DIVECOSYS – Platform in Partnership for research and training

"Diversity of cropping systems and ecologically-based pest management in West Africa"

www.divecosys.org

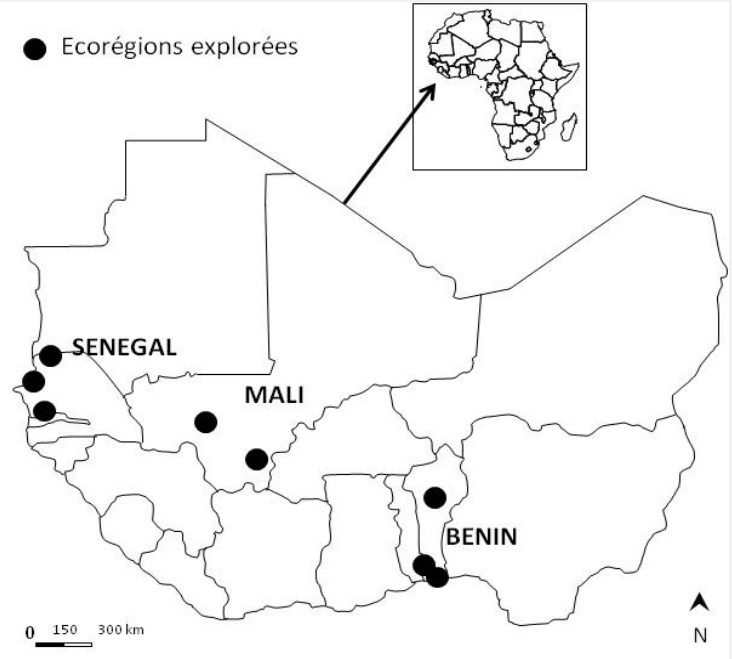




DIVECOSYS - Introduction

- launched in 2010
- Formal protocol agreement firmed in 2014 between 8 partner institutions from 4 countries: Benin, Mali, Senegal and France
- On-going discussion with 2 institutions from Ivory Coast (CNRA and Houphouet Boigny University)

DIVECOSYS - Partnerships



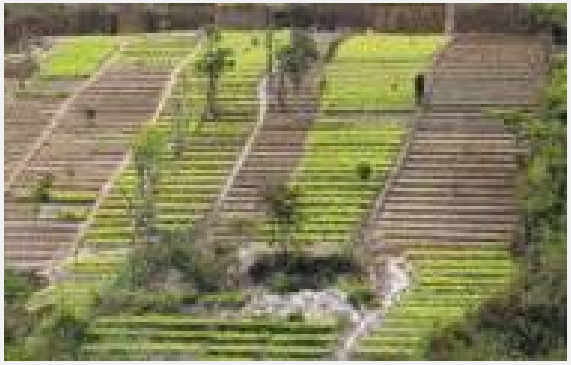
Focus areas of DIVECOSYS

- **National African Research Institutes in Agronomy** : INRA Benin, ISRA Senegal, IER Mali
- **Universities** : Cheikh Anta Diop Dakar and Gaston-Berger Saint-Louis (Senegal) Abomey-Calavi (Benin)
- CIRAD France : UR HortSys, UR AIDA
- **CGIAR**: IITA

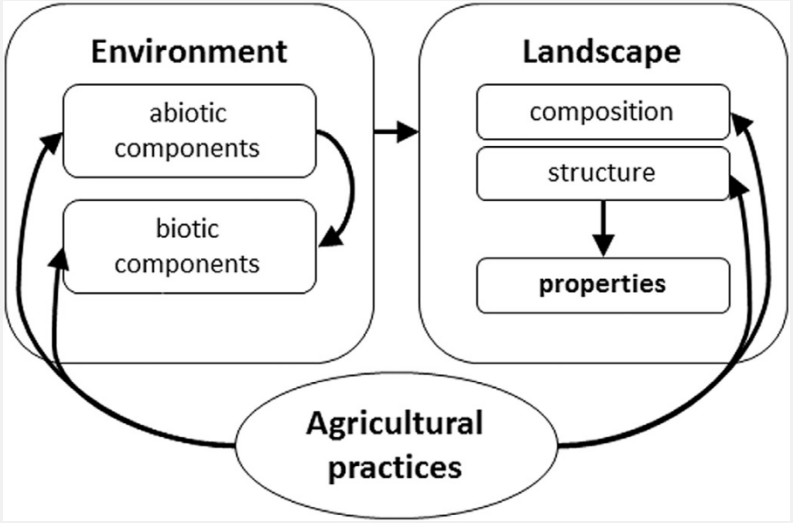
- More than 40 scientists
- Agronomists, entomologists, bio-modeling specialists, ecologist, spatial ecologists, weed specialist, phytopathologist, socio-economist

DIVECOSYS - Objectives

- To explore the potential of biodiversity and to design new sustainable agricultural systems based on an increase mobilization of ecological processes for pest-management (pest regulation, drastic reduction of pesticide use) at different scales, from field to landscape level
- Systems adapted to global changes: human population increase, global warming, biological invasions, access to resources
- Using a multi-disciplinary approach between : agronomy, ecology, geomatics, database management and analysis, social sciences
- Strengthening capacity building (PhD) and training sessions
- Submission of research projects



DIVECOSYS - Approach



- To analyse the effects of agricultural practices on ecological services (environment, landscape, field)
- In various agro-ecological areas
  - Dry climate and diversified landscape (Niayes, Senegal river)
  - Dry climate and simplified landscape (Mandingue plateau in Mali, Kandi Region in Benin)
  - Perennial diversified ecosystems (gallery forests) with diversified crops (cerals, legumes, tubers, cotton) and bimodal rainfall
- To design innovative systems

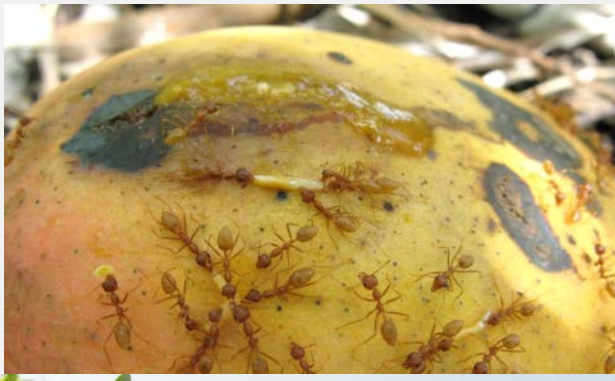
DIVECOSYS - Activities

- Research and extension projects for pest management :
  - Millet head miner in Senegal
  - Cotton bollworm in Benin landscapes
  - Mango and cashew fruit flies in west African orchards
  - Cabbage diamondback moth in Senegal

- Capacity Building :
  - Actually : 10 PhD students
  - Visits to partners inside the scientific network
  - Regional workshops : « *Approches écologiques pour la gestion des bio-agresseurs à l'échelle du paysage* » (Cotonou, déc. 2013)
  - Regional seminar : Dakar, june 2015

- Training sessions :
  - How to write a scientific publication
  - Use of a GIS software (QGIS)

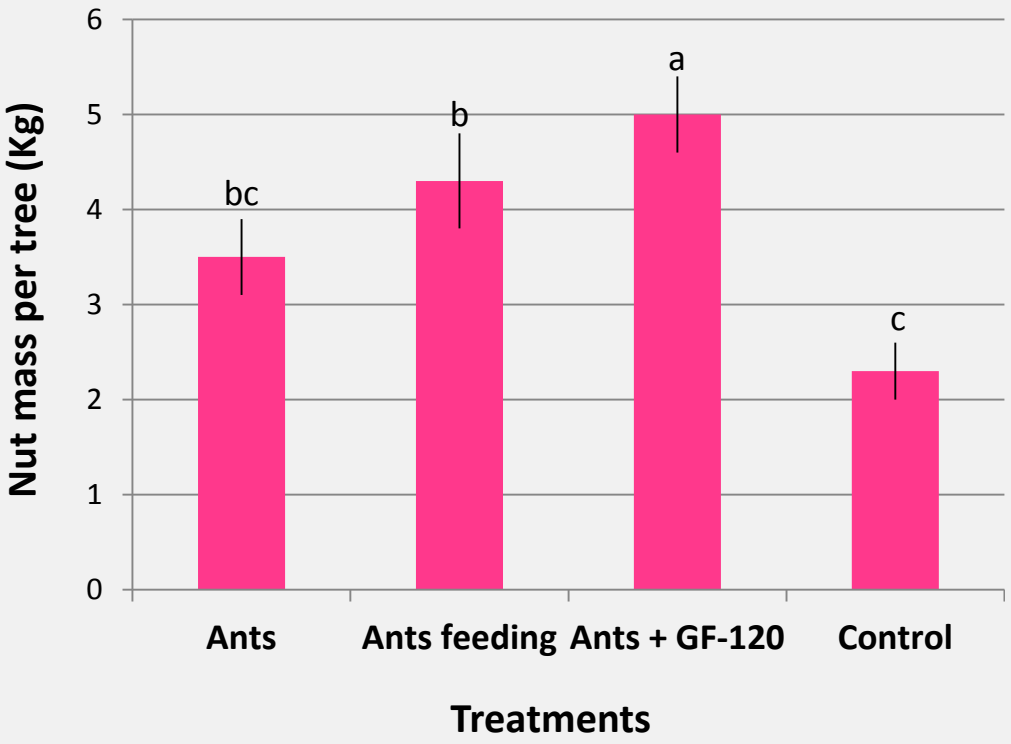
DIVECOSYS – Fruit value chains in Benin (CIRAD-IITA)



- Fruit pests controlled by weaver ants:
  - Fruit fly (Diptera Tephritidae) controlled in mango & citrus orchards.
  - Sap-sucking bugs (Heteroptera Coreidae & Alydidae) and thrips controlled in cashew orchards.
- Capacity Building :
  - Current year : 7 PhD students: collaboration of J.-F. Vayssières with U.A.C. (Cotonou), U.C.A.D. (Dakar) and U.L. (Lomé).
  - Training of S.S.A. students at IITA station.
- Publications :
  - 2014: 4 with I.F.
  - 2015: 3 with I.F. already published and
  - 6 others planned in 2015.

DIVECOSYS – Research activities

- **One example : increasing cashew yields with the use of weaver ants in Benin**

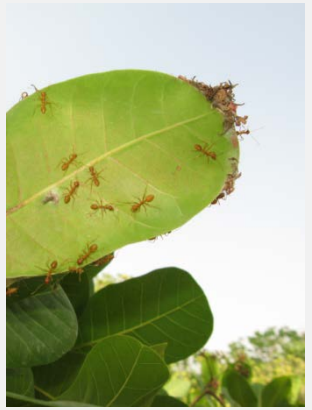


Yield increasing

✓ant + ant feeding vs control : 69% increase

✓ant + GF-120* vs control : 117% increase

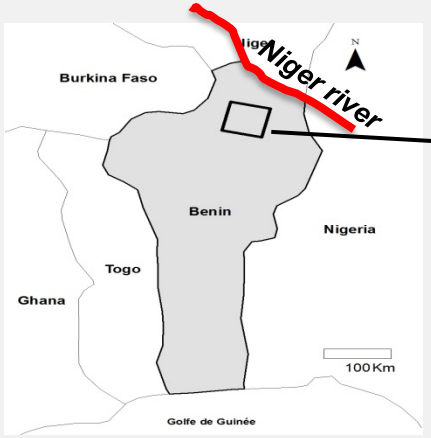
* fruit pest bait

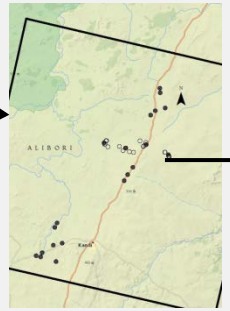


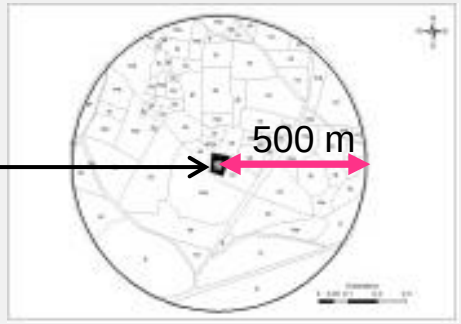
Cashew nut mass per tree (Kg) in the four different treatments. **As for mango the presence of weaver ants in cashew orchards is crucial** !

DIVECOSYS – Research Activities

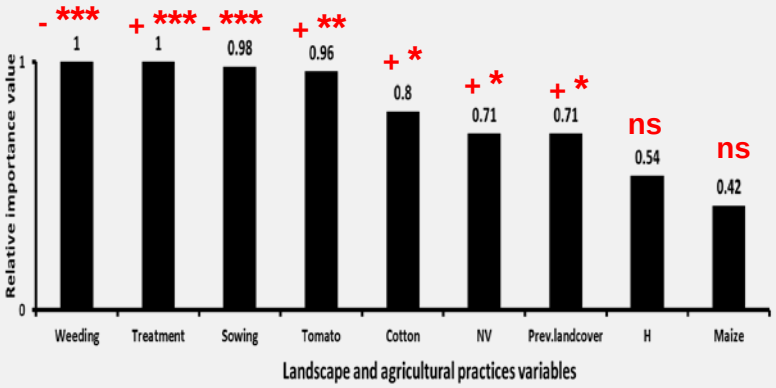
- Effects of landscape context and agricultural practices to explain the abundance of *Helicoverpa armigera* in cotton fields in northern Benin (Tsafack *et al*., 2013)



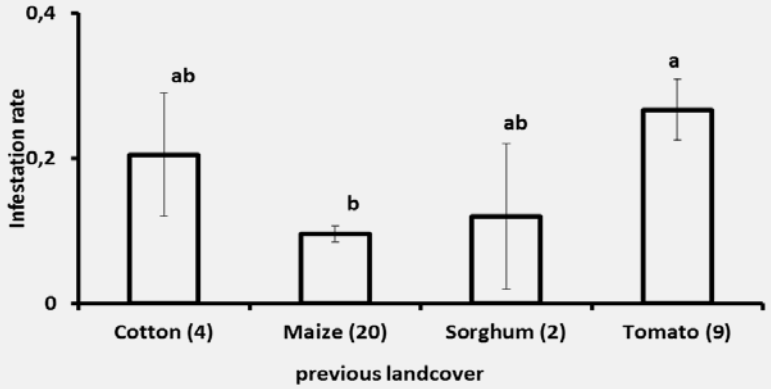




Landcover entities recorded 500m radius around the selected cotton fields (cotton-maize-natural vegetation-tomato-millet-rice-peanut-cowpea)



In red: 95% confidence of model-averaged parameter estimates



Manual weeding, insecticide treatment frequency and sowing date : most important predictors of the abundance of *H. armigera*. (weeding frequency and sowing date negatively related to the abundance of *H. a*.)

Fields with tomato as previous landcover were more infested than those with maize (resource concentration)

DIVECOSYS - Activities

- Optimization and dissemination of the results:

  - Publication of the scientific project of DIVECOSYS : Brévault et al. (2014)

  - More than 20 publications since 2012
  - Presentation to Agroecology symposium – FAO – Rome, sept. 2014

- Submission of research projects :

Position paper, oct 2014 : *Enhancing agrosystems resilience to climate change through a landscape approach: a case study with bugs management*

Thank you for your attention