ECONOMICS OF FORESTRY.

by D. Spriggins.

In recent issues of Forest Notes, several writers have made mention of the economics of growing different forest crops. It was therefore with the hope of maintaining interest in this fairly important aspect of forestry, that this article has been written.

Whether the growing of a particular crop is economic or not is certainly not an easy matter to determine, and the terms "economic" and "uneconomic" are all too often bandied about to either justify or discredit the growing of a particular crop one is in favour of or opposed to growing.

If we accept the view which is widely gaining acceptance, that all of the wood products of the forest are these days no longer indispensable to mankind, and can be substituted in technical efficiency by substitutes such as steel, aluminium, and synthetic fibres not produced from wood pulp, then it is possible to make some predictions.

It should be reasonable to expect that the extent to which wood products are replaced by substitutes will, to a large degree, be strongly influenced by the difference in price between timber products and its substitutes.

If this is so, then timber production forestry should aim to produce as cheaply as possible, the basic raw materials which when converted into their final form, can compete favourably in price with likely substitutes.

As with any other form of business, it is essential that the return from the sale of goods, in this case the raw forest material, be greater than the cost of producing these goods; i.e., that the business runs at a profit. Failure to recognize this would really amount to an unwitting subsidy to the timber-using industries, and whilst this may not be a cause of concern in that the manpower and capital directly and indirectly employed in timber conversion may by taxes, etc., contribute to the economy a considerable amount of revenue it would have not otherwise received, it is fairly essential that the extent of the subsidy, if any, be known.

The reason it is important to know the level of the subsidy, if any, being given towards the growing of a particular crop is that if the subsidy is a large one, it could be a better proposition for the community to invest that same amount in other fields, such as one of the non-wood industries or if it was cheaper, even to assist the importation of timber. (Heresy!!)

It may be felt that as forests provide other services such as recreation, water yield, etc., that such a hard business-like approach is not required for forestry operations. This, however, should not necessarily be so, for the fact that forests may also yield non-wood products, should not justify highly unprofitable timber production on the same area. If water production or recreation was the chief use of a particular forest, this could probably be achieved simply by conserving the original forest, and with limited access protective burning and fire protection as the only major costs involved.

Accepting the principle, then, that forestry which has timber production as its main goal, should aim to run at a profit, a comparison has been made of the estimated costs of production and possible returns from some typical forest crops.

Figures quoted for yields should be regarded as estimates only, nevertheless they are probably reasonable enough to give an indication for comparison purposes between crops.

As the money invested in the different timber production crops could have been invested in alternative fields such as loans to local government authorities etc., on which rates of interest would be charged, it is considered reasonable to charge an interest rate of 5% compound on all costs involved in producing the timber crop, i.e., it gives a measure of the cost of the use of establishment monies and the necessary waiting until the crop grows and becomes saleable. In the following exercises this is done by discounting back to the time of planting, all future returns and costs using the 5% rate of interest. For comparison purposes, interest rates of 2%, 3% and 4% have also been included.

Exercise 1.

A high site quality jarrah forest 50 miles from Perth has just been clear fallen. Assume that the site is also capable of growing an average crop of Pinus pinaster.

Alternative 1. (a) Re-grow another crop of jarrah on a 130 year rotation.

1. (b) Grow a crop of pinaster on a 55 year rotation.

Basic assumptions.

The jarrah stand is given a non-commercial thinning at age 40, as it has been fairly well established that for mill log production this is financially a better proposition than waiting until age 70 when a commercial thinning would be possible.

For the jarrah forest an annual expenditure of 40 cents per acre has been chosen. This is derived by dividing the annual Dept. budget (less pine grants) by the total acreage of State Forest. This gives a figure of 45 cents, but assuming that only 80% is spent directly for timber productive reasons, 40 cents should be a fair figure.

Over and above any direct costs incurred in producing a crop of timber, there must be levied charges for overheads such as leave, pay-roll tax, head office administration, research, etc. To cover these in these exercises 40% overheads on any direct costs have been used. It is considered that these overheads would be conservative.

Exercise 2.

An area of native forest on the Swan Coastal Plain some 25 miles from the Perth market is converted to a Pinaster plantation and worked on a 55 year rotation, produces an average yield.

An annual maintenance charge of 3 dollars per acre has been used, which may be considered to be a little high to cover such things as firebreak maintenance, control burning, maintenance of roads, water points, etc.

Exercise 3.

A former jarrah and blackbutt site of red soil, 50 miles from the Perth market is cleared, and a low site quality (SQ IV to V), P. radiata plantation is established and worked on a 40 year rotation.

Discussion.

With the figures used and a 5% interest rate on money used in producing the different crops, only the radiata crop shows a positive return. The fact that the pinaster and jarrah crops do not break even may not necessarily be a bad thing if, as mentioned previously, it can be demonstrated that by using capital indirectly and by providing employment, the community may benefit in the long run. As an index of these indirect returns and benefits, I understand that the British Forestry Commission declare a crop economic if it yields a positive return or breaks even using a 2% interest rate. On this basis, all of the crops in the exercises would be "economic".

It is interesting to note (whether you agree with this method of analysis or not) the large difference between pinaster and radiata crops, and this would suggest that on many of the marginal radiata sites which at present are usually planted with pinaster, it could be a good investment to upgrade these sites to radiata suitability (if this is technically possible),

by the heavy application of fertilizers, as the higher financial return from the radiata crop would certainly permit a fair amount of expenditure on this or other methods of site improvement.

Exercise 1. (a) Re-growing a crop of jarrah (high site quality), 50 miles from the Perth market.

Operation	Year	Direct costs dollars	plus 40% O'heads	vol. lds. per acre	Royalty dollars per ld.	Rev-enue dollars	Discounted values at 5% compound	
							Costs	Returns
Thinning (un-merch)	40	8	11.2	-	-	-	5.05	
2nd thinning, mark and top disposal	70	2	2.8	14	4.40	61.6	0.09	2.02
3rd thin and top disposal	100	2	2.8	37	4.40	162.8	0.02	1.24
Clear fall	130	-	-	78	4.40	343.2		0.62
Annual maintenance 40 cents per acre.							11.2	
					TOTALS		12.90	3.88
Comparative residuals using different interest rates. 2% + $29.66 3% + $0.82 4% - $6.44					Residuals		-$9.02	

Exercise 1. (b) Pinaster on former jarrah site, 50 miles from Perth.

Operation	Year	Direct costs dollars	plus 40% O'heads	U/B Vol lds per acre by size classes	Stumpage residual dollars per load	Rev-enue dollars	Discounted values at 5% compound	
							Costs	Returns
Establish-ment.	0	40	56	-	-		56	
Weed control	2	5	7				6.4	
Road upgrade	5	10	14	-	-		7.1	
Low prune	10	15	21	-	-		13.0	
Re super	10	6	8.4	-	-		5.1	
High prune	15	10	14	-	-		6.7	
1st thin	18	-	-	Chip. 18	1.12	20		
				5"-7" 10	3.81	38(58)	-	24
Re-super	20	6	8.4	-	-		3.2	
Re-super	30	6	8.4	-	-		2.0	
2nd thin	30	-	-	5"-7" 9	4.18	38		
				7"-9" 4.2	4.77	33		
				9"-12" 1.4	11.44	16(87)		20
Re-super	40	6	8.4	-	-		1.2	
3rd thin	42	-	-	5"-7" 3.4	4.18	14		
				7"-9" 5.2	7.77	40		
				9"-12" 8.2	11.44	94		
				12"- 1.1	14.59	16(164)		21
Clear fall	55	-	-	5"-7" 2.5	4.18	10		
				7"-9" 5.0	7.77	39		
				9"-12" 8.4	11.44	96		
				12"- 28.0	14.59	408(553)		38
Annual maintenance		3	4.2	-	-		78.0	
					TOTALS		$178.8	$103
					Residual		-75.8	

Comparative residuals using different interest rates.

2% + $79 3% - $4 4% - $52

Exercise 2. Pinaster crop on the Swan Coastal Plain, 25 miles from Perth.

Operation	Year	Direct costs dollars	plus 40% O'heads	U/B Vol. lds per acre by size	Stumpage residual dollars	Revenue dollars	Discounted values at 5% compound	
							Costs	Returns
Establishment	0	20	28.0	-	-	-	28.0	-
Cultivation	2	2	2.8	-	-	-	2.5	-
Cultivation	3	2	2.8	-	-	-	2.4	-
Road upgrade	5	7	9.8	-	-	-	7.6	
Low prune	10	15	21.0	-	-	-	13.0	
Re-super	10	6	8.4	-	-	-	5.1	-
High prune	15	10	14.0	-	-	-	6.7	
1st thin	18	-	-	Chip. 18	2.84	51		
				5"-7" 10	5.53	55(106)		44
Re-super	20	6	8.4	-	-	-	3.2	
Re-super	30	6	8.4	-	-	-	2.0	-
2nd thin	30	-	-	5"-7" 9	5.90	53		
				7"-9" 4.2	9.49	40		
				9"-12" 1.4	13.16	18(101)		23
Re-super	40	6	8.4	-	-	-	1.2	
3rd thin	42	-	-	5"-7" 3.4	5.90	20		
				7"-9" 5.2	9.49	40		
				9"-12" 8.2	13.16	108		
				12"- 1.1	16.31	18(195)		25
Clear fall	55	-	-	5"-7" 2.5	5.90	15		
				7"-9" 5.0	9.49	47		
				9"-12" 8.4	13.16	110		
				12"- 28.0	16.31	456(628)		43
Annual maintenance		3	4.2	-	-	-	78.0	
					TOTALS		149.7	135
					Residual		-$14.7/acre	

Comparative residuals using different interest rates.
2% + $189 3% + $87 4% + $22

Exercise 3. A crop of low site quality P. radiata, established 50 miles from the Perth market.

Operation	Year	Direct costs dollars	plus 40% O'heads	U/B Vol. lds per acre by size classes	Stumpage residual dollars per ld.	Revenue dollars	Discounted values at 5% compound Costs	Returns
Establishment	0	100	140				140.0	
Weed control	2	5	7				6.4	
Road upgrade	5	15	21				16.4	
Low prune	8	15	21				14.2	
1st thin	14	-	-	Chip. 16	2.50	40		
				5"-7" 16	7.26	106(146)		74
High prune	15	10	14				6.8	
2nd thin	20	-	-	5"-7" 14	7.54	105		
				7"-9" 4	10.54	42(147)		56
3rd thin	25	-	-	5"-7" 8	7.54	60		
				7"-9" 14	10.54	148		
				9"-12" 6	13.61	82(290)		86
4th thin	30	-	-	5"-7" 4	7.54	30		
				7"-9" 7	10.54	74		
				9"-12" 16	13.61	219(323)		75
5th thin	35	-	-	5"-7" 3	7.54	23		
				7"-9" 3	10.54	32		
				9"-12" 12	13.61	164		
				12" + 7	16.17	113(332)		60
Clear fall	40	-	-	7"-9" 10	10.54	105		
				9"-12" 21	13.61	286		
				12" - 64	16.17	1030(1421)		200
Annual maintenance		3	4.2				72.0	
						TOTALS	255.8	551
						Residual	+295.2	

Comparative residuals using different rates of interest.
2% + $1001 3% + $715 4% + $470