Rangeland Plant Ecophysiology **Name:**
EXAM 3, REWM 3500, Fall 2009

Define the following terms. [2 points each]

1) *ecosystem*

2) *grazing morphotype*

3) *phytolith*

4) *grazing avoidance*

5) *grazing tolerance*

6) *allelopathy*

7) *Haber process*

8) Define and distinguish each of the following types of organismal interactions and provide an example of a plant-plant interaction for each category: Amensalism, Commensalism, Parasitism. **[9 points]**

9) List two forms of reactive nitrogen found in the atmosphere, one oxidized form and one reduced form, and describe a key anthropogenic source for each. **[6 points]**

10) Explain clearly how the expansion of agricultural land devoted to growing leguminous crops (such as soybean used to make tofu) is linked to the growth of greenhouse gas concentrations in the atmosphere. **[8 points]**

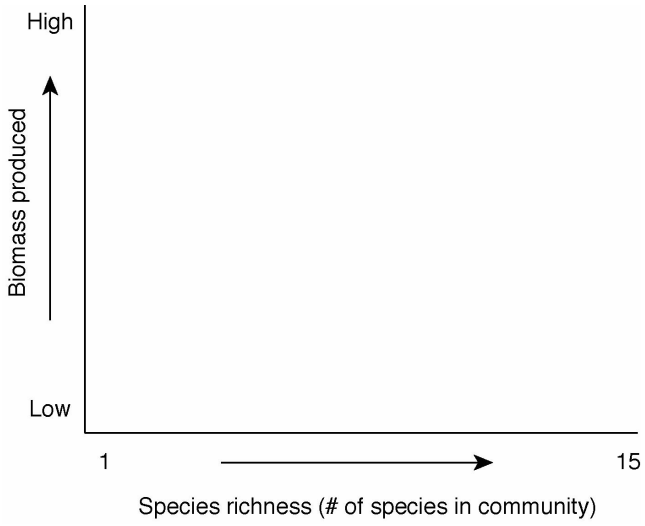
11) Describe two ways in which invasion by non-native plants can alter ecosystem processes or dynamics and give a clear and specific example for each. **[6 points]**

12) List and describe the three main hypotheses or causes that have been proposed to explain the ecological success of non-native plant invaders. **[6 points]**

13) It was thought for many years that the amount of reserve carbon (stored carbohydrates) in grasses was a good predictor of regrowth potential after defoliation. Provide an argument contrary to this notion. Briefly describe evidence supporting your argument. **[6 points]**

14) Mahall and Callaway in a very influential pair of papers published in 1991 and 1992 provided experimental evidence for direct communication between roots of creosote bush (*Larrea*) and bursage (*Ambrosia*) in the Mohave desert. Carefully describe their experiment documenting root-root interaction between these two shrubs and the evidence that allelopathy was playing a role. **[8 points]**

15) On the graph below, draw a curve for the relationship between biomass production and plant species richness (diversity). Underneath the graph, *name* and clearly *explain* the two hypotheses discussed in class proposed to account for this relationship. **[8 points]**



16) Historically, what accounted for the greatest losses of mesic grasslands in the US? What is the greatest threat now to the remaining fragments of these grasslands? Finally, explain how changes in fire frequency have altered vegetation structure in mesic grassland at the Konza Prairie Biological Station? **[9 points]**

17) Clearly describe the three hypotheses offered in the McDowell 2008 article for drought-induced tree die-off? **[8 points]**

18) Based on the theory of competition developed by David Tilman, what process leads to competitive success in plants? You must describe this process in terms of resource competition and resource availability through time. You may wish to use a graph to help with your answer. **[6 points]**

19) In your opinion, what was the single most important concept (not covered on today's exam) introduced this semester in REWM 3500? Why did you choose this concept? What is the direct application of this concept to management of rangeland, forest, or wildlife resources? **[6 points]**