Title: Directionality of community change with respect to nutrient identity

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Abstract:

Previous analyses of relationships between multiple nutrient enrichment and community diversity have suggested that the addition of multiple limiting nutrients has greater impacts than the addition of a single nutrient on plant biodiversity (Harpole et al. 2016). Within the assumption of niche collapse is the trade-off among resource use strategies – addition of phosphorous, for example, may not produce large declines in species diversity when all resource competition occurs on an axis of nitrogen limitation. Comparison of pairwise compositional dissimilarity plots suggests that fertilization drives greater divergence between communities of different nutrient identities relative to control.

­­To expand upon prior analyses on the role of nutrient identity, exploration of the species-specific responses to multiple added nutrients can shed light on the mechanisms that may be driving niche collapse.

For multiple nutrient limitation to drive niche differentiation across some three-dimensional trade-off surface, there must be:

1. A diversity of species with different growth strategies (the raw possibility to have niche differentiation), and;
2. A heterogenous environment that may support species with different resource use strategies

Using this data, we can ask:

1. Are there consistent patterns in resource use trade-offs among species in Nutrient Network sites? For example, do species which show a proportional increase in response to nitrogen fertilization show a decrease in response to phosphorous addition?
2. What site-level variables are correlated with the presence of a resource use tradeoff?
   1. We hypothesize that trade-offs in response to nutrient enrichment will be strongest in sites with higher spatial heterogeneity in resource use (measured heterogeneity in soil resources, CV of biomass pre-treatment), larger species pool, and higher mean annual precipitation (or lower harshness? Higher productivity?)
3. What characteristics are associated with greater affinity for certain resources/tradeoffs?
   1. We hypothesize that relationships between nutrient identity and response will be correlated with functional group identity (and some subset of species traits)?

Explanatory Variables:

Timeline:

Data:

Status:

Supporting Information: