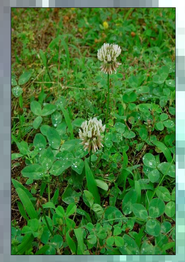

EDGE-MEDIATED SUCCESSION AND DROUGHT RESPONSE IN A PLANT COMMUNITY

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INTRODUCTION

•Edges are important in determining community structure, but their impact on community dynamics is relatively unknown

•Edges can mediate succession by buffering communities on either side through changes in climatic factors across edges

•We examined patterns of vegetation dynamics along an edge gradient in 1996 and 2001, a time period that also included a severe drought (1999)

OBJECTIVES: Determine possible vegetation patterns across an edge in response to succession and a severe drought

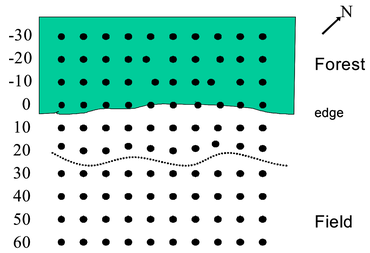
METHODS

Study site

•Hutcheson Memorial Forest, New Jersey

•Grid stretching across forest-field edge divided into 1 m^2 plots

•mid-successional system with young forest and 14 year old field



Sampling

•Ten transects run across edge with plots placed at ten meter intervals from edge

•Each transect went 30 meters into forest and 60 meters into field

•In each plot, percent ground cover of each understory plant species recorded

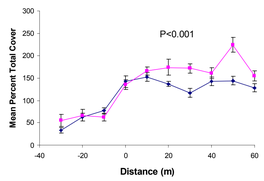
Analysis

•Measures of community and population level attributes analyzed using regression and ANOVA to determine possible edge-mediated succession and drought response patterns

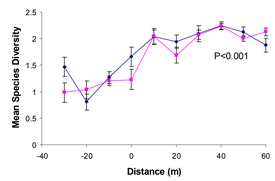
RESULTS

1. Cover, richness, diversity, and evenness were lowest in the forest, higher at the edge, and higher still in the field. The pattern was consistent between years.

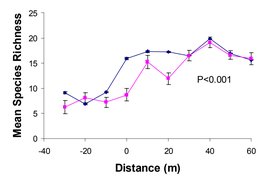
TOTAL COVER



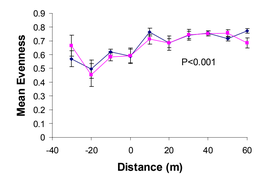
DIVERSITY



RICHNESS

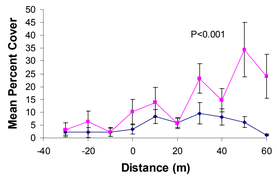


EVENNESS

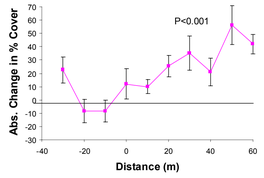


2. Grasses and exotic species showed an increase in cover in the field between 1996 and 2001, indicating an unexpected pattern of successional reversal

GRASS COVER

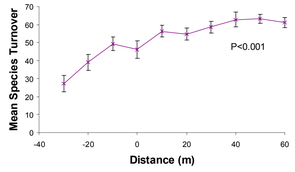


EXOTIC COVER CHANGE



3. Species turnover increased from the forest to the field from 1996 to 2001, showing increasing replacement in the field following the drought

TURNOVER



CONCLUSIONS

- Pattern of successional reversal in grasses likely due to effects of 1999 drought
  - Drought would have created many gaps that would have been filled by early successional species, such as grasses
  - Especially important in the field, where open conditions are more at risk from drought than the forest interior
- Increase in species turnover with distance from the edge reflects increasing replacement by grass species in the field following drought.
- Increasing cover of exotic species in the field suggests area returned to an earlier stage of old field succession following the drought.
- Results suggest observed pattern is more related to the drought than to the process of succession.
  - Edges serve primarily as buffers from drought stress
  - Areas further from the edge experienced greater community change




Some of the species that greatly increased in cover in the field, from left to right: *Achillea millefolium, Agrostis hymenalis, Hieracium pratense, Bromus racemosus*