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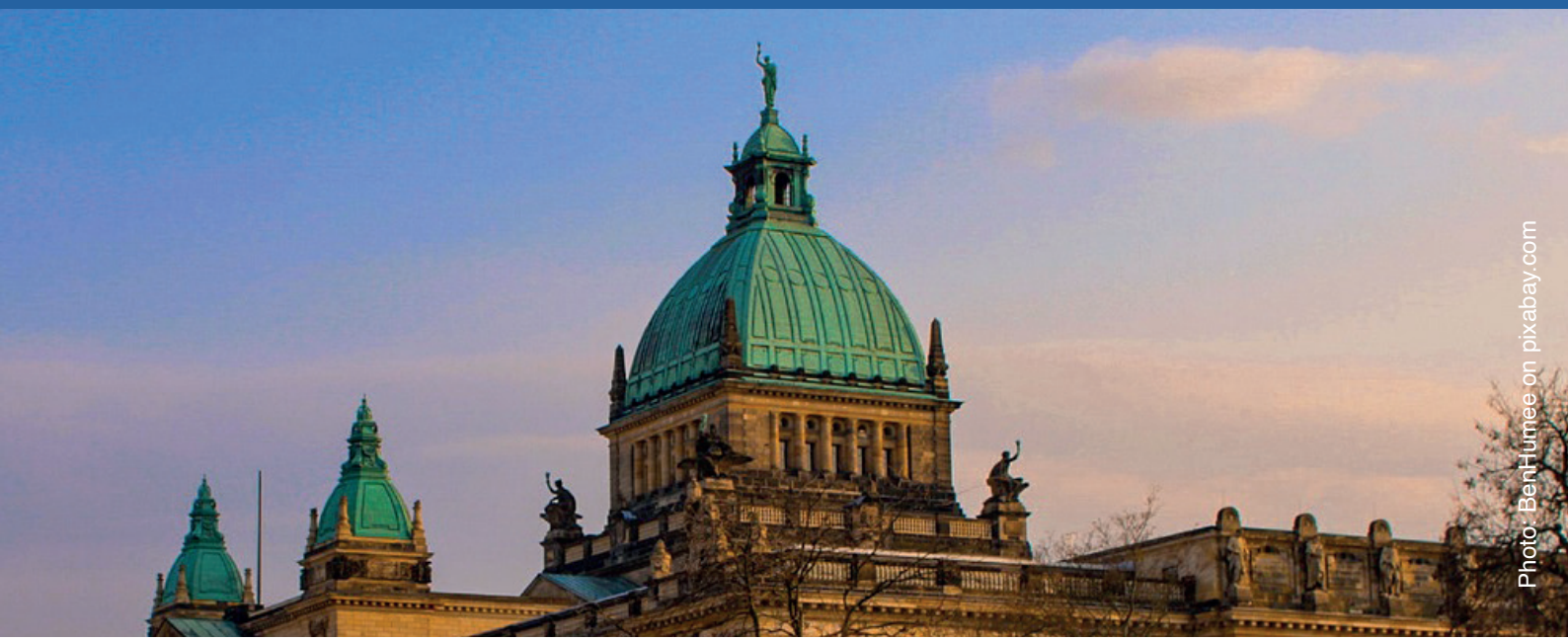

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Book of Abstracts

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Merging an agent-based modelling approach of nutritional ecology and a population dynamics model at landscape level for the management of the Senegalese grasshopper

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Locusts are among the most destructive agricultural pests in the world. Oedaleus senegalensis, the Senegalese grasshopper, may cause serious crop damage and food security problems throughout the Sahel region. Contrary to the protein-limitation paradigm which stipulates that low N concentration in plants impairs herbivores fitness, recent studies have shown that the Senegalese grasshopper can maximize its performance by selecting foods with high carbohydrate content relative to protein. Previous studies conducted in experimental plot fields showed that soil amendments, which decrease carbohydrate/protein content within plants had a negative impact on the pest fitness. However, the extent to which soil amendment linked with the nutritional ecology of individuals may shape population dynamics remains unknown. This study aims at testing if we can extrapolate those results supporting a Carb-limitation hypothesis, at a landscape scale and population level of the Senegalese grasshopper. We developed an agent-based model coupling processes extracted from a population dynamics model from the 1990s with an agent-based modelling approach of nutritional ecology representing the individuals' choices of food according to their carbohydrates to protein ratio. The resulting ABM describes the life cycle and the dynamics of Oedaleus senegalensis in a virtual landscape representing habitats and environmental conditions in Senegal. Simulations with the model examined the effect of soil amendments on the population dynamics while considering other sources of seasonal and latitudinal variability, such as predation, climate, vegetation availability and composition. We believe that such model combining population ecology with agricultural land use practices can further provide evidence-based management strategies to support farmers in their decision-making to keep the pest below a density threshold and minimize damage.