RISK MODELLING FOR AN INVASIVE TICK IN BENIN

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Rhipicephalus (Boophilus) microplus

• Pest
  – Short life cycle
  – Acaricide resistance
  » High burden: Anemia, ...

• Disease vector
  – *Anaplasma marginale*
  – *Babesia bovis & B. bigemina*

• Imported from Brazil in 2006
TICKRISK Objectives

• Assessment of the feasibility and usefulness of using modern geo-technology on smartphones by local stakeholders to collect epidemiological information

• Production of an environmental suitability map for *R. microplus* in West Africa using data on land surface temperature and NDVI
Field data collection

- 104 farms in 2011
  - Live ticks from cattle (2-4)
  - Capillary blood on filter paper
- September-December
Data collection - feasibility
Current distribution of *R. (B.)* ticks
Usefulness of geo-technology

“Paper” workflow
- Filling paper forms by field workers
- Sent to the national laboratory
- Entering information in file by technicians
- Ticks + filled forms sent to coordinator center
- Identification of ticks in coordinator center
- Entering and updating files by coordinator

- No coordinates 19%
- Correct 10%
- Transform:
  - (Y,X) 17%
  - (-X,Y) 30%
  - Typing errors 24%
  - 7 <> 2, 6/9 <> 0, 3 <> 5
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Absence/Presence ~ Temperature

Worldclim

MODIS LST Day
Absence/Presence ~ Precipitation

WORLDCLIM

RFE

NDVI

MODIS

TRMM
Precipitation ~ Vegetation
Models: GLM, NLDA, RF
Important variables

Worldclim
- GLM
  - Precipitation seasonality (Bio15)
  - Isothermality (Bio03)
  - Temperature seasonality (Bio 04)
- NLDA
  - Mean Diurnal Temperature Range (Bio02)
  - Precipitation of Dryest Month (Bio14)
  - Annual Precipitation (Bio12)
- RF
  - Mean Diurnal Range (Bio02)
  - Max Temperature of warmest Month (Bio05)
  - Temperature seasonality (Bio04)

MODIS
- GLM
  - LST A0
  - LST A1
  - NDVI A1
- NLDA
  - LST A0
  - LST A1
  - NDVI A1
- RF
  - LST A0
  - LST A1
  - NDVI A1
Risk map for West Africa

Climate suitability
- High
- Low

Maps showing distribution of Rhipicephalus microplus with varying climate suitability.
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