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Potential future distribution of *Striga*  
in the light of climate and  
land use change



## ***Striga* and it's potential distribution... where is it now, and where will it be tomorrow?**

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## ***Striga hermonthica* (Del.) Benth.**

- Parasitic flowering plant
- *Lamiales*, family *Orobanchaceae*
- obligate hemiparasite
- Gramineae as hosts
  - *Zea mays* L.,
  - *Sorghum bicolor* (L.) Moench,
  - *Pennisetum americanum* (L.),
  - *Oryza* spp.

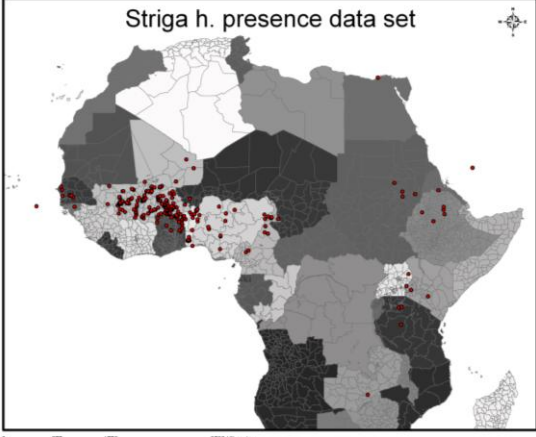


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1. Potential Distribution and Climate Change

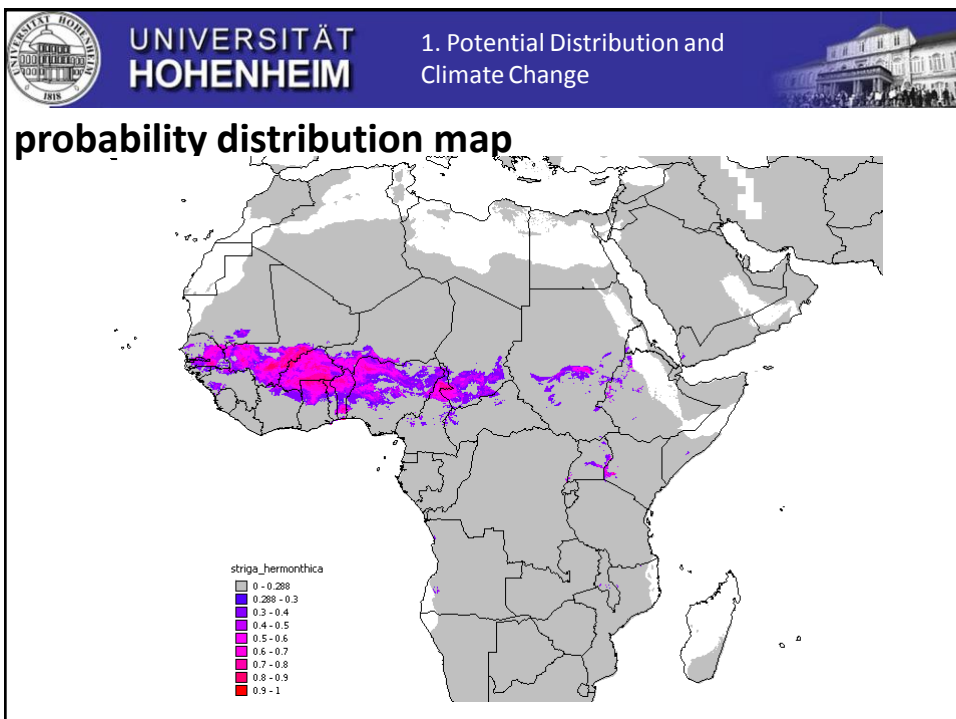
## Climate envelope models


- Prediction of suitable habitats for plant species
  - Based on climatic variables
    - Temperature, Seasonality, precipitation
    - Statistical analysis of given points

Striga h. presence data set




- → probability distribution map





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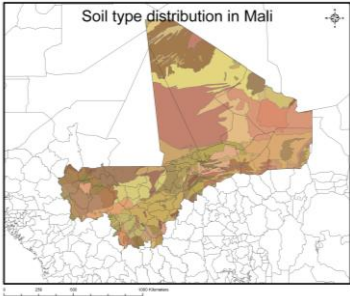
1. Potential Distribution in West Africa



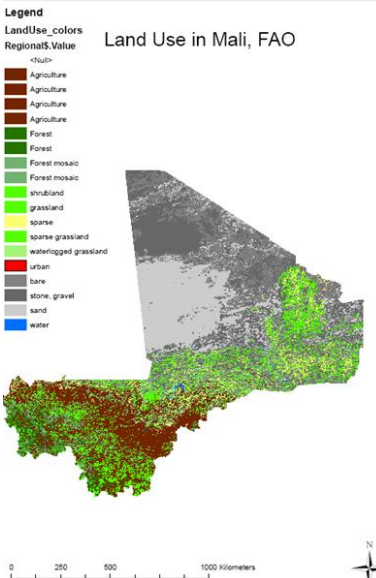
### Current work:

- It is not only about climate:
  - Integration of
    - Soil maps
    - Land use maps
    - Management and cropping systems


→ More detailed predictions of possible future infestation hot-spots



Soil type distribution in Mali




Land Use in Mali, FAO



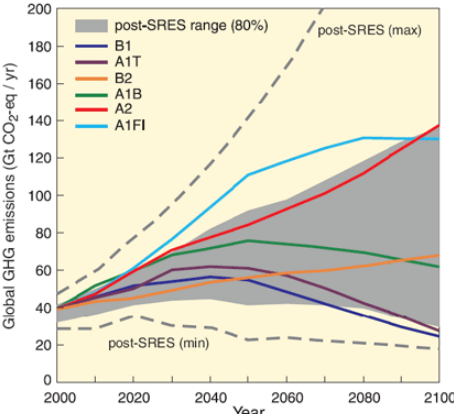
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1. Potential Distribution and Climate Change

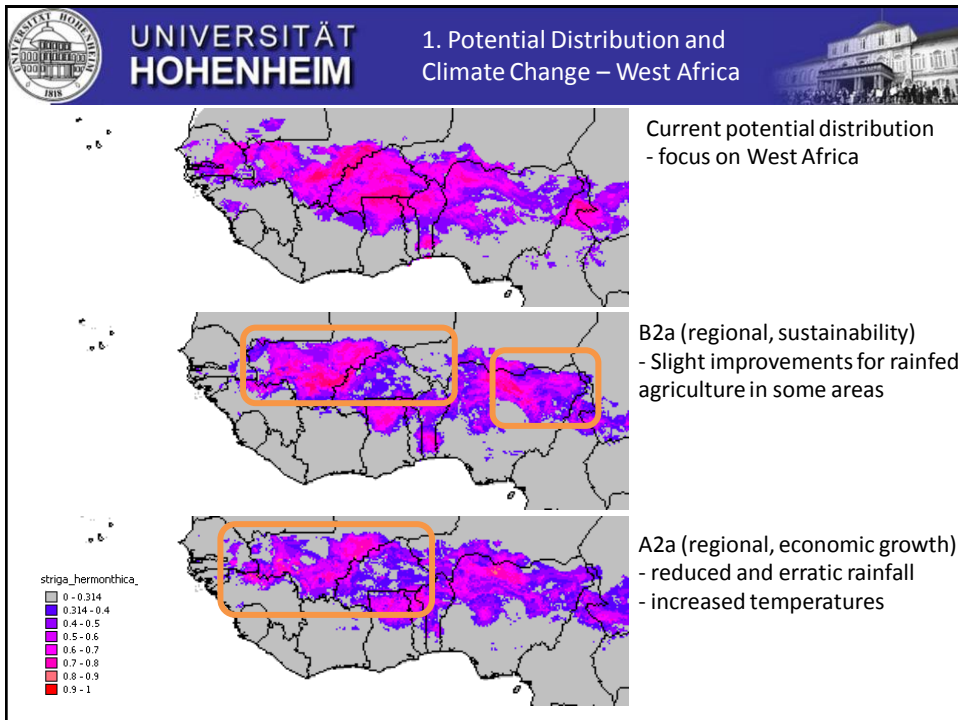


### Climate envelope models – DivaGIS and Maxent

- IPCC datasets on Climate Change are used to modify the CEMs
  - Scenario A2: 2.0-5.4 K (regionalization, economic development)
  - Scenario B2: 1.4-3.8 K (regionalization, sustainability)



The graph plots Global GHG emissions (Gt CO<sub>2</sub>-eq / yr) on the y-axis (0 to 200) against Year on the x-axis (2000 to 2100). It shows several scenarios: B1 (blue), A1T (orange), B2 (green), A1B (red), A2 (purple), and A1FI (cyan). A grey shaded area represents the post-SRES range (80%), with dashed lines for post-SRES (min) and post-SRES (max). Emissions generally increase over time, with A2 and A1FI reaching the highest values by 2100.



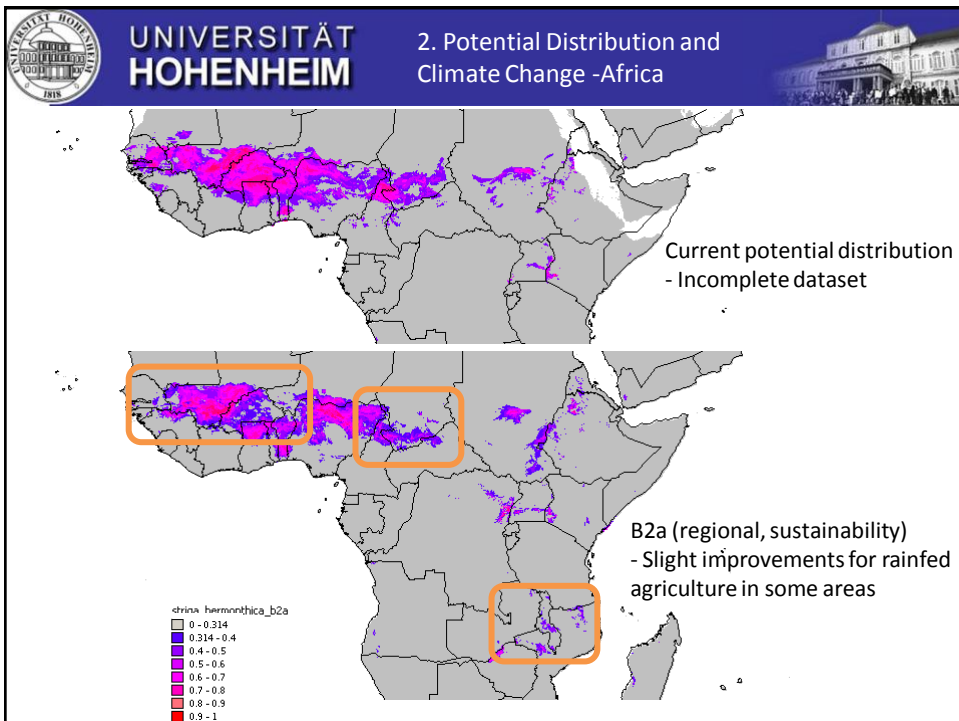
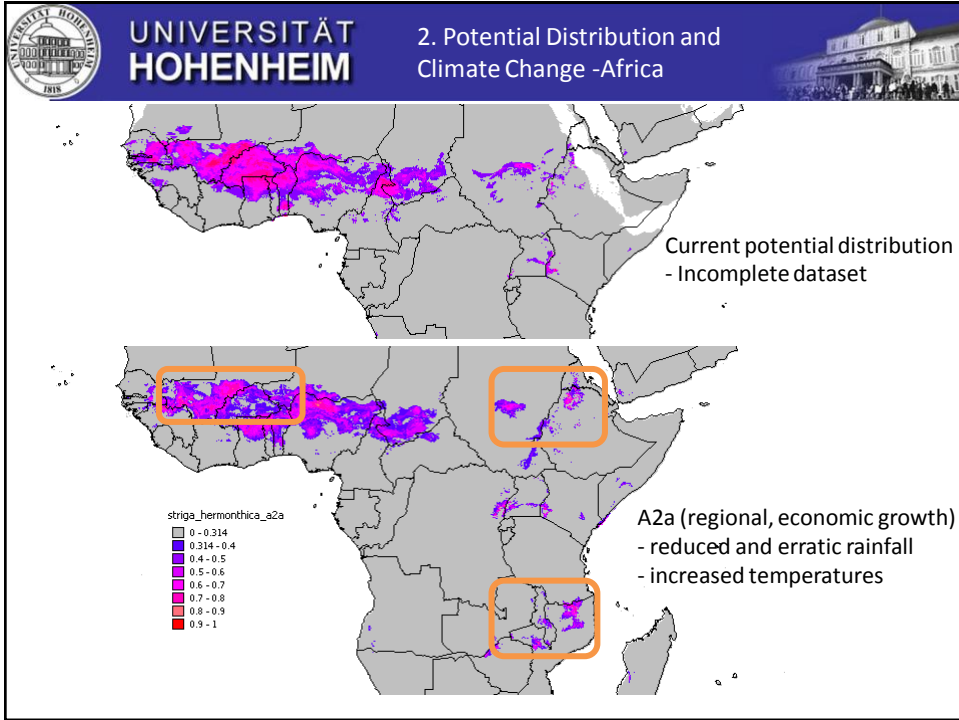
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2. Potential Distribution and Climate Change - Africa

**Next steps:**

- In order to predict potential distribution of Striga for Africa, we need data from additional sources
  - East Africa and South-East Africa
    - Sudan (via Gezira University)
    - Ethiopia (via EIAR and Hawassa University)
    - Kenya (via Food Security Center, HOH)
    - ...?
- Based on this improved data further predictions can be made for Africa, or the world.

**Striga**





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Potential Distribution and  
Climate Change – world wide



## Climate envelope models

– a little preview



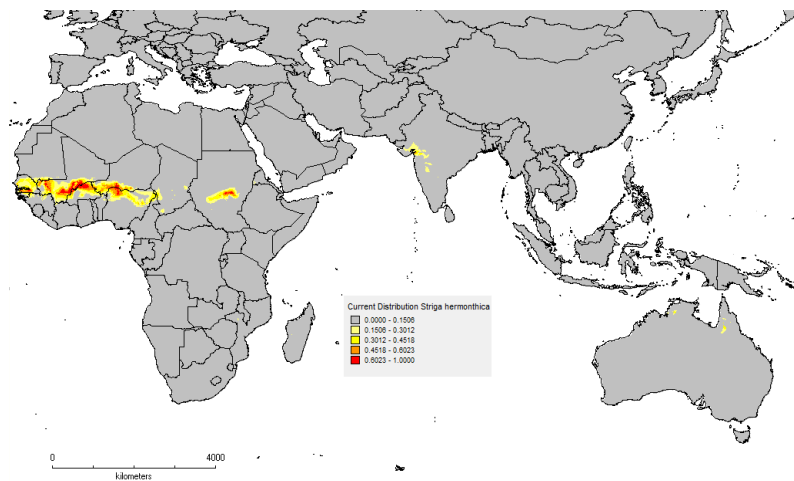
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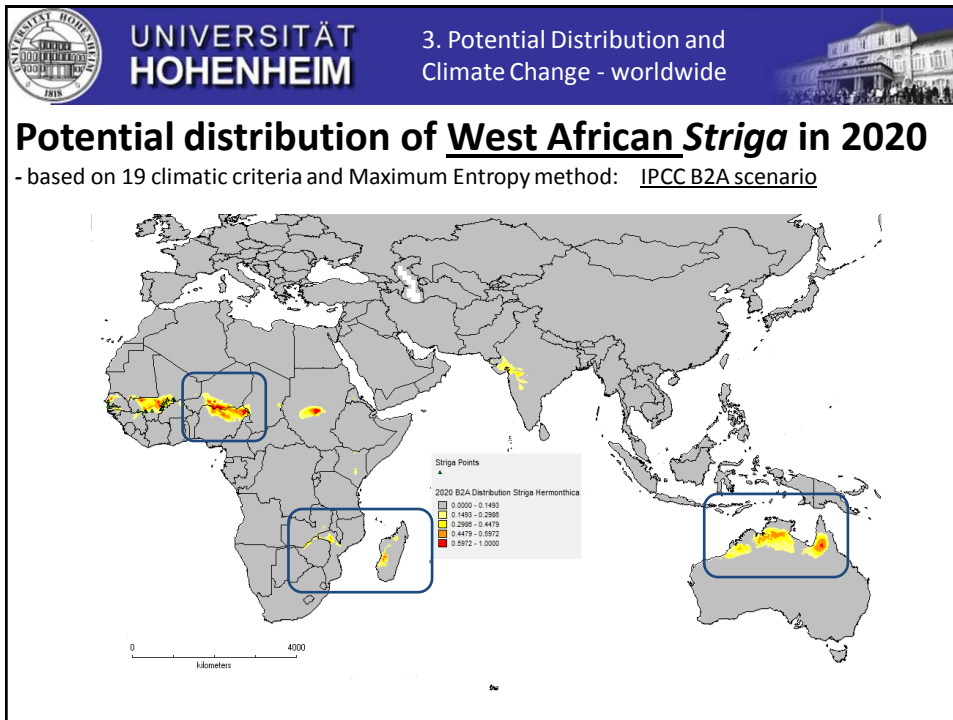
3. Potential Distribution and  
Climate Change - worldwide



## Current potential distribution of West African Striga

- based on 19 climatic criteria and Maximum Entropy method






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**Final remarks**

- Climate Envelope models can serve as a guideline for potential weed distribution
- Detailed data on distribution and climate preferences is necessary
- Forecasts across continental ranges prove difficult due to
  - Local climate variability and adaptations
  - Host plant / management variations
  - Local varieties within target species
- Necessity to include management, vegetation, soil... into the assessments




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**Understanding the present distribution of parasitic weeds of the genus *Striga* and predicting its potential future geographic distribution in the light of climate and land use change.**


- BMZ funded small grant project
- Cooperation between UHOH and ICRISAT, Mali
- March 2010 – March 2012
  
- Two main research activities
  - 1. Potential distribution and climate change
  - 2. Soil, soil organic matter and microbial communities



Bundesministerium für  
wirtschaftliche Zusammenarbeit  
und Entwicklung



Deutsche Gesellschaft  
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Science with a human face



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**Thank you for your attention.**



