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Dominant native and non-native species leaf traits in nutrient enriched grasslands worldwide

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Predicting how ecosystems will respond to interacting drivers of global change, such as eutrophication and non-native species invasions, is one of the greatest challenges facing ecosystem scientists. Non-native plant species now comprise almost 4% of the world's flora and they often dominate ecosystems following nutrient additions. However, whether native and non-native plant species show fundamentally different functional traits, and how their traits respond to pervasive increases in nutrient availability, remains unclear. Here, we use a nutrient addition experiment replicated across 27 grasslands on four continents, to test whether 158 dominant native and non-native species differ in leaf traits and whether these differences are modified by the addition of multiple nutrients. The three to eight most dominant species (mean cover of each species = 26 %) were sampled from each community (1 m2). We found that dominant native and non-native species exhibit similar specific leaf areas and leaf nitrogen content; indicating similar growth strategies. However, non-native species showed higher leaf phosphorus and potassium concentrations, along with lower leaf % carbon relative to native species. These trait differences could be leading to increased nutrient cycling rates in non-native dominated grasslands. Native and non-native species responded very similarly to nutrient additions. The exception was leaf % N, where differences between native and non-native species, along with their responses to nutrient enrichment, depended on whether they were forbs or grasses. Our findings highlight the functional importance of species' biogeographic origin in grasslands at the global scale. Nonetheless, nutrient enrichment had a greater effect on plant species functional traits than species origin or site abiotic conditions. This, coupled with the similarity in native and non-native species' trait responses to nutrient enrichment, suggests that eutrophication is likely a more important driver of ecosystem change globally.