SANREM 2014 Annual Meeting

"Building a sustainable future from a foundation of research"

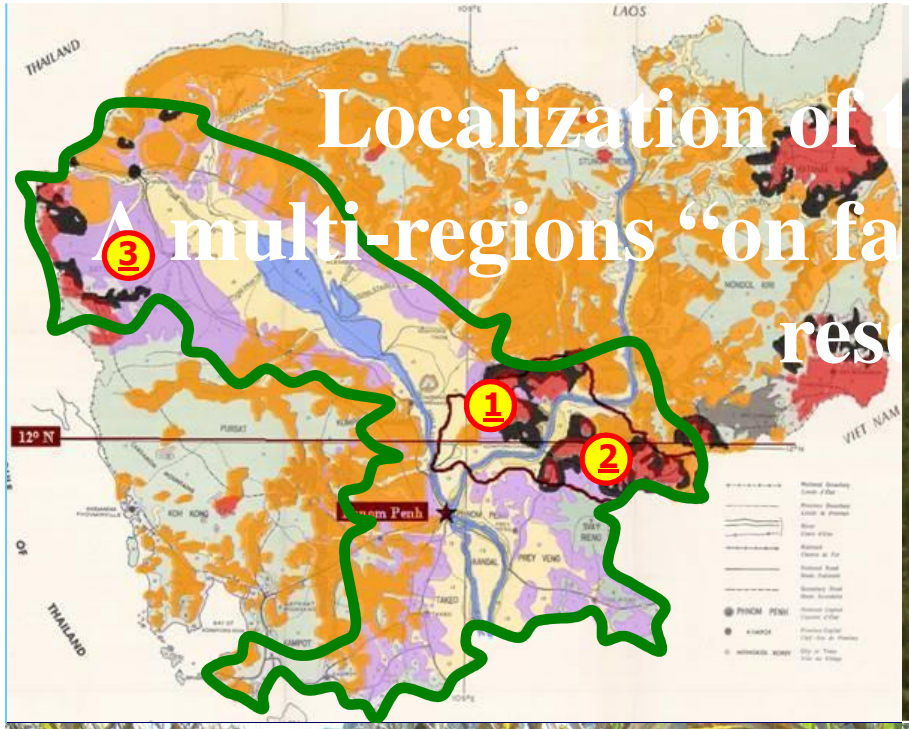
Farmers' experiences on Conservation Agriculture in Cambodia

Presented by Rada KONG, on behalf of farmer Ms. Pheap PHENG

SANREM INNOVATION LAB
Feed the Future Innovation Lab for Collaborative Research on Sustainable Agriculture and Natural Resource Management

VirginiaTech
Invent the Future

19th-21st Crystal Gateway Marriott Hotel in Arlington, Virginia



Localization of
multi-regions "on fa
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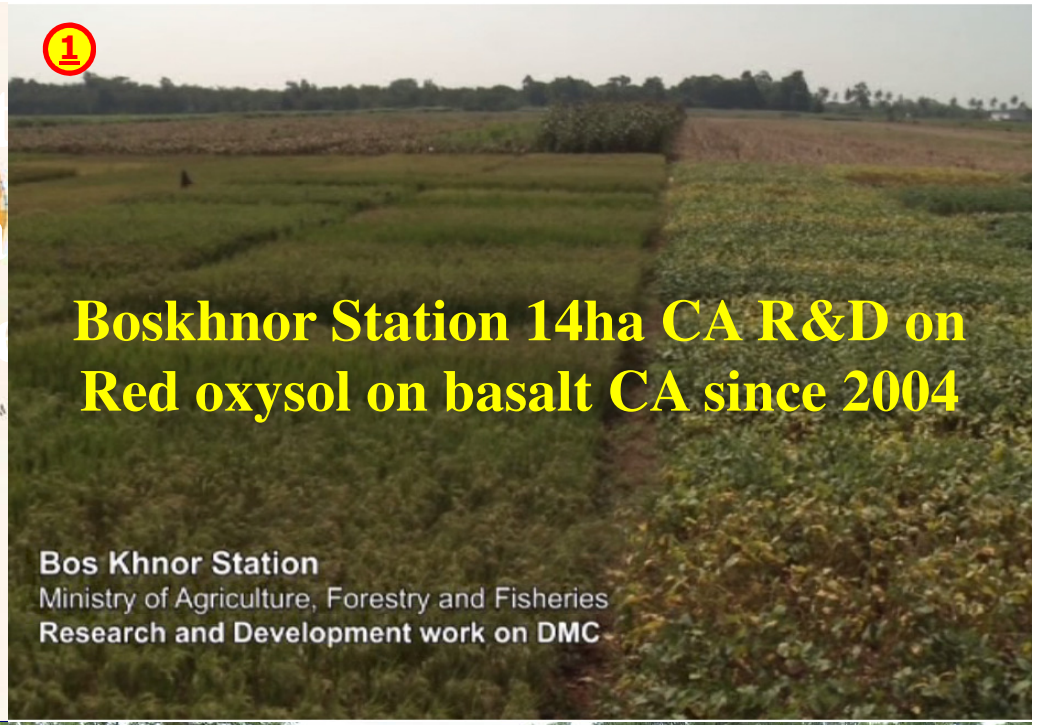


1 Boskhnor Station 14ha CA R&D on Red oxysol on basalt CA since 2004

3 Pilot extension: Medium-big farmer on Vertisol on limestone since 2009

2 Pilot extension: smallholders on Verti-oxysol on basalt since 2008

SANREM 2014 Annual Meeting:

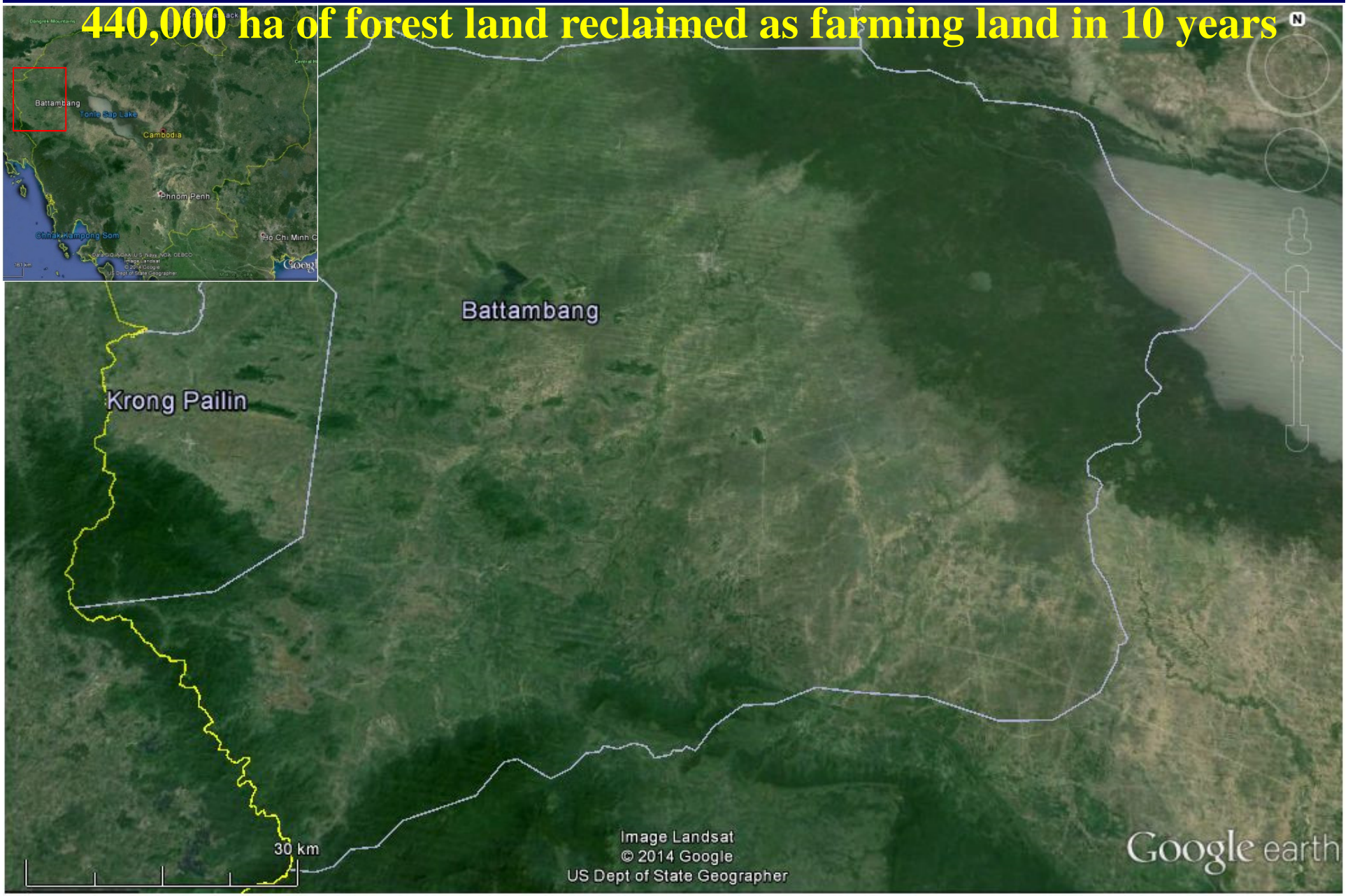
"Building a sustainable future from a foundation of research"

Plan of Presentation

1. General context of agrarian systems in the pilot areas
2. Proposed cropping systems and evolution of CA extension
3. What do the farmers have learned and constraints / need faced for DMC adoption and scaling up?
4. Project's strategic plan for the 5th ("last") year

Western Areas of Cambodia

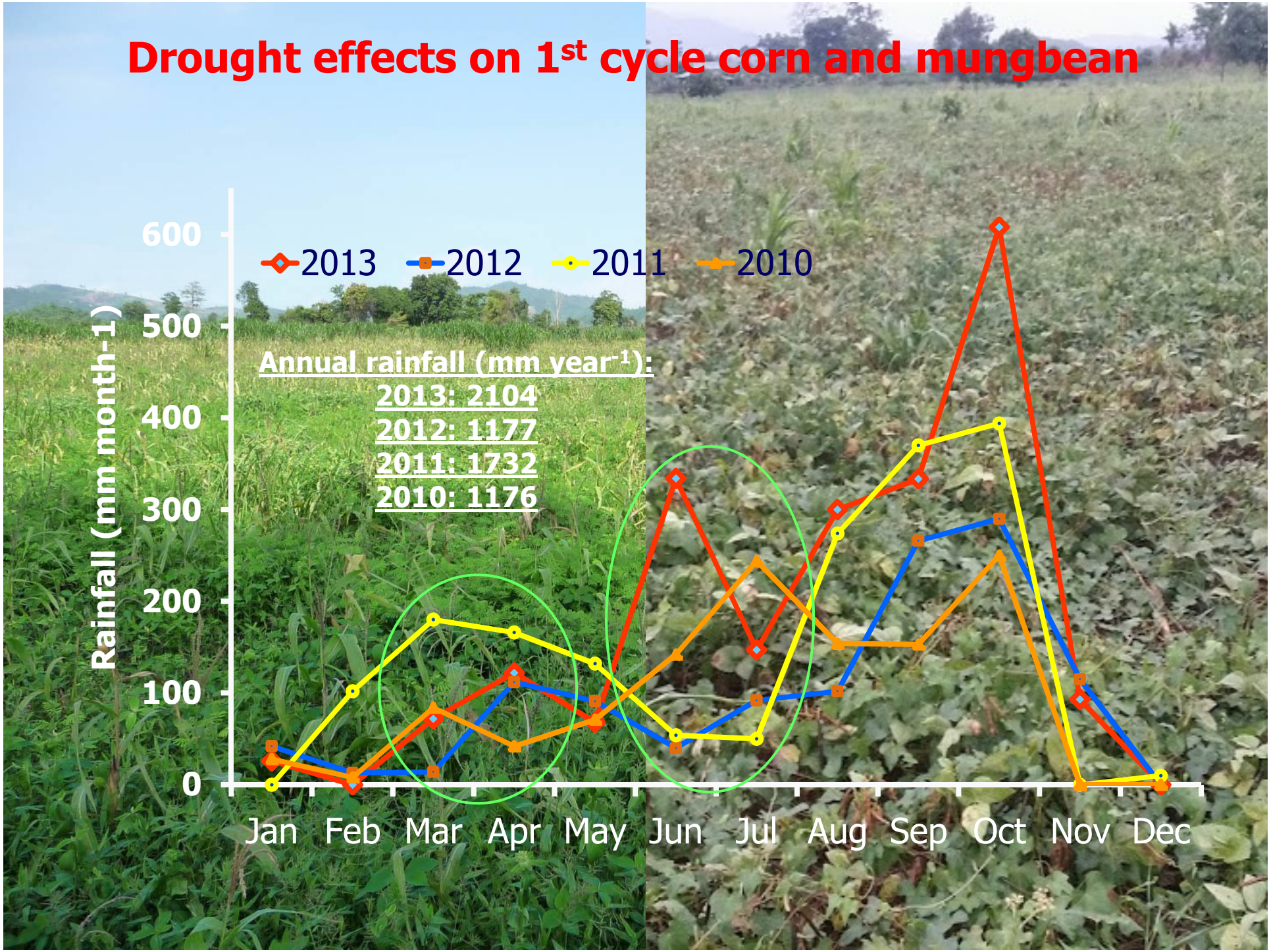
440,000 ha of forest land reclaimed as farming land in 10 years



1. General context of village agrarian system

- **Plow-based conventional cropping system:**
  - **2000-2004: Mungbean/Peanut, Mungbean/Soybean and Peanut/Peanut**
  - **2004-2008: Mungbean/Maize and Fallow/Maize**
  - **Since 2008: Farmers started to grow Maize/Maize, and recently shift to Cassava**
  - **Initially maize yield 1st cycle 4.7 t/ha and 2nd cycle 6 t/ha but now 1st cycle 2.5 t/ha and 2nd cycle 4 t/ha**
- **Risks of 1st cycle crops: Maize and Mungbean**

Drought effects on 1st cycle corn and mungbean



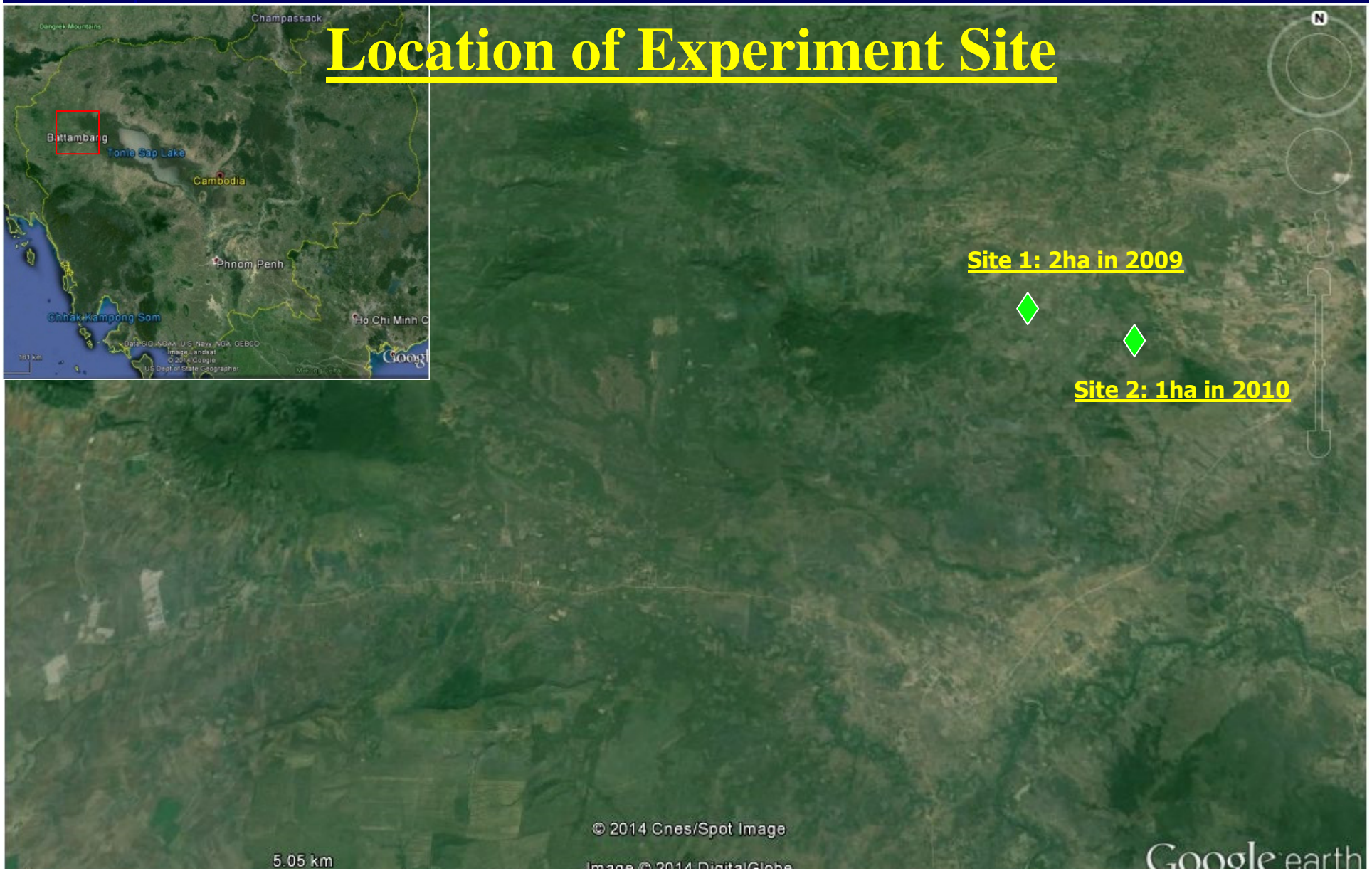
1. General context…(cont.)

- Constraints of plow-based conventional cropping system:

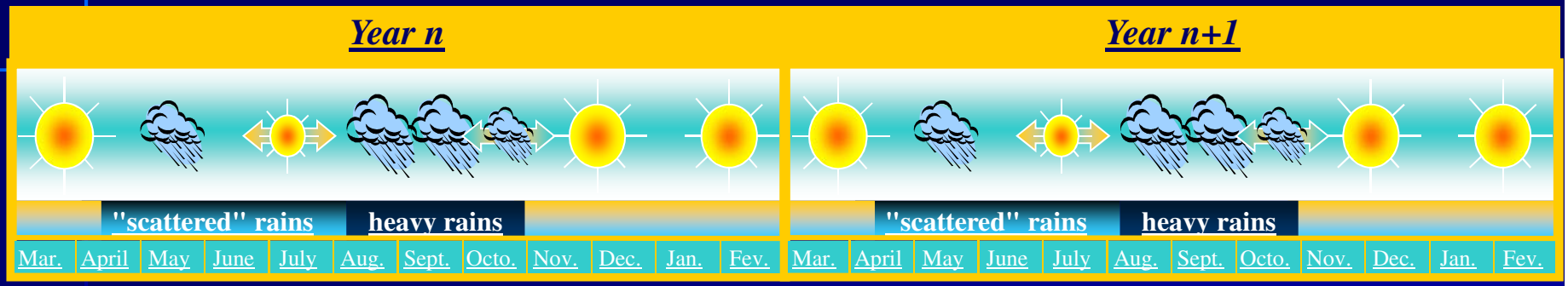
  - Soil erosion and soil lost via run-off
  - Continuous decrease of soil fertility → soil degradation → Yield drop
  - Increasing weed pressure → higher cost for its control
  - Soil compaction and waterlogged problems
  - More vulnerable to climate changes (drought and flood)
  - Higher production cost → less profits


2010
2013

2. Proposed CA maize cropping systems and evolution of extension:



Experimentation sites:
Tested CA cropping systems



Mono-cropping:

- Maize "mono cropping"

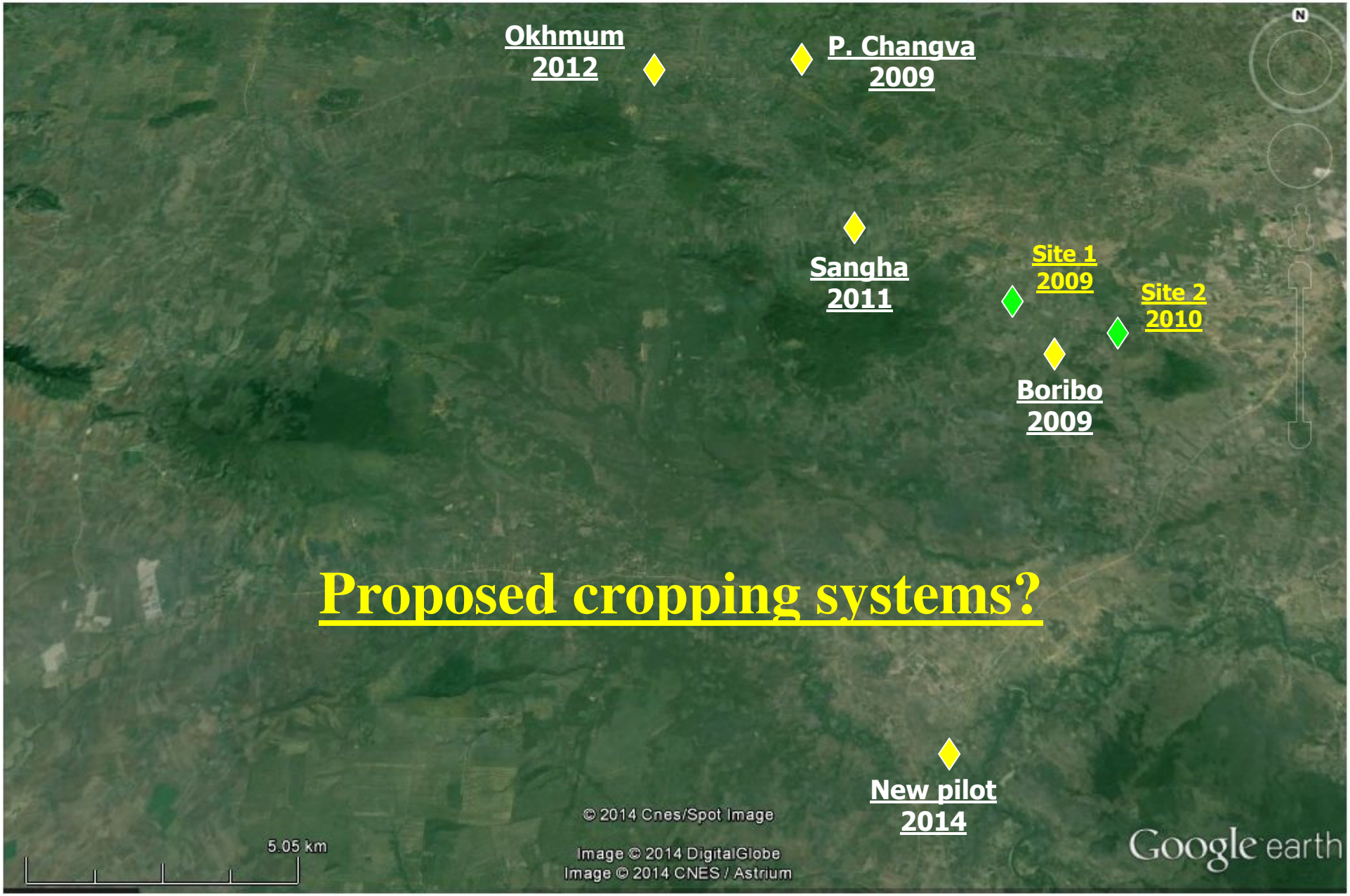
Biannual rotation crops:

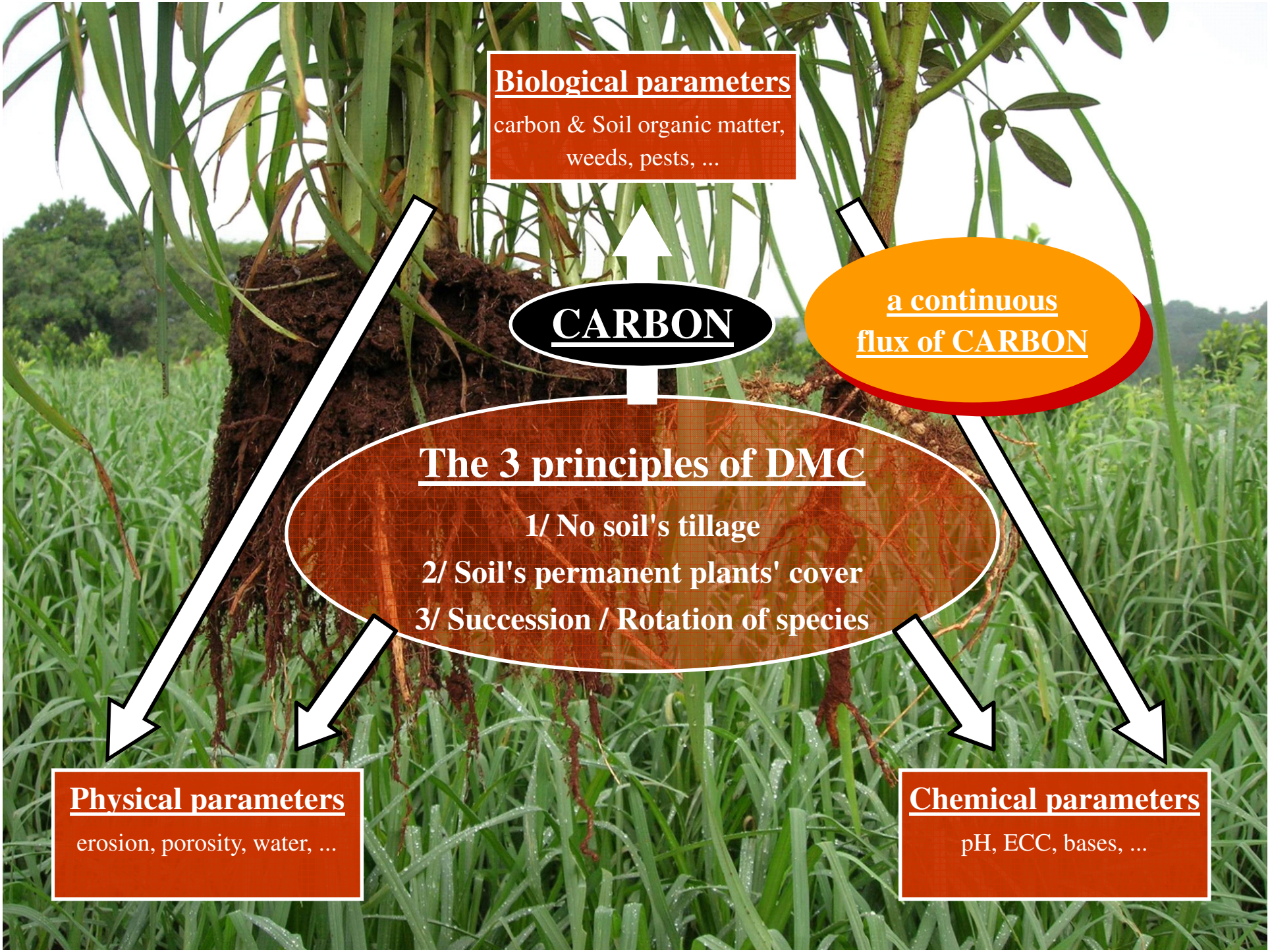
- Maize // Soybean rotation
- Maize // Rice rotation
- Maize // Cassava rotation

Intensified crops:

- Cassava // Maize - Maize rotation

Targeted villages

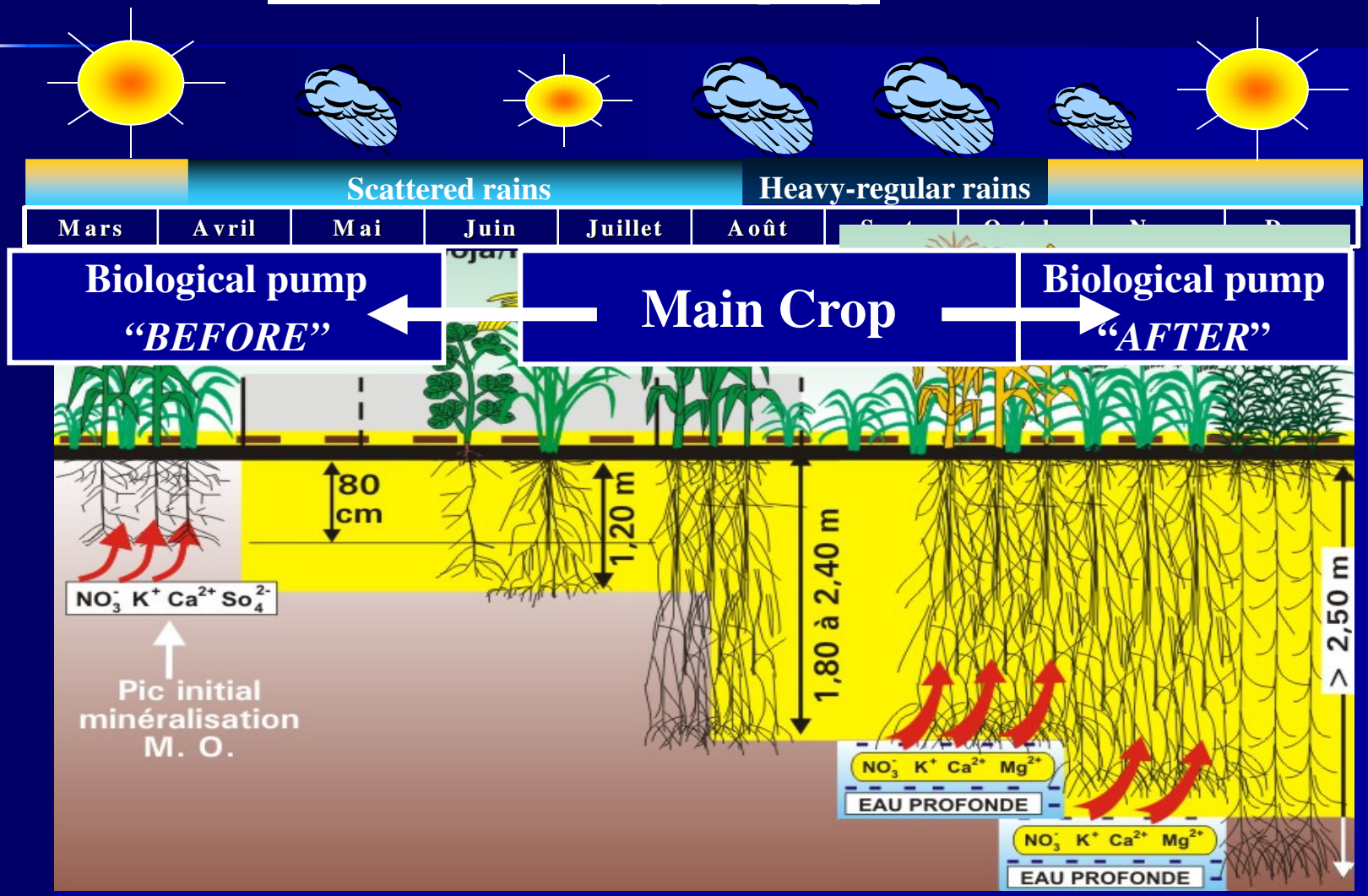



Biological parameters
carbon & Soil organic matter, weeds, pests, ...
CARBON
a continuous flux of CARBON
The 3 principles of DMC
1/ No soil's tillage
2/ Soil's permanent plants' cover
3/ Succession / Rotation of species
Physical parameters
erosion, porosity, water, ...
Chemical parameters
pH, ECC, bases, ...

Principles of DMC and cropping systems typology

Principles of DMC technologies

The "notion" of *biological pump*

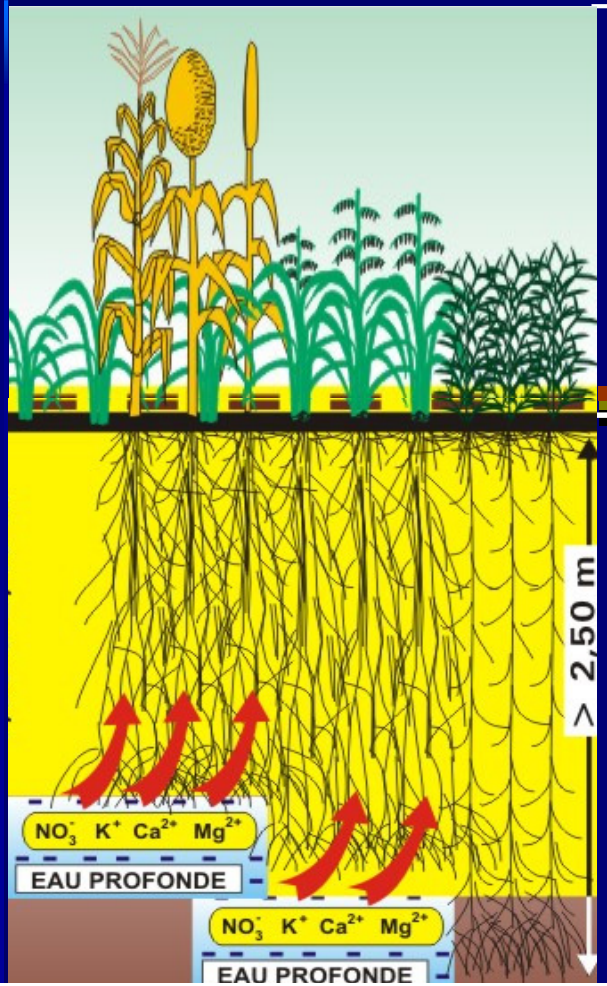


Source: L **Seguy**, S. **Bouzinac – CIRAD – A. Maronezzi, Agronorte – Sinop/MT , 2002.**

Principles of DMC and cropping systems typology

Principles of DMC technologies

The "Multi-functionality" of *biological pump*

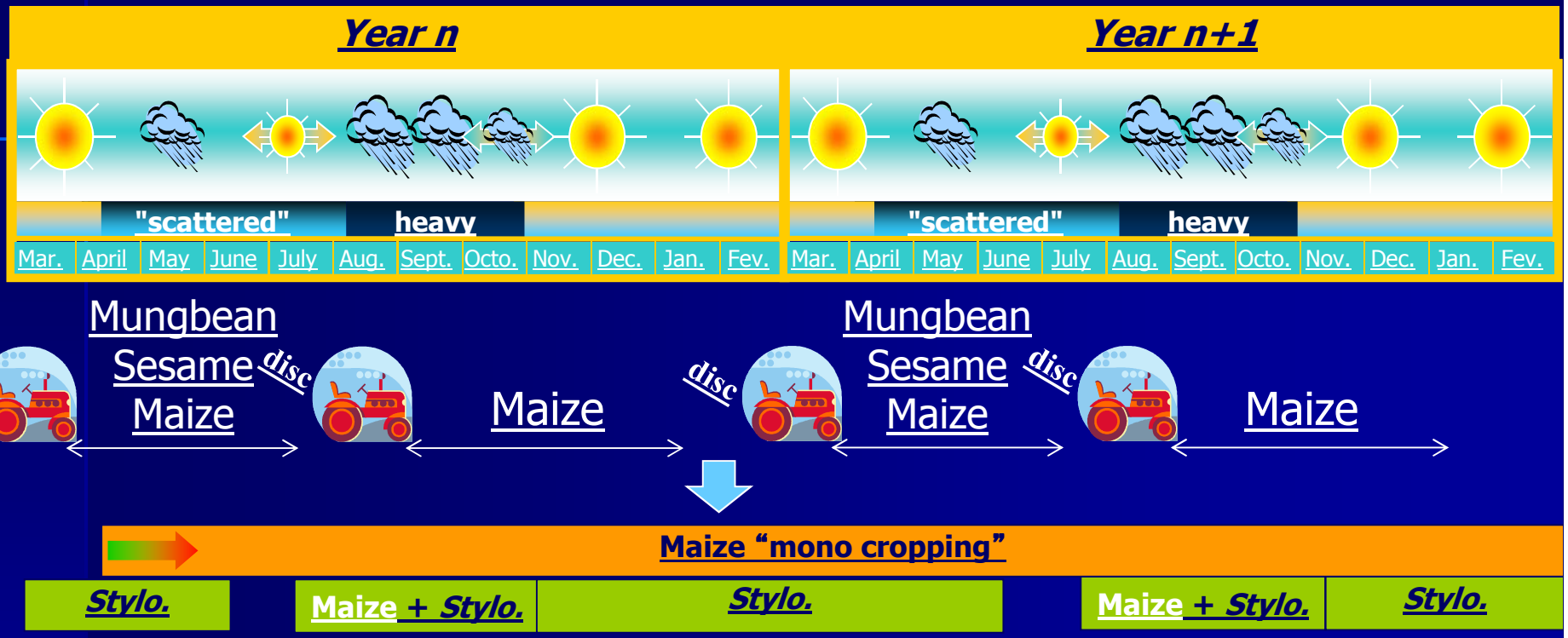


	FUNCTION	EFFECT
Above	*Food*	Nutrient for crops, Fodder for Cattle Biomass for soil's fauna/µflora chains
	Protection	Erosion / run-off, Evaporation, T (°C) *Xenobiotiques* bio-degradation ®
	"Pest-buster"	Weed control (shade, *allelopathy*) Disease (splash effect, blast on rice…®) Insect (…*via biodiv*. … ®)
Below	*C Loader*	C storage - ECC increase, pH buffer … Bio activity / diversity increase ® publi.) Bio-degradation / detoxification (?) ®
	Structure	Roots system *matrix*, decompaction Porosity, Water reserve Aggregation & O.M.% ®
	Recycling pump	Connection to deep water *i.e.* maximization of the water potential Recycling of lixiviated ions NO_3^-, bases ®

Logical questions from farmers:

- Increase crop productivity?
- Reduce labor and input cost?
- More profitable?

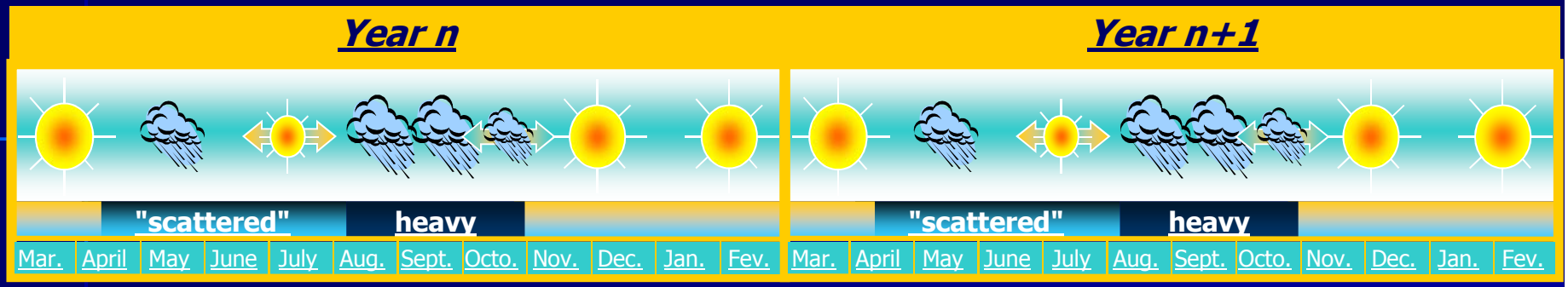
2. Proposed CA maize cropping systems:

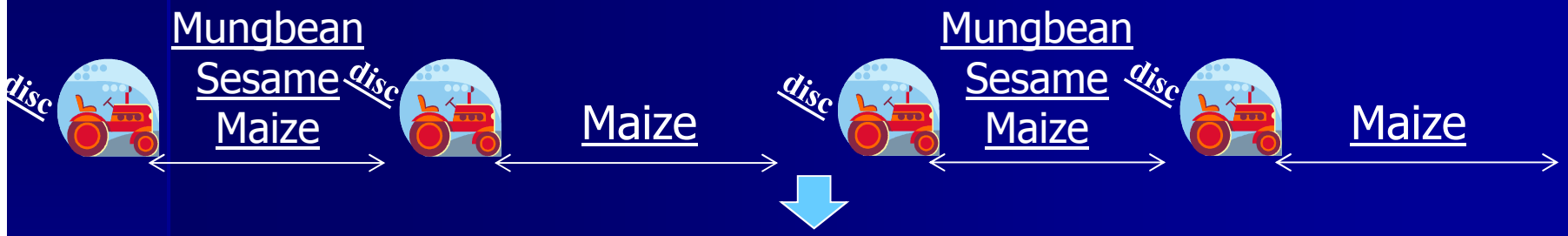


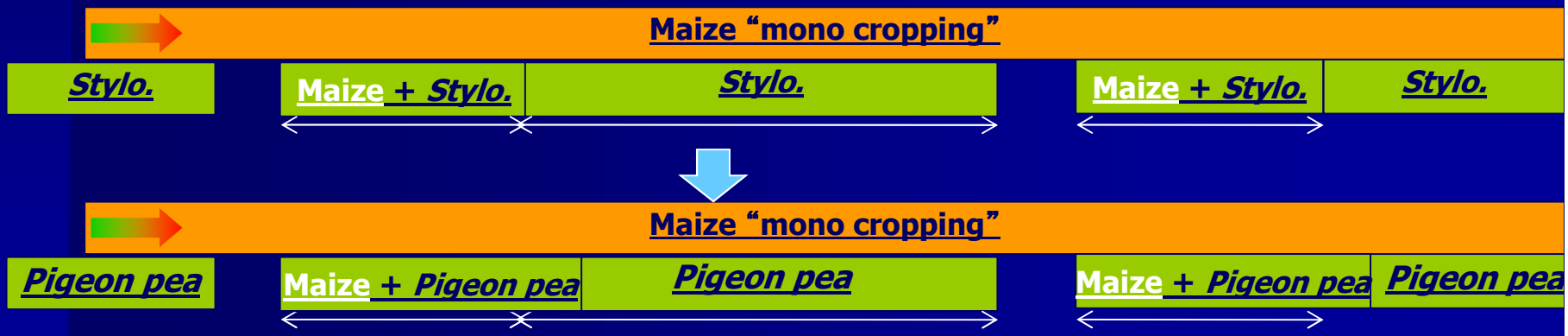
Stylo is not suitable for Alkaline soil!

Cambodia – Kampong Cham 2011

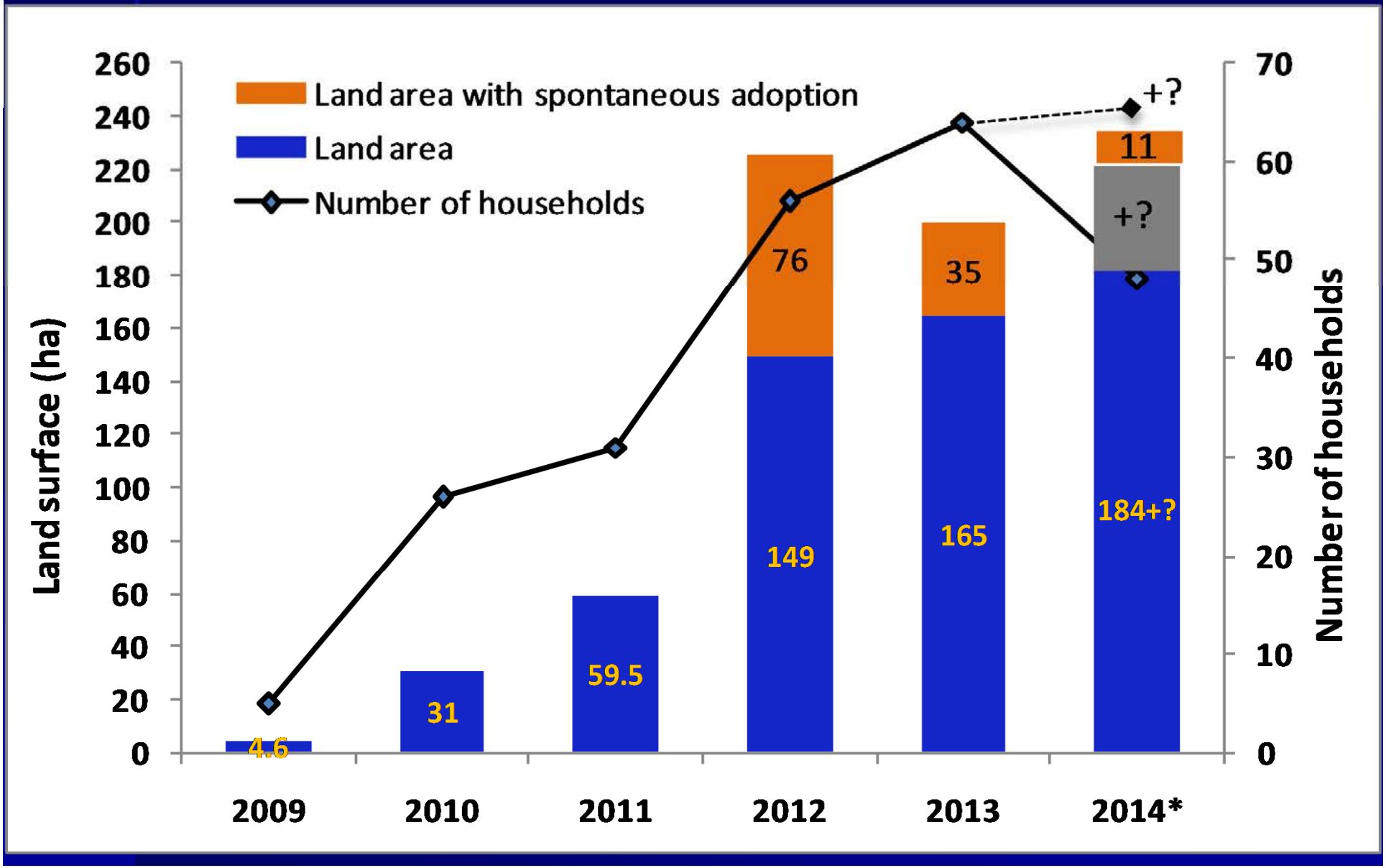
Moving from Stylo to Pigeon pea…







Evolution of CA extension 2009-2014



3. What have the farmers learned about CA ?

Some key advantages perceived by farmers are:

- Stop plowing from 2nd year of DMC implementation → save labour and reduce cost
- Protect soil erosion and soil lost via runoff
- Reduce weed pressure and population esp. gramineae species → reduce labor
- Restore and improve soil fertility, and proper cropping management advised by the project → increase yield
- Proper use of agrochemicals so save time, labor and lower cost

But…!

Constraints and need for adoption…

3. What have the farmers learned about CA ?

Constraints

- So far not yet have suitable cover crops, the proposed cover crops pigeon pea required additional sowing labor and no market
- The presence of cover crops requests for locally herbicides which require more labor and less efficiency without **Atrazine** and **Paraquat**
- Not yet available CA based **Cassava**!
- Limited direct seed planters, depending totally on the services provided by the project

Constraints (cont.)-

- Limited capacity of direct planter to sow on wet soil conditions compared to normal Thai planter
- Credit access to invest fertilizers, the farmers take inputs as credit from the suppliers
- Secondary constraints with insects (millipedes, cricket,s ants…) damaging young maize seedling on mulching plot

Needs

Three key needs conditioning CA adoption for the farmers:

- Market for cover crops to get extra income, animal feeds request more investment and labour
- Making services on CA practices esp. sowing accessible with private contractors like plow and conventional sowing
- Project, NGOs, GOs…provide cheap interest credit for fertilizers inputs; Farmer Cooperative credit fund is limited!

4- What project's strategic plan 2014?

Cover crops

From PADAC-SANREM – Pigeon pea growing after maize harvest– Dec 2012

Cover crop

Pigeon pea in dry season

Rolling down pigeon pea in May-June

Pigeon pea mulch for corn sowing

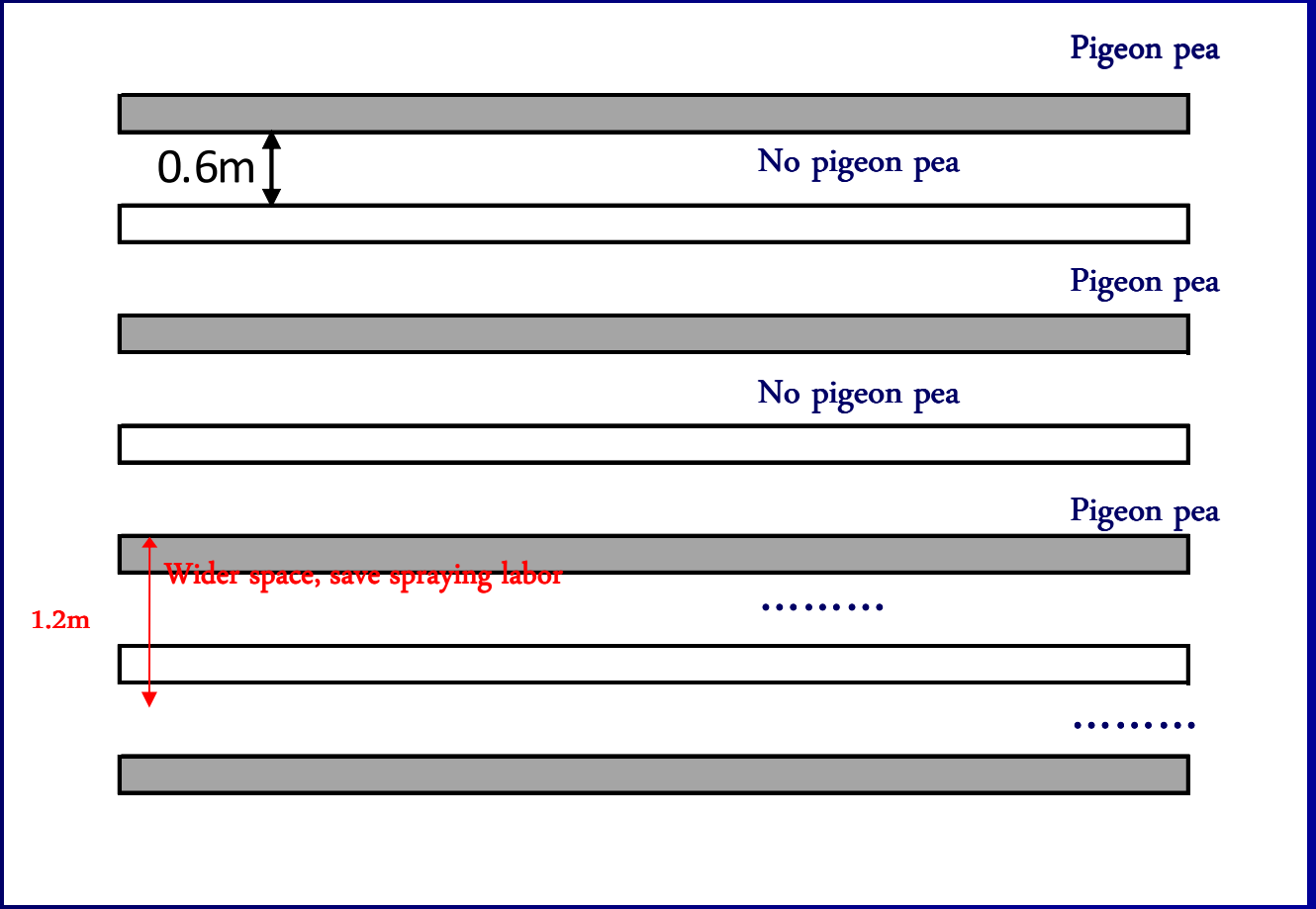

Cover crop pigeon pea sown on corn line
From PADAC-SANREM – Pigeon pea slowly growing with maize– Aug. 2013

From PADAC-SANREM – Pigeon pea growing with maize– Oct. 2013

New proposal: Trial on 1.2m pigeon pea

- Free seed at reduced density 60,000 to 40,000 plant/ha
- Subsidized 23N/ha (12.5$/ha)
- But farmer apply basal 16N-20P-00K and spray 2,4D inter-row

Farmer: 7.5 ha



Market of Pigeon pea

Cattle fattening

Local market:

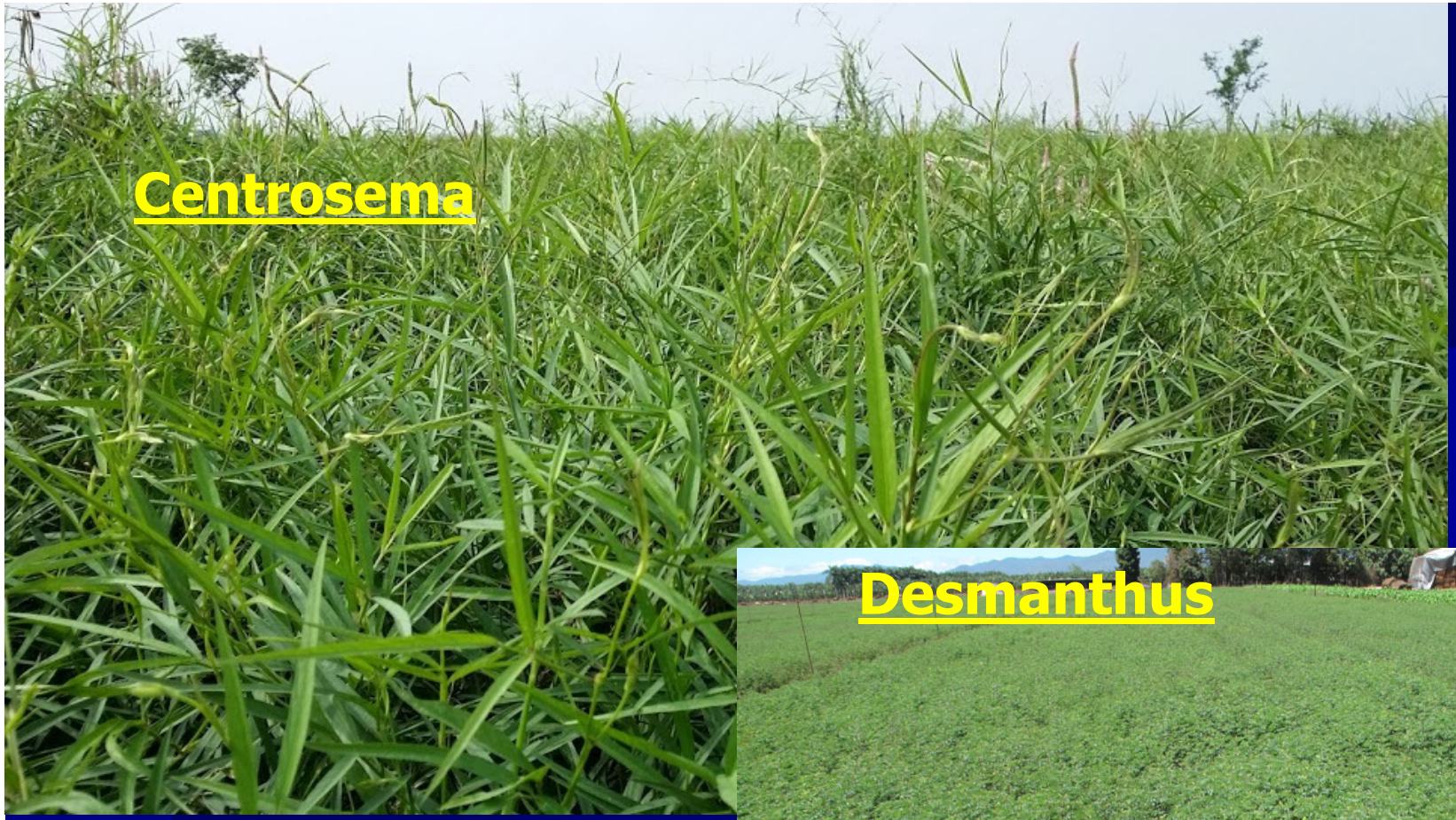
International market:

Thai market with

agronomes & vétérinaires SANS FRONTIÈRES

ICL
GRAVITY INTERTRADE CO. LTD.

ACIAR
aciar.gov.au



Testing new cover crops

4- What project's strategic plan 2014?

Direct planters:

- Disc scrapper allows sowing on wet conditions

- 3 direct planter meeting sowing date wanted by farmers

4- What project's strategic plan 2014?

Direct planters:

Renting planter and sprayer to existing Farmer Cooperative:
Agricultural Cooperative of Kaksekor Nhor Nheum

4- What project's strategic plan 2014?

CA based cassava:

Skyrocket cassava 2014

4- What project's strategic plan 2014?

CA based cassava:

Thank you very much for your attention!

Acknowledgement:

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