

## **Polyploidy and Invasion Success in Spotted Knapweed, *Centaurea stoebe*: Specialist Herbivores as Drivers of Invasions and Effective Control Agents?**

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### **Abstract**

Evidence indicates that invasive plants are frequently characterized by natural variation in ploidy level in their native range but only polyploid forms in their invasive range. In addition, cytotypes in the native range of a species can be spatially separated despite occupying similar environmental niches. The mechanisms dictating these patterns are poorly understood but may relate to interactions with specialist herbivores. Selection derived from plant-herbivore interactions has the potential to contribute to the evolution of plants following polyploidisation events by differential selection for defense and life history traits. Escape from such interactions may result in both different population-level responses for cytotypes with different traits and, in the case of introduced populations, lead to rapid evolutionary change. Such evolutionary changes between native and invasive cytotypes may, in turn, lead to increased biological control efficacy. We analyzed in detail the multiple interactions between over 100 populations of spotted knapweed, *Centaurea stoebe* L., and its specialist insect herbivores, some of which have been introduced as biological control agents for the past 30 years. Both diploid and tetraploid cytotypes occur in the native European range, but only tetraploids occur in the introduced range in North America. Our studies include gene expression studies of transcripts related to defense, a series of bioassays with specialist root feeders and a common garden demography experiment with various accessions of *C. stoebe* cytotypes that differ in their life histories, in the presence and absence of these root feeders. We will summarize and discuss our results and that of other groups to come up with a general framework towards a better understanding of the role of specialist herbivores in promoting invasion success of polyploids and to predict their biological control efficacy.