ABSTRACT OF THE THESIS

Diversity and Stability: an Experimental Study of Stressed Old-Field Ecosystem Patches

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The effect of plant community diversity on stability was tested in seven plant communities within a 4-year-old field at Hutcheson Memorial Forest, New Jersey. Heat stress was applied by covering communities with clear plastic in early summer of 1975. Stability was measured as 1) deflection from ground state (control), and 2) magnitude (size) of recovery. Responses were measured as per cent cover of all community species.

Community deflection did not correlate with the Shannon-Wiener index, species richness, or evenness. The lack of dependence of deflection on these community parameters was due, at least in part, to species-specific deflections. Community recovery was positively correlated with pre-treatment community evenness, and even more strongly with post-treatment community evenness. There were species-independent negative relationships between recovery and post-treatment concentration (%) of dominance as well as between recovery and post-treatment number of dominants. The greater recovery by communities with a more even distribution of dominance was the result of balanced increases by the leading dominants and the uncommon species. Recovery was low in communities with an uneven

distribution of dominance because either the leading dominants and the uncommon species were low in recovery or an increase by one group was negated by a decrease in the other.