belsky, A.J., W.P. Carson, C.L. Jensen, and G.A. Fox. 2002. Overcompensation by Plants: Herbivore Optimization or Red Herring? Evolutionary Ecology 7: 109-121.

Another review on overcompensation and its evolutionary significance. This paper is entertaining at times but the authors also make some good points about the issue of overcompensation and future directions for researchers.

Bergelson, J. and M.J. Crawley. 1992. Herbivory and *Ipomopsis aggregata*: The Disadvantages of Being Eaten. American Naturalist 139: 870-882.

Bergelson and Crawley tested 14 populations of scarlet gilia to look for overcompensation across populations. They found little evidence to support Paige and Whitham's findings. An interesting paper just for the fact that they tried to repeat a previous experiment on the same plant.

Bergelson, J., T. Juenger, and M.J. Crawley. 1996. Regrowth Following Herbivory in *Ipomopsis aggregata*: Compensation but not Overcompensation. American Naturalist 148: 744-755.

A response to Paige's comments about their original paper finding no overcompensation in scarlet gilia.

Bigger, D.S. and M.A. Marvier. 1998. How Different Would a World Without Herbivory Be?: A Search for Generality in Ecology. Integrative Biology 60-67.

A good place to start reviewing the literature. A meta-analysis of over 200 experiments involving herbivory were reviewed to look for common themes on the impacts of herbivory.

Bonser, S.P. and R.J. Reader. 1995. Plant Competition and Herbivory in Relation to Vegetation Biomass. Ecology 76: 2176-2183.

Bonser and Reader studied whether effects of herbivory and competition depend on aboveground plant biomass.

Briske, D. 1993. Grazing Optimization: A Plea for a Balanced Perspective. Ecological Applications 3: 24-26.

A note to the journal urging caution when evaluating studies on compensation and management implications. The note is also a response to Painter and Belsky (1993). The paper does not present anything new and is not particularly informative.

Cantor, L.F. and T.G. Whitham. 1989. Importance of Below-Ground Herbivory: Pocket Gophers May Limit Aspen to Rock Outcrop Refugia. Ecology 70: 962-970.

Cargill, S.M. and R.L. Jefferies. 1984. The Effects of Grazing by Lesser Snow Geese on the Vegetation of a Sub-arctic Saltmarsh. Journal of Applied Ecology 21: 669-686.

Aboveground net primary production was higher in grazed areas for both years of a two-year study. This paper is often cited as one of the most well documented studies on overcompensation.

Cebrian, J. and C.M. Duarte. 1994. The Dependence of Herbivory on Growth Rate in Natural Plant Communities. Functional Ecology 8: 518-525.

Reviewed 56 published accounts relating plant growth rate to the percentage of photosynthetic biomass consumed daily by herbivores. Herbivory increased with plant turnover rate and fast growing plants supported a lower biomass of photosynthetic tissue than slow growing ones. Herbivory is independent of ecosystem primary production.

Crawley, M.J. 1983. Herbivory: The Dynamics of Animal-Plant Interactions. Blackwell Scientific Publications, Oxford.

A well written general book on plant-animal interactions.

Crawley, M.J. 1997. Plant Ecology. Blackwell Scientific Publications, Oxford.

A general plant ecology textbook.

Daehler, C.C. and D.R. Strong. 1995. Impact of High Herbivore Densities on Introduced Smooth Cordgrass, *Spartina alternifloral*, Invading San Francisco Bay, California. Estuaries 18: 409-417.

Daehler and Strong examined the possibility of using two sap-feeding insects as biological controls on the invasive plant, *Spartina alternifloral*.

Doak, D.F. 1992. Lifetime Impacts of Herbivory on a Perennial Plant. Ecology 73: 2086-2099.
Doak studied dwarf fireweed for long-term impacts from herbivory. He argues that short-term impacts from herbivory should not be extrapolated to long-term impacts or benefits.

Dyer, M.I. 1975. The Effects of Red-Winged Blackbirds (*Agelaius phoeniceus* L.) on Biomass Production of Corn Grains (*Zea mays* L.). Journal of Applied Ecology 12: 719-726.
Dyer claims that herbivory by blackbirds on the tips of ears increases the length of corn ears and the amounts of kernels per ear. This study was one of many studies in the 1970's that reinvigorated the debate about compensatory growth. There are some problems with his experimental design that are not accounted for in his discussion of the issue and these problems are often mentioned in papers that criticize his findings.

Dyer, M.I. and U.G. Bokhari. 1976. Plant-Animal Interactions: Studies of the Effects of Grasshopper Grazing on Blue Grama Grass. Ecology 57: 762-772.
Dyer and Bokhari used lab experiments to examine the impacts of grasshopper grazing on blue grama grass at three temperatures. Cited as evidence for overcompensation, it is often criticized for design errors and the fact that it is a lab experiment.

Dyer, M.I., C.L. Turner and T.R. Seastedt. 1993. Herbivory and its Consequences. Ecological Applications 3: 10-16.
The authors contend that herbivores cause plants to induce non-linear growth leading to an optimization curve where low-levels of herbivory cause increases in community production but extreme herbivory causes decrease. They present their argument using examples from the literature.

Frank, D.A., M.M. Kuns, and D.R. Guido. 2002. Consumer Control of Grassland Plant Production. Ecology 83: 602-606.
The authors examined the impact of ungulate herbivory on grasslands by comparing aboveground and belowground production in Yellowstone National Park. The authors note that most studies of grazing on grasslands deal with aboveground production while few to none incorporate belowground production.

Hawkes, C.V. and J.J. Sullivan. 2001. The Impact of Herbivory on Plants in Different Resource Conditions: A Meta-Analysis. Ecology 82: 2045-2058.
Hawkes and Sullivan did a meta-analysis on the literature to review the evidence for how plants are affected by herbivory in different resource conditions. Hawkes and Sullivan found no conclusive evidence that plants in better resource conditions can tolerate herbivory better. They suggest there are very complex interactions between resource abundance or limitation and herbivory.

Huntly, N. 1991. Herbivores and the Dynamics of Communities and Ecosystems. Annual Review of Ecology & Systematics 22: 477-503.

Huntly writes a broad overview paper about the mechanisms by which herbivores affect plants.

Jaremo, J., P. Nilsson and J. Tuomi. 1996. Plant Compensatory Growth: Herbivory or Competition? Oikos 77: 238-247.

Jaremo, J. and E. Palmqvist. 2001. Compensatory Growth: A Conquering Strategy in Plant-Herbivore Interactions? Evolutionary Ecology 15: 91-102.

The authors developed a model based on the phenotypic trait of compensating or ordinary plant and how this trait affects population dynamics. An interesting read.

Juenger, T. and J. Bergelson. 1997. Pollen and Resource Limitation of Compensation to Herbivory in Scarlet Gilia, *Ipomopsis aggregata*. Ecology 78: 1684-1695.

Juenger and Bergelson examined scarlet gilia for interactions and limitations from pollination for clipped and unclipped plants. They suggest that changes in plant architecture and phenology change interactions with their pollinators.

Lennartsson, T., J. Tuomi and P. Nilsson. 1997. Evidence for an Evolutionary History of Overcompensation in the Grassland Biennial *Gentianella campestris* American Naturalist 149: 1147-1155.

Maschinski, J. and T.G. Whitham. 1989. The Continuum of Plant Responses to Herbivory: The Influence of Plant Association, Nutrient Availability, and Timing. American Naturalist 134: 1-19.

The authors found that plant responses to herbivory changed with availability as resources. The design is somewhat confusing and raises questions about the results.

Mathews, J.N.A. 1994. The Benefits of Overcompensation and Herbivory: The Difference Between Coping with Herbivores and Liking Them. American Naturalist 144: 528-533.

Mathews expands on Vail's theoretical model of bet-hedging and points out assumptions that may skew results based on Vail's model.

Mazancourt, C. de, M. Loreau and L. Abbadie. 1998. Grazing Optimization and Nutrient Cycling: When do Herbivores Enhance Plant Production? Ecology 79: 2242-2252.

Mazancourt et al. designed a model in which nutrient cycling is a key factor in the grazing optimization by an herbivore.

McNaughton, S. J. 1986. On Plants and Herbivores. American Naturalist 128: 765-770.

McNaughton rebuts to Belsky's 1986 paper, "Does Herbivory Benefit Plants?" McNaughton clarifies issues raised by Belsky and claims her arguments are illogical.

Paige, K.N. 1999. Regrowth Following Ungulate Herbivory in *Ipomopsis aggregata*: Geographic Evidence for Overcompensation. Oecologia 118: 316-323.

Paige examined eight populations of scarlet gilia across Colorado and Arizona to test for overcompensation.

Paige, K.N. and T.G. Whitham. 1987. Overcompensation in Response to Mammalian Herbivory: The Advantage of Being Eaten. American Naturalist 129: 407-416.

This paper reinvigorated the debate about overcompensation and started a flurry of call and response papers about the issue.

Painter, E.L. and A.J. Belsky. 1993. Application of Herbivore Optimization Theory to Rangelands of the Western United States. Ecological Applications 3: 2-9.

Painter and Belsky criticize current management practices focusing on the herbivore optimization theory, which they claim was popularized by the press and has been subsequently misused and misinterpreted by land managers. The authors give a brief history on the debate about compensatory growth then spend the rest of the article criticizing experiments that have demonstrated that grazing can be beneficial to plants.

Palmisano, S. and L.R. Fox. 1997. Effects of Mammal and Insect Herbivory on Population Dynamics of a Native California thistle, *Cirsium occidentale.* Oecologia 111: 413-421.

Palmisano and Fox explore differences in between insect and mammalian herbivory as well as spatial and temporal heterogeneity on the effects of herbivory on a native thistle.

Simons, A.M. and M.O. Johnston. 1999. The Costs of Compensation. American Naturalist 153: 683-687.

Some interesting points about the evolution of overcompensation are made but the models presented are not completely clear.

Strauss, S.Y. and A.A. Agrawal. 1999. The Ecology and Evolution of Plant Tolerance to Herbivory. Trends in Ecology and Evolution 14: 179-185.

Strauss and Agrawal review the literature and synthesize ideas about the evolution of overcompensation.

Strong, D.R., H.K. Kaya, A.V. Whipple, A. Child, S. Kraig, M. Bondonno, K. Dyer, and J.L. Maron. 1996. Entomopathogenic Nematodes: Natural Enemies of Root-feeding Caterpillars on Bush Lupine. Oecologia 104: 1-7.

Strong et al. discuss a trophic cascade whereby an entomopathogenic nematode protects populations of lupines from the ghost moth caterpillars.

Trlica, M.J. and L.R. Rittenhouse. 1993. Grazing and Plant Performance. Ecological Applications 3: 21-23.

Another note to the journal regarding land managers, decision-making and compensation.

Vail, S.G. 1992. Selection for Overcompensatory Plant Responses to Herbivory: A Mechanism for the Evolution of Plant-Herbivore Mutualism. American Naturalist 139: 1-8.

Vail proposes that overcompensation may have evolved in plants from the bet-hedging strategy. Vail presents two models that may oversimplify the idea of overcompensation.

Van Der Meijden, E. 1990. Herbivory as a Trigger for Growth. Functional Ecology 4: 597-598.
The author shows a simple model demonstrating the advantages for plant genotypes that can overcompensate. The model seems too simple for a problem as big as herbivory but the author does reiterate some important questions and makes some interesting points about the compensation issue.

Whitham, T.G., J. Maschinski, K.C. Larson, and K.N. Paige. 1991. Plant Responses to Herbivory: The Continuum from Negative to Positive and Underlying Physiological Mechanisms *in* Plant-Animal Interactions: Evolutionary Ecology in Tropical and Temperate Regions. Eds. Price, P.W., Lewinslohn, T.M., Fernandes, G.W. and Benson, W.W. John Wiley & Sons, Inc. New York.
The authors review the impacts herbivores can have on plants and the arguments for an against the overcompensation idea. They present the idea of a continuum of plant responses that allows them to be plastic in their response to herbivory.