

Exotic and African plant diversities in fruit and vegetable agroecosystems in Senegal.

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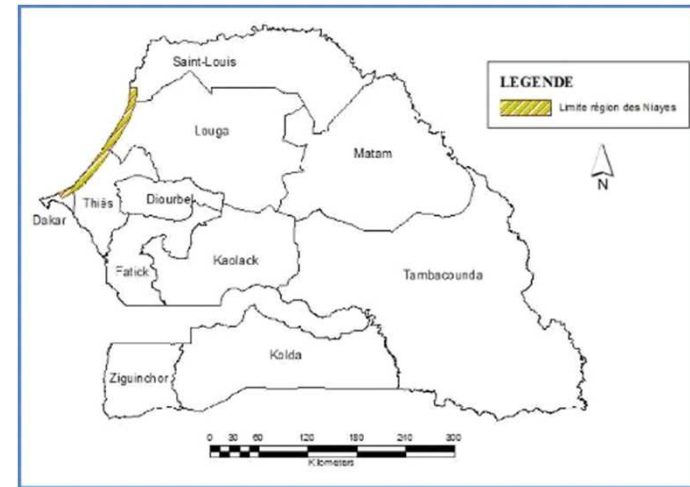
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Plant diversity

- Horticulture: very high cultivated diversity : 880 species considered as African vegetables species (Grubben & Denton, 2004)
- Plant diversity : a tool for pest and disease agroecological management (Ratnadass & al. , 2012)
- Within and around the agroecosystem
- Permanence of various crops
- Isolation from natural vegetation (Altieri, 1999)
- Fruit and vegetables species & mango cultivars

Material and methods

- Niayes area (alizes) – sub canarian climate
- Woodland and herbaceous savanna (Ba & Noba, 2001)
- Surveys with 64 orchards farmers (Grechi & al. 2012)
- Surveys with 11 market gardens and 2 field experiments on cabbage crops



Wikipedia, 2012



Market garden in Malika (Dakar Suburb)

Plants diversity within the orchards

- 18 fruit tree species:

- Mango (63%),
- mandarins (13%),
- grapefruit (11%),
- orange (7%),
- lemon (2%),
- papaya (2%),
- cashew tree (1%)
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- Only 3 from Africa:

- *Phyllanthus acidus*, →
- *Annona senegalensis*,
- *Borassus sp.*

Papaya Solo →



The mango cultivars (25)

- Polyembryonic cvs:
 - Allongée Birane Diop,
 - Boucodiékhhal (36%)
 - Dieg bou gatt (2%),
 - Greffal ,
 - Séwé (2%),
 - Mangue Papaye,
- Monomebryonic cvs. :
 - Kent (55%),
 - Keitt (4%),
 - Pêche (1%),
 - Amélie.



Kent

Séwé

Boucodiekhal



The hedgerows around the orchards

- 33 indigenous species:

- *Euphorbia basalmifera*, →
- *Combretum spp.*,
- *Faidherbia albida*,
- *Acacia macrostachya*...

- But some exotic species:

- *Prosopis juliflora*,
- *Leucaena leucocephala*
- *Azadirachta indica*



Cultivated diversity in the orchards

- 17 vegetables species, in rainy or dry season (irrigated..): eggplant, tomato, cabbage, chili pepper, okra, djackattou, muskmelon...
- 6 food crops, mainly during rainy season : cassava, millet, peanut, maize, cowpea, sorghum

And pastures ... and weeds



Plant diversity in the market gardens

- 10 vegetables
- Other crops : aromatic plants (mint, celery,..), bissap, food crops (sweet potato, maize, cassava...)
- Hedges: trees (coconut, *Acacia spp.*),
- Fruit trees: mango, citrus, ...
- Weeds: *Amaranthus spp.*, *Portulaca oleracea*, *Cyperus spp.* *Calothropis procera*, *Commelina spp.*




The cabbage cropping systems

- Cabbage all over the Niayes area in all season
- *Plutella xylostella*,
- Cabbage with cowpea (*Vigna unguiculata*) as repellent
- Cabbage with Chinese mustard (*Brassica juncea* L Czern) as a candidate trap crop.
- No *P. xylostella* on cowpea.
- Reduction by 58% of *P. xylostella* on cabbage bordered by cowpea compared to no border. Less *P. xylostella* on cabbage bordered by Chinese mustard
- Crops associations can reduce the pest population development on the cabbage crops, but the effects of trap crop and repellent plants are still not so clear.



Conclusion: planned diversity

- Agroecology: control of the pest and disease by increasing the number of species in the agroecosystem in order to optimize the regulation systems
- The planned diversity is mostly due to exotic plants introduced in the last centuries (fruits, vegetables, food crops..) and on a annual basis (cabbage, carrot...)
- Fruit and vegetable agroecosystems are irrigated
- The cultivated diversity distinct from natural vegetation
- Rather large permanent diversity through trees
-  Open agroecosystems with a large part of artificialisation

Conclusion: exotic vs. indigenous

- Can the planned biodiversity bring ecosystemic services? (Leroux et al. 2008)
- “Inputs to agriculture” services
 - erosion control, water cycle regulation, soil fertility, local climate regulation and pollination: OK
 - biological control of bioagressors?
 - control of biological invasions?
 - cowpea ? *B. juncea*?
- New agroecosystems causes new rules of functioning. What kind of ecosystems services?
- Need for use local plant diversity or plants that could multiply and survive in the Niayes area

Thank you

Thanks to all the farmers in the Niayes area for taking their times to answer to the trainees, technicians and scientists interviews.