Cost of Direct Seeding

Case Study - Year 2000

Department of Conservation and Land Management

Bushcare
The National Vegetation Initiative

Contents

Purpose of this case study

- To closely scrutinise the costs associated with direct seeding. Detailed analysis of direct seeding costs are generally poorly documented.
- To complement a recent cost analysis of using seedlings in revegetation establishment (see "Cost Sharing Arrangements for Revegetation and Remnant Bush protection in Key Conservation Areas" - CALM Wheatbelt Region 2000 / 01)
- To provide the basis of direct seeding costs for possible inclusion into CALMs (Wheatbelt Region) cost sharing arrangements.
- To allow for realistic cost comparisons between direct seeding and seedling establishment. Direct seeding is often referred to as being more cost effective than using seedlings. This document will help to clarify this notion.

Issues raised from this case study

- **Scarcity of seed in the Wheatbelt**. Based on the low percentage of seed that actually develops into seedlings (about 1% for small seeded species such as Eucalypts and about 5% for large seeded species such as Acacias) (Greening Western Australia, 1993) and conservation of quality seed being a priority in the Wheatbelt, it follows that direct seeding should only be used where there is a capacity and commitment to using establishment techniques of a high standard.
- **Time commitment**. Direct seeding activities associated with small areas, eg 1.5 ha (this case study) and using chemical weed control, require a substantial time commitment per ha associated with organising equipment, eg 3 x separate spray applications and 3 x separate cultivations, if implemented by the farmer at the correct time.

This case study....

- Is a real case study with documentation of time associated with seed collection and cleaning.
- Is based on the collection and planting of 17 local native species, representing 6 genera.
- Uses contract rates for some activities, eg ripping, cultivation and spraying.
- Uses labour costs of $20 per hr.
- Costs are worked out on a per ha basis.
- Uses chemical weed control, starting in year of planting (alternative is to scalp topsoil for weed control)

Table 1. Direct seeding costs calculated on a per ha basis.

Materials / activities	Cost per ha (consumables)	Cost per ha (labour)
Deep ripping		
• Using 160 hp shire grader @ $95 per hr; @ 6 km / hr + 10% turning time; and 2.6 m ripping width. • Therefore: if 6000m = 1 hr, then 3, 846 m (38.5 strips of 2.6 m in 1 ha)= 0.64 hr, + 10% turning time = 0.7 hr / ha total. • Therefore, 0.7 x $95 per hr = $66.50 per ha (grader) • $66.50 (materials + labour). Estimated to be about $14 labour (equivalent to $20 per hr) and $52.50 operating cost .	$52.50	$14
Weed control (pre planting)		
May - Glyphosate @ $5 per L, @ 1 L per ha (can be mixed with insecticide)	$5	$55[1]
August - Glyphosate @ $5 per L, @ 2 L per ha	$10	$55[1]
Pest control (insecticide)		
May - [2]Chlorpyrifos @ $10.50 per L, @ 70 ml per ha	$0.74	Mixed with May weed control
May - [3]Cypermethrin @ $14.50 per L, @ 75 ml per ha	$1.08	
August - [4]Talstar @ 200 ml per ha (@ $450 per 5 L)	$18	$55[1]
Cultivation		
@ $15 per ha (as per contract scarifying - Farm Budget Guide 2000)	$15 (includes labour)	
Seed		
Collect, extract and clean own seed (this case study - labour only). Labour @ $20 per hr.		$516 / ha
Travelling cost + time associated with travelling[5]	$41.50 / ha	$29.10 / ha
OR…..Purchase seed from seed merchant (CALM seed store - Manjimup or Landcare Services - York)	$456.78 / ha	
Bulking agent		
Used at 16.6 L of vermiculite per ha (@ $16 per 100 L)	$2.66	
Sand	---	
Cultivation + Broadcasting of seed		
Total of 3 person hours		
@ $15 per ha (as per contract scarifying - Farm Budget Guide 2000)	$15 (includes labour)	
Labour: @ 2 hrs per 1.5 ha. Therefore 1 ha = 1.3 hr (@ $20 per hr)		$26.67
Mixing of seed		
Use of cement mixer to mix seed with moistened vermiculite (0.5 hr)		$10
Totals (collect own seed)	$161.48	$760.77
TOTAL cost per ha (collect own seed)	**$922.25 per ha**	
Totals (purchase seed)	$119.98	$672.45
TOTAL cost per ha (purchase seed)	**$792.43 per ha**	

See over-page for explanatory notes

[1] Based on contract spray rates of $55 per hr @ 1.5 ha per hr (using a 4WD motorbike).

[2] Chlorpyrifos - Contact insecticide.

[3] Cypermethrin - Contact insecticide.

[4] Talstar - main bare earth (contact) insecticide.....forms covering on soil (important to not disturb soil after application).

[5] This case study: 2 people did 6 x 100 km trips. Therefore:

- labour totals 12 hours. Therefore 12 hrs x $20 per hr = $240 per 14 kg of seed. Assuming a rate of 1.7 kg per ha, then $240 divided 14 kg = $17.14 per kg x 1.7 kg = $29.10 per ha.
- travel costs = 600 km x 56.5 c per km = $339 (govt rate for engines between 1600 and 2600 cc). Therefore = $339 divided by 14 kg of seed = $24.20 (per kg) x 1.715 kg per ha (used at this site) = $41.50 per ha.

Note: A seed collecting licence is required in most cases. Non-commercial @ $10 or commercial @ $100 per season ?.

Additional costs - Equipment

- High pruning pole with secateurs.
- Secateurs.
- Cement mixer
- Optional: Aerosol smoke treatment equipment, eg fire box, piping, enclosed canopy with shelving.

Additional costs - Reliability of direct seeding in the Wheatbelt

If **all** the correct establishment techniques are applied, direct seeding will be successful (on average) in one out of every three years (Greening Western Australia, 1991). Incompatible (with direct seeding) climatic conditions in the Western Australian Wheatbelt are thought to be responsible for the shortfall in reliability.

Based on the poor average reliability, the total cost per ha given in table 1, justifiably, requires multiplication by three to arrive at a realistic cost per ha. The real costs would be as follows:

Total cost per ha (collect own seed) = $922.25 x 3 = **$2766.75**

Total cost per ha (purchase seed) = $792.43 x 3 = **$2377.29**

Attachment 1

- Documentation of time associated with seed collection and cleaning
- Calculations based on the above documentation.

Seed collection and cleaning time allocation

date	hours	# people	duty	total hours
30-Sep	7	3	seed collect	21
05-Oct	10	3	seed collect	30
06-Oct	10	3	seed collect	30
07-Oct	5	5	seed collect	25
11-Oct	10	3	seed collect	30
12-Oct	8	3	seed collect	24
15-Oct	4	1	seed cleaning	4
18-Oct	7	1	seed cleaning	7
20-Oct	7	1	seed cleaning	7
21-Oct	7	3	seed cleaning	21
22-Oct	4	1	seed cleaning	4
15-Nov		1	seed collection	
16-Nov		1	seed collection	
22-Nov	6	1	seed cleaning	6
23-Nov	4	1	seed cleaning	4
01-Dec	6	1	seed cleaning	6
02-Dec	6	1	seed collection & cleaning	6
07-Dec	9	1	seed collection & cleaning	9
09-Dec	4	2	seed collection	8
10-Dec	4	1	seed cleaning	4
15-Dec	8	1	seed collection & cleaning	8
16-Dec	4	1	seed cleaning	4
22-Dec	6	3	seed collection	18
23-Dec	8	1	seed cleaning	8
29-Dec	10	2	seed collection & cleaning	20
12-Jan	8	1	seed cleaning	8
13-Jan	4	1	seed cleaning	4
	166	47		316
	hours per person			total hours

total seed collected 14 kilo's

b

What sort of seed cleaning?

Is it (all) necessary?

Calculations as per the above table

Seed collection (collection of own seed from local sources and from multiple populations)

Hours per kg (given attached species list and includes collection and cleaning)

- 316 hrs = 14 kg seed
- Therefore = 22.6 hrs per kg

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Seed weight used per ha

- Used 1,715g for 1.5 ha
- Therefore = 1,143g per ha

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Therefore seed cost is:

- 22.6 hrs per 1000g = 25.8 hrs per 1,143.3g (amount used on 1 ha)
- @ $20 per hour (labour cost)
- = $20 x 25.8 hrs = $516 per ha (1,143.3g).

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depends on species and quantities collected.

516 / 1143.3 = 0.45 $/g

ie 45c/g.

$225/ha → 1000g/ha at 22.5c/g
→ 500g/ha at 45c/g

Attachment 2
Species collected and seeded

	Genus	Species	# seeds per gram	Total seed wt g	seed wt used direct seeding (grams)	$/gm	cost of seed
BRP45	Acacia	lasiocalyx	57	164	20	$ 0.15	$ 3.00
BRP52	Acacia	hemiteles	140	109	20	$ 0.21	$ 4.20
BRP46	Acacia	acuaria		550	40	$ 0.20	$ 8.00
BRP48	Acacia	acuminata	54	1803	200	$ 0.19	$ 38.00
BRP32	Allocasuarina	acutivalvis	384	499	496	$ 0.24	$ 119.04
BRP4	Allocasuarina	campestris	909	213	194	$ 0.22	$ 42.68
BRP1	Eucalyptus	capillosa	200	385	250	$ 0.26	$ 65.00
BRP21	Hakea	incrassata		26	22	$ 2.40	$ 52.80
BRP25	Hakea	lissocarpha	42		1	$ 2.22	$ 2.22
BRP20	Hakea	platysperma	114+45	142.4	74	$ 1.01	$ 74.74
BRP10	Hakea	scoparia		40	38	$ 1.90	$ 72.20
BRP23	Hakea	trifurcata		12	6	$ 3.90	$ 23.40
BRP30	Isopogon	divergens		200	100	$ 0.80	$ 80.00
BRP11	Melaleuca	cordata		26.6	6	$ 0.40	$ 2.37
BRP63	Melaleuca	leptospermoides		8	8	$ 0.39	$ 3.12
BRP28	Melaleuca	radula	2500	43.5	51	$ 0.48	$ 24.48
BRP5	Melaleuca	uncinata	1420	200	189	$ 0.37	$ 69.93
					1715g		$ 685.18 / 1.5ha

* Nursery must subsidise expensive seedlings (from expensive seed) with cheaper seedlings - ie average out costs ?

ie $456.78/ha

must be seed merchant costs.

References

Greening Western Australia (1993). *Direct Seeding of Trees and Shrubs.*

Greening Western Australia (1991). *Review of the use of direct seeding for establishing trees and understorey species on farmland in Western Australia.*

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