CLIMATE-SMART Agriculture 2015

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Conservation agriculture to mitigate climatic variations in medium altitude areas according to farmers' perception: the case of Madagascar (Lake Alaotra).

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UMR INNOVATION

[CIRAD/UMR Innovation]

Introduction

Conservation agriculture (CA) has been promoted to reduce labor requirements, to improve soil structure, water conservation, yields and eventually smallholder's income through a sustainable rainfed agriculture.

Is CA an option for a more climate smart agriculture for farmers ?

What are farmers' perceptions on a long run CA adoption ?

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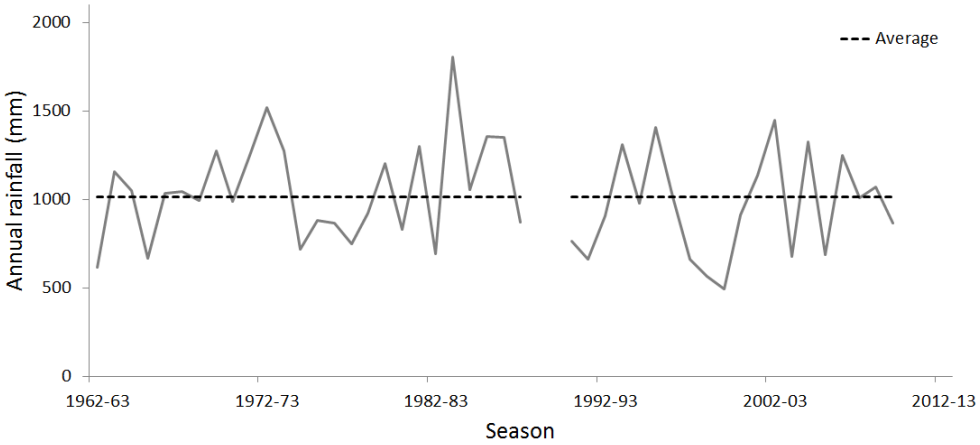
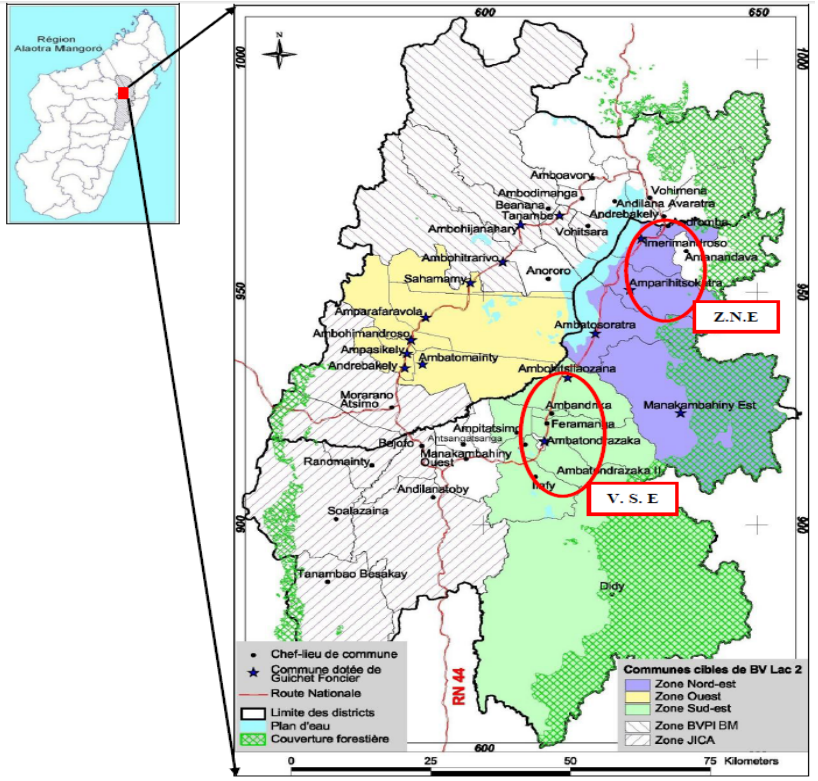
Outline

- Study area: Lake Alaotra, Madagascar
- Situation with a high rainfall variation (600/1600 mm/an
- events : erratic rainfall and typoons
- *
- Does CA techniques can mitigate climatic hazards ?
- Mulching is the key point of CA for being climate smart





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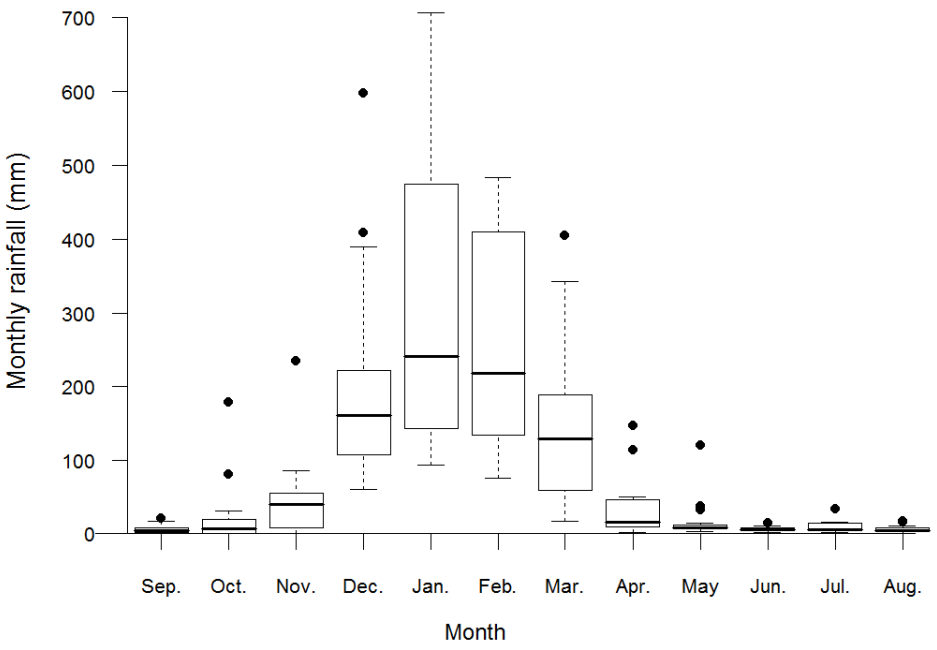
Rainfall trend analysis

- Annual and montly rainfall pattern displays a high risk of erratic rainfall, in particular during the first 3 montts

- Mulching can significantly improve water balance and buffer hydric stress

- What are farmer's perception ? What expected output is prioritary ?



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Conservation Agriculture (CA)

- To promote a sustainable rainfed agriculture (less erosion, soil fertility, better hydric pattern…)
- To mitigate some climatic events : erratic rainfall and erosion from heavy rains during typhoons
- The mulching of crop residue has a key role into the achievement of climate-smart agriculture (Bruelle et al , 2015).
- Implement a permanent mulch in a CA cropping system is a real challenge for smallholder:
  - To implement a real efficient mulch
  - To manage CA systems on a mid term basis (5 years)

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CA adoption level

In 2010, after a cohort analysis ;

After the analysis on 3000 plots monitored by the Bv-lac projects (plots with technical advices/extension) :

- 420 hectares under CA stricto sensu (for 600 farmers)
- In 2013/2014 : new study after project shutdown : 40 % of the oldest CA farmers have abandoned (post projet trauma).

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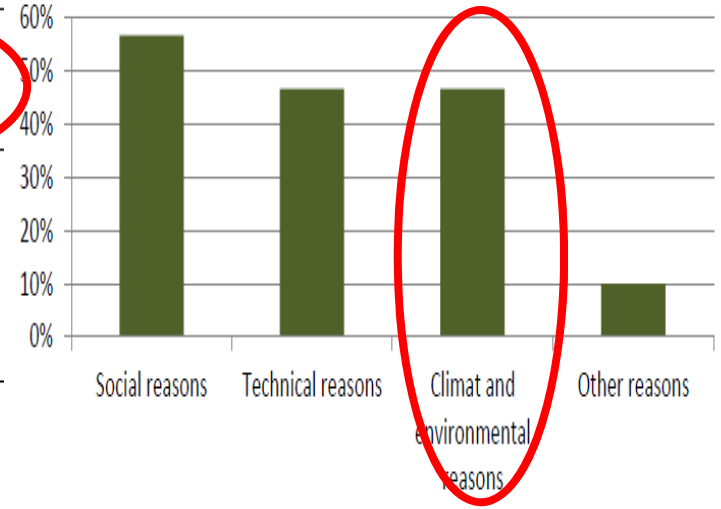
Main reasons of abandon of CA

Social reasons		Economic reasons		Technical reasons		Environmental reasons		Other reasons	
Technician's absence	23%	Superposition of labor requirement	10%	Increase of required labor	17%	**Drought**	**20%**	Simply the benefits of CA	3%
Uncrontroled free zebu grazing	23%	Increase of expenses	33%	Lack of experience	7%	Insects	23%	Retirement	3%
Bushfire (linked also with drought)	**3 %**	Crops incompatible with CA	3 %	Difficulties to get seeds for associated plants	10%	Soil compaction	3%	Health (refusal of phytosanitary products considered indispensable with CA	3%
Conflict with the project	13%	Absence of assistance and bank credits after project shutdown	23%	Difficulties to get phytosanitary products	3%				
Difficulties to find labor force	10%	Disappointing economic performances	3 %	**Difficulties to control the cover**	7%				
Absence of assistance and bank credits with the project ending	23%	Other reasons	7 %	Excess of weed	7%				

(In italic, points linked with climatic events)



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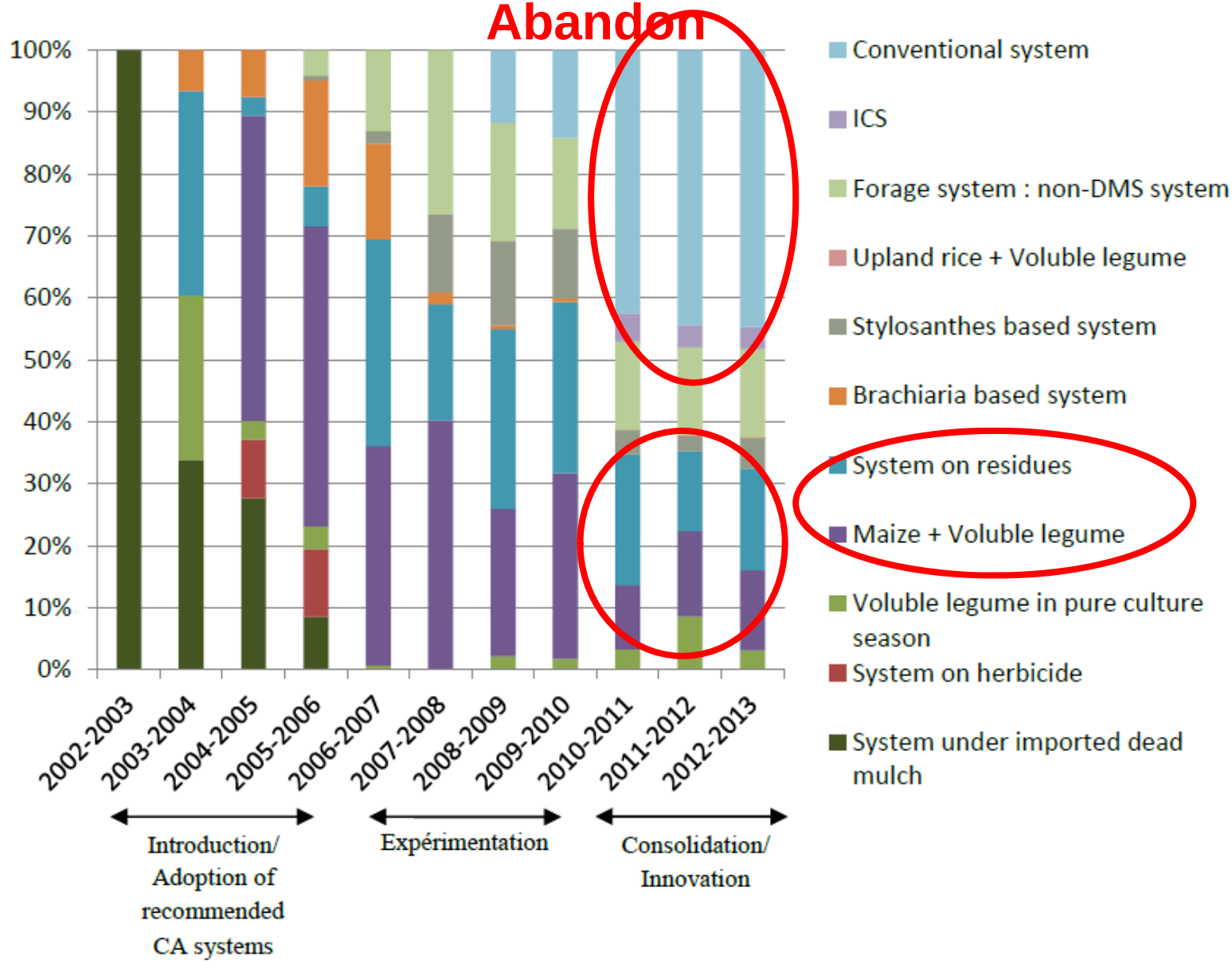
CA cropping system evolution on *tanety*



CA Crop rotation

Cropping systems	Definition
T1	Maize + Voluble legume//Upland rice
T3	Introduction of groundnut in the basic rotation de T1
T4	Introduction of upland rice in the continuous system "Maize + Voluble legume"
T5	Maize based continuous system
T6	Introduction of "cassava + *stylosanthes*" in the basic rotation de T1
T7	Unsettled crop rotation
T8	Maize + Voluble legume//Maize + Voluble legume//Upland rice
T9	Cassava based continuous system
T9-b	Bean based continuous system
T10	Rice + *stylosanthes*//maize + *stylosanthes*
T11	Bean + *stylosanthes* //Cassava + *stylosanthes*

Maize/Dolic //rice //groundnut

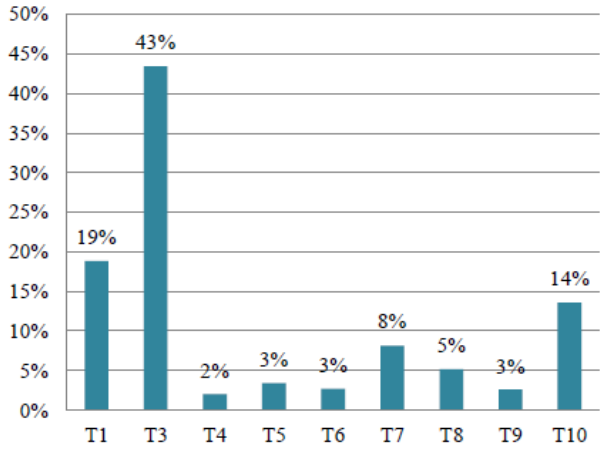


Figure 7: Cropping system in % of surface on *tanety* in the Nortern zone

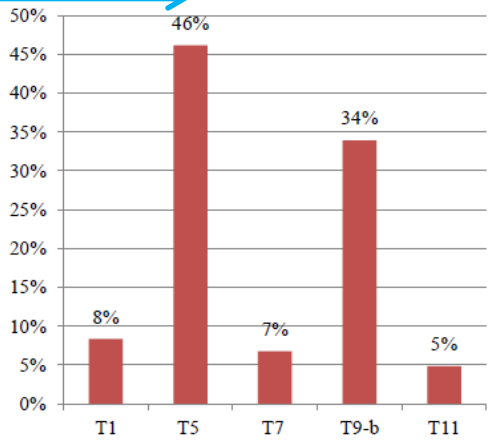


Figure 8: Cropping system in % of surface on *tanety* in the Southern zone

Maize or Cassava Based systems

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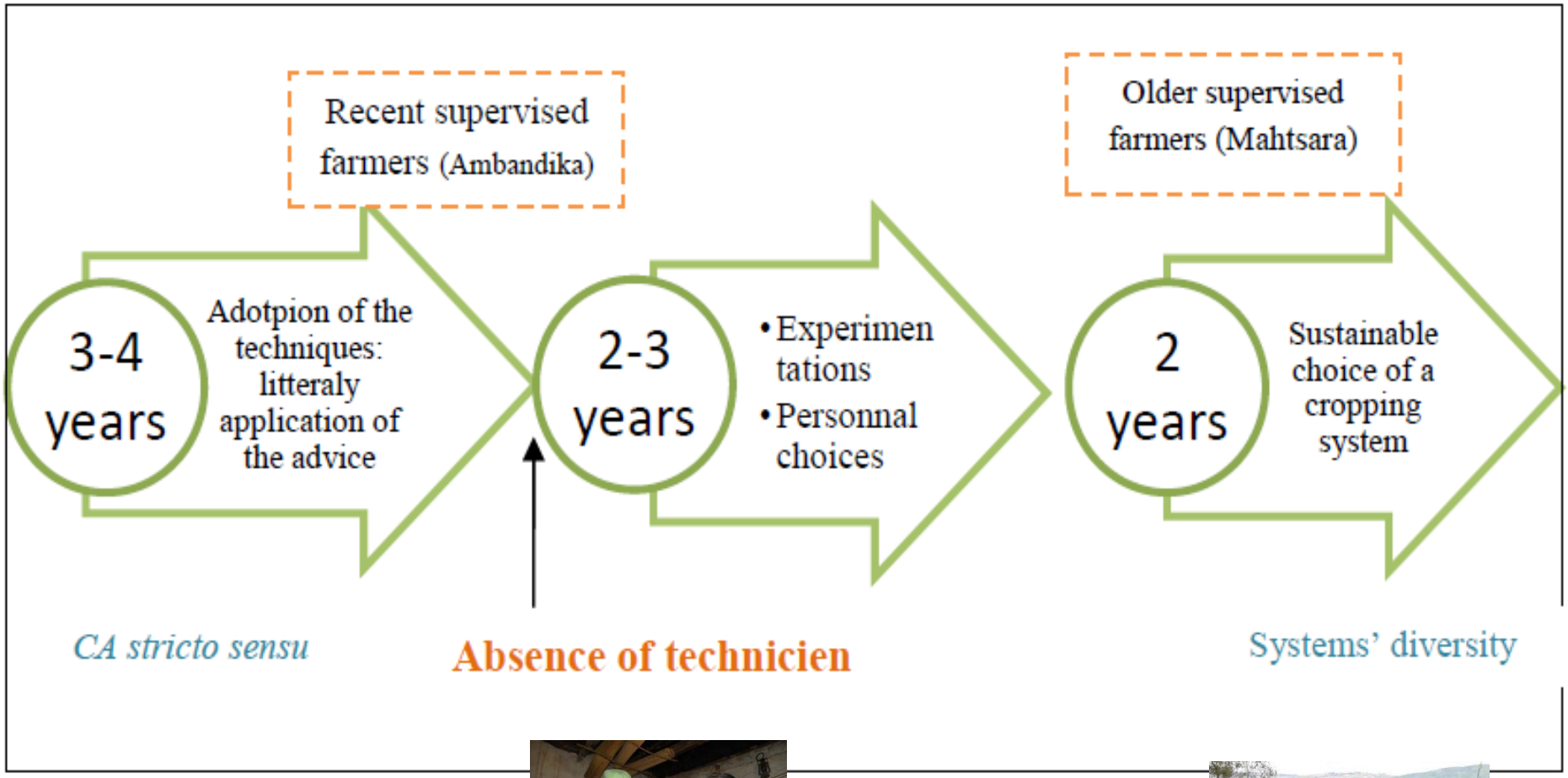
Innovation adoption scheme



SWOT analysis

Strengths	Weaknesses	Opportunities	Threatens
Yields' increase or production stabilization	increase of expenses (inputs, cover transportation, labour)	Partnership dissemination project (e;g the ABACO project)	Farmers individualism
Improvement of soil structure, fertility and soil moisture	Pests increase	Spontaneous spread between CA and non CA farmers	Lack of organisation between the producers and supply problems in seeds, inputs
Reduction of labor requirements related to weeding and no-tillage	Increase of labor for planting associated crops and cover transport		Non-transmission of CA during intergenerational handover

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Economic related expected output ! Yield, Labor, Expenses

Farmers' behavior typology

1st criteria	2nd criteria	Type de comportement	Effectif
CA Mastery/know-how	no consequence with the project end	Self-sufficient/Autonomous	29 (40%)
	Regrets of technical exchanges and counselling without direct impact on CA surfaces	Enquirer	22 (30%)
	Regrets of supervision with direct impact on CA surfaces	Not autonomous	16 (22%)
CA Non-mastery/know-how	Need a permanent advice	Never autonomous	6 (8%)

70 % of farmers having adopted CA in the long run (7-10 years) are autonomous

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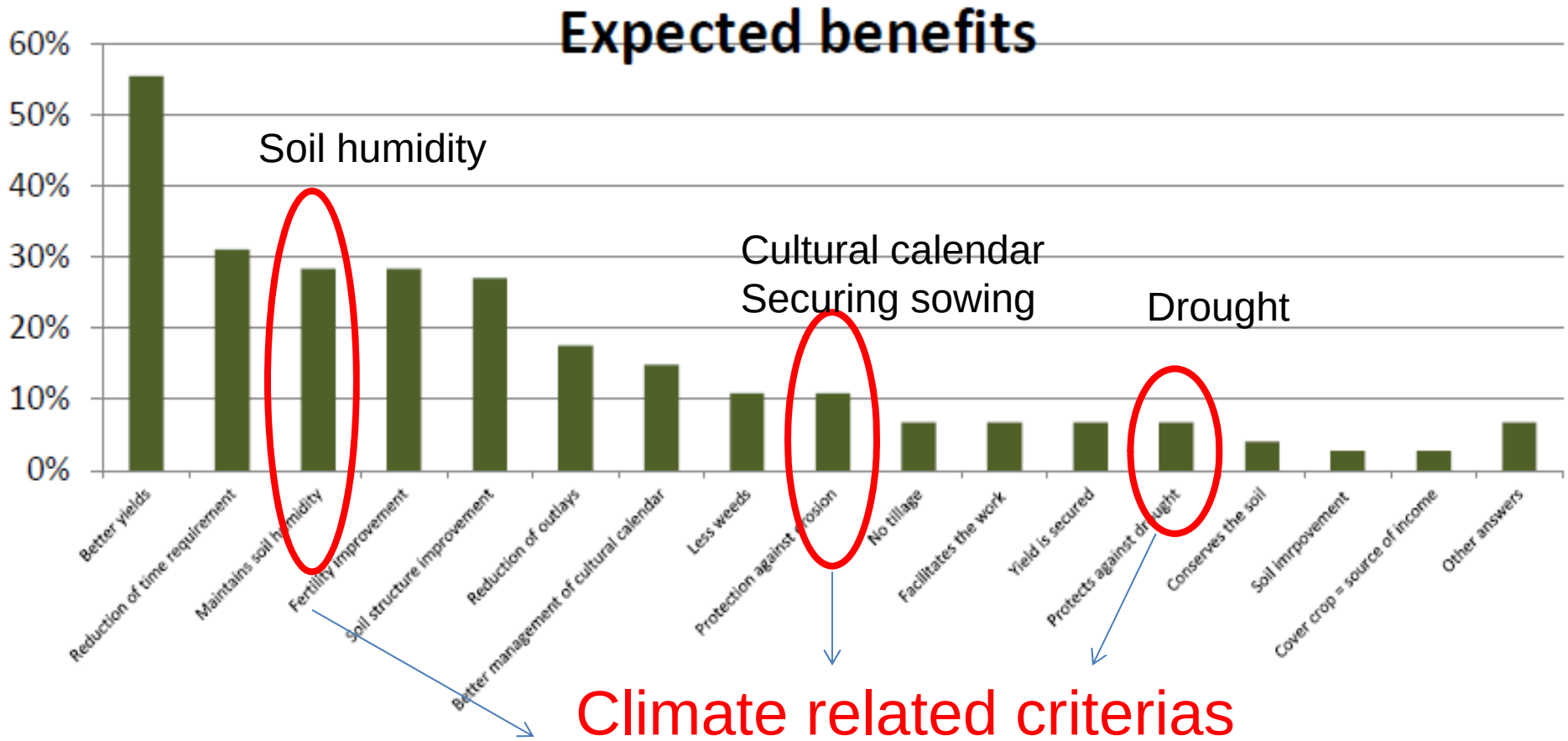
Expected outputs from CA adoption



Climate related criterias

Second after economic criteria

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Conclusion

- A continuum between conventional and CA systems
- 5 to 7 years to adopt CA and 10 years to adapt it to local constraints (CA and/or ICS)
- Take time to effectively see both economic output and risk reduction (7 to 10 years)
- Economic output is the priority (introduction of groundnut but no mulch, replacement of associatec crops …
- Advantages of mulching = securing sowing and yield, better soil moisture, less weeding come second priority
- Mulching to limit erosion and mitigate climatic effect in early stage of the crop is highly recognized
- A good and effective mulch is not so easy to implement
- More scope for ICS, more flexible

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CA to mitigate climatic effects

- Mulching is the key point but economic priority lead to a replacement of covercops to crop with an economic output (but far less mulch)
- CA can potentially mitigate climatic effects but farmers perception put priority on rapide economic output.
- « Being climate smart » is behind « economically friendly » (and regular yield)
- CA requires time to convince farmers in the long run

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Thanks for your attention

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