#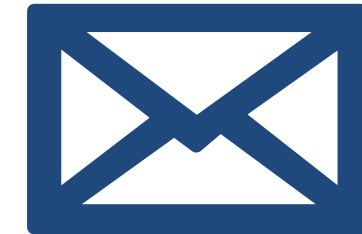 Realized niche of eight endemic plant species of Katangan Copperbelt (D.R. Congo): implications for copper species conservation — copperflora.org

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## Introduction

South of the Katanga province (D.R. Congo), a unique vegetation grows on soils developed on approximately 100 Cu-Co outcrops among the most important in the world (the Katangan Copperbelt). These outcrops form isolated hills in the landscape hosting plant communities evolving along the mineralization gradient. More than 600 metallophytes can be found in these communities with some 32 strict endemics solely known from mineralized soils, 24 broad endemics and some hyperaccumulators (Faucon et. al 2010).

These species present physiological and biological adaptations allowing them to tolerate toxic levels of metals in soils. This high genetic potential is an opportunity to develop restoration strategies of polluted soils. However, most endemics are seriously threatened by the intense mining activities with more than 65 % of them identified as critically endangered (IUCN status). Conservation strategies are being implemented but knowledge about the habitat of each endemic species is still limited.

**Aim** ▶ In order to characterize the ecology of these species, we modeled ecological realized niches of eight endemic species along copper-cobalt gradients in order to optimize conservation and restoration actions.

## Method

*Barleria lobelioides*  *Basananthe kisimbae*  *Triumfetta likasiensis*  *Tinnea coerulea var. obovata*

*Lopholaena deltombei*  *Euphorbia cupricola*  *Sopubia neptunii*  *Commelina zigzag*

1. **Transects** were set along copper and cobalt gradient on three sites
2. Individuals were **identified** and **counted** for each species
3. **5 plots** where the species occurred were selected → At both the extremities, at 1st/3rd quartile and at median
4. Individuals were **counted** and composite **soil samples** collected (0-15 cm) for each plot (1m²)
5. Realized niches with kernel density plots

« Vioplot »
R software

## Results

Ecological niches of the selected endemics are distributed between Cu-soils values of 50 and 11 000 mg.kg⁻¹ and between Co values ranging from 4 to 1500 mg.kg⁻¹. Six species occur in the lower 100 mg.kg⁻¹ concentrations of Co. As for the Cu gradient, two species present ecological optimum over 3000 mg.kg⁻¹.
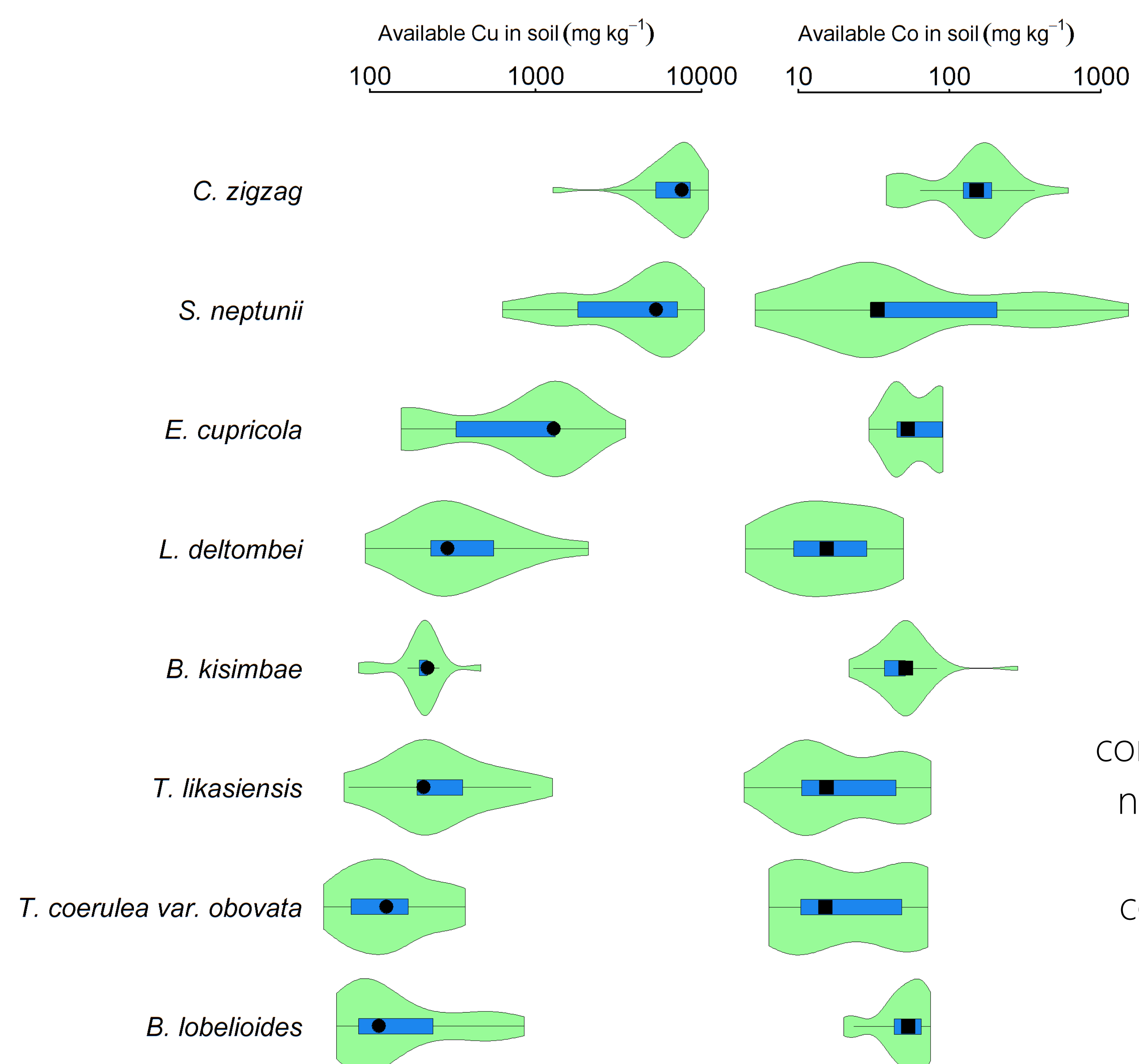


Heterogeneity of species distributions exists principally according to metal. Species occuring in lowest Cu-concentrations are not necessarily present in lowest Co-concentrations in soil and reciprocally.

Realized niche of eight endemic plant species along Cu (left side) and Co (right side) gradients. Niches were modeled with « vioplot » library on R software. Black squares and dots are the medians, blue areas are the ecological amplitudes (range between 1st and 3rd quartiles) and green areas are the density of individuals by m² calculated with kernel density methods. The available concentrations of metals in soil are obtained by flame atomic absorption spectroscopy of the soil filtrate (CH3COONH4-EDTA 1 N at pH 4.65). The scale of axis is logarithmic.

## Take home messages

- **Variations of ecological niches along the gradients indicate a need of adequacy between species conservation strategies and soils' metal contents**
- **Conservation actions need to be undertaken at species level**

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