

iLime: Farming for the long-term

James Fisher, Désirée Futures

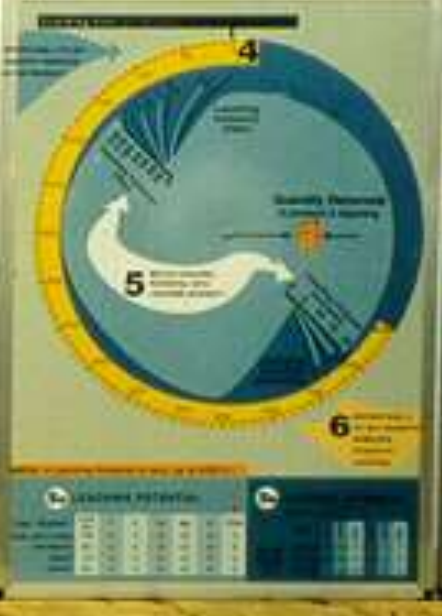
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Chris Gazey, Department of Primary Industries and Regional Development



GRDC

GRAINS RESEARCH
& DEVELOPMENT
CORPORATION



3. [Section 3]

Product	Quantity	Value

4. [Section 4]

Product	Quantity	Value



Ecalc4d.xls [Read-Only] [Compatib... Search Sheet

Home Insert Page Layout Formulas Data Review View Share

Paste Font Alignment Number Conditional Formatting Format as Table Cell Styles Cells Editing

B4 Normal Use menu to adjust the size of this display.

Welcome to the Lime and Nutrient calculator!

This calculator is used to estimate the quantity of a nutrient or lime equivalent that is removed with your rotations.

In the next screen you will be asked to specify your annual rainfall, the soil-type for your paddock and the number of years of paddock history that you will enter.

Click **Continue/Reset** to proceed or **Exit** to close the program.
For information on how to use this program, click **Help**.

Continue/Reset

Exit

Help

Data Entry Results

Welcome Help DataEntry Results Lime1 +

Ready 100%

Ecalc4d.xls [Read-Only] [Compatib... Search Sheet

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Paste Font Alignment Number Conditional Formatting Format as Table Cell Styles Cells Editing

F7

ROTATION - wheat:wheat:wheat

Back to Start Help Data Entry Edit Data

Total quantity removed
331 kg/ha

Average quantity removed per year
110 kg/ha

Total 'nutrient' supplied
0 kg/ha

Sheet of Results Removal by components... Next Calculation

IMPORTANT NOTE:
The supply only takes account of the quantity of 'nutrient' provided by the fertiliser(s) or lime. It does NOT take account of supply from soil, residue or other sources. Also, no allowance is made for the availability of the fertiliser(s) to the plants.

Year	Quantity removed (kg/ha)
2000	60
2001	110
2002	110

Welcome Help DataEntry Results Lime2 Lime1 +

Ready 100%

Optlime v2008-1.5 with ENV_0g.xls [Compatibility Mode] Search Sheet

Home Insert Page Layout Formulas Data Review View Share

Optlime page selection: Overview **Site & soil** Apply lime Soil model Cashflow

Optlime version 2008.1

About Optlime

A bio-economic model of soil acidity management in Australian systems

For ease of model use, adjust the viewing scale until you can see all of the text. Viewing scale: 100%

Only view data into cells that are shaded yellow...

Guidelines for the use of Optlime

What is Optlime?
 Optlime is a model that represents the essential biological, physical and economic factors related to soil acidity management in Western Australia. The model allows users to define site and soil characteristics for an acidic system and then simultaneously assess likely outcomes for 2 different lime sources and application strategies. 50t and 40t/ha liming scenarios are examined over a 20 year simulation so as to capture the long-term impacts of soil acidity management. Output provided allows you to examine the likely effect of liming on pH, exchangeable aluminium, yields, and profits. An investment appraisal is provided to show you how long might stack up financially using a variety of lime factors.

Note: Optlime is not a lime recommendation tool, and should never be used as one. In practice, responses to liming for apparently similar situations can be very variable. The simplifications in the model do not allow us to fully account for this variability. For this reason, Optlime should be seen as an aid to understanding the management of soil acidity, not as a recipe.

How do I use Optlime?
 Optlime consists of 5 sheets:
 - Overview (this sheet)
 - Site & soil (for entry of details related to soil characteristics, climatic zone, and use pattern etc)
 - Apply lime (for entry and comparison of lime sources and application strategies, and for viewing model output)
 - Soil model (detailed calculations of lime dissolution, lime leaching and acidity amelioration; this sheet is for viewing only)
 - Cashflow (detailed calculation of yields v. lime and associated cashflows; this sheet is for viewing only)

To begin using Optlime, navigate to the 'Site & soil' sheet and follow the instructions provided for data entry. Where applicable, default values are provided to aid in this process. Next, navigate to the Apply lime sheet and follow the instructions there for defining of lime sources and application strategies. Summary results are provided on the 'Apply lime' sheet, while detailed calculations can be viewed on the 'Soil model' and 'Cashflow' sheets.

Ready

Optlime v2008-1.5 with ENV_0g.xls [Compatibility Mode] Search Sheet

Home Insert Page Layout Formulas Data Review View Share

Optlime page selection: Overview Site & soil **Apply lime** Soil model Cashflow

Introduction

Optlime allows side-by-side comparisons for two lime sources & application strategies. Lime product characteristics can be manually entered, or you can load typical values for various WA lime sources. These 'typical' values are general only, and are not intended to represent product from specific lime providers. Next, enter lime costs, and select a deep banding placement strategy. Then move to the lime applications section and enter rates for topdressed and deep banded lime. A range of charts are provided for presentation of results. Main balance tables summarising the fate of applied lime and investment appraisals are also provided at the end of this page.

Lime source and strategy A										Lime source and strategy B									
Lime product characteristics				Lime applications			Lime product characteristics				Lime applications								
Source (ton)	% Weight	% MV	\$\$\$	Year	Topdress	Deep band	Source (ton)	% Weight	% MV	\$\$\$	Year	Topdress	Deep band						
0.080-0.125	0.0%	00.0%	4.8%	Yr 1, wheat	1.00		0.080-0.125	0.0%	00.0%	4.8%	Yr 1, wheat	2.00	2.00						
0.125-0.250	00.0%	00.0%	54.0%	Yr 2, canola			0.125-0.250	00.0%	00.0%	54.0%	Yr 2, canola								
0.250-0.500	00.0%	00.0%	27.0%	Yr 2, barley			0.250-0.500	00.0%	00.0%	27.0%	Yr 3, barley								
0.500-1.000	00.0%	00.0%	1.8%	Yr 6, wheat			0.500-1.000	0.0%	00.0%	1.8%	Yr 4, wheat	0.01							
> 1.000	1.0%	00.0%	0.2%	Yr 6, wheat	1.00		> 1.000	1.0%	00.0%	0.2%	Yr 6, wheat								
Weighted average MV: 88.9%				87.3%			Weighted average MV: 80.9%				87.3%								
Max cost (t/ha)		Soil-test (t/ha)		Yr 6, wheat		Yr 7, barley		Max cost (t/ha)		Soil-test (t/ha)		Yr 6, wheat							
Soil-test (t/ha)		Plant density		Yr 6, wheat		Yr 6, wheat		Soil-test (t/ha)		Plant density		Yr 6, wheat							
				Yr 10, canola		1.00						Yr 10, wheat							
				Yr 11, barley								Yr 11, barley							
				Yr 12, wheat								Yr 12, wheat							
				Yr 13, wheat								Yr 13, wheat							
				Yr 14, canola								Yr 14, canola							
				Yr 18, barley		1.00						Yr 18, barley							
				Yr 19, wheat								Yr 19, wheat							
				Yr 19, wheat								Yr 17, wheat							
				Yr 18, canola								Yr 18, canola							
				Yr 18, barley		1.10						Yr 18, barley							
				Yr 20, wheat								Yr 20, wheat							
				Yr 20, wheat								Yr 20, wheat							
50:50 split, 10-20cm:20-3-				Total lime (t/ha)		0.00 0.00		70:30 split, 10-20cm:20-3-				Total lime (t/ha)							
				CO ₂ eqv. (t/ha)		2.65 0.00						CO ₂ eqv. (t/ha)							
												1.70 1.70							

Results for lime source and strategy A

profit is at year 17

Chart selection and controls

Results for lime source and strategy B

profit is at year 15

Ready

Soil_Amelioration_Profit_Calculator_Version_April_2016.xlsx [Read-Only] Q- Search Sheet

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Soil Amelioration Profit Calculator

Version: 12 April 2008

Home and Cost Calculations

Line and Amelioration Costs

Profit Calculator

Results

Determine Line Spacing

Line Requirements from Past Use

Line Export Tables

Quantity of Lines to Apply

Response to Linking Information

Response Curves from Base Field

Response Curves from Control

Wt Data Points

Wheat Response Tables

GRDC
Grains Research & Development Corporation

Department of Agriculture and Food Western Australia

Acknowledgment: The Lines Profitability Calculator was developed by Rob Sands of FARMANCO, as part of the Lieske Group's Research Project "Improved stable and soil management practices" which is a GRDC funded project. The calculator uses calculations, information and data from the Optimize program developed by the Department of Agriculture and Food Western Australia.

Disclaimer: The Lieske Group, GRDC, and Farmanco make no representations as to accuracy, completeness, correctness, suitability, or validity of any information provided in this calculator and will not be liable for any errors, omissions, or delays in this information or any losses, injuries, or damages arising from its use. Your use of any information (samples) output from this calculator is entirely at your own risk.

Help

Toggle Ribbon On/Off

Ready | Profit Calculator | Results | Line and Amelioration Costs | Quantity of Lines to Apply | Line Requirement: 100%

Soil_Amelioration_Profit_Calculator_Version_April_2016.xlsx [Read-Only] Q- Search Sheet

Home Insert Page Layout Formulas Data Review View

Share

146

Soil Amelioration Profit Calculator

Version: 12 April 2008

Scenario: Sample Block		Soil Amelioration Profit Calculator										Line Use				
Code	Name	Base Yield	V/B Price	Income	Fertiliser				Total Cost		Profit		Export	Fuel & Labour		Total
					Fixed	Variable	Fixed	Variable	\$/ha	\$/ha	\$/ha	\$/ha		kg/ha	\$/ha	
W	Wheat	1.80	\$270	\$522	\$68	\$47	\$214	\$115	\$382	\$370	\$190	\$50	2.1	84	40.2	
B	Barley	1.80	\$360	\$320	\$96	\$49	\$214	\$115	\$382	\$380	\$158	\$79	1.6	84	46.9	
Or	Oats	0.80	\$510	\$340	\$98	\$47	\$214	\$115	\$381	\$459	\$79	\$98	1.3	84	39.4	
S	Soyabn	1.00	\$800	\$300	\$93	\$60	\$214	\$115	\$344	\$314	-\$24	\$10	12.5	87	90.0	
H	Hay	4.00	\$180	\$720	\$300	\$40	\$200	\$115	\$475	\$118	\$240	\$60	30.0	81	52.0	
O	Other	1.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0	0	0.0	
D	Other	1.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0	0	0.0	
D	Other	1.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0	0	0.0	
		100	\$270	\$522	\$68	\$47	\$214	\$115	\$382	\$370	\$190	\$50	2.1	84	40.2	
P	Future	2.50	\$75	\$181			\$200	\$0	\$180	\$50	\$20	\$70	0.0	0	0.0	

Years	1	2	3	4	5	6	7	8	9	10	10y Tot.	20y Av.
Revenue	40	40	40	40	40	40	40	40	40	40	400	40
Base Yield	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Yield Decline %	0	-2	-4	0	-5	-30	0	0	0	0	0	0
Income	270	270	270	270	270	270	270	270	270	270	2700	270
Line Exp Cost	922	912	848	780	648	598	540	500	445	345	6470	647
Line Exp Profit	148	162	222	290	322	372	420	470	525	595	4230	423
Line Tot Cost	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Line Tot Profit	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
% Based on 22-23	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%
Line Return	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%	8.18%
Net 0-20	5.90	6.22	6.77	7.58	8.77	10.32	12.22	14.45	17.02	20.00	100.00	10.00
Net 10-20	4.40	4.83	5.02	5.89	7.25	8.72	10.32	12.22	14.45	17.02	85.00	8.50
Net 20-40	4.70	5.20	5.25	6.28	7.88	9.58	11.45	13.50	15.72	18.12	90.00	9.00
Net 40-60	5.00	5.50	5.50	6.50	8.00	9.50	11.25	13.50	15.75	18.25	95.00	9.50
Net 60-80	5.30	5.80	5.80	6.80	8.30	9.80	11.55	13.80	16.05	18.30	100.00	10.00
Net 80-100	5.60	6.10	6.10	7.10	8.60	10.10	11.85	14.10	16.35	18.60	105.00	10.50
Net 100	5.90	6.40	6.40	7.40	8.90	10.40	12.15	14.40	16.65	18.90	110.00	11.00

Ready | Profit Calculator | Results | Line and Amelioration Costs | Quantity of Lines to Apply | Line Requirement: 100%

Overview

- What do people want and/or require?
- iLime
 - implements Optlime as an app
 - three test versions
- When is it coming?
- Getting involved

Information to Assist Making Decisions About Managing Soil Acidity

1. Currently what information do you/your clients use when purchasing and applying lime?
2. What information do you currently use when making decisions about managing soil acidity?
3. What information do you need/would you like to be able to access that is currently not available?
4. What is/are the best ways for you to access such information?

Responses

- How much lime is needed for a given pH to budget over long-term?
- If my soil acidifies at X rate, what are the implications for production and profitability?
- For applications of 2 t/ha vs 1 t/ha vs 5 t/ha what is the estimated pH change?
- How much and how often to lime?
- Confident figures for return on investment.
- (We) use a rule of thumb 3–5 years to pay off lime; pretty rough! This could be improved.
- Lime costs a lot so don't want to over-do it, but don't want to under-do.
- To address sub-surface acidity is it best to apply on surface and wait or mix?
- How much to get it down to sub-soil and how get it there?
- What to do on paddocks that received lime (say) five years ago?

Categories

Liming to recover or maintain pH

Economics of liming

Comparison of lime sources

Sub-surface liming

Factors to consider once soil pH managed

Usability

Answer in just a few clicks

Specific to my farm/situation

Able to use with poor reception/internet

Mobile—all (also computer for some)

iLime...

Test v 3

last update 21/11/18

because I'm farming for the long term.

RE-SET DEFAULTS

Rainfall zone

325 - 450 mm

Soil and initial acidity profile

Duplex_30cm (pH 4.5, 4.2, 4.3)

Rotation

WWWWW

Scenario A

Lime type & costs

Generic south west limestone

Lime rates & placement strategy

1 t per 10 years

Scenario B

Lime type & costs

Generic south west limestone

Lime rates & placement strategy

1 t per 7 years

CALCULATE



Home



Soil



Lime



Strategies



Rotation



About

Lime requirement

100% NV lime

3.4 t/ha

Generic south west limestone

4.3 t/ha

Generic south west limestone

4.3 t/ha

Estimated annual acidification

95 kg lime equivalent/ha.year

**Generic south west limestone -
1 t per 10 years**

**Generic south west limestone -
1 t per 7 years**

Return on investment at 5 years

170%

170%

**Return on investment at 10
years**

430%

300%

Net present value (20 years)

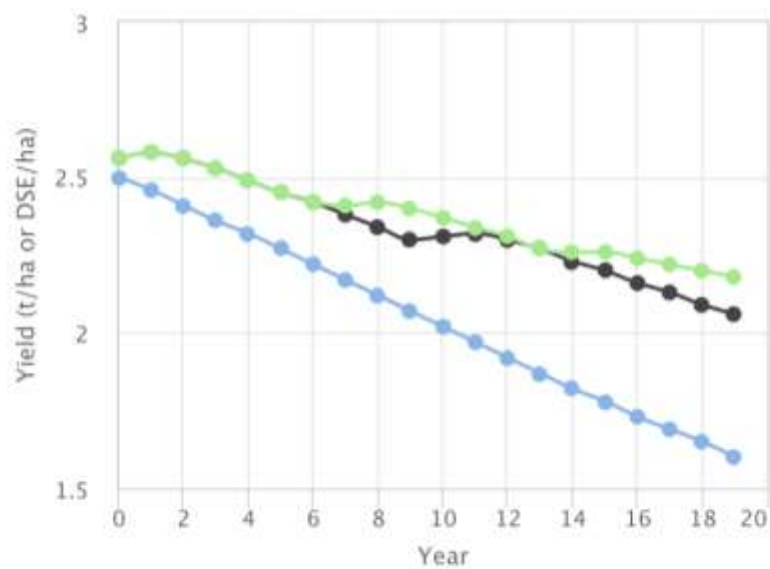
430 \$/ha

465 \$/ha

Select graph to show

Yield

Yield over time



— Unlimed

— Generic south west limestone - 1 t per 10 years

— Generic south west limestone - 1 t per 7 years

because I'm farming for the long term.

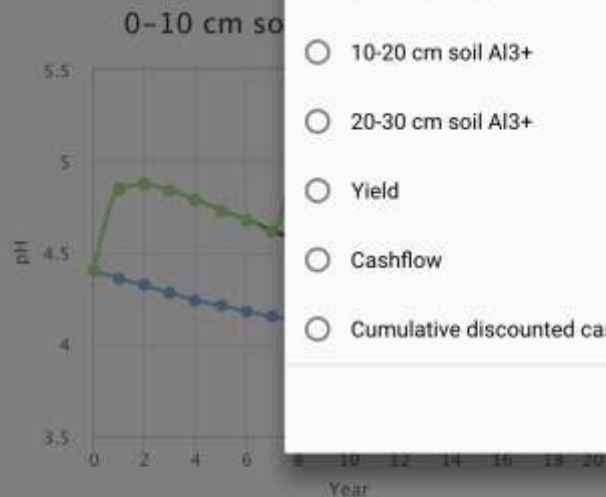
Net present value (20 years)

430 \$/ha

465 \$/ha

Select graph to show

Select chart type



10-20 cm soil Al3+

20-30 cm soil Al3+

Yield

Cashflow

Cumulative discounted cashflow

OK

◆ Unlimed

◆ Generic south west limestone - 1 t per 10 years

◆ Generic south west limestone - 1 t per 7 years

because I'm farming for the long term.

Net present value (20 years)

430 \$/ha

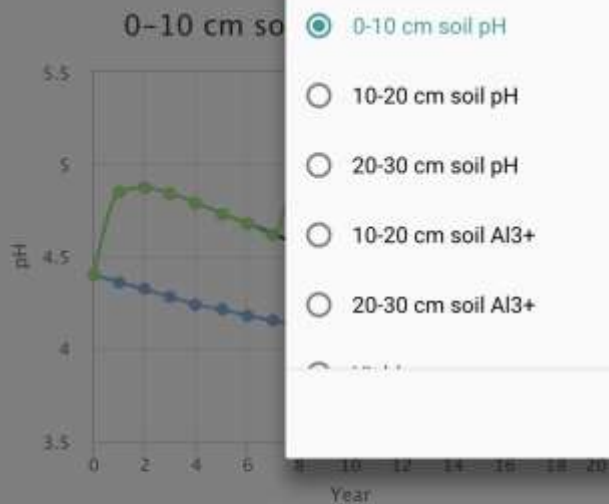
465 \$/ha

Select graph to show

Select chart type

- 0-10 cm soil pH
- 10-20 cm soil pH
- 20-30 cm soil pH
- 10-20 cm soil Al3+
- 20-30 cm soil Al3+

OK



- ◆ Unlimed
- ◆ Generic south west limestone - 1 t per 10 years
- ◆ Generic south west limestone - 1 t per 7 years



Home



Soil



Lime



Strategies



Rotation

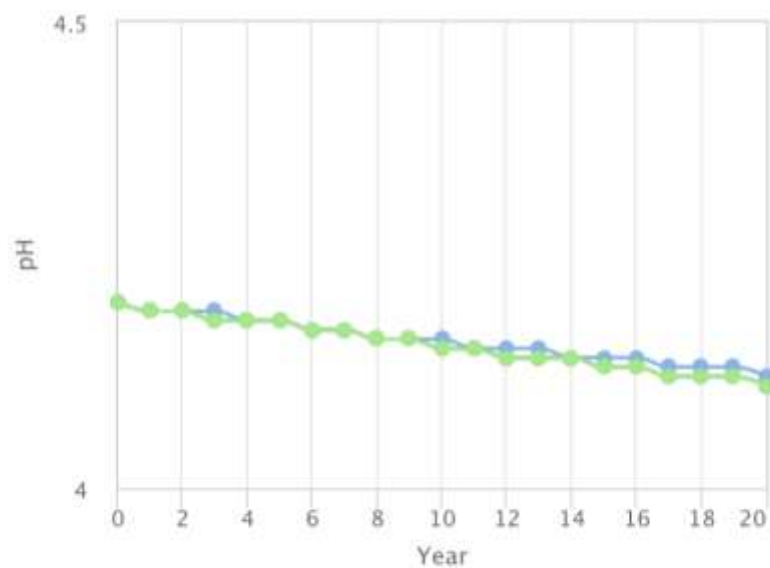


About

Select graph to show

20-30 cm soil pH

20-30 cm soil pH over time



Unlimed

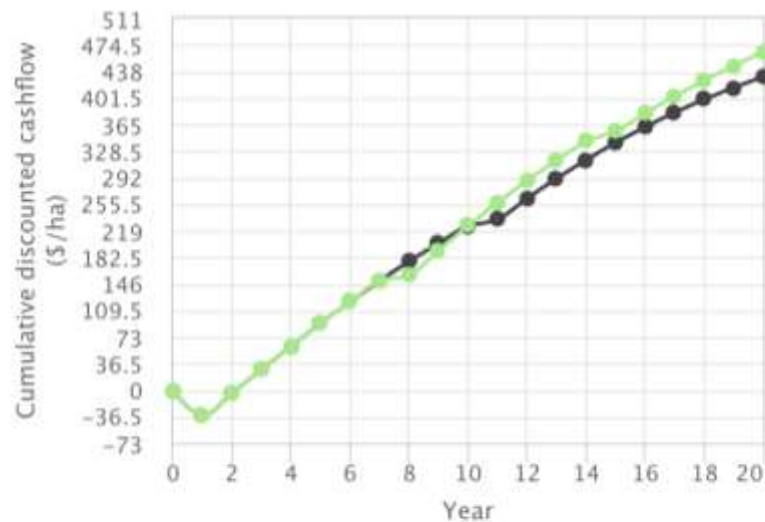
Generic south west limestone - 1 t per 10 years

Generic south west limestone - 1 t per 7 years

Select graph to show

Cumulative discounted cashflow ▾

Cumulative discounted cashflow over time



- Unlimed
- Generic south west limestone - 1 t per 10 years
- Generic south west limestone - 1 t per 7 years

because I'm farming for the long term.

RE-SET DEF

Select graph to show

Cumulative discounted cashflow ▾

Rainfall zone

325 - 450 mm

Cumulative discounted cashflow over time

Scenario A

Lime type & c

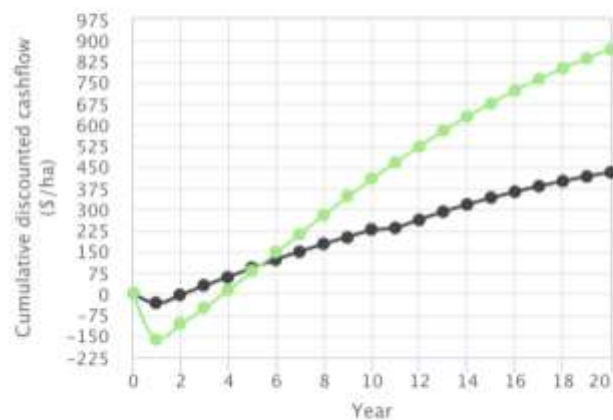
Generic south west limestone

Scenario B

Lime type & c

Generic south west limestone

CALCULATE



Unlimed

Generic south west limestone - 1 t per 10 years

Generic south west limestone - 4 t year 1



Home



Soil



Lime



Strategies



Rotation



About

because I'm farming for the long term.

RE-SET DEF

Select graph to show

Cumulative discounted cashflow

Rainfall zone

325 - 450 mm

Scenario A

Lime type & cost

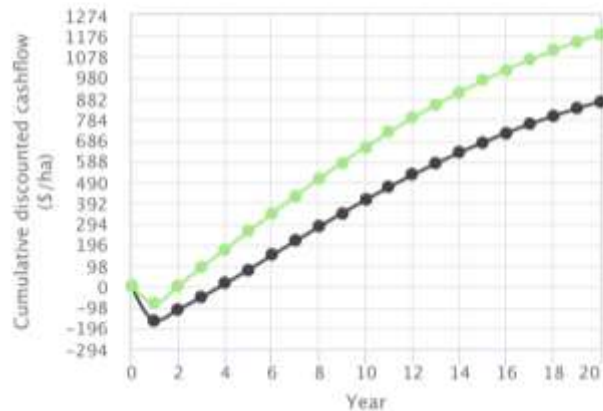
Generic south west limestone

Scenario B

Lime type & cost

Generic south west limestone

Cumulative discounted cashflow over time



CALCULATE

- Unlimed
- Generic south west limestone - 4t year 1
- Generic south west limestone - 4t incorp. to 20 cm



Home



Soil



Lime



Strategies



Rotation



About

Customise

- Make it specific to farm / situation
- Rainfall zones set choices
- Customise (and save)
 - soil: characteristics of layers
 - rotation: 'crops' and length
 - lime characteristics and cost
 - liming strategy

Liming Strategies

Year, rate and incorporation

Year	Rate (t/ha)	Incorporated to 20 cm?	Incorporated to 30 cm?
1	<input type="text" value="4"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
2	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

When is it coming?

- Version 1 iLime app



Acknowledgements

Thank you to farmers at many field days, Soils Constraints West steering committee, Kwinana West RCSN members, Garren Knell, Wayne Pluske, Ashton Gray, Graham McConnell, Ashley Herbert, Jeremy Lemon, John Blake, Art Diggle, Gaus Azam, Jenni Clausen for initial suggestions and feedback.

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Summary

- Feedback from concept to testing
- Version 1 iLime app
 - release end of April
- Getting involved
 - workshops May-June and spring field
 - james@desireefutures.net.au

Now:

happy to answer your questions or to hear your opinion

