There are two ways to maintain consistent biomass production - testing hypotheses with diversity drops in invaded grasslands (Wilsey et al. 2014. Ecology Letters 17:92-100).

A long-standing hypothesis in ecology is that species diversity is positively related to ecosystem stability (Elton 1958). Diverse systems are predicted to be important in a systems ability to produce a consistent amount of biomass (that is, a low coefficient of variation [CV] in biomass production over time). Many studies have found support for this hypothesis. Three mechanisms have been proposed to explain positive diversity-stability relationships: 1) species growth asynchrony, where a decrease in biomass production by one species is countered by an increase in other species, 2) species effects, where diverse systems are more likely to include stable species, and 3) portfolio effect, where diverse systems are more diverse because of non-proportional scaling of biomass and variability. However, these mechanisms had not been tested previously for situations where species diversity has fallen due to invasion by exotic species. Our new study addressed this long-standing hypothesis, and we found interesting results. Our study used the MEND plots, which were established with either 9 native or 9 exotic species under non-irrigated or summer-irrigated (128 mm) conditions in a common garden, and then monitored over five growing seasons. Species diversity and richness were more than twice as high in native-community than exotic-community plots by the third year, setting up the prediction that native communities will be less variable in biomass production over time than exotic communities. Interestingly, the difference in species diversity did not lead to differences in biomass CV. Furthermore, we found that different mechanisms were operating in exotic and native communities. In native communities, biomass CV was lowest when asynchrony was highest; that is, the asynchrony process was maintaining stable biomass production. Exotic communities had less synchronous growth than native communities. However, exotic communities had an increase in dominance by grass species that had greater than average stability. These ‘stable’ dominant species enabled exotic communities to have equal biomass CV compared to native communities. Thus, our results suggest that there are two ways to maintain consistent biomass production: through species growth asynchrony (exemplified by native communities), or by having especially stable species as the dominant species (exotic communities). Finally, the high stability of exotic communities suggests that they may persist on the landscape for longer periods than previously recognized.