

1st Symposium of the “ Flore du Cambodge, du Laos et du Vietnam ”

*From forest to cultivation:
Replanting high value forest tree species by using
Rubber trees (*Hevea brasiliensis*) as relay crop*

Stephane Boulakia (CIRAD), Lim Khan Tiva (CRRI) and Sam Ol (FA)



Cambodian Rubber
Research Institute



Forestry
Administration

*From forest to cultivation: replanting high value forest tree species by using Rubber trees (*Hevea brasiliensis*) as relay crop*

Objectives of the trials

- *Technical feasibility of Rt.-Ft association*

* biology of the sp in crop condition, of the association

- *Economic performances*

* prospective modeling according to growth, price ...

- *Conservation*

* Development of arboreta with most endangered sp.

Trials systems

- *Location:* red basaltic oxysol of Kampong Cham Plateaux

- *Experimental system:* 3 trials planted in 2005, 2006 and 2008 (# 8 ha)

- *14 associated forest tree species*

Technology

Planting pattern and crops management

Normal Rubber planting pattern

Interrow: 6,0 to 7,5 m

Rubber tree every 2,4 to 3,0 m

Rt density: # 550 Rt/ha

Hedgerow Rubber planting pattern & Forest tree association

Interrow: (3,0 + 13,0) m

Rubber tree every 2,25 m

Rt density: # 550 Rt /ha

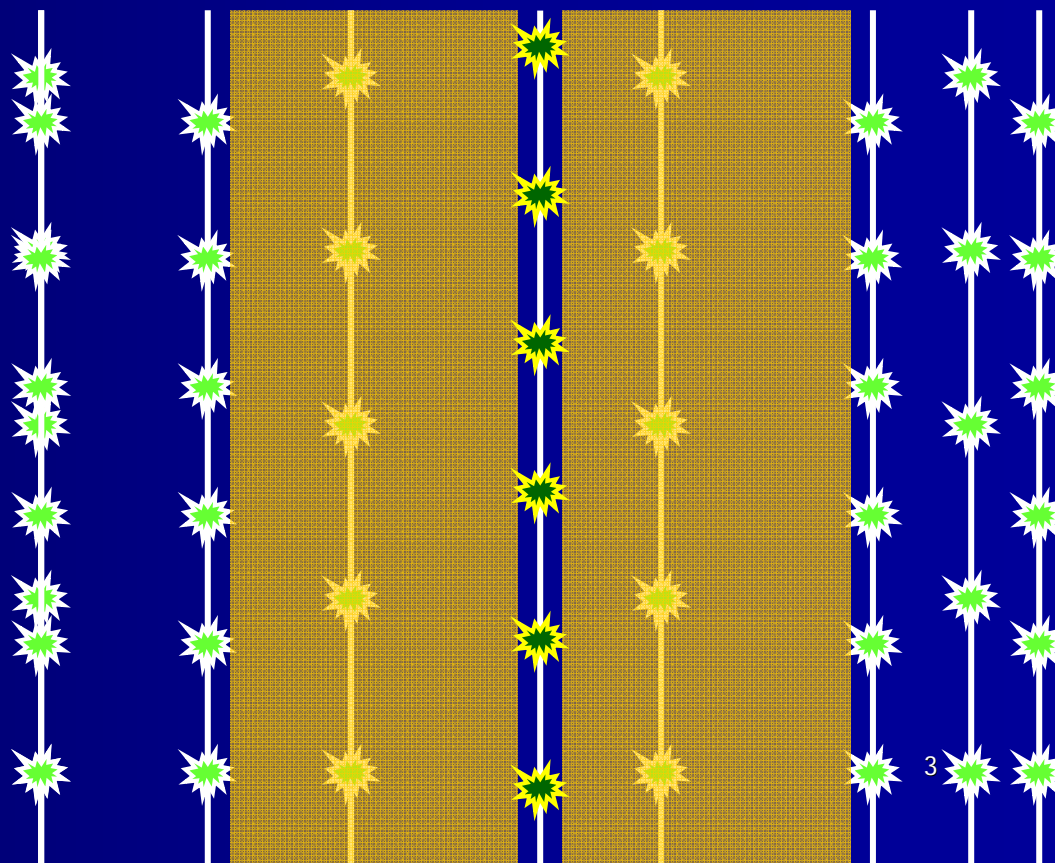
Forest trees on a single line, every 2,5 m

Ft density: 250 Ft /ha

Interrow management

Year 0: Corn + *Stylosanthes guianensis*

Y.1 - Y.5: Stylo. cover regularly rolled



Technology

Planting pattern and crops management

Association Rubber tree with Teak (Tectona grandis)



3 years old

Technology

Trees growth

Girth (cm) at 1 m high

	1,5 year	2 years	3 years	3,5 years
Rubber control	10,7 cm	11,9 cm	21,4 cm	28,7 cm
Rubber R.T + Teak	10,1 cm 94 % of C ^{ol}	10,7 cm 90 % of C ^{ol}	20,3 cm 95 % of C ^{ol}	28,7 cm 100 % of C ^{ol}
Teak			18,4 cm 14,7 % dead	26,6 cm 14,7 % dead

Economic

Basic economic model

Y. 0	Y. 6	Y. 30
Planting	Tapping period # 24 years	RT Cut back
6 years immature period		FT Cut back or keep growing
<u>Latex income:</u> $1,5 \text{ t/ha/y} \times 24 \text{ y} \times 1\,500 \text{ USD/t} = 54\,000 \text{ USD/ha}$		
<u>Rubber wood income:</u> $115 \text{ m}^3 \times 400 \text{ USD/m}^3 = 46\,000 \text{ USD/ha}$		
<u>Total Rubber income</u> = 100 000 USD/ha		
<u>Forest t. wood income:</u> $150 \text{ t/ha} \times 0,3 \text{ m}^3/\text{t} \times 2000 \text{ USD/m}^3 = 100\,000 \text{ USD/ha}$		
<u>Total Rubber + Forest tree incomes</u> = 200 000 USD/ ha/ 30 years		
= 6 700 USD/ ha/ year ⁶		

Diversification

Link with the FA's "Cambodian Tree Seeds Project"



The CTSP, a program oriented on Forest natural resources conservation:

- **List of endangered species (34 indigenous sp., 21 priority sp.)**
- **Agro-ecological mapping of Cambodia**
- **Natural seed sources / conservation area**



- **Initiation of "genes Banks"**
- **Initiation of tree "improvement"**

Diversification

Link with FA's "Cambodian Tree Seeds Project"

Association with 14 species

Planting 2005 (6 sp., 0,2 ha / sp.)

- *Tectona grandis*
- *Dalbergia bariensis*
- *Azelia xylocarpa*
- *Dipterocarpus alatus*
- *Albizia lebbeck*
- *Hopea odorata*

Planting 2006 (12 sp., 0,4 ha / sp.)

- *Tectona grandis*
- *Dalbergia bariensis*
- *Sindora siamensis*
- *Pterocarpus macrocarpus*
- *Azelia xylocarpa*
- *D. cochinchinensis*
- *Xylia dolabriformis*
- *Moringa oleifera*
- *Albizia lebbeck*
- *Gluta laccifera*
- *Hopea odorata*
- *Lagerstroemia calyculata*

Diversification

Link with FA's "Cambodian Tree Seeds Project"

Association with 14 species



Hopea odorata 28 months

Diversification

Link with FA's "Cambodian Tree Seeds Project"

Association with 14 species



Moringa oleifera

Diversification

First results on Forest Trees growth

Girth (cm) at 1 m high

Species	2,5 years	Species	2,5 years
<i>Tectona grandis</i>	21,5	<u><i>Dipterocarpus alatus</i></u>	16,6
<i>Dalbergia bariensis</i>	24,0	<u><i>Azelia xylocarpa</i></u>	11,9
<u><i>Albizia lebbeck</i></u>	22,2	<u><i>Hopea odorata</i></u>	8,8

Prospective conclusion

Technology development

- *continue assessment, especially during 2 critical periods*
 - * **Rubber canopies “closure” (Y. 5 – Y. 7)**
 - * **First tapping years (Y. 6 – Y. 11)**
- *extend to all endangered species (seeds coll. & germination)*
 - * **“ex situ” conservation**
 - * **multilocal approaches (site diversification)**

Scaling up

- *Rubber planters*
- *C sink projects*

... in order to shift

*from costly and illegal logging to low production cost cropping*¹²



Feeding the link between biodiversity reservoir and economic production

will contribute to “give a value” to the biodiversity “information”

and illustrate the fact that

“a standing forest worth much more than a cut back one !”

Thank you for your attention

Dalbergia bariensis – 30 months after planting