

Workshop  
“Climate Change  
and Natural  
Rubber Systems”

# The role of rubber agroforestry in farming systems and its effect on households.

## Adaptation strategies to climate change risks ?

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# What do we expect from rubber agroforestry systems in terms of sustainability ?

- Income diversification (rubber + fruits + timber ...) = better economic resilience = economic sustainability
- No impact of agroforestry practices on rubber production (kg/tree/ha/year) as long as no trees above rubber canopy : rubber production is generally not in competition with associated crops
- Reservoir of local biodiversity and « forest effect » on climate if large areas : environmental impact and positive effect on climate change : potential mitigation but still to be assessed
- Less soil erosion and better use of water as vegetal biodiversity increases a « **forest like behavior** »
- Soil fertility maintenance or improvement if soil is covered by grasses and shrubs
- Possibility of timber production : rubber farmers might be the very next timber producers as timber can be easily cropped with rubber (up to 50 trees/ha)
- more globally environmental friendly : re internalizing externalities is a real challenge. **\*including impact of climatic change**
- Rubber trees do not require high quantities of fertilizers during mature period and almost pesticides : rubber is already « bio compatible »
- Effect of high temperatures on physiology of rubber trees and NR production : agroforestry may play a positive role to maintain good climatic conditions

# Indonesia

**Rubber Agroforestry Systems (RAS)=  
diversification inside one cropping  
system**

**SRAP research programme  
1997/2007 with IRRI and ICRAF**  
Rubber planting density  
similar to that of monoculture

RAS 1 : an  
improved  
extensive jungle  
rubber



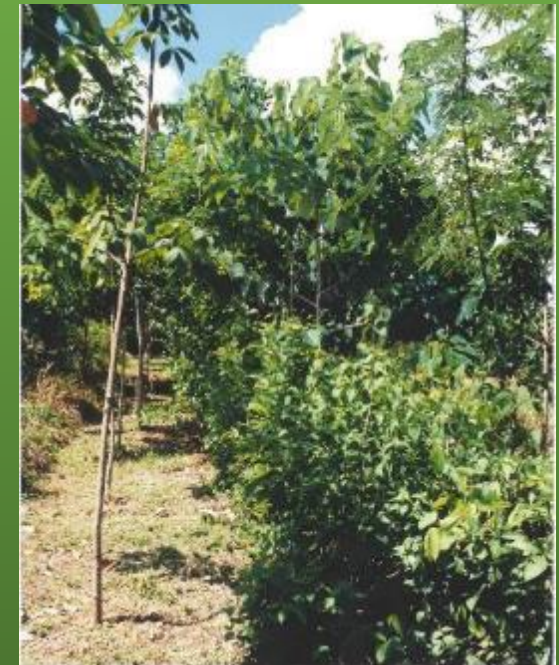
RAS 2 : an  
intensive  
system  
with  
intercrops

RAS 3 :  
**rehabilitation**  
of *Imperata*  
grasslands

Low cost of  
establishment  
Low  
management  
High productivity



Intensive  
Intercropping  
In immature  
period  
More diversified



1994 to 2007

# The situation in 2019 in West Kalimantan Indonesia

## From rubber to oil palm

- priority to oil palm from 1997
- Rubber remains for diversification and family labour use

70 % oil palm

20 % clonal rubber : monoculture , RAS/AF,  
10 % remains of old jungle rubber  
and tembawang

Probably around 25 % of farmers have AF systems



A new landscape in 2019

# Some AF systems in Southern Thailand

TSU/Phattallung



Rubber-Guava



Rubber-Gnetum



Rubber-Longkong



Rubber-Mangosteen



Rubber-Livistana



Rubber-Salacca

During rubber mature period



Rubber-Pineapple



Rubber-Chili



Rubber-Corn

Highly diversified AF systems  
Linked to a local context

During rubber immature period



Rubber-Rice

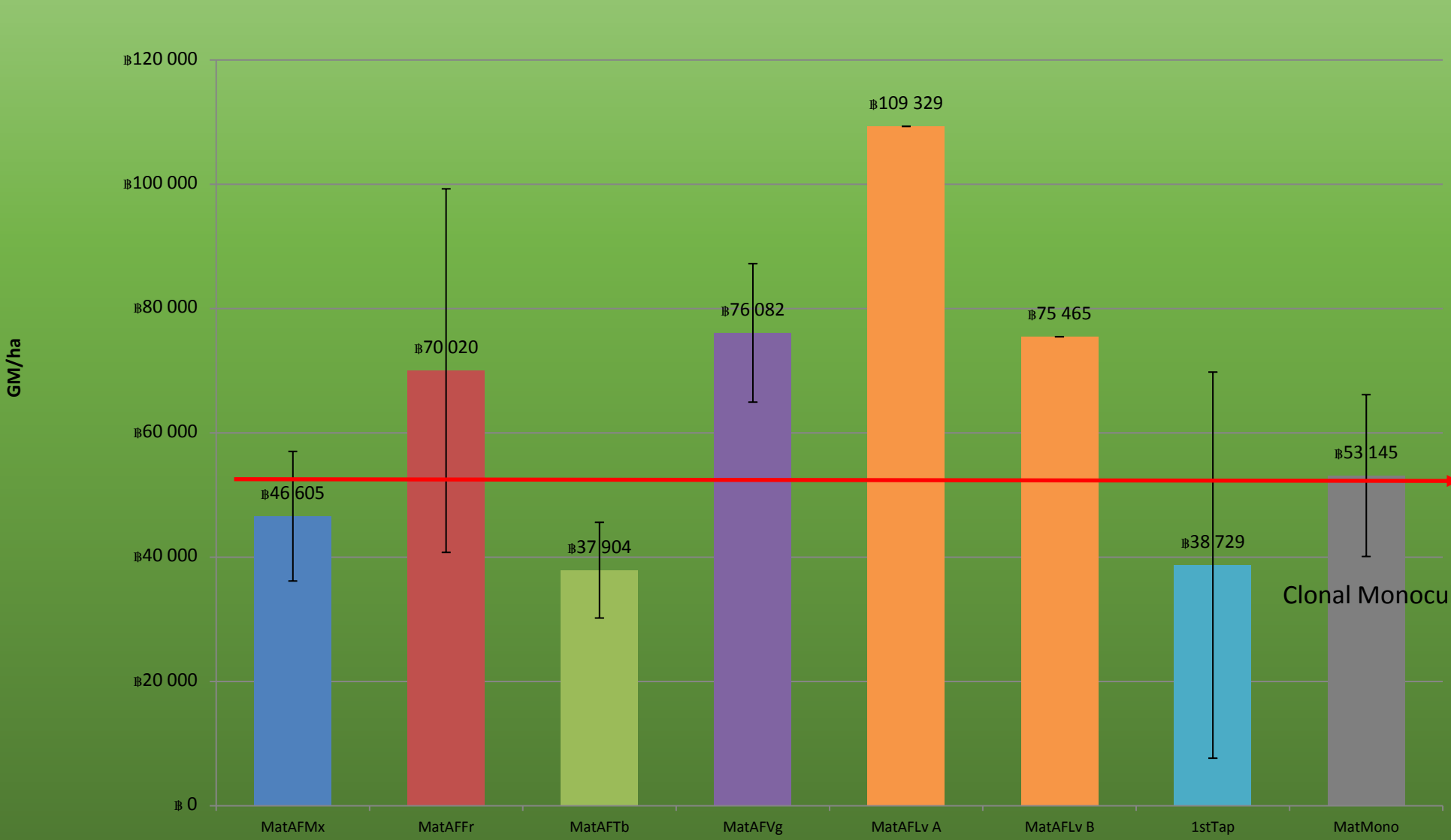


Rubber-Papaya



Rubber-Banana

# Gross margin/ha/year for various AFS types and rubber monoculture in Thailand (2015)

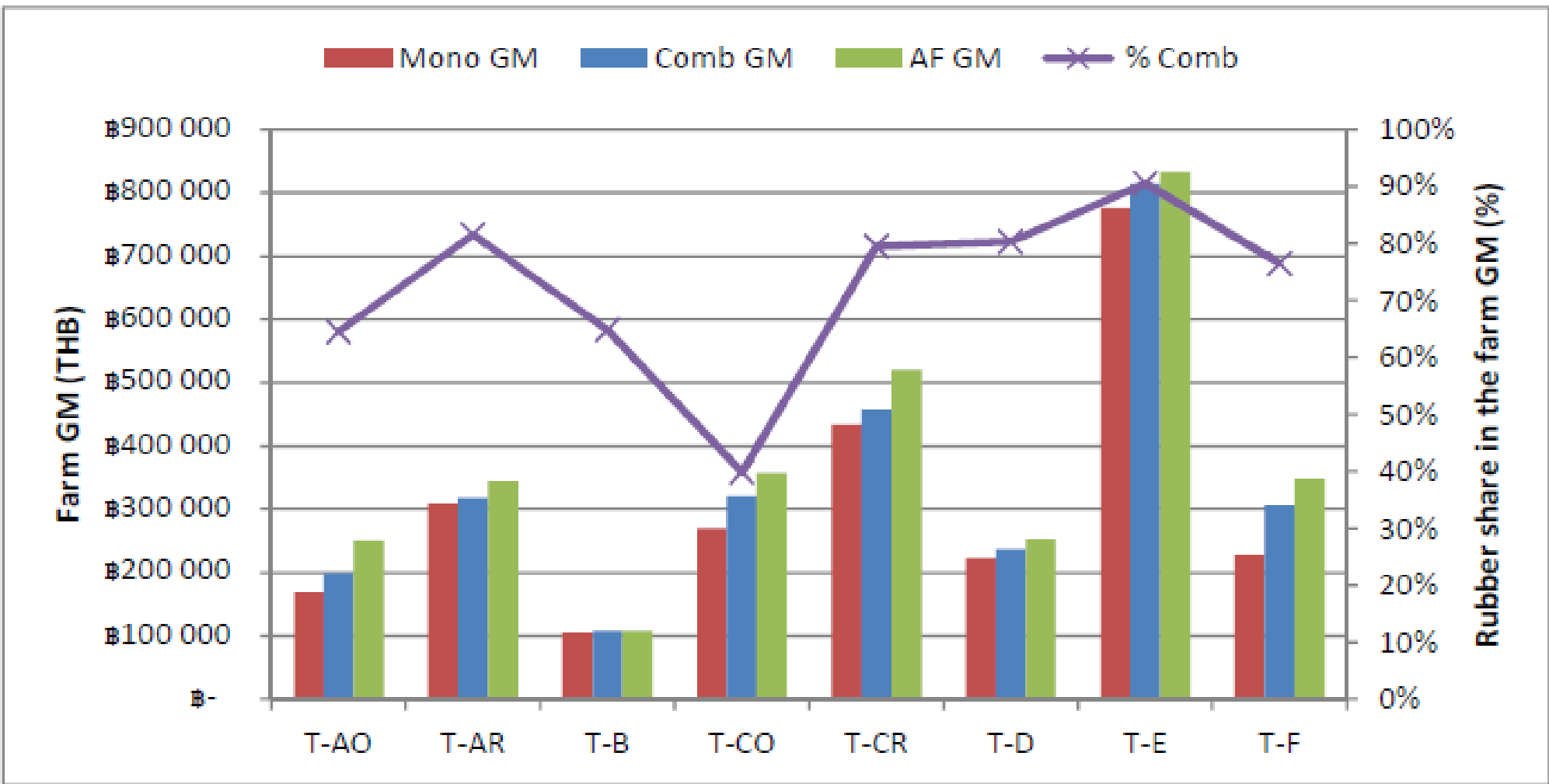


- type MatAFVeg: mature rubber trees only associated with vegetable species,
- Type MatAFFr: mature rubber trees associated with fruit and sometimes vegetable species,
- Type MatAFTb: mature rubber trees only associated with timber species,
- Type MatAFMx: mature rubber trees associated with fruit, vegetable and/or timber species,
- Type MatAFLv: mature rubber trees associated with livestock and other plant species.

Clonal Monoculture

source:  
Stroesser et al 2018.

# Figure 10 - Comparison of variants Mono, Comb and AF for the eight farm types, in an « average » rubber price context (RubA) (Indicator: Farm Gross Margin)



Mono :  
clonal rubber

Comb : current  
situation with 25  
to 63 % of rubber  
in SAF

AF = all plots  
in SAF

GM = farm gross  
Margin = gross  
annual agricultural  
income

# Impact of low rubber price

- Rubber price very low since 2013
- Decrease in rubber interest
- No quality pricing → move from slab production (less contamination) to cuplump. Abandon of hand-mangle use in kalimantan
- Do limit momentarily rubber replantation interest for most farmers however it has never a real impact on long term plantation trend

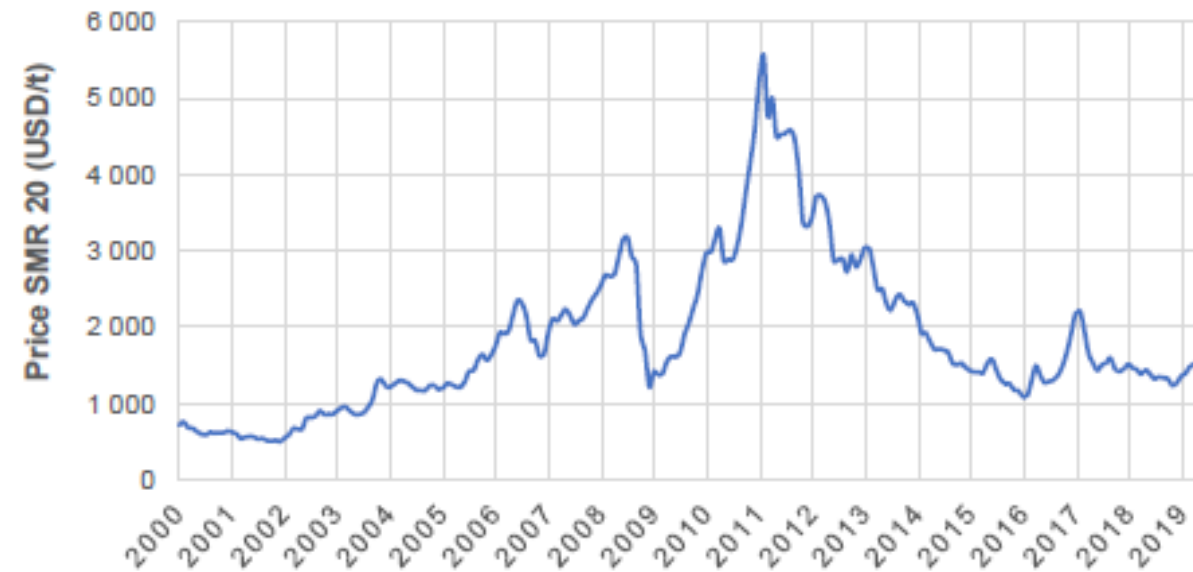
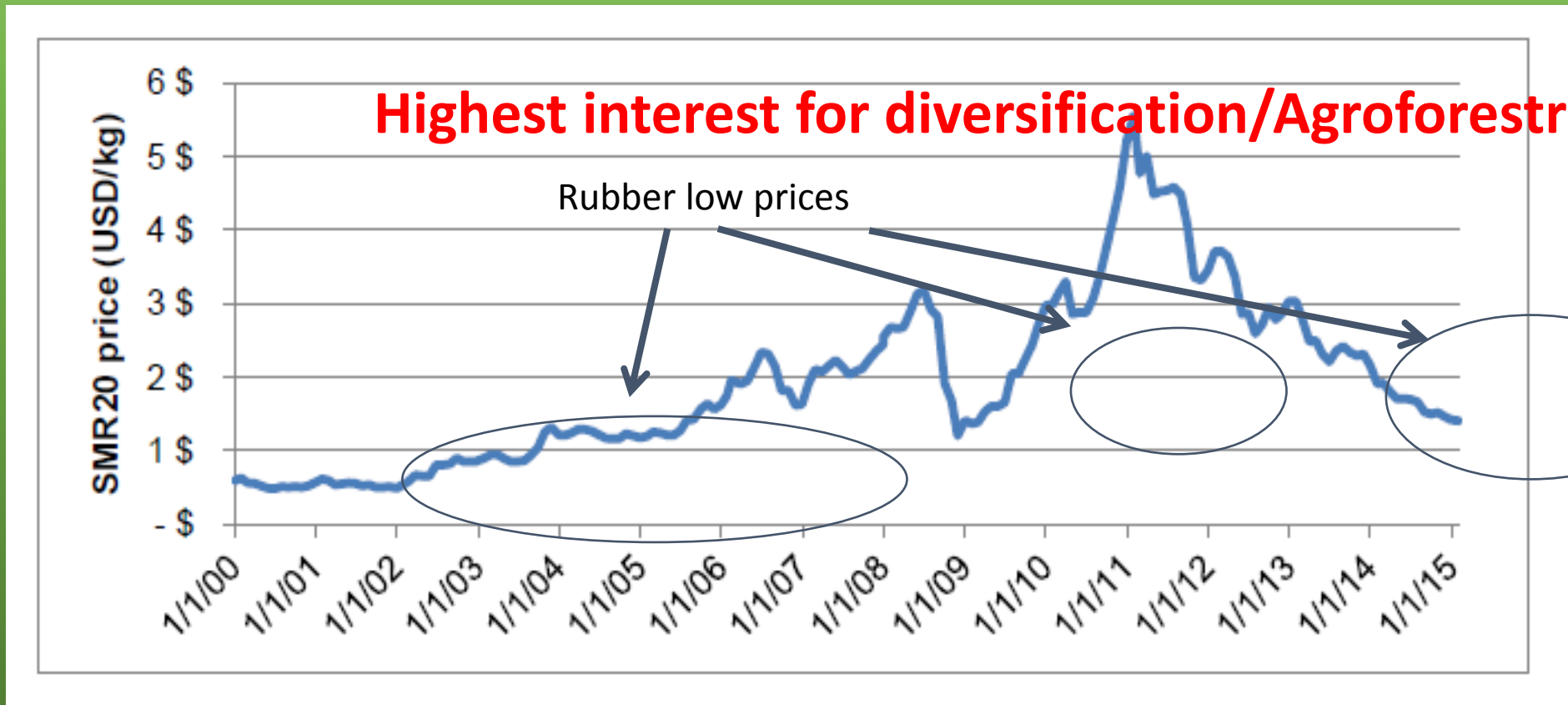


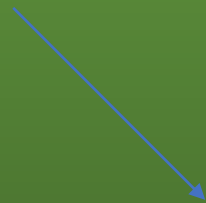
Figure 14 Prix du caoutchouc naturel (Grade SMR20) à Kuala Lumpur de Janvier 2000 à Mai 2019 (Malaysian Rubber Board, 2019)



Thailand and Indonesia : farmers suffers from rubber prices volatility → high interest to income diversification and agroforestry practices = long term economic sustainability

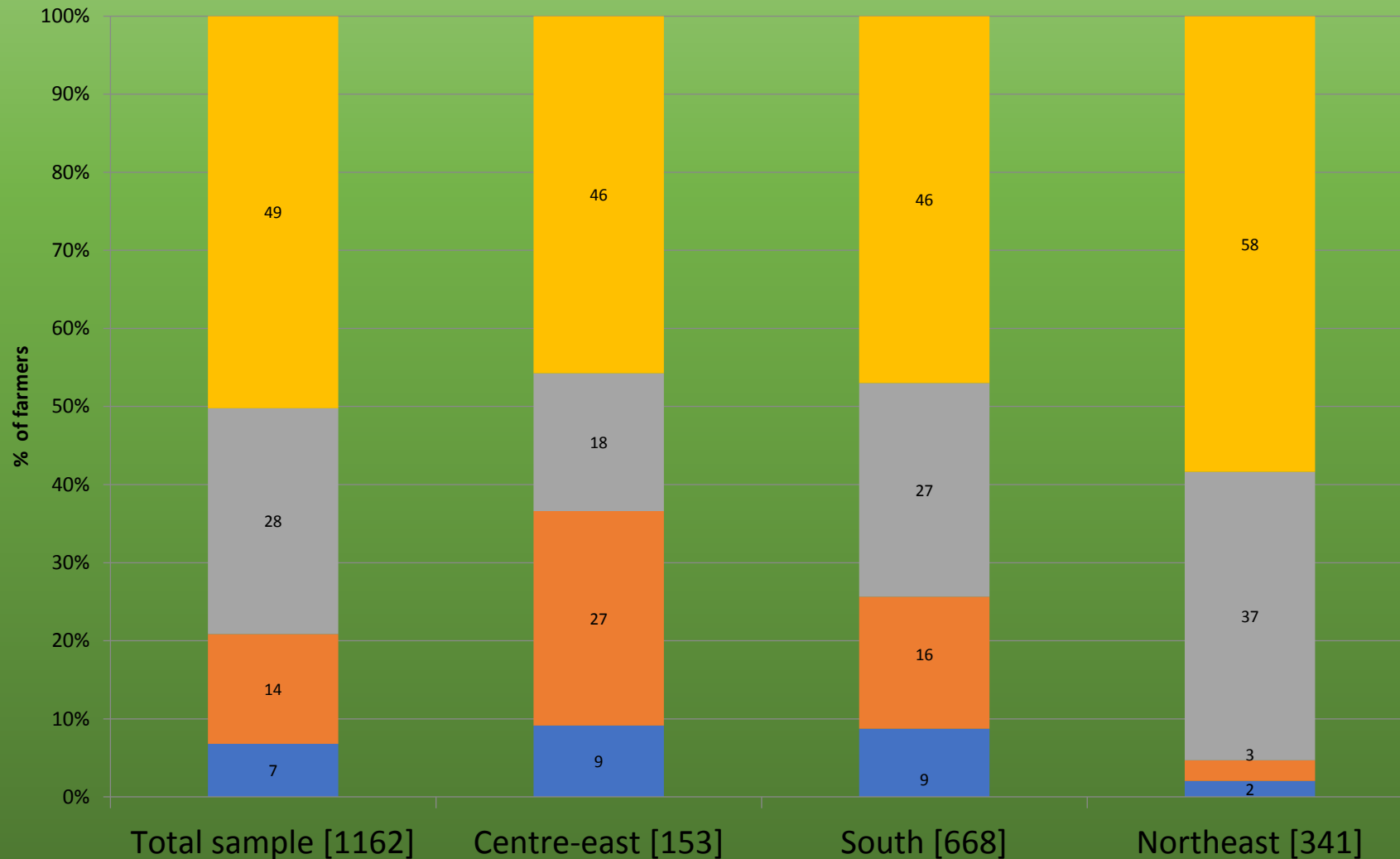


Any link with climatic changes ???



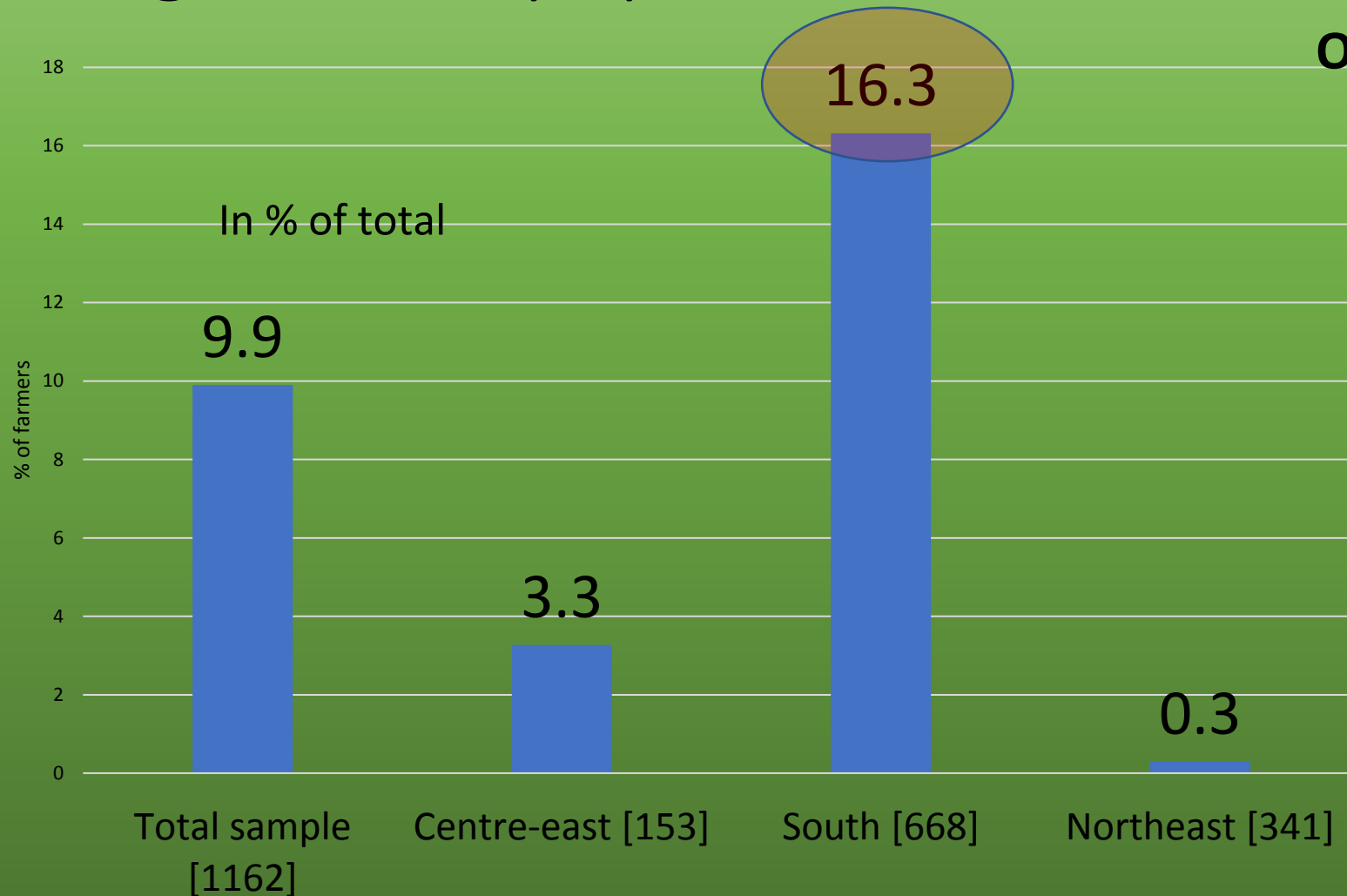
# In Thailand important diversification for the rubber based households

But high rubber contribution to total household income:  
70% in average in 2013  
(SD = 31%)



- on-farm & off-farm diversification
- on-farm diversification
- off-farm diversification
- Only rubber

# In Thailand, despite their interest, rubber agroforestry systems remains underdeveloped



**Only few farmers adopted AFS**

For farmers with AFS, adoption is not systematic on all the mature rubber plantations

Agroforestry practices only on the south

# The lessons learned...In Indonesia and Thailand

## Indonesia

- Rubber agroforestry trials in Indonesia came right in time in 1994 with a strong demand from farmers for low cost clonal systems with income diversification : the right time at the right place BUT....
- Oil palm came in 1997 with a very strong pressure from companies (through the policy of concessions) providing an interesting alternative to rubber with full credit (but loss of land ! ) and better return to labour
- Interest in agroforestry practices remain high for old men but poor interest from younger generation...what will be the future ?
- Time for rubber replantation and the same old story remains (poor access to planting material ..... ) and serious need for training and technical information on tapping
- Poor tapping practices in Indonesia limit rubber lifespan to less than 25 years
- Impact important of white root diseases in areas with forest or old jungle rubber before plantation...

## Thailand

- Low rubber prices do not help to maintain interest in rubber ... BUT raises interest for agroforestry/diversification in Thailand...
- So far in Thailand diversification is more at the farm or household level than at the rubber plot level

# So : impact of agroforestry on possibility to adapt/mitigate the climatic change ??????

## A forest like environment

- Globally : more trees , more biomass will create a more local humid and probably less hot micro climate at plot level that would be more efficient to mitigate climatic change ...
- It is expected and probable ...
- **But** still has to be measured and verified



# BUT some trade-off might arise

**Competition for water** between rubber trees and associated trees or crops:

- immature period
- Mature period (some trees are not adapted...)
- Particularly accurate topic for Myanmar for instance , and may be South Sumatra, Cambodia outside « red soils » .... or similar areas

For shade: all associated trees should be below rubber canopy...

Possible development of some panel disease due to moisture (phytophthora observed in Jambi in 2005 in RAS 1 SAF systems)

Possible allelopathy for some tree/tree Associations ???

.....

# What next ? The very next future ?

## Research

- Propose and suggest rubber SAF designs adapted to local markets and demand...
- Explore the intercropping possibilities during immature period linked with the local context and constraints to generate income at a critical period.
- Identify the cash crop or timber species with various type of rubber density : double spacing might be economically interesting for smallholders according to local markets
- Explore the different strategies for income diversification: cropping system, farming system or activity system leve

## Institution/Development

- Most farmers are capable to implement rubber SAF but might lack initial capital and access to , cash crop/timber plants (if poor availability)
- National regulation should recognize the right of the farmer to sell timber and any product (tree tenure policy is unfavorable in RCI.....)



# THANKS FOR YOUR ATTENTION



Rubber +  
Mangoustan +  
Pakliang +



Rubber + Tiam +  
Pakliang



Rubber +  
Longkong



Rubber +  
Mangoustan + tiber  
trees



Jungle  
rubber



Rubber + timber tree



Rubber +  
Salak