

## **Preliminary Results on Rubber Smallholders Research in Cambodia**

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### **ABSTRACT**

Clone diversification in Cambodia is the main topic of the rubber development to answer the need of planters.

The APIP project (Agricultural Productivity Improvement Project) was financed by World Bank. The Small Rubber Research Component (SRRC) acted on a completing manner with the PHF-AFD project to develop a national plan for rubber development.

Comparative clone tests on different localizations showed the good behavior of clone IRCA 18, PB 260 and RRIM 600 for girth and yield characteristics.

Fertilizers affected the girth of the trees during immature period. Fertilizer did not affect the yield per tree, but yield per ha was higher because the number of tapping trees was higher at the opening.

Clone characterization on site is one of the most important steps for studying the most interesting plant material around the country even in the new areas. This is quite good news to envisage seriously a clone in the country where clone GT 1 is mainly planted in smallholdings.

## 1. Introduction

Clone diversification in Cambodia is the main topic of the rubber development to answer the need of planters.

The APIP project (Agricultural Productivity Improvement Project) was financed by World Bank. The Small Rubber Research Component (SRRC) acted on a completing manner with the PHF-AFD project to develop a national plan for rubber development.

The SRRC involved a research activity on four agronomical tests which are:

- clone comparison tests
- fertilizers tests
- planting tests
- intercropping tests

CRRI had collected data from clone tests and fertilizer tests. Data were verified and completed to make possible to conclude on clone behavior. Many difficulties were met due to local conditions for collecting data.

### **a) Clonal comparative trials**

The aim of those trials is to evaluate the plant material in smallholdings.

#### ***Experiment and protocol***

Four clones were compared on girth and yield: GT 1, RRIM 600, IRCA 18 and PB 260.

Sites of experiment are Chamcar Andong, Trapaeng Russey, Snuol, Memot, Kompong Thom, and Ratanakiri. Twenty tests are located on all sites. All experimental conditions are the same on each plot. : 6 x 3 m avec 5 lines per clone. Girth measurement was made at 1 m from ground during immature period and at 1.7 m from ground during tapping period. Yield was registered by valuing latex volume on each plot. There was no replication.

#### ***Results***

##### ***Girth of clones***

Annual girth comparison of each clone on each site showed the best growth at Trapaeng Russey (TR) (Fig. 1). In year six, girth increased at Chamcar Andong for clones PB 260, IRCA 18 and RRIM 600. Memot has the less girth for all clones. Only sites of Trapaeng Russey and Chamcar Andong reached the minimum circumference for opening. No data on girth are available in year seven; the first year of tapping.

Comparative clone study shows that IRCA 18 and PB 260 have the best girth at Chamcar Andong with more than 11% and 8% compared to GT 1 (Fig. 2). At Trapaeng Russey, the good girth of the clones reached to an equivalent girth in year 6. In Snuol, RRIM 600 has a lower girth with only 93% of clone GT 1. At Memot, the PB 260 circumference reached only 85% of that of GT 1. At Kompong Thom, all clones girth is equivalent. IRCA 18 showed the lowest increment in Ratanakiri with only 91% of GT 1.

In conclusion, the growth of clones was faster on sites of Trapaeng Russey and Chamcar Andong. Memot is particular site with late girth. Referring to GT 1, clones girths are equivalent on four sites; GT 1 got the smallest girth in Chamcar Andong.

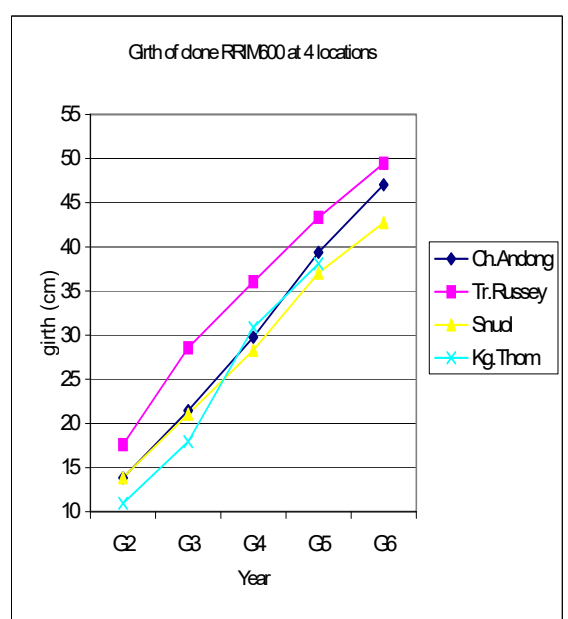
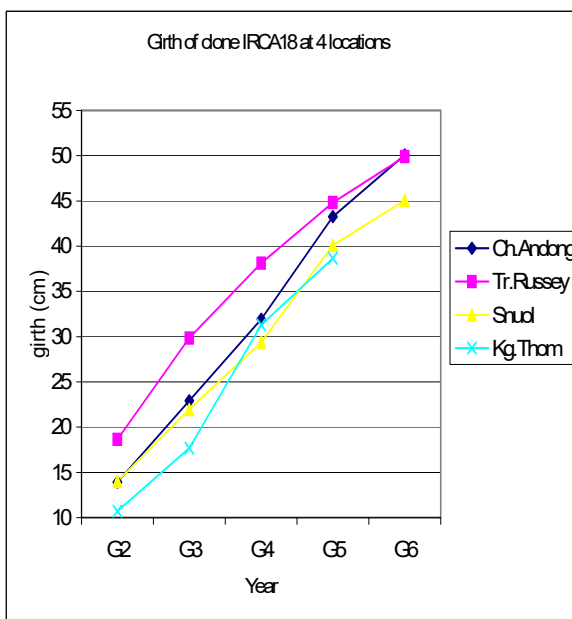
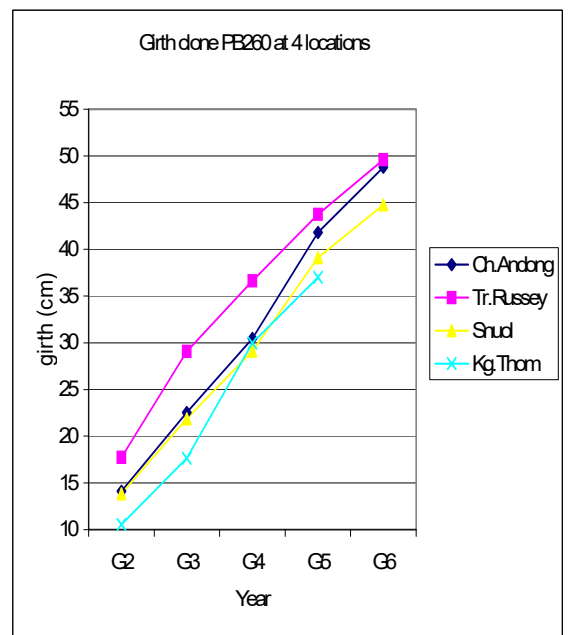
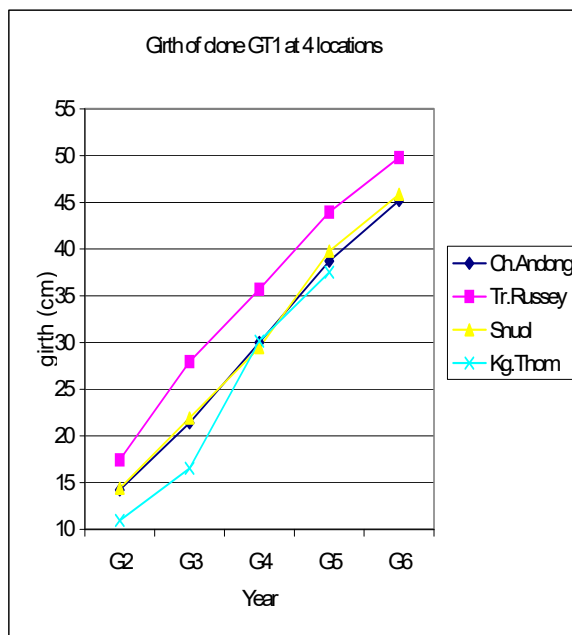


Figure 1: Annual girth of clones on experimental sites

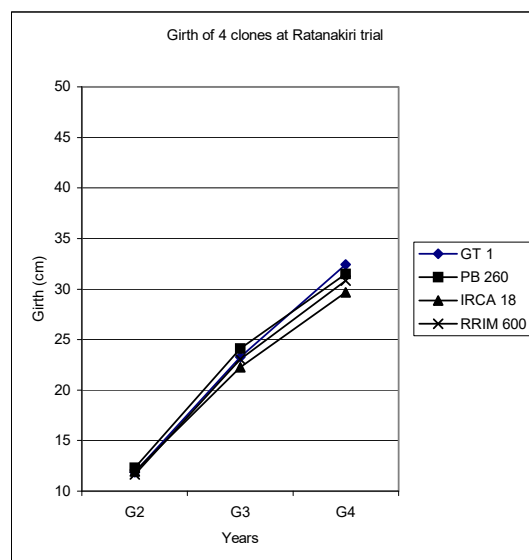
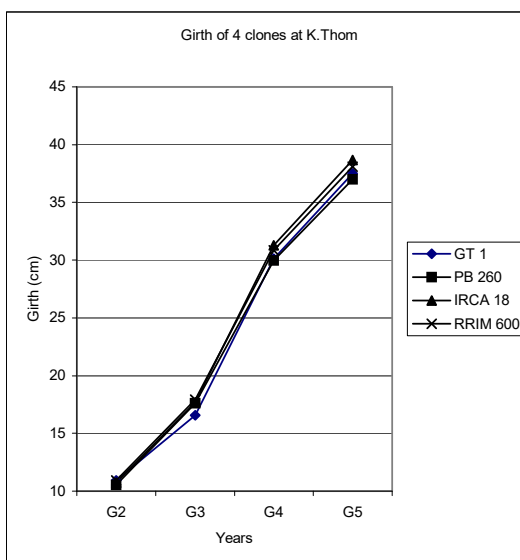
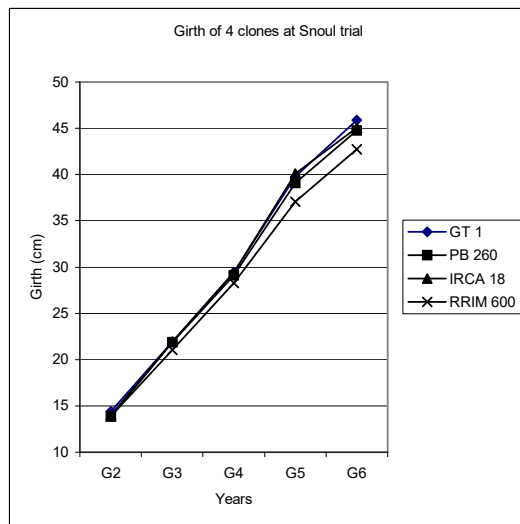
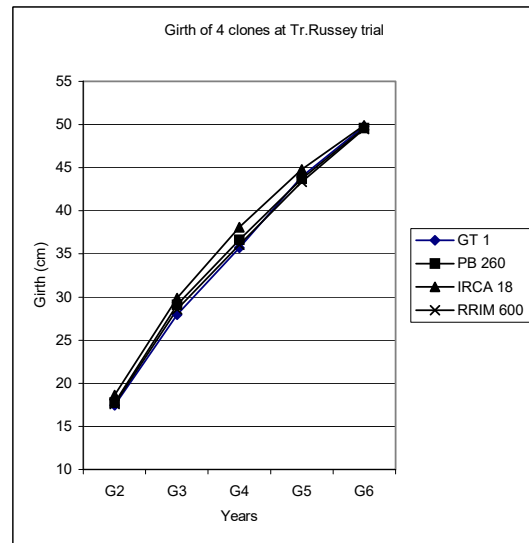
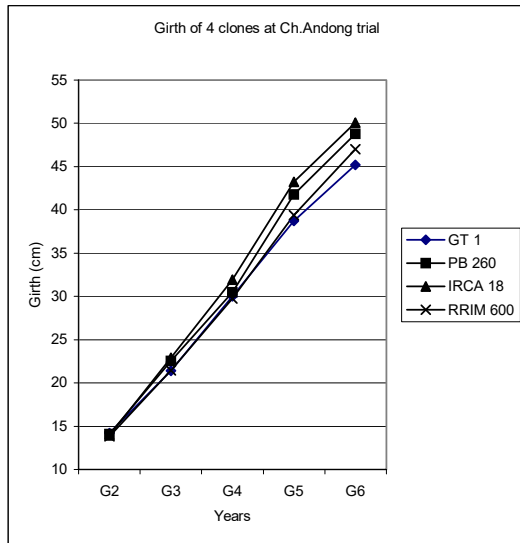


Figure 2: Clonal annual circumferences on each plot

### *Girth and yields in Chamcar Andong and Trapaeng Russey*

On two sites; Chamcar Andong (CA) and Trapaeng Russey (TR), two trials were set up. Girth has been measured every year. Yields were collected in each plot: 1 year in Chamcar Andong and 2 years in Trapaeng Russey. Results are shown in tables 3 and 4.

Table 3: Circumference of the clone tests in Chamcar Andong and Trapaeng Russey

			Girth per year (cm)				Increment per year (cm)			
			GT1	PB260	IRCA18	RRIM600	GT1	PB260	IRCA18	RRIM600
Girth (cm) 1m-height	CATC 01	Year 2	15,81	15,83	15,79	17,31				
		Year 3	22,64	24,69	24,45	25,68	6,83	8,86	8,66	8,37
		Year 4	30,80	31,31	33,08	31,61	8,16	6,62	8,63	5,93
		Year 5	37,54	42,16	44,41	42,07	6,74	10,85	11,33	10,46
		Year 6	42,66	48,87	50,78	47,82	5,12	6,71	6,37	5,75
			100%	115%	119%	112%	100%	131%	124%	112%
	CATC 02	Year 2	14,68	15,47	15,71	12,21				
		Year 3	22,05	24,49	25,01	19,27	7,37	9,02	9,30	7,06
		Year 4	29,75	32,03	32,33	26,32	7,70	7,54	7,32	7,05
		Year 5	39,88	41,44	42,08	36,68	10,13	9,41	9,75	10,36
		Year 6	47,72	48,69	49,36	46,26	7,84	7,25	7,28	9,58
			100%	102%	103%	97%	100%	92%	93%	122%
	TRTC 01	Year 2	17,09	17,01	18,43	17,77				
		Year 3	27,43	28,28	30,56	29,36	10,34	11,27	12,13	11,59
		Year 4	36,07	37,05	39,33	38,01	8,64	8,77	8,77	8,65
		Year 5	44,14	44,35	45,69	44,95	8,07	7,30	6,36	6,94
		Year 6	49,90	49,77	50,31	50,85	5,76	5,42	4,62	5,90
			100%	100%	101%	102%	100%	94%	80%	102%
	TRTC 02	Year 2	17,76	18,47	18,84	17,43				
		Year 3	28,43	29,88	29,14	27,74	10,67	11,41	10,30	10,31
		Year 4	35,33	36,20	36,88	34,06	6,90	6,32	7,74	6,32
		Year 5	43,76	43,11	43,91	41,71	8,43	6,91	7,03	7,65
		Year 6	49,65	49,40	49,46	48,08	5,89	6,29	5,55	6,37
			100%	99%	100%	97%	100%	107%	94%	108%
Girth (cm) 1.7m-height	CATC 01	Year 6	44,35	47,33	50,75	49,45				
		Year 7	48,45	51,17	55,37	53,60	4,10	3,84	4,62	4,15
			100%	106%	114%	111%	100%	94%	113%	101%
	CATC 02	Year 6	48,18	48,57	50,00	48,81				
		Year 7	51,94	51,36	53,02	53,09	3,76	2,79	3,02	4,28
			100%	99%	102%	102%	100%	74%	80%	114%
	TRTC 01	Year 6	49,20	48,24	49,93	50,43				
		Year 7	52,12	50,61	52,29	52,70	2,92	2,37	2,36	2,27
			100%	97%	100%	101%	100%	81%	81%	78%
	TRTC 02	Year 6	49,55	49,03	51,62	49,75				
		Year 7	53,04	51,60	54,10	52,61	3,49	2,57	2,48	2,86
			100%	97%	102%	99%	100%	74%	71%	82%

On the site of Chamcar Andong, TC01, GT1 showed the lowest girth in immature period. But, it is not the case in test TC02. Actually the difference with others clones disappeared. RRIM 600 had the best girth increments in year 5 and 6 (table 3). In Trapaeng Russey, girths are higher than in Chamcar Andong. In between clones, girths were equivalent in the two tests (table 3). During tapping period, clones characteristics were still the same than during immature period. Annual girth increment was lower for all clones compared to GT 1, with an exception for clones IRCA 18 in trial CATC01 and RRIM 600 in trial CATC02. In the same time, yield of clones were very different than that of GT 1 (table 4). This advantage was due to the number of tapped trees, with initial circumferences higher than that of GT 1. Then competition girth versus yield begins with a decrease in girth increment for clones with the highest yield.

Table 4: Productions of clones tested in Chamcar Andong and Trapaeng Russey

Annual yield per ha for 2 years of tapping						
Year			GT1	IRCA 18	PB260	RRIM600
1	2004	CATC01	—	228	290	288
		CATC02	193	411	397	111
		TRTC01	300	748	888	610
		TRTC02	388	490	539	389
2	2005	TRTC01	700	1205	1358	1029
		TRTC02	630	873	864	877
Average 1 year			294 100%	469 160%	528 180%	350 119%
Average 2 years			665 100%	1039 156%	1111 167%	953 143%
Density of tapped per ha						
Year			GT1	IRCA 18	PB260	RRIM600
1	2004	CATC01	—	181	277	179
		CATC02	249	199	235	181
		TRTC01	263	326	319	319
		TRTC02	311	248	293	226
2	2005	TRTC01	427	434	489	454
		TRTC02	417	386	466	373
Production g/t for 2 year of tapping						
Year			GT1	IRCA 18	PB260	RRIM600
1	2004	CATC01	1010	1380	950	1550
			100%	137%	94%	153%
		CATC02	890	1540	1550	980
			100%	173%	174%	110%
		TRTC01	830	1840	1970	1490
			100%	222%	237%	180%
		TRTC02	930	1280	1150	1120
			100%	138%	124%	120%
2	2005	TRTC01	1640	2780	2770	2280
			100%	170%	169%	139%
		TRTC02	1510	2260	1850	2350
			100%	150%	123%	156%
Average 1 year			915 100%	1510 165%	1405 154%	1285 140%
Average 2 years			1575 100%	2520 160%	2310 147%	2315 147%

## **b) Fertilizer trials**

The aim of the research is to evaluate the effect of fertilizer on girth and yield of clones GT 1 and RRIM 600 in smallholdings.

### ***Experimental conditions***

The two clones were compared on girth and yield characteristics.

Experimental sites are those of Chamcar Andong, Trapaeng Russey, Snuol, Memot, Kompong Thom, and Ratanakiri. Fifteen tests were set up on sites.

Fertilizer doses were the following: ½ dose (T0), 1 dose (T1), 2 doses (T2)

Experimental conditions were identical on all plots: planting 6 x 3 m with 5 lines per clone. Girth measurements were made every year at 1 m from ground during immature period and then at 1.7 m from ground during tapping period. Yields were registered by valuing the latex volume on each plot, with no replication in Chamcar Andong (1 year data) and Trapaeng Russey (2 years data).

### ***Results***

Only data from Chamcar Andong and Trapaeng Russey have been collected. Fertilizers had a positive effect on girth (table 5) from 6% to 15% in CA TF02 then 3% and 7% in TRTF01 according to the employed dose. After year 4, there was no more effect of fertilizer on girth increments. At six year old, fertilizer effect was smooth. There was an important heterogeneity according to the tested sites.

Fertilizer did not affect yield in g/t (table 6). Yields of treatments with fertilizers were just equivalent, even lower than those of the treatment without fertilizer. In the same time, annual girth increments of treatments with fertilizer were lower than those of control. It could be amazing as we could expect higher girth increments with trees producing the less. Conversely, yield per ha was higher with fertilizer treatments which have a greater number of tapped trees than treatment without fertilizer. It is the gain of girth obtained at the end of the immature period which gives that result, because of the opening of more trees in year seven. Meanwhile, data must be carefully interpreted as far as some problems and difficulties appeared during the data collections due to local work constraints.

Table 5: Circumferences of fertilizer tests in Chamcar Andong and Trapaeng Russey

			Girth per year (cm)			Increment per year (cm)		
			To	T1	T2			
Girth (cm) at 1m-height	CATF 01	Year 2	17,80	18,42	18,44			
		Year 3	27,43	27,78	28,32	9,63	9,36	9,88
		Year 4	34,70	36,26	36,29	7,27	8,48	7,97
		Year 5	45,08	45,43	45,44	10,38	9,17	9,15
		Year 6	51,56	51,53	52,42	6,48	6,10	6,98
			100%	100%	102%	100%	94%	108%
	CATF 02	Year 2	11,96	15,38	16,35			
		Year 3	18,59	22,50	25,74	6,63	7,12	9,39
		Year 4	26,08	29,92	33,32	7,49	7,42	7,58
		Year 5	35,93	41,43	44,45	9,85	11,51	11,13
		Year 6	45,75	48,62	52,66	9,82	7,19	8,21
			100%	106%	115%	100%	73%	84%
	TRTF 01	Year 2	15,19	17,53	17,63			
		Year 3	24,80	28,33	28,58	9,61	10,80	10,95
		Year 4	32,84	36,63	37,48	8,04	8,30	8,90
		Year 5	41,15	43,22	44,59	8,31	6,59	7,11
		Year 6	46,26	47,74	49,47	5,11	4,52	4,88
			100%	103%	107%	100%	88%	95%
	TRTF 02	Year 2	17,05	16,91	17,63			
		Year 3	27,74	28,14	29,33	10,69	11,23	11,70
		Year 4	34,85	35,08	35,96	7,11	6,94	6,63
		Year 5	42,64	42,47	43,57	7,79	7,39	7,61
		Year 6	48,66	48,98	50,08	6,02	6,51	6,51
			100%	101%	103%	100%	108%	108%
Girth (cm) at 1.7m-height	CATF 01	Year 6	48,96	49,38	49,57			
		Year 7	52,42	53,15	53,46	3,46	3,77	3,89
			100%	101%	102%	100%	109%	112%
	CATF 02	Year 6	49,37	47,92	50,47			
		Year 7	54,29	51,14	53,03	4,92	3,22	2,56
			100%	94%	98%	100%	65%	52%
	TRTF 01	Year 6	49,12	49,36	50,10			
		Year 7	51,56	51,12	52,38	2,44	1,76	2,28
			100%	99%	102%	100%	72%	93%
	TRTF 02	Year 6	49,86	49,87	50,57			
		Year 7	53,06	52,86	53,39	3,20	2,99	2,82
			100%	100%	101%	100%	93%	88%



Table 6: Productions fertilizer tested in Chamcar Andong and Trapaeng Russey

Annual yield kg/ha for 2 years of tapping					
Year		Clones	To	T1	T2
1	2004	GT1	507	635	698
			79%	100%	109%
		RRIM600	342	404	482
			84%	100%	119%
2	2005	RRIM600	814	919	942
			88%	100%	102%
Yield g/t/t for 2 years of tapping					
Year		Clones	To	T1	T2
1	2004	GT1	22.15	23.86	28.14
			93%	100%	118%
		RRIM600	16.10	15.43	18.84
			104%	100%	122%
2	2005	RRIM600	23.67	21.21	22.52
			111%	100%	106%
Density of tapped trees per ha					
Year			To	T1	T2
1	2004	CATF01	444	409	322
		CATF02	75	217	371
		TRTF01	138	201	291
		TRTF02	250	215	260
2	2005	TRTF01	347	458	444
		TRTF02	361	422	406

### c) Discussion - Conclusion

The first data on yield of the comparative clone tests on different localizations showed the good behavior of clone l IRCA 18, PB 260 and RRIM 600 for girth and yield characteristics. This is quite good news to envisage seriously a clone in the country where clone GT 1 is mainly planted in smallholdings. Clone characterization on site is one of the most important step for studying the most interesting plant material around the country even in the new areas. It should be useful to keep on going the APIP trials.

Even we have only two years data with fertilizer trials, it have been shown that fertilizers affected the girth of the trees during immature period. That was registered even heterogeneity was observed in fields. Fertilizer did not affect the yield per tree, but yield per ha was higher because the number of tapping trees was higher at the opening.

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