**Black Locust (Robinia pseudacacia L.) in Austria: The Interplay of Climate, Climate Change and Range Expansion**

KLEINBAUER Ingrid*, DULLINGER Stefan*, ESSL Franz°, PETERSEIL Johannes°, ENGLISCH Thorsten°

* VINCA – Institute for Nature Conservation and Analyses, Vienna, Austria
° UBA - Federal Environment Agency, Vienna, Austria

**REFERENCES:**
Jacob et al., 2005: unpublished report within the EU-project prudence - Prediction of Regional scenarios and Uncertainties for Defining European Climate change risks and Effects

**FIRST**

The leguminous tree black locust arrived in Europe during the 17th century. By now it has become the most problematic introduced tree species in Austria: threatening silvicultures as well as rare endangered plant communities, in particular species-rich dry and semi-dry, nutrient poor grasslands and thermophilous oak forests. Once established population density increases rapidly due to efficient vegetative reproduction by root suckering.

**THAT’S WHY**

We have to identify regions and habitats at risk of becoming invaded under a warmer climate.

**BUT HOW?**

We constructed the environmental envelop for black locust in Austria, using Generalized Linear Models (GLM, McCullagh & Nelder, 1989) to regress several factors (Fig. 3) against presence/absence of black locust. Occurrence data was extracted from the “Mapping the Flora of Austria” database: for each cell (3’ x 5’) in a raster - covering the whole country - the status of black locust is known (see Fig. 2)

In a stepwise backward selection (p<0.05) the following factors were chosen as best predictors (see Fig. 3):
- mean April temperature
- mean winter precipitation sums
- mean number of frost days
- land use index
- curvature index

The bootstrap-corrected final model’s regression coefficient $R^2$ is 0.71 and Somer’s index (Dxy) is 0.89.

**THEN**

Mean April temperature and mean winter precipitation were recalculated using two different climate change scenarios for the end of the current century: 1) HadAM3 from the IPCC (Pope et al.,2000) and 2) a regionalized model from ETH Zurich (Jacob et al., 2005), CH, which has been downscaled for the whole Alpine region. Please see Fig. 4 and 5 for details in changes and comparison of climate change scenarios.

**NEXT STEPS**

To account for differences in recruitment success
- in different habitat types
- along a temperature gradient
- under increased Nitrogen availability
- and facing a competitor (native Quercus petraea) …

... we started a field experiment in late spring 2006 to test for germination success and survival (see Fig. 6 and 7). The experiment will be finished by the end of 2008.

**REFERENCES:**
Jacob et al., 2005: unpublished report within the EU-project prudence - Prediction of Regional scenarios and Uncertainties for Defining European Climate change risks and Effects