

9. Soil Amendment Model

The Soil Amendment Model is used to query how the rates of lime, gypsum and a mixture of the two is determined.

The model has two sub models:

- a) LimeMate
- b) SodiCalc

The Soil Amendment Model has been developed for acid and sodic dispersive soils.

For an **acidic soil** a rate of lime will appear in the recommendation section of SoilMate:

Evaluation	Recommendation	Details & Reports
Wheat Raingrown South West Slopes (North-Temora) NSW		
Paddock	Paddock 1	
Paddock Section	All of Paddock 1	
Area	100	
Profile Sampled	0-10	
Texture	Loamy Sand	
Colour		
	Value	Rate
NITROGEN		146
Nitrate nitrogen (KCl) (mg/kg)		80
Ammonium nitrogen (KCl) (mg/kg)	2	
PHOSPHORUS		25
Phosphorus (Colwell) (mg/kg)	1	
Phosphorus Buffer Index (PBI)	55.0	
POTASSIUM		
SULFUR		10
Sulfur (KCl-40) (mg/kg)	8.0	
LIME		2198
Exch. Ca (BaCl ₂ /NH ₄ Cl) (meq/100g)	5.00	

For a **sodic dispersive soil** the rate of Gypsum will appear in the recommendation section of SoilMate.

Evaluation	Recommendation	Details & Reports
Wheat SA Upper SE (Bordertown) Heavy clay/loam		
Paddock	Paddock 1	
Paddock Section	All of Paddock 1	
Area	100	
Profile Sampled	0-10	
Texture	Heavy Clay	
Colour		
	Value	Rate
Exch. Mg (BaCl ₂ /NH ₄ Cl) (meq/100g)	17.00	
MAGNESIUM		
Exch. K (BaCl ₂ /NH ₄ Cl) (meq/100g)	1.00	
Exch. Na (BaCl ₂ /NH ₄ Cl) (meq/100g)	4.00	
Aluminium (KCl) meq/100g	0.0	
ECEC (meq/100g)	52.0	
Exch. magnesium %	32.7	
Exch. sodium %	7.7	
Dispersion Index (Loveday/Pyle)	10.0	
GYPSPUM		2393
Copper (DTPA) (mg/kg)	6.0	

2.6. Evaluation Model : Soil Amendments - Tab : Soil Inputs

This model has several default values and if changed the changed values then become the default values.

Default Values

1. pH 5.5 CaCl₂
2. Depth 10 cm
3. Neutralising value 85%

Products

Although there is Gypsum and Lime in the product database it is strongly recommended that the Lime and Gypsum that is used locally be added to the product list. (see Add Other Products).

Organic Carbon

The model needs to have the organic carbon added to operate. If OC has not been measured then it can be added by:

1. Click on Soil Amendments Tab
2. Add OC% to Non Tested OC%

The screenshot shows the 'Evaluation Model: SoilAmendments' window. The 'Soil Inputs' tab is selected. The 'Sample Details' section contains the following fields: 'Depth From/To (cm)' with values 0.00 and 10.00, 'Soil pH (target)' with value 5.5, and 'Select Soil pH (measured) Analyte' with radio buttons for 'Select pH (CaCl₂)' (selected) and 'Select pH (H₂O)'. The 'Soil pH difference (CaCl₂/H₂O)' field shows 0.50. The 'Overrides' section includes 'NonTested OC %' and 'Soil Texture' (Loamy Sand). The 'Lime Product Details for LimeMate and SodiCalc' section shows 'NV of Preferred Product' as 85.00. The 'Soil Amendment Model' dropdown is set to 'LimeMate'. On the right, there are 'Actions' (Close, Defaults, Calculate) and 'Report Printing' (Preview, Print, Export, Email) buttons.

2.7. Evaluation Model : Soil Amendments - Tab : LimeMate

The **LimeMate** tab shows all the parameters that have been used to calculate the rate of lime.

A report of the results of LimeMate can be produced. Click **Report Printing**. Click **Preview**

Note the selected product will be highlighted.

PRODUCT COMPARISON	SELECTED PRODUCT					
	Product 1			Product 2		
Particle Size (mm)	% of Product	Neutralising Value (%)	Effective NV	% of Product	Neutralising Value (%)	Effective NV
0.000-0.125	0.00	0.00	0.00	0.00	0.00	0.00
0.125-0.250	0.00	0.00	0.00	0.00	0.00	0.00
0.250-0.500	0.00	0.00	0.00	0.00	0.00	0.00
0.500-1.000	0.00	0.00	0.00	0.00	0.00	0.00
above 1.000	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00		0.00	0.00		0.00
Lime Product Cost (\$/t)	50			50		
Lime Delivery Cost (\$/t)	30			30		
Lime Spread Cost (\$/t)	10			10		
Relative Lime Cost (\$/t)	0.00			0.00		

2.8. Evaluation Model : Soil Amendments - Tab : SodicCalc

The **SodicCalc** tab allows comparison of lime, gypsum or a mixture of the two.

Note: The product selected in the dropdown box will be highlighted and will appear in reports.

A report of the results of SodicCalc can be produced. Click **Report Printing** Click **Preview**.

Note: the selected product will be highlighted.

SoilMate SodicCalc Report
Back Paddock Company - Monday, 14 December 2009 - Paddock 1

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<u>Grower Details:</u>		<u>Inputs:</u>	
Grower Name:	Back Paddock Company	Depth to be treated:	10.00 cm
Paddock Name:	Paddock 1	Soil pH (CaCl2):	7.9
Address:	PO Box 823 CLEVELAND 4163	Soil pH (H2O):	8.6
Phone:		EC (1:5 H2O):	0.20 dS/m
Interpretation Date:	Monday, 14 December 2009	Exchangeable Ca:	30.00 meq/100g
Interpreter Name:	Gardiner, Stephen	Exchangeable Mg:	17.00 meq/100g
Interpreter Phone:		Exchangeable K:	1.00 meq/100g
<u>Other:</u>		Exchangeable Na:	4.00 meq/100g
Organic Carbon %:	1.10 %	Exchangeable Al:	0.00 meq/100g
Soil Texture:	Heavy Clay	Effective Cation Exchange Capacity:	52.00 meq/100g
Clay % (from Soil texture):	70 %	Current Soil Sodium % of CEC	7.69 %
Electrochemical Stability Index:	0.021	Target Sodium % of CEC	6.00 %
Dispersion Index	10	Current Soil Magnesium % of CEC	32.69 %
<u>Comments:</u>		Target Magnesium % of CEC	30.00 %

SELECTED PRODUCT					
GYPSUM (pH(CaCl2)>6.5)		LIME (pH(CaCl2)<5.0)		LIME+GYPSUM (pH(CaCl2)5.0-6.5)	
Commercial Gypsum	2393 kg/ha	Lime Rate	43219 kg/ha	Lime % Mix	0.00 %
Gypsum Purity	80 %	Effective Neutralising Value	85 %	Gypsum % Mix	100.00 %
Product Cost	50 \$/t	Product Cost	50 \$/t	Lime Rate	- kg/ha
Delivery Cost	30 \$/t	Delivery Cost	30 \$/t	Gypsum Rate	2393 kg/ha
Spread Cost	10 \$/t	Spread Cost	10 \$/t	Combined Product Rate	2393 kg/ha
Blend Cost	0 \$/t	Total Cost	90 \$/t		
Total Cost	90 \$/t	Est Lime Efficiency	3 %		
Cost \$/ha: 215.35		Cost \$/ha: 3889.73		Cost \$/ha: 215.35	

2.9. Evaluation Model : Soil Amendments - Tab : LimeMate Inputs

The **LimeMate Input** tab allows % of particle size and cost to be entered for different lime products for comparison.

	Product 1			Product 2		
	% of Product	Neutralising Value (%)	Effective NV	% of Product	Neutralising Value (%)	Effective NV
0.000-0.125			0.00			0.00
0.125-0.250			0.00			0.00
0.250-0.500			0.00			0.00
0.500-1.000			0.00			0.00
above 1.000			0.00			0.00
Total	0.00		0.00	0.00		0.00
Lime Product Cost (\$/t)	50			50		
Lime Delivery Cost (\$/t)	30			30		
Lime Spread Cost (\$/t)	10			10		
Relative Lime Cost (\$/t)	0.00			0.00		

2.10. Evaluation Model : Soil Amendments - Tab : SodiCalc Inputs

The **SodiCalc Inputs** tab allows for the inputs that calculate for Gypsum to be adjusted

This model has several default values and if changed the changed values become the default values.

Default Values

1. 6% for Na cations
2. 25% for Mg cations
3. Depth 10cm
4. 85% purity Gypsum

SodiCalc Parameters	
Bulk Density	1.40 t/m3
Target Sodium % of Cations	6
Target Magnesium % of Cations	25
Gypsum Purity %	85
S% in Gypsum	15.81

Gypsum Costs	
Gypsum Product Cost	50 \$/t
Gypsum Delivery Cost	30 \$/t
Gypsum Spread Cost	10 \$/t
Gypsum Blend Cost	0 \$/t