

# The effect of *Helichrysum* shrub encroachment on orchids in a tropical, montane grassland ecosystem, Tanzania

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## **Abstract**

### **Context**

Although shrub encroachment is a common phenomenon in grasslands, which often suppress co-existing herbaceous plants, little is known about how encroaching native shrubs affect endemic and threatened orchid species.

### **Aims**

We assessed the effect of the native dwarf shrub *Helichrysum* species on orchid species in a protected mountainous grassland system in Tanzania.

### **Methods**

We selected five *Helichrysum* shrub-dominated blocks and applied four treatments in each, i.e. no or low encroachment (<20% *Helichrysum* cover; ‘low cover’), high encroachment (>50% *Helichrysum* cover; ‘high cover’), cutting all stems of *Helichrysum* shrubs to ground level (‘stem cut’) and removing both stems and roots of all *Helichrysum* shrubs (‘uprooted’). We then compared orchid species diversity, abundance and functional traits by using a mixed linear model across treatments.

### **Key results**

Orchid species diversity and abundance were significantly lower in ‘high cover’ plots than in other treatments. In ‘high cover’ plots, orchid species such as *Disa robusta*, *Satyrium acutirostrum*, and *S. sphaeranthum* had a significantly lower chlorophyll content than they did in ‘low cover’ plots. The ‘uprooting’ treatment showed significantly higher orchid species diversity in the second field season.

### **Conclusion**

The expansion of *Helichrysum* shrubs adversely affected orchid abundance, diversity, and individual vigour, which in turn affected the regenerative ability of orchids

### **Implications**

We suggest that management should focus on shrub removal, because only ‘cutting’ had a beneficial effect on orchids. Shrub removal should be focused on areas of high shrub cover to promote further orchid species growth in this mountainous grassland of Tanzania.

**Keywords:** Africa, below- and aboveground competition, cutting, *Helichrysum splendidum*, Kitulo National Park, plant–plant interactions, protected area, uprooting.

