



ADOPTION OF CONSERVATION AGRICULTURE IN LAOS

A case study in the Mekong Corridor



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OUTLINE

- Context
- Objectives
- Methodology
- Results & discussion
- Conclusion



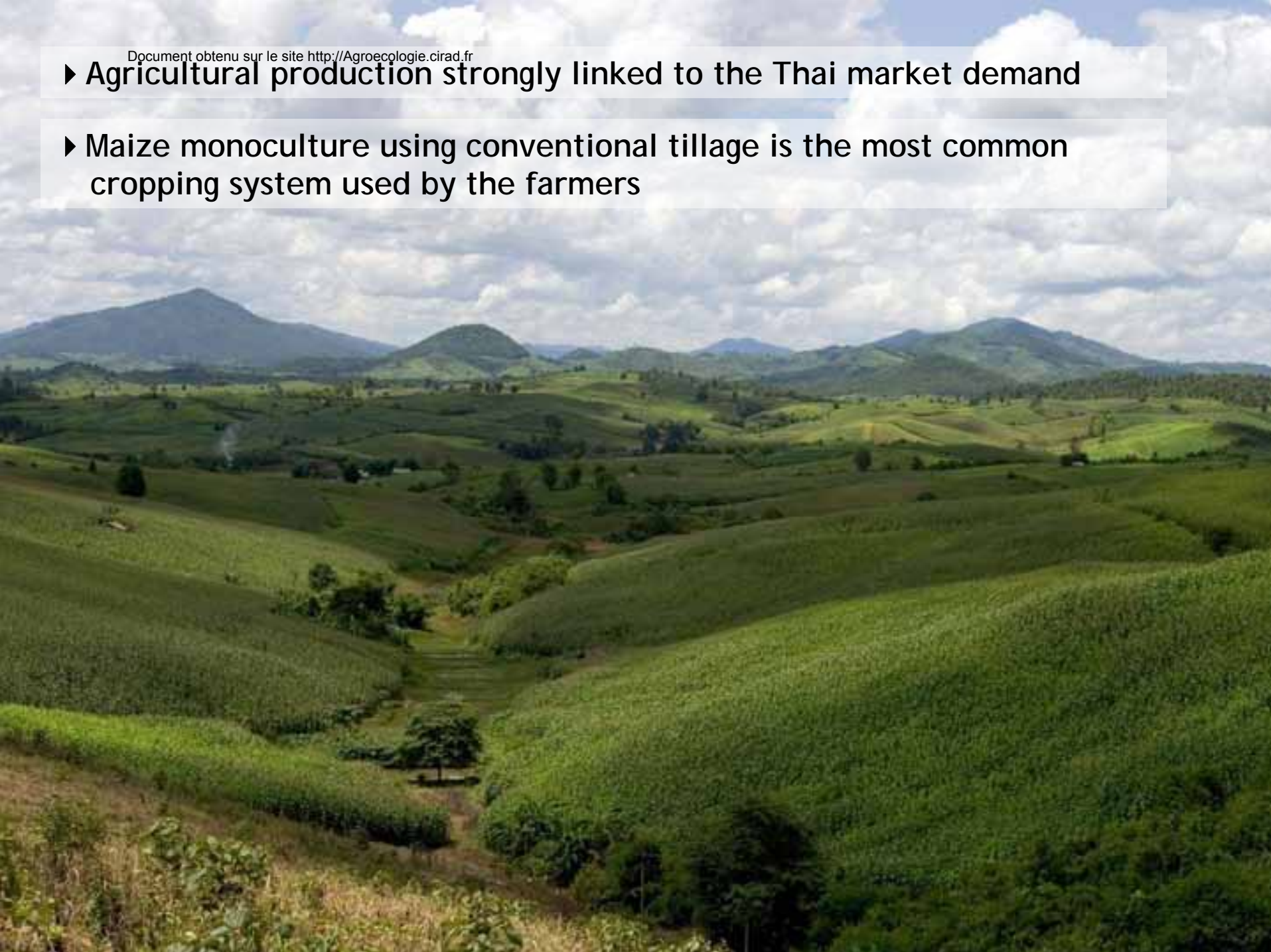


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- ▶ **Agricultural production strongly linked to the Thai market demand**
- ▶ **Maize monoculture using conventional tillage is the most common cropping system used by the farmers**



► **Agricultural production strongly linked to the Thai market demand**

► **Maize monoculture using conventional tillage is the most common cropping system used by the farmers**



► Intensive systems based on heavy mechanized tillage on steep slope



► **Herbicides are now widely used for land preparation after burning or ploughing, and for chemical weeding**



Document obtenu sur le site <http://Agroecologie.cirad.fr>
on highly fertile soils, farmers have generated important profits with maize production. Livelihoods have been improved but...

Soil erosion and exhaustion



Environmental pollution and threats on human health due to pesticides misuse



INCREASE LIVELIHOOD'S VULNERABILITY

Siltation of paddy fields



Destruction of road infrastructures





> PASS-PCADR with the support of PRONAE has started dissemination of DMC systems since 2006

2006		2007		2008	
(21 villages)		(38 Villages)		(45 Villages)	
smallholder	S (ha)	smallholder	S (ha)	smallholder	S (ha)
385	400	689	830	1254	1790

Botene district
10 villages

Thongmixay district
10 villages

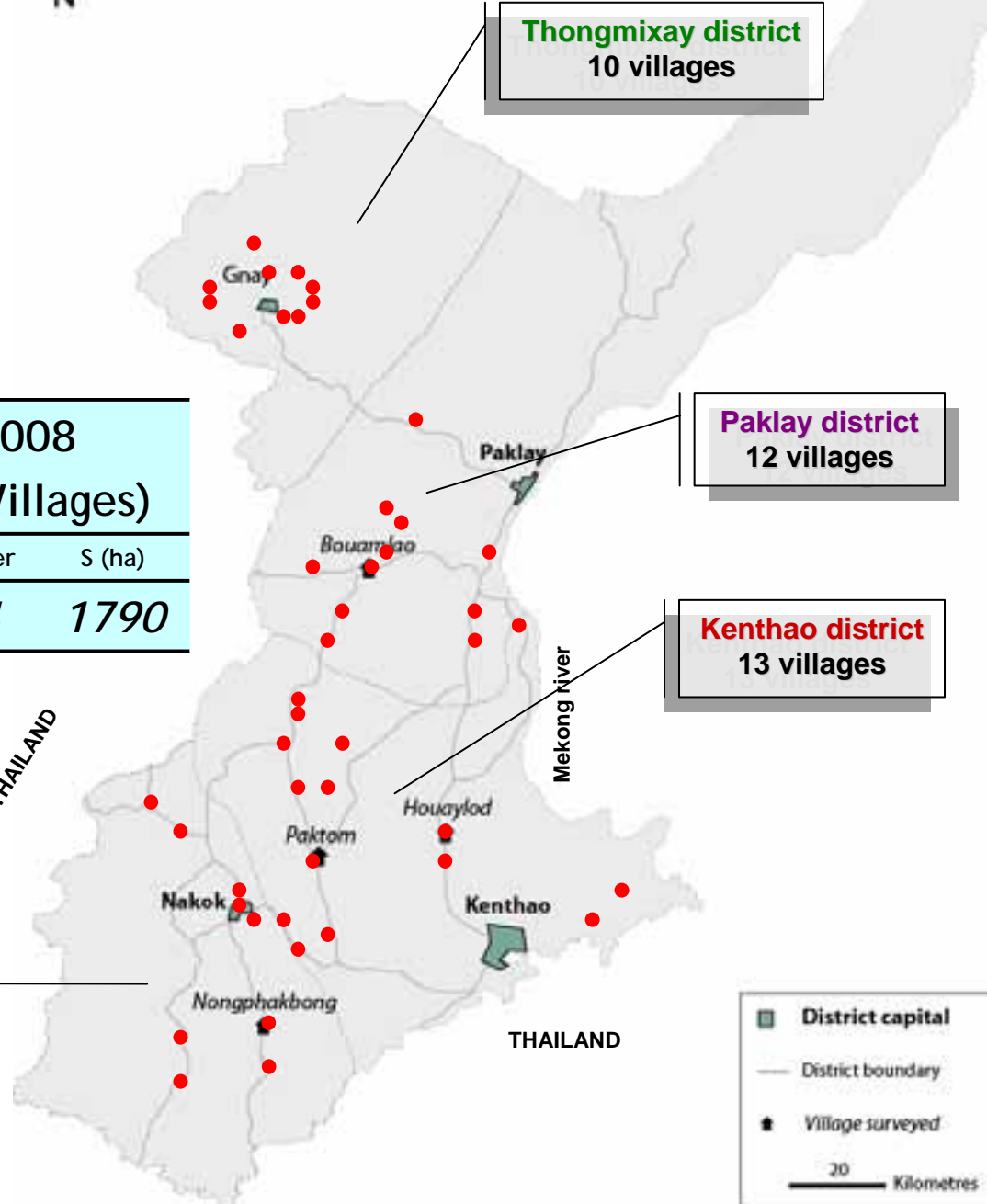
Paklay district
12 villages

Kenthao district
13 villages

THAILAND

Mekong river

THAILAND



- District capital
- District boundary
- Village surveyed
- 20 Kilometres

STEPS FOLLOWED FOR DISSEMINATION OF DMC SYSTEMS

Document obtenu sur le site <http://Agroecologie.cirad.fr>

STEP 1: LAND PREPARATION

- > CONVENTIONAL CROPPING SEQUENCES WITH LOCAL SPECIES
- > MAIZE MONO CULTURE WITH CROP RESIDUES MANAGEMENT



Document objetu sur le site <http://www.ecologie.gouv.fr>
STEP 2: CROP MANAGEMENT

= NECESSITY TO IMPROVE NO-TILL CROPPING SYSTEM WITH ROTATION,
INTERCROPPING WITH LOCAL SPECIES

- > 2-YEAR ROTATION SEQUENCE MAIS - VIGNA UMBELLATA
- > INTERCROPPING MAIZE+VIGNA UMBELLATA





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OBJECTIVES

- To gain information on the technical and socioeconomic environment in southern Xayaburi province
- To estimate the level of dissemination of the DMC systems at the community level
- To determine the factors conditioning smallholders' adoption or rejection of the DMC systems





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METHODOLOGY

- *PASS-PCADR survey*

- 21 villages, 2160 smallholders (total of 3872 smallholders), random sampling

- *PRONAE survey*

- 4 villages in 3 districts

- Sampling : 462 smallholders (total of 942 smallholders)

- > households associated with PRONAE (Validation Group)

- > random sampling among others households

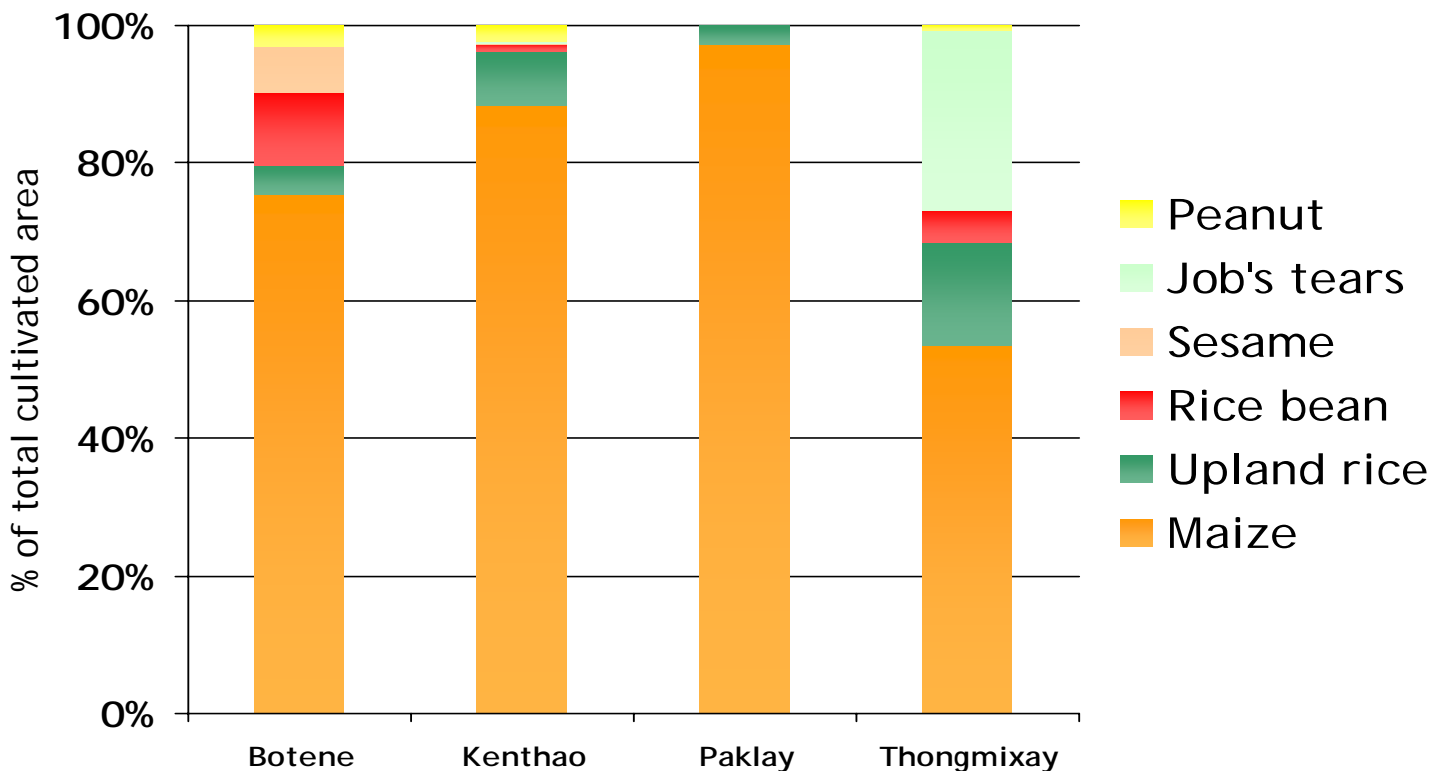
- Gender-disaggregated survey



Crop diversification



Land use for crops in 2007





OUTLINE

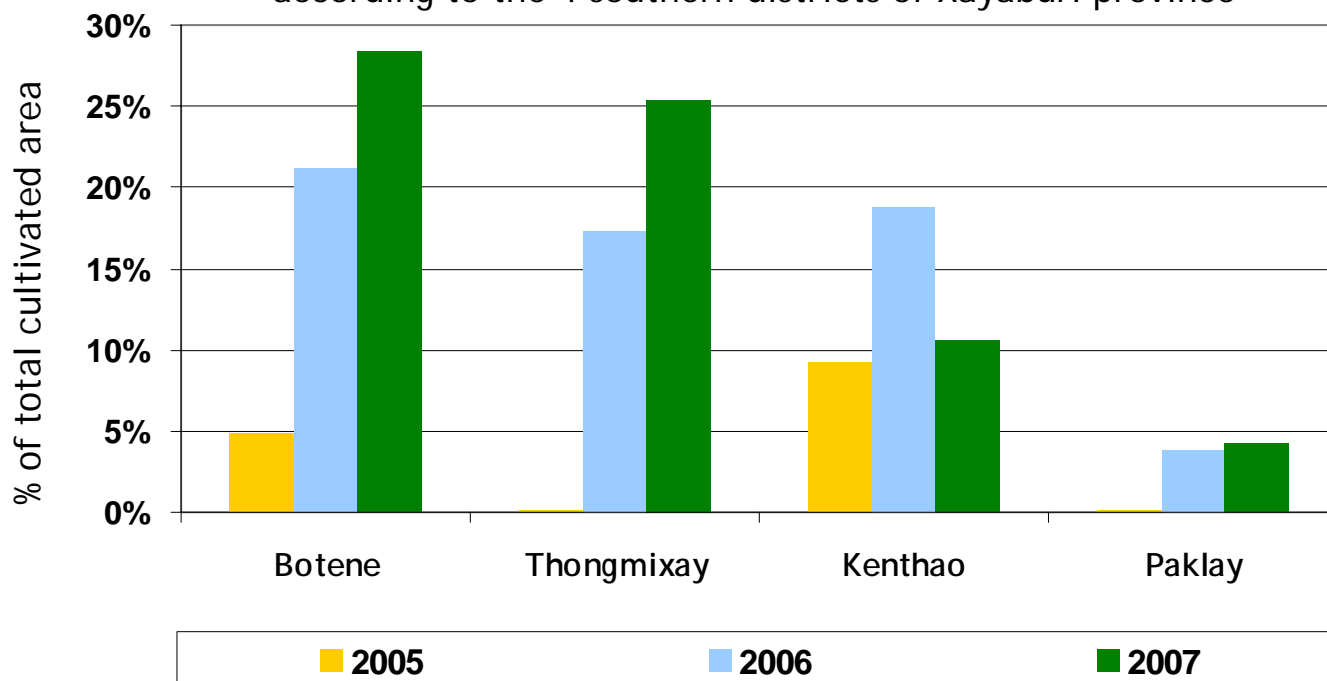
- Context
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Dissemination of DMC systems



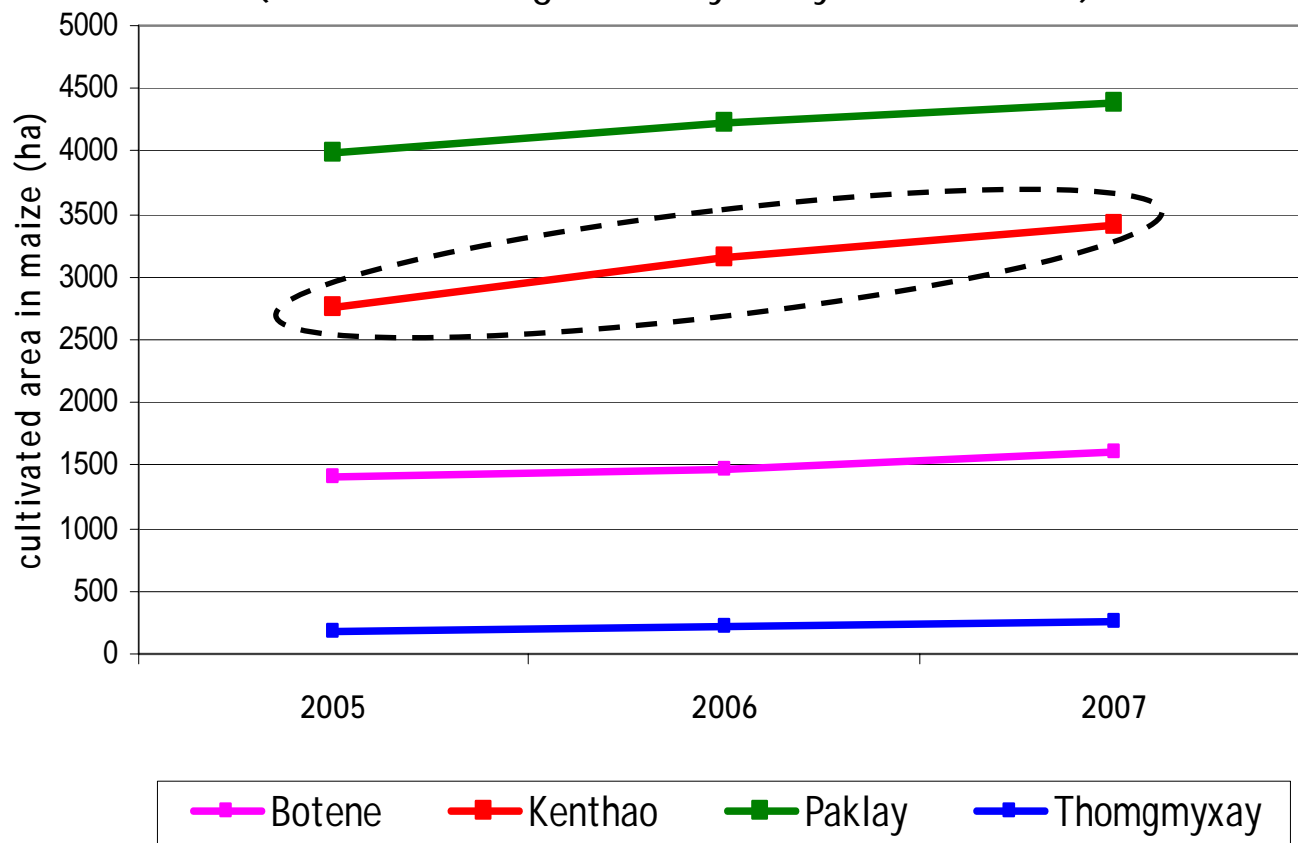
Evolution of cultivated area under DMC according to the 4 southern districts of Xayaburi province



Data from survey carried out in 21 villages of the 4 districts

Maize expansion & intensification

Evolution of maize cultivated area
(in the 21 villages surveyed by PASS-PCADR)

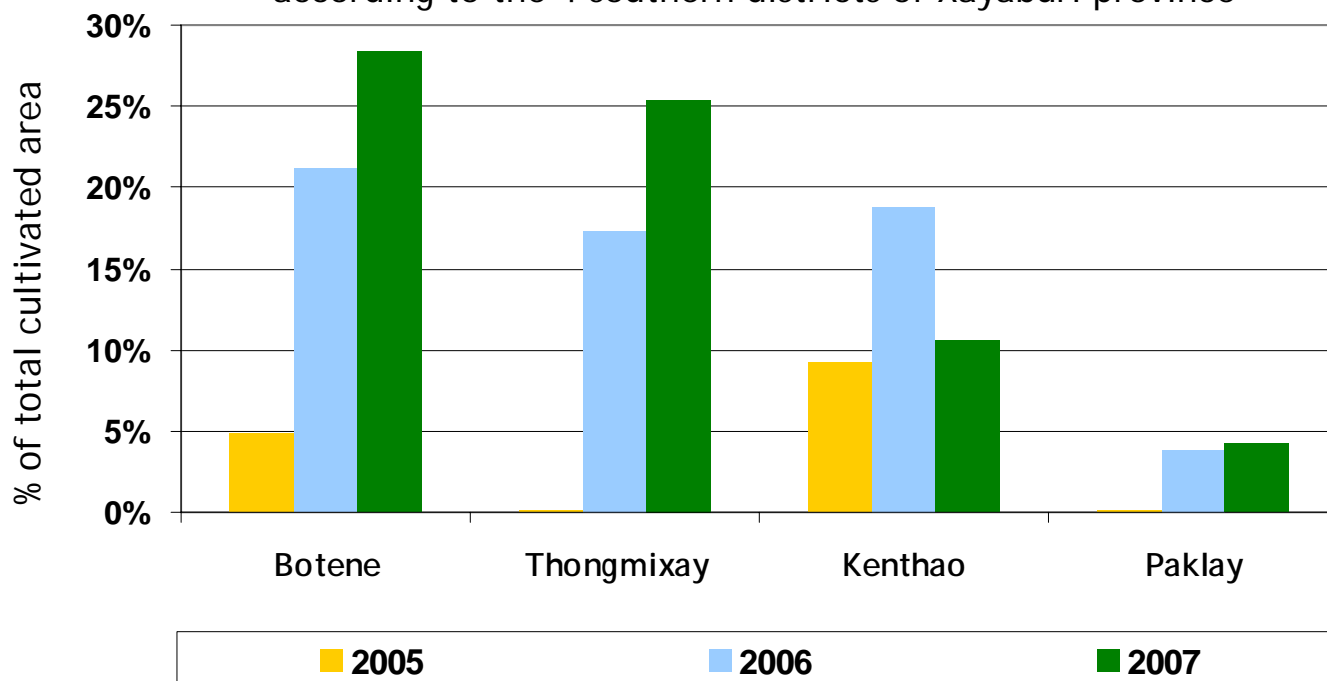


Data from survey carried out in 21 villages of the 4 districts

Dissemination of DMC systems



Evolution of cultivated area under DMC according to the 4 southern districts of Xayaburi province

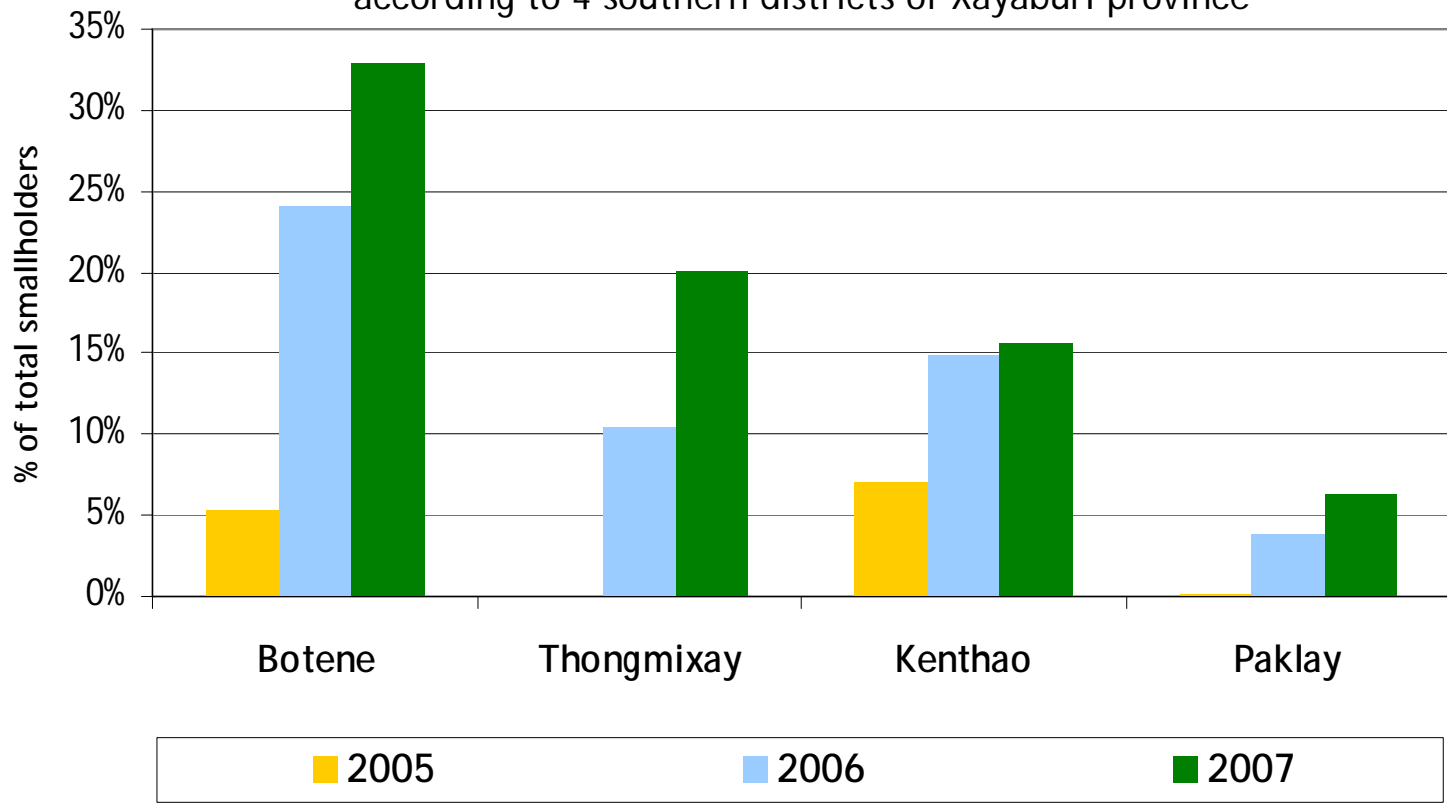


Data from survey carried out in 21 villages of the 4 districts

Dissemination of DMC systems

Smallholders using DMC systems

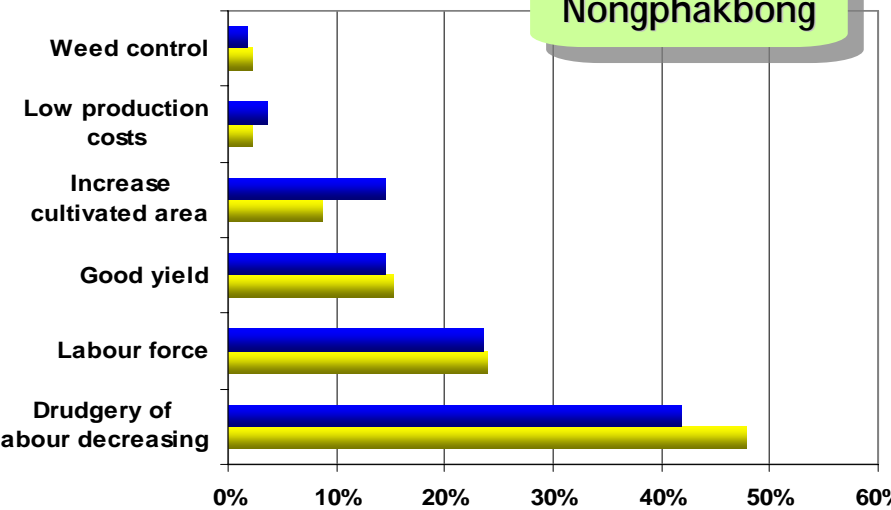
according to 4 southern districts of Xayaburi province



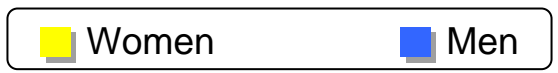
Data from survey carried out in 21 villages of the 4 districts

Why do farmers practice no-tillage?

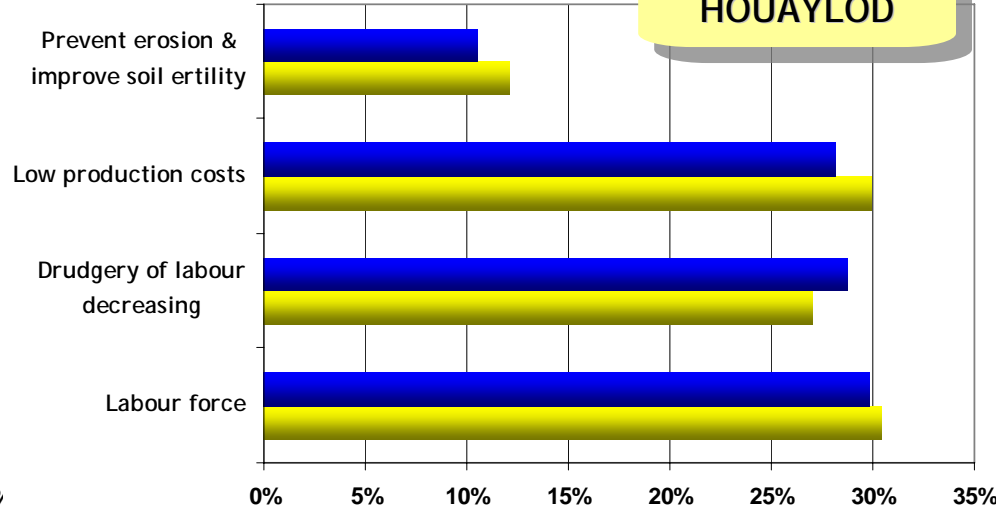
Nongphakbong



% of respondents

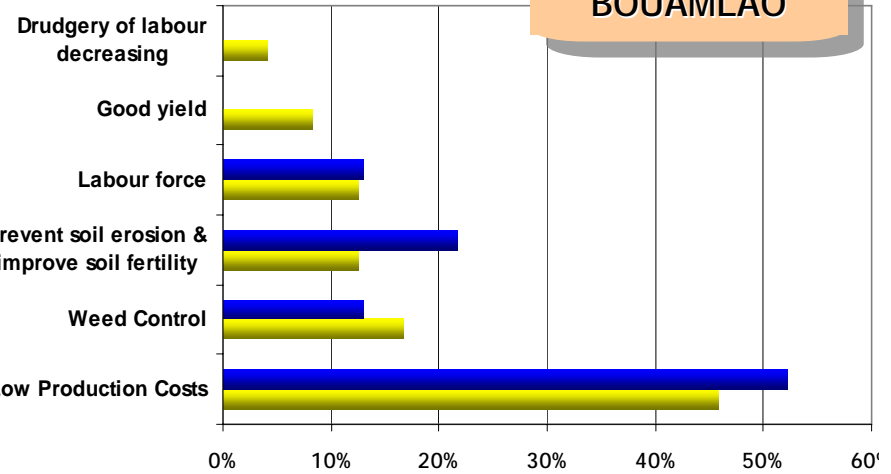


HOUAYLOD



% of respondents

BOUAMLAO



0%

10%

20%

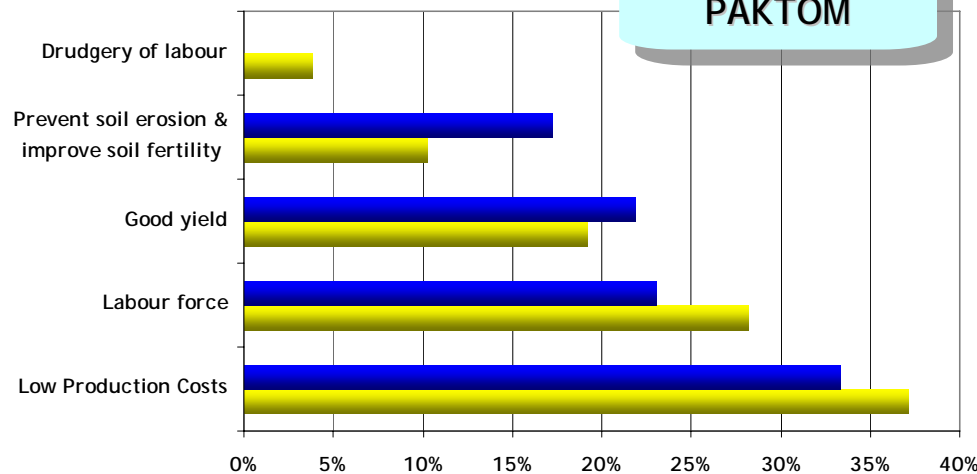
30%

40%

50%

60'

PAKTOM



0%

5%

10%

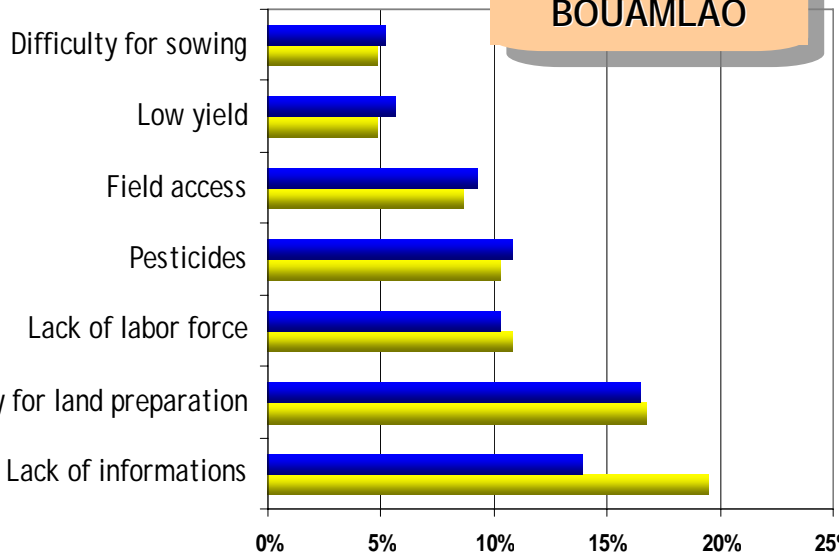
15%

20%

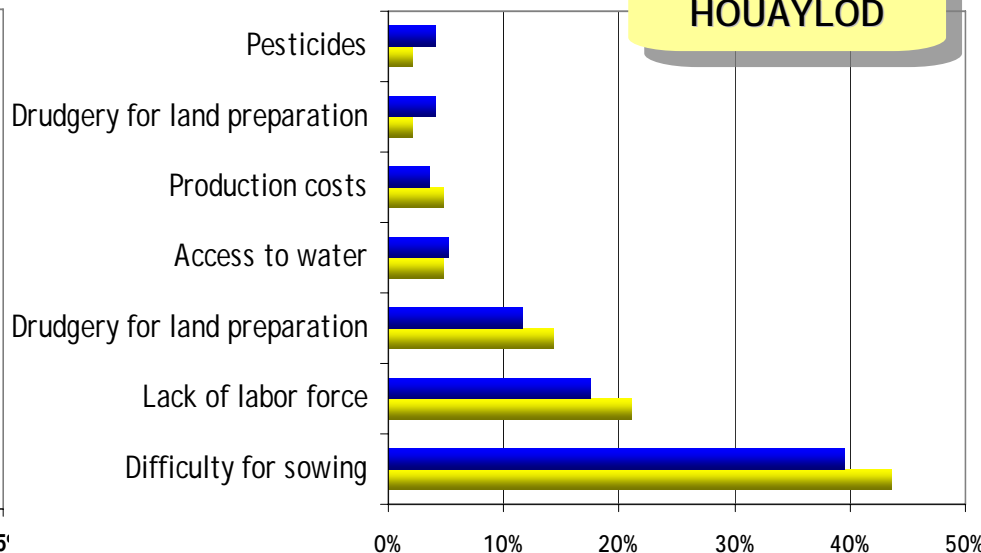
40%

How is no-tillage perceived by « other farmers »?

BOUAMLAO

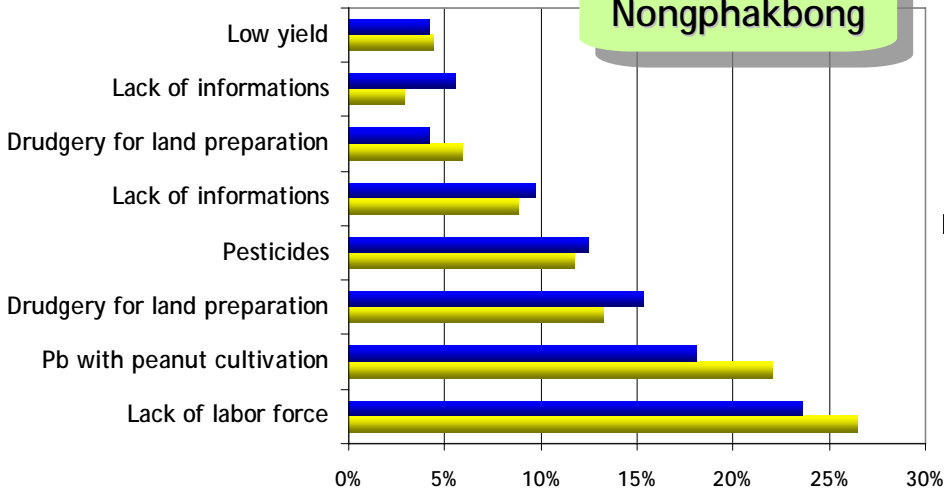


HOUAYLOD

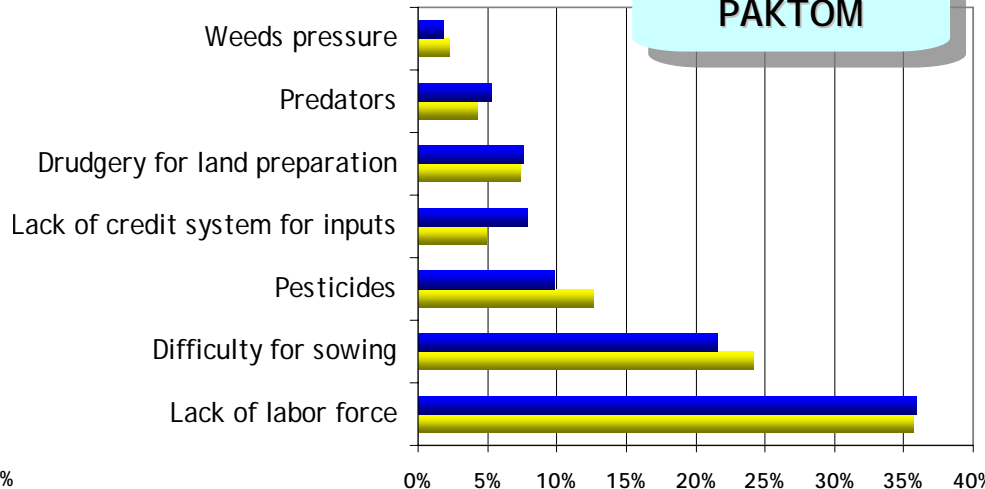


■ Women ■ Men

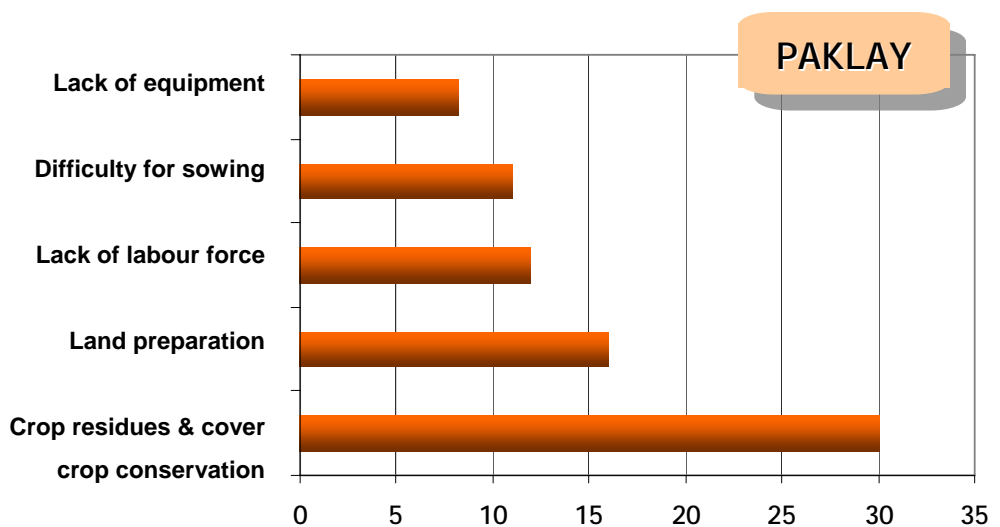
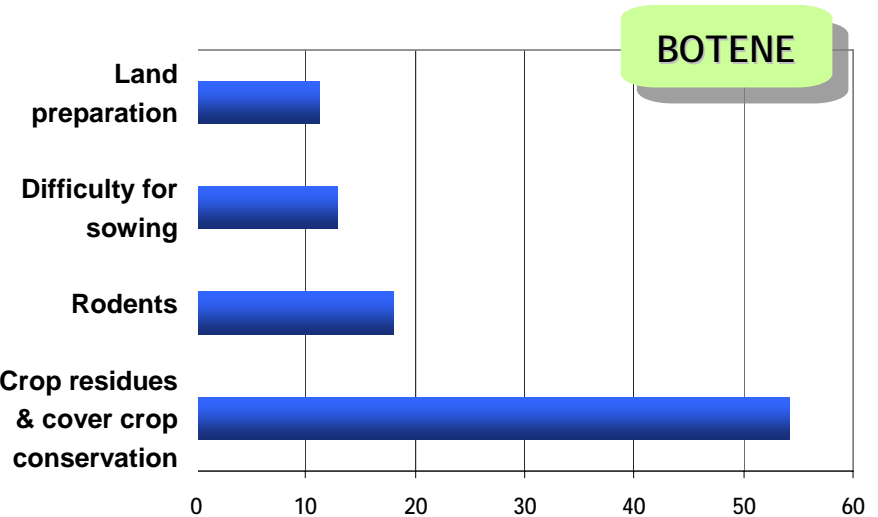
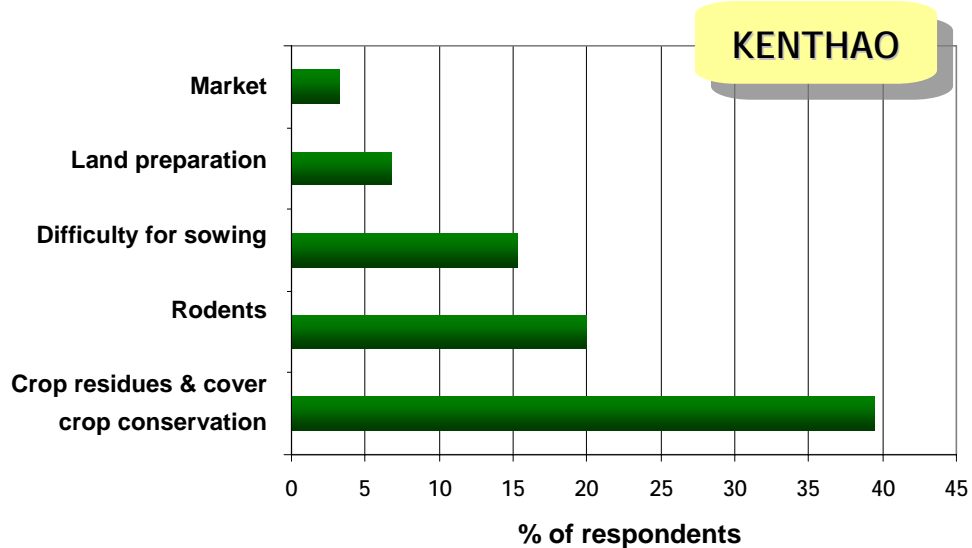
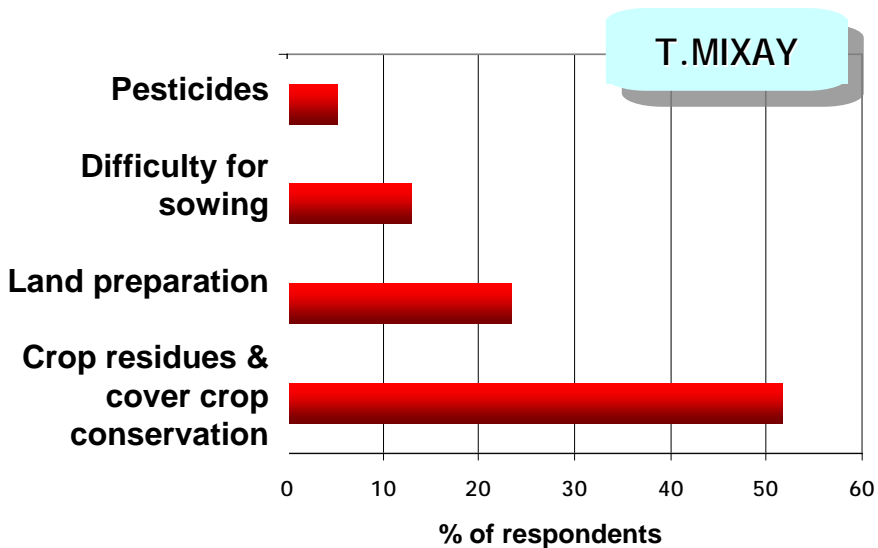
Nongphakbong



PAKTOM



What are the main constraints for improving current DMC systems?



In the areas with productive soils

- > Basaltic soils
- > New opened areas on schist

Soils with conventional tillage

(ploughing+herbicides)

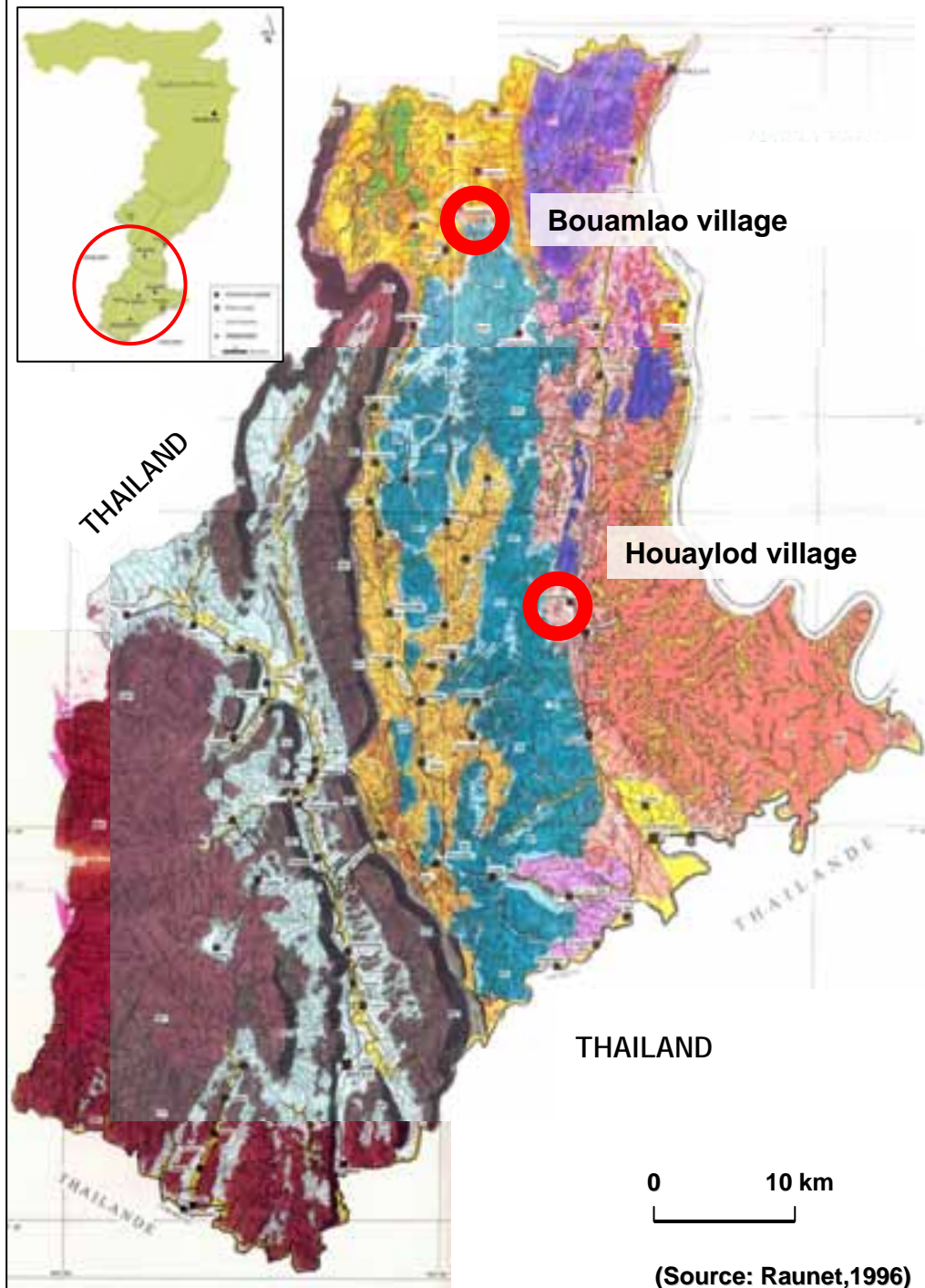
- OM=4,1%
- CEC=28,6 cmol/kg
- OC=2,38%

Natural forest:

- OM=7,9%,
- CEC=39,1 cmol/kg;
- OC=4,6%

• Range of maize yields : **4,0 to 4,5 t/ha**
(>5 years of ploughing and maize monocropping)

• Range of net profits with maize cultivation : **370 to 540 USD/ha**

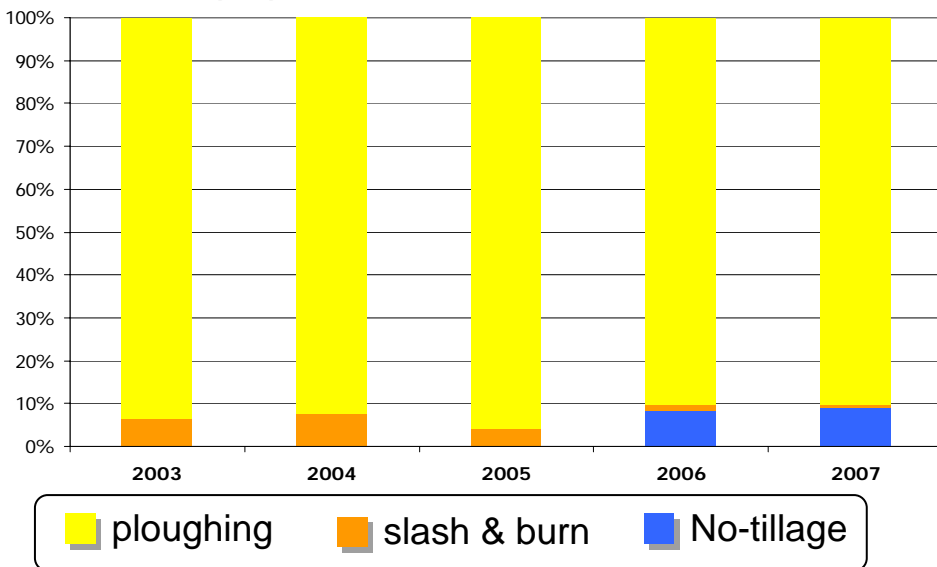


(Source: Raunet, 1996)

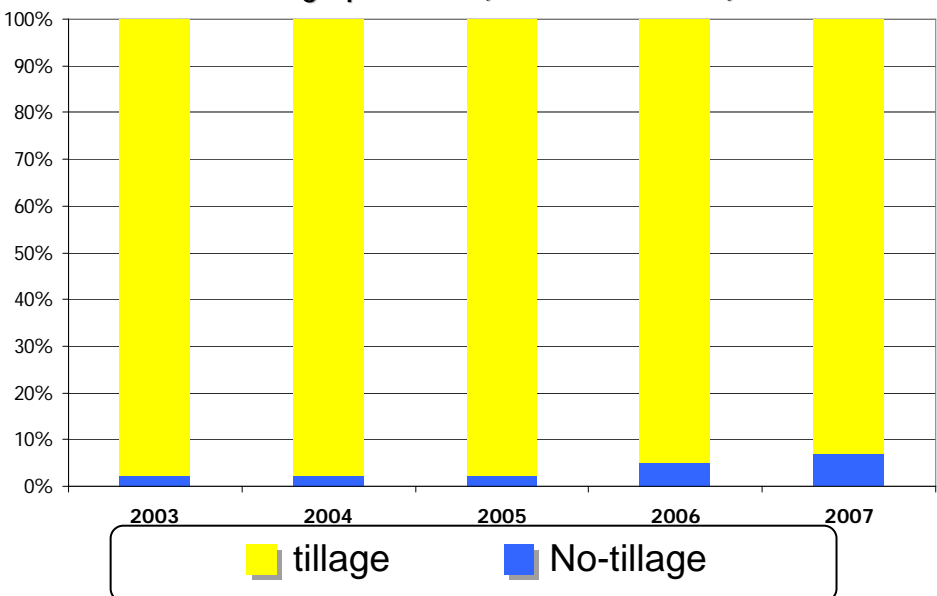
Case study: Bouamlae, Paklay district

On basaltic soil, very low dissemination...

Land preparation (% of total cultivated area)



No-Tillage practice (% of households)



What are the research hypothesis?

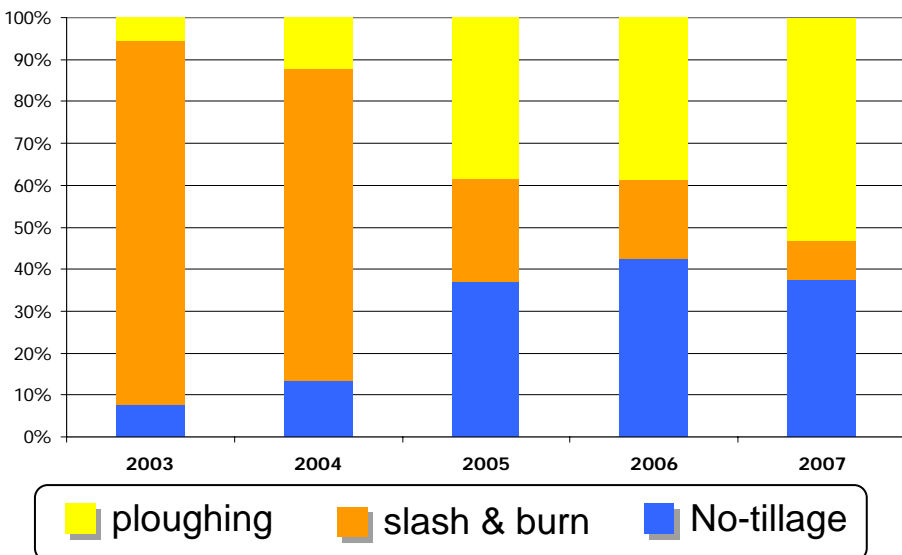
✓ Mean cultivated area with maize = 1,2 ha/labour > drudgery of labour
= **Lack of specific equipment**

✓ Due to high demand of Thai market
>Maize price increase
>High profits generated
>Farmers' strategy is to generate maximum profits on short-term with maize monoculture under conventional tillage
= **Economic environment**

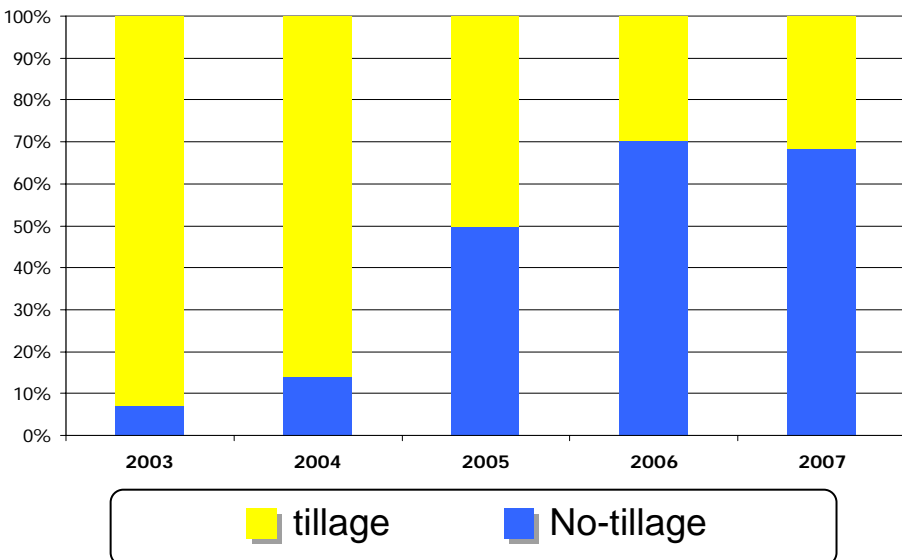
✓ Difficulties for preserving crop residues during the dry season (i.e. rice bean)
>Constraints on crop diversification
= **Lack of land management at village community level**

Case study: Houaylod, Kenthao district

Land preparation (% of total cultivated area)



No-Tillage practice (% of households)



In new opened areas, rapid adoption by smallholders but...

Research hypothesis

“Pioneer front” recently opened
>important increase of cultivated area allowed by heavy mechanization on steep slope

Mean cultivated area with maize = 1,2 ha/labour

= Limited labour availability

The socioeconomic environment pushes farmers to use tillage-based systems and intensify maize mono cropping

= Economic environment, credit & collection system

- New opened areas on schist (less than 5 years of intensive cultivation)



In the most fragile areas

- > Sandy soils
- > Long exploited areas on schist

Soils with conventional tillage

(ploughing)

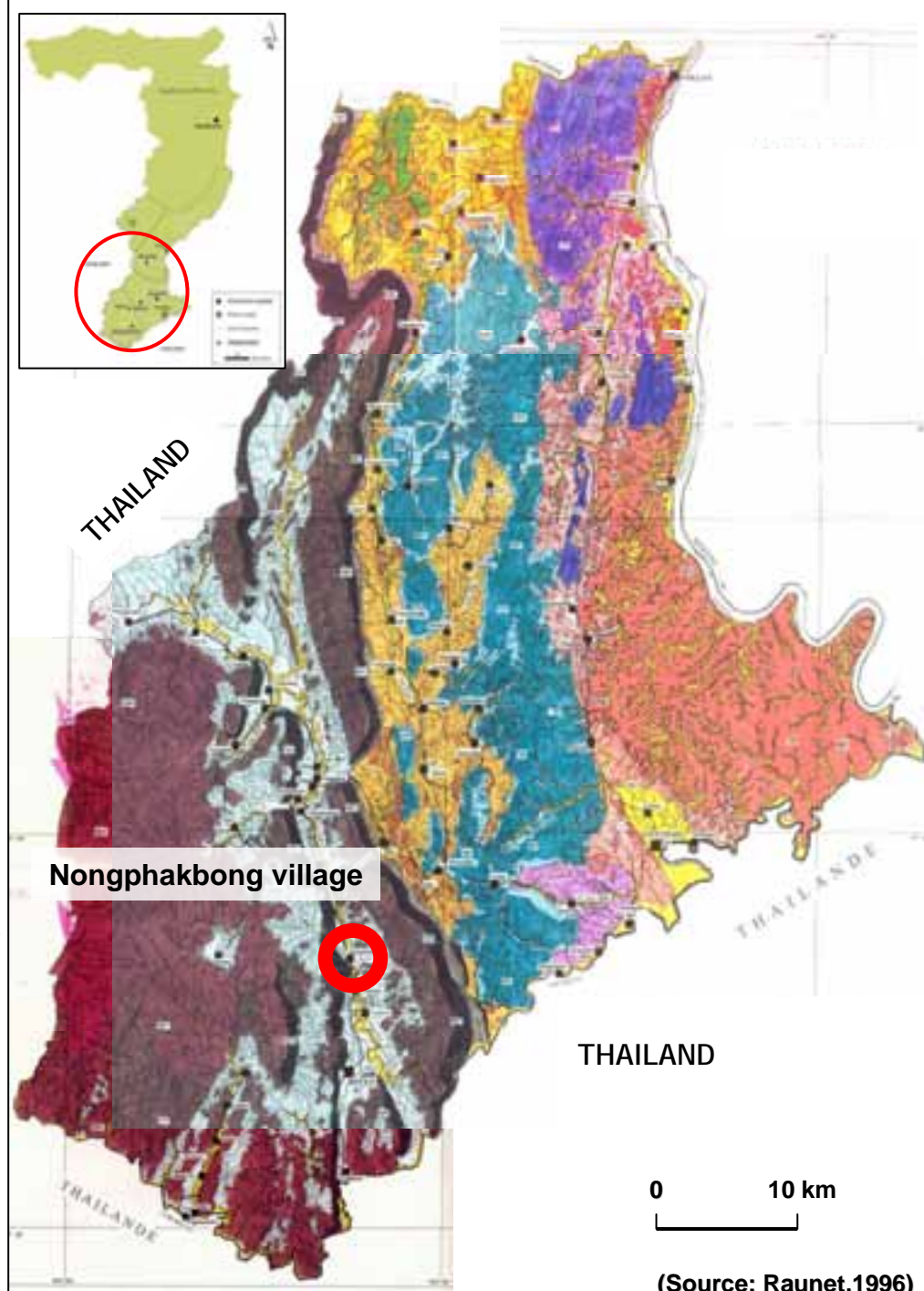
- OM=2,5%
- CEC=19,80 cmol/kg
- OC=1,45 %

On basaltic soils:

- OM=4,1%
- CEC=28,6 cmol/kg
- OC=2,38%

• Range of maize yields : 2,4 to 3,5 t/ha
(after 5 years of ploughing and maize
monocropping) - **(4,0 to 4,5 t/ha)** -

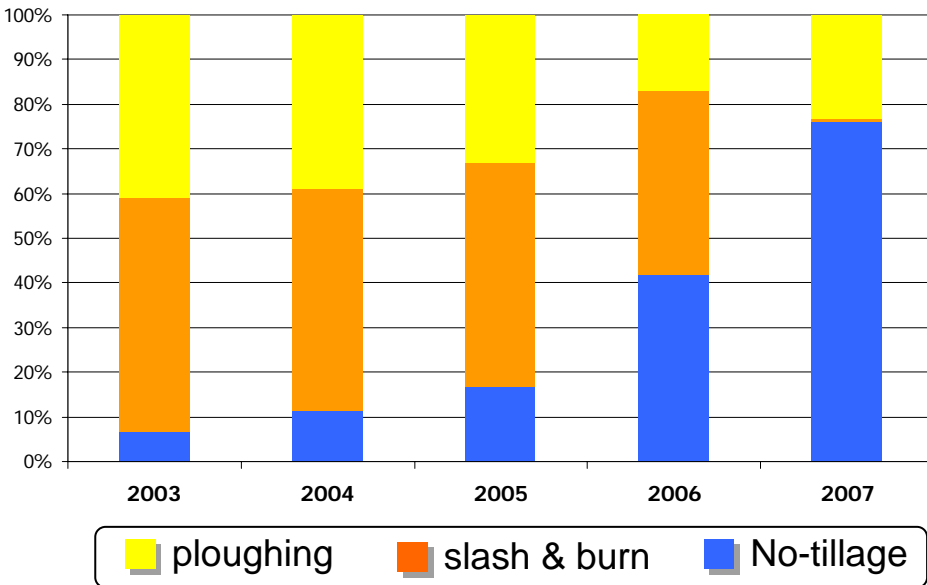
• Range of net profits with maize
cultivation: 100 to 300 USD/ha
- **(370 to 540 USD/ha)** -



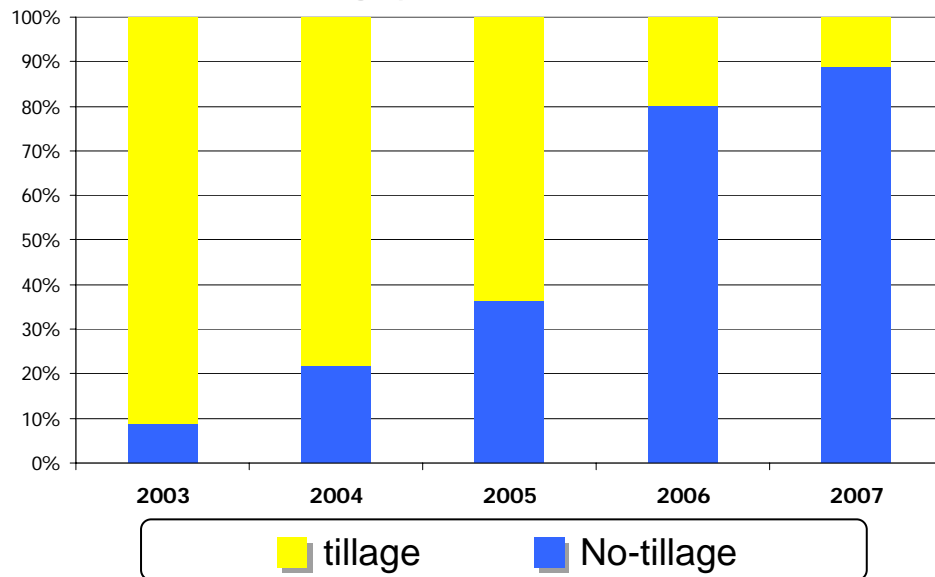
Case study: Nongphakbong, Botene district

Document obtenu sur le site <http://Agroecologie.cirad.fr>

Land preparation (% of total cultivated area)



No-Tillage practice (% of households)

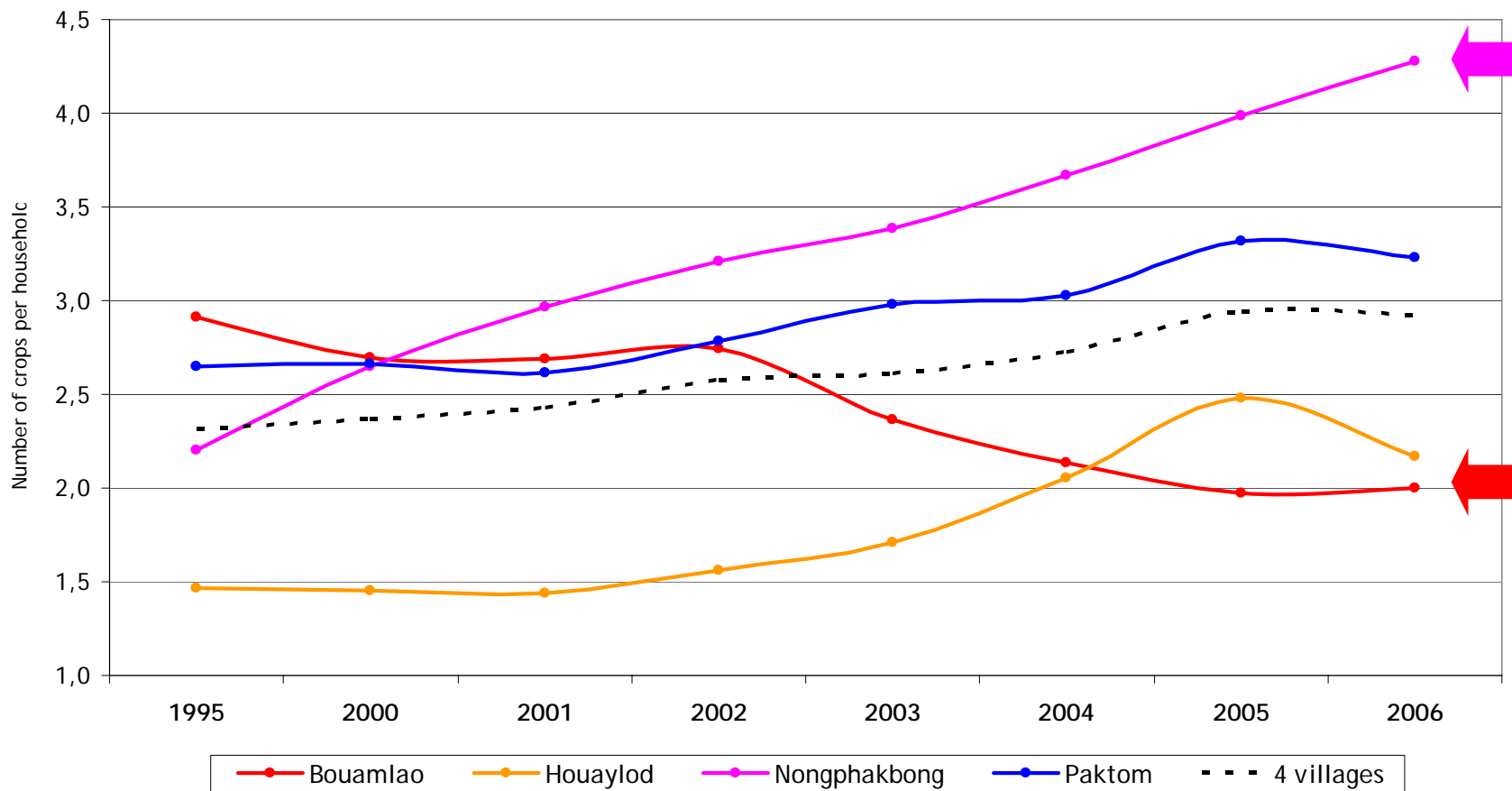


Wide and rapid dissemination...

What are the research hypothesis?

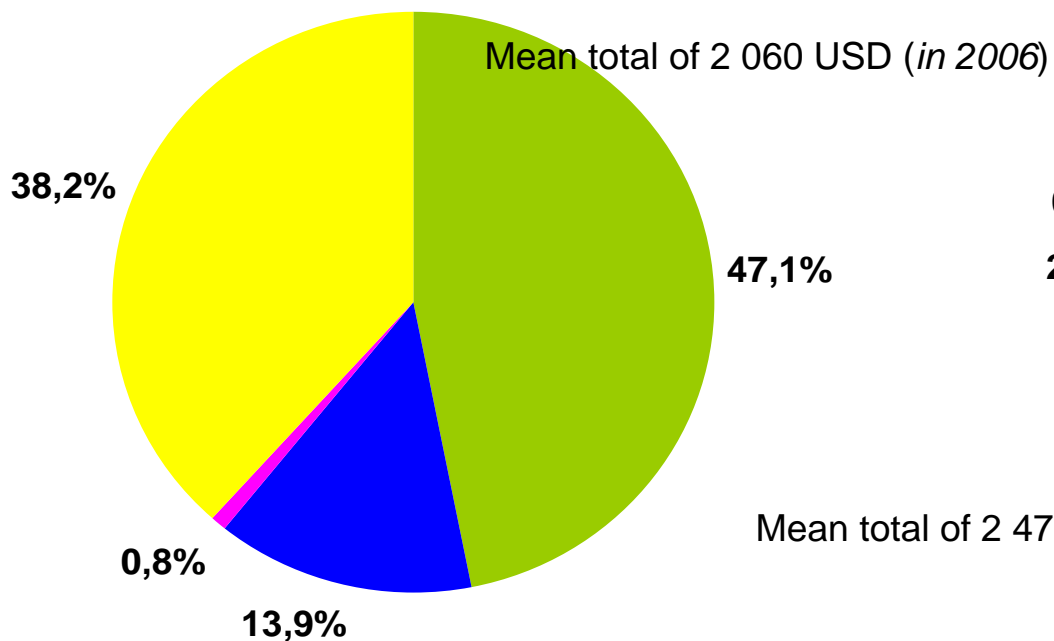
- **Very low profit generated** by maize mono cropping and important soil exhaustion > maize yields decline (loss of 2t/ha within 4 years)
> Farmers are willing to develop alternatives
- **High environmental and economic risks** due to degraded and fragile soils,
> significant levels of crop diversification
> involvement in off-farm or non-farm activities

Crop diversification

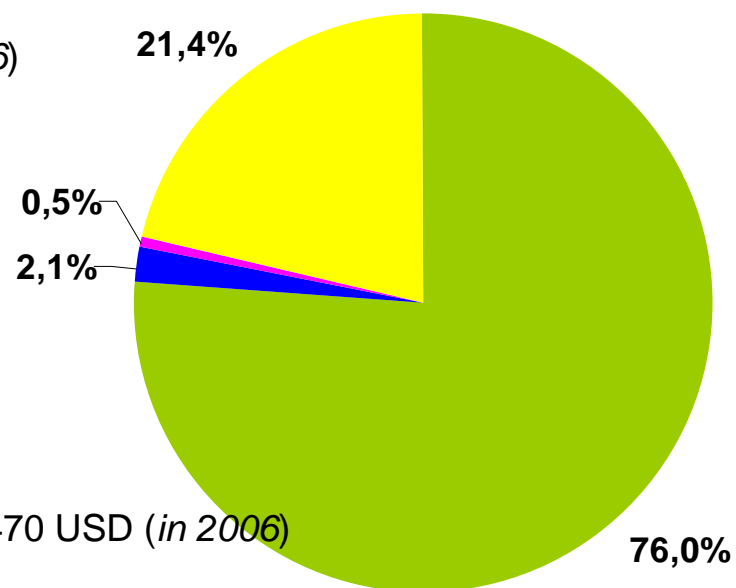


Income sources

NONGPHAKBONG



BOUAMLAO



■ Cash crops ■ Cattle & buffalo husbandry ■ Pig farming ■ Off farm & Non-Farm activities

- Adoption of DMC systems for an agriculture completely manual on steep slopes
- Mean cultivated area with maize/labour = 0,5 ha
- Main cropping system adopted by smallholders is the 2-year rotation sequence maize-*Vigna umbellata*



Sowing of maize on rice-bean residues in Nongpakbong village

Sowing of *Vigna umbellata* with hand-jab seeder on *Imperata cylindrica* in Botene district



Conclusion

- In the most fragile areas, dissemination of innovations is wide and rapid and livelihoods appear more diversified:
 - > these trends can be considered as 'risk avoidance' strategies
 - > by diversifying their livelihoods, smallholders attempt to limit their vulnerability to the potential failure of a single economic activity
- Diversification has to be integrated to development policy because it gives households more capabilities to improve their livelihood security
 - > possible through land management, livestock-agriculture integration



Conclusion

- Discussion related to land management at the village community level has to be engaged rapidly in order to protect the watershed, to promote crop diversification and agrobiodiversity and for a better integration of livestock and agriculture
- In complete contrast with commonplace ideas regarding the association of DMC with large-scale, mechanized agriculture, in southern Xayaboury province, DMC systems appear to be adopted preferentially by small-scale farmers, engaged in manual agriculture, on steeply sloping land.





THANK YOU
FOR YOUR
ATTENTION!