

This report provides the key financial indicators for determining the feasibility of investing in rubber cultivation in Sri Lanka. All of the inputs and labour costs were calculated using the market prices in effect in 2022. At the end of the typical rubber lifespan, Hevea rubber generated a cumulative net total income of LKR 21 million. It also has a 24% internal rate of return and a benefit-cost ratio of 1.9 at a 10% discount rate.

Financial Feasibility Analysis of Hevea Rubber Cultivation in Sri Lanka

Agricultural Economics- Rubber Research Institute

The data analysis and preparation

Sankalpa J K S - Senior Research Officer
(M.Sc., M. Econ. B.Sc.)

Ishani P G N - Research Officer
(M.Sc., B.Sc.)

Content

1. Cost of labour in replanting	3
2. Cost of materials in replanting.....	3
2.1 Cost of fertilizer in immature stage	4
2.2 Cost of fertilizer in mature stage	4
3. Cost of labour in mature stage	5
4. Cost of materials in mature stage.....	6
5. Total cost in immature stage	7
6. Total cost in mature stage	7
7. Expected yield from rubber	8
8. Cost-benefit analysis.....	9
9. Sensitivity analysis	9

1. Cost of labour in the replanting of rubber

The cost of labour during the immature period of rubber cultivation is an approximately immature period of rubber cultivation is approximately LKR 0.68 million and half of the labour cost falls under the year one establishment. Table 1 gives the yearly breakdown of the cost of labour in the immature period of rubber.

Table 1: Cost of labour (in LKR) in replanting

Category	Years					
	1	2	3	4	5	6
Total labour days/ha	333	72	49	42	46	55
Total labour Cost@1150 (LKR/ha)	382,950	82,986	56,547	47,957	52,557	63,250

2. Cost of materials (in LKR) in replanting

The cost of labour inputs distribution throughout the first six years depicts in Table 2.

Table 2: Cost of labour (in LKR) in replanting

Activity	YOP	year 2 upkeep	year 3 upkeep	year 4 upkeep	year 5 upkeep	year 6 upkeep
	LKR /ha					
Fencing						
Planting material **	48,600					
Re-supplying **	464	464	464			
Cover crop establishment	10,800					
Fertilizer	69,918	115,068	167,184	165,240	222,500	218,050
Transport - internal	12,000	12,000	12,000	12,000	12,000	12,000
Transport external - approx.	6,000	2,000	2,000	2,000	2,000	2,000
Total cost for pests and diseases control	8,300	5,000	5,000	5,000	5,000	5,000
Cost for commencement of tapping*						20,420
Digging holes machinery	90,000					
Surveying						
Total Material Cost	246,082	134,532	186,648	184,240	241,500	237,050

** Assuming planting material cost as Rs. 90 per plant

YOP: Year of planting, * can also be included in the mature stage of cultivation

2.1 Cost of fertilizer in the immature stage

The cost of fertilizer without subsidizing the costs gives in Table 3. The total cost of fertilizer is close to 0.957 million in the first six years. The fifth-year seems the highest cost of fertilizer according to the categorisation.

Table 3: Cost of fertilizer in the immature stage

Fertilizer Cost LKR per Ha						
Activity	YOP	Year 2 upkeep	year 3 upkeep	year 4 upkeep	year 5 upkeep	year 6 upkeep
RU 12:14:14 (ERP base)	56,760	113,520	165,120	163,200	220,000	215,600
Kieserite	13,158					
Dolomite		1,548	2,064	2,040	2,500	2,450
Total Cost	69,918	115,068	167,184	165,240	222,500	218,050

2.2 Cost of fertilizer (in LKR) in the mature stage

The total cost of fertilizer is LKR 0.145 million during the whole mature period of rubber. No recommendation to apply fertilizer 25th year onwards. This whole cost of fertilizer falls under the inorganic fertilizer application.

Table 4: Cost of fertilizer in the mature stage

Year	Cost LKR per ha								
	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
No of trees	480	475	470	465	460	455	450	445	440
*Fertilizer Mixture	8,832	8,740	8,648	8,556	8,464	8,372	8,280	8,188	8,096
*Kieserite	960	950	940	930	920	910	900	890	880
Total fertilizer Cost	9,792	9,690	9,588	9,486	9,384	9,282	9,180	9,078	8,976

Contd. Table 4.

Year	Cost LKR per ha									
	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
No of trees	435	430	425	420	415	410	405	400	395	390
*Fertilizer Mixture	8,004	7,912	7,820	5,313	5,250	5,187	5,123	5,060	4,997	0
*Kieserite	870	860	850	630	623	615	608	600	593	0
Total fertilizer Cost	8,874	8,772	8,670	5,943	5,872	5,802	5,731	5,660	5,589	0

Note: No fertilizer application after the 25th year of planting

3. Cost of labour in the mature stage of plantation

The total labour cost during the mature stage (from year 7 to year 30) is close to LKR 5.78 million. Most of the cost goes to tapping labour costs. Here, tapping cost was calculated using existing labour rates in the plantation sector (LKR 1150). The cost of labour during the mature stage dives in Table 5.

Table 5: Cost of labour in the mature stage

Activity	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Weeding	13	13	13	13	13	13	13	13	13
Fertilizer Application	3	3	3	3	3	3	3	3	3
Pests & Diseases									
Census & Numbering									
Marking tapping panel	3	3	3	3	3	3	3	3	3
Desilting of drains/maintenance of soil cons. Measures									
TOTAL Labour days	42	18	18	18	18	18	18	18	18
Total Labour Cost without tapping Cost assuming labour cost LKR 1150	48,300	20,125	20,125	20,125	20,125	20,125	20,125	20,125	20,125
Tapping Labour Cost (LKR)	120,436	258,227	255,509	252,791	250,073	247,355	244,636	241,918	239,200
Total Labour Cost (LKR)	168,736	278,352	275,634	272,916	270,198	267,480	264,761	262,043	259,325

Contd. Table 5.

Contd. Table 5. Activity	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
Weeding	13	13	13	7	7	7	7	7	7
Fertilizer Application	3	3	3	3	3	3	3	3	3
Pests & Diseases									
Census & Numbering									
Marking tapping panel	3	3	3	3	3	3	3	3	3
Desilting of drains/maintenance of soil cons. Measures									
TOTAL Labour days	18	18	18	12	12	12	12	12	12
Total Labour Cost without tapping Cost assuming labour cost LKR 1150 (LKR)	20,125	20,125	20,125	13,800	13,800	13,800	13,800	13,800	13,800
Tapping Labour Cost (LKR)	236,482	233,764	231,045	228,327	225,609	222,891	220,173	217,455	214,736
Total Labour Cost (LKR)	256,607	253,889	251,170	242,127	239,409	236,691	233,973	231,255	228,536

Contd. Table 5.

Activity	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Weeding	7	7	7	7	7	7
Fertilizer Application						
Pests & Diseases						
Census & Numbering						
Marking tapping panel	3	3	3	3	3	3
Desilting of drains/maintenance of soil cons. Measures						
TOTAL Labour days	10	10	10	10	10	10
Total Labour Cost without tapping Cost assuming labour cost LKR 1150	10,925	10,925	10,925	10,925	10,925	10,925
Tapping Labour Cost (LKR)	212,018	209,300	206,582	203,864	201,145	198,427
Total Labour Cost (LKR)	222,943	220,225	217,507	214,789	212,070	209,352

4. Cost of materials in the mature stage of plantation

The cost of materials during the mature stage includes tapping material costs, fertilizer costs and other costs of inputs in fungicide applications. Table 6 gives the category-wise distribution of material costs.

Table 6: Cost of materials in the mature stage

Category	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Fertilizer & Pest Disease Cost (LKR)	13,292	13,190	13,088	12,986	12,884	12,782	12,680	12,578
Tapping Material Cost (LKR)	33,600	34,750	45,108	34,050	37,700	45,312	31,500	32,650
Total Material Cost (LKR)	46,892	47,940	58,196	47,036	50,584	58,094	44,180	45,228

Table 6 contd.

Category	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23
Fertilizer & Pest Disease Cost (LKR)	12,476	12,374	12,272	12,170	9,443	9,372	9,302	9,231	9,160
Tapping Material Cost (LKR)	42,516	37,450	30,100	42,720	29,400	30,550	45,424	29,850	28,000
Total Material Cost (LKR)	54,992	49,824	42,372	54,890	38,843	39,922	54,726	39,081	37,160

Table 6 contd.

Category	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Fertilizer & Pest Disease Cost (LKR)	9,089	3500	3500	3500	3500	3500	3500
Tapping Material Cost (LKR)	41,028	27,300	33,950	38,232	27,750	25,900	25,550
Total Material Cost (LKR)	50,117	30,800	37,450	41,732	31,250	29,400	29,050

5. Total cost (in LKR) in the immature stage

The total cost of replanting during the first six years gives in Table 7. It is close to LKR 2 million and a higher percentage of the cost falls under the year of establishment.

Table 7: Total cost (in LKR) in the immature stage

Total Labor Cost (LKR)	382,950	82,986	56,547	47,957	52,557	63,250
Total Material Cost (LKR)	246,082	134,532	186,648	184,240	241,500	237,050
Total Cost (LKR)	629,032	217,518	243,196	232,197	294,057	300,300

6. Total cost (in LKR) in the mature stage

The total cost of labour and material is approximately LKR 6.7 million during the mature stage of rubber cultivation. Based on the agronomic practices adopted during the maintenance stage, a variety of costs of inputs and labour can be observed in this stage. Table 8 gives the summary of total inputs and labour costs during the mature stage of rubber. The cost of tapping operation starting is estimated as LKR 113,126 in the sixth year of planting and this amount can also be included in the

Table 8: Total cost (in LKR) in the mature stage

Year	7	8	9	10	11	12	13	14	15
Total Labour Cost	168,736	278,352	275,634	272,916	270,198	267,480	264,761	262,043	259,325
Total Material Cost	46,892	47,940	58,196	47,036	50,584	58,094	44,180	45,228	54,992
Total Cost	212,128	322,792	330,330	316,452	317,282	322,074	305,441	303,771	310,817

Table 8 contd.

Year	16	17	18	19	20	21	22	23	24
Total Labour Cost	256,607	253,889	251,170	242,127	239,409	236,691	233,973	231,255	228,536
Total Material Cost	49,824	42,372	54,890	38,843	39,922	54,726	39,081	37,160	50,117
Total Cost	302,931	292,761	302,560	277,470	275,831	287,916	269,553	264,915	275,154

Table 8 contd.

Year	25	26	27	28	29	30
Total Labour Cost	222,943	220,225	217,507	214,789	212,070	209,352
Total Material Cost	30,800	37,450	41,732	31,250	29,400	29,050
Total Cost	250,243	254,175	255,739	242,539	237,970	234,902

7. Expected yield from rubber (ha of land)

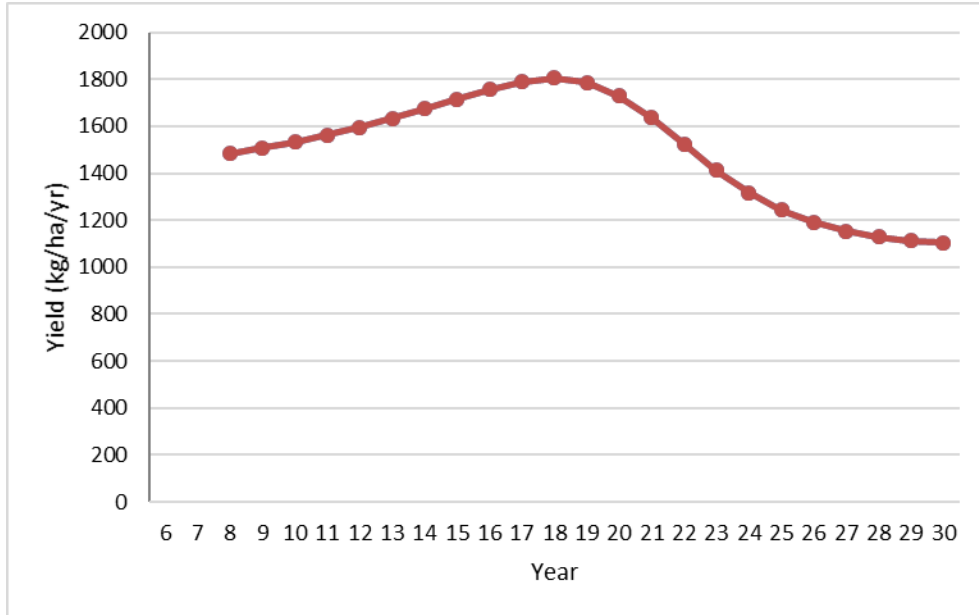


Figure 1: Potential yield variation of hevea rubber

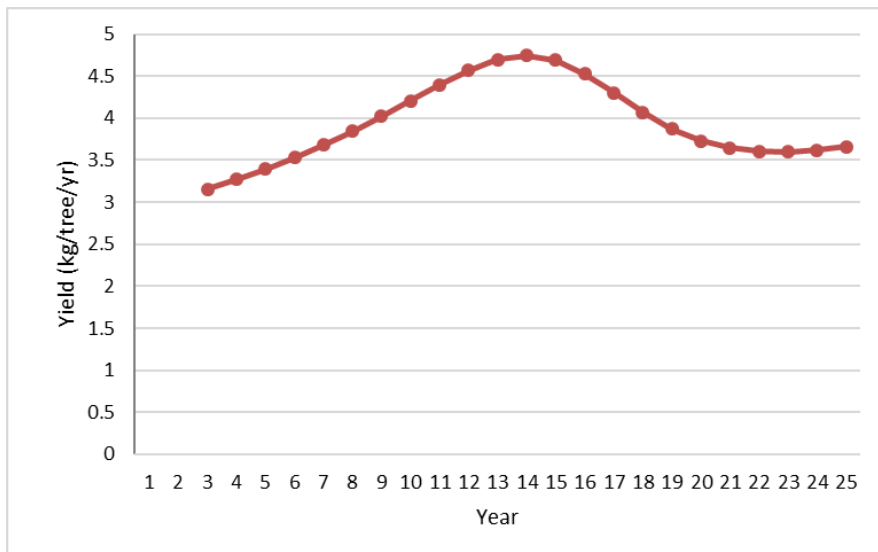


Figure 2: Commercial level yield variation per tree

8. Cost-benefit analysis

Benefit-cost analysis of investment in rubber cultivation can be seen in Table 9. Accordingly, the most appropriate Discount rate (DR) is 15 % as of the year 2022 since annual interest can be estimated as close to 15%. It takes about 3 years of tapping to recover the initial investment made on rubber cultivation if the price is LKR 850 per kilo.

Cumulative net revenue from rubber after 30 years (usual lifespan) = LKR 21 million

Total income from rubber after 30 years (usual lifespan) = LKR 32 million

Table 9: Benefit-cost analysis

Category	at 10% D.R	at 15% D.R	at 25% D.R	at 50% D.R**
Sum of Present Value of Income(PVB)	7,463,884	4271967	1737163	357225
Sum of Present Value of Costs(PVC)	3,832,687	2782832	1845457	1165349
Net Present Value =(PVB-PVC)	3,631,197	1489135	-108294	-808124
Benefit / Cost Ratio	1.95	1.54	0.94	
Internal rate of return (IRR)	24%			

9. Sensitivity analysis

Different prices are used to estimate the financial profitability of rubber cultivation and accordingly, at 15% DR, the Breakeven price is close to LKR 550 per kilo.

Table 10: Cost-benefit analysis under different prices

Price	D.R. 10%		D.R. 15%	
	NPV (LKR Mn)	BCR	NPV (LKR Mn)	BCR
1,100	5.70	2.51	2.73	1.98
1,000	4.92	2.29	2.23	1.80
900	4.06	2.06	1.73	1.62
850	3.63	1.95	1.48	1.54
800	3.19	1.83	1.23	1.45
750	2.75	1.72	0.99	1.36
700	2.33	1.61	0.74	1.27
650	1.90	1.50	0.49	1.18
600	1.47	1.38	0.24	1.09
550	1.03	1.27	-0.01	1.00

Table 11 shows the financial analysis indicators if the current yield is cut by 20%.

Table 11: Benefit-cost analysis under 20% yield reduction

<i>Sensitivity Analysis</i>	at 10% D.R	at 15% D.R	at 25% D.R	at 50% D.R**
Sum of Present Value of Income(PVB)	5,992,553	3423482	1390257	285782
Sum of Present Value of Costs(PVC)	3,728,829	2722939	1820969	1160306
Net Present Value =(PVB-PVC)	2,263,725	700543	-430713	-874523
Benefit / Cost Ratio	1.61	1.26	0.76	
IRR	20%			