

Advice Sheet 16: Calculating Lime Requirements

Why is the calculation method important?

Because analysis of pH in the laboratory is conducted on a dried and ground sample, the resultant pH is often greater than a pH value measured in moist soil in the field. The following calculation takes this into account and should only be used with laboratory pH values. Separate calculations are available for field pH measurement based recommendations. The equation used is the Genfer Lime Recommendation, released by the UK MAFF in 1986.

To illustrate the quality of the NRM laboratory measured pH, the laboratory participates in various Proficiency Testing Schemes for pH analysis. CONTEST is a ring test between 60+ participating laboratories. WEPAL ISE is a European PT scheme which all PAAG laboratories participate in. Reference samples are analysed and the results are compared between the participating laboratories. The measure of accuracy used is the Z-score.

Performance in these schemes can be demonstrated on request.

Calculation of lime requirement (LR) t/ha

Lime recommendations are based upon the target pH, which is higher than the recommended pH because of the natural acidifying effect of rain over time and the time response of soil to the neutralizing effect of lime.

The depth for which the calculations are made is critical and this should be taken into account when sampling. The arable calculations are based upon 20 cm of soil to account for plough-incorporated material, the grassland calculations are based upon 15 cm of soil.

The general equation is: $LR = (\text{target pH} - \text{Soil pH}) \times \text{lime factor}$

Target pH is determined from Table A or Table B below and the lime recommendation from Table C

Note:

- All values are reported to the nearest whole number; minimum rate 2 t/ha
- Values at or above the recommended soil pH are reported as Nil
- Maximum LR for grass is 7 t/ha; no maximum for arable or reseed

Lime requirements for other target pH's or other depths of incorporation should be calculated using the same principles.

Table of Arable Lime Requirements (A)

Soil Type	Recommended pH	Target pH	Soil Depth (cm)	Lime Factor for 1.0 pH Unit (t/ha)
Sands / Light	6.5	6.7	20	6.0
Medium	6.5	6.7	20	7.0
Clay	6.5	6.7	20	8.0
Organic	6.2	6.4	20	10.0
Peat / Peats	5.8	6.0	20	16.0

Table of Grassland Lime Requirements (G)

Soil Type	Recommended pH	Target pH	Soil Depth (cm)	Lime Factor for 1.0 pH Unit (t/ha)
Sands / Light	6.0	6.2	15	4.5
Medium	6.0	6.2	15	5.0
Clay	6.0	6.2	15	6.0
Organic	5.7	5.9	15	7.5
Peat / Peats	5.3	5.5	15	12.0

Table of Lime Recommendations (C)

pH	Sands		Medium		Clay		Organic		Peat	
	A	G	A	G	A	G	A	G	A	G
6.5	0	0	0	0	0					
6.4	2	0	2	0	2					
6.3	2	0	3	0	3					
6.2	3	0	4	0	4		0			
6.1	4	0	4	0	5		3			
6.0	4	0	5	0	6	0	4			
5.9	5	2	6	2	6	2	5			
5.8	5	2	6	2	7	2	6		0	
5.7	6	2	7	3	8	3	7	0	5	
5.6	7	3	8	3	9	4	8	2	6	
5.5	7	3	8	4	10	4	9	3	8	
5.4	8	4	9	4	10	5	10	4	10	
5.3	8	4	10	5	11	5	11	5	11	0
5.2	9	5	11	5	12	6	12	5	13	4
5.1	10	5	11	6	13	7	13	6	14	5
5.0	10	5	12	6	14	7	14	7	16	6
4.9	11	6	12	7	14	7	15	7	18	7
4.8	11	6	13	7	15	7	16	7	19	7
4.7	12	7	14	7	16	7	17	7	21	7
4.6	13	7	15	7	17	7	18	7	22	7
4.5	13	7	15	7	18	7	19	7	24	7
4.4	14	7	16	7	18	7	20	7	26	7
4.3	14	7	17	7	19	7	21	7	27	7
4.2	15	7	18	7	20	7	22	7	29	7
4.1	16	7	18	7	21	7	23	7	30	7
4.0	16	7	19	7	22	7	24	7	32	7

Notes:

Arable LR based on 20 cm soil ; Grassland LR based on 15 cm soil

No maximum LR for arable ; maximum surface application for grass 7 t/ha

Separate LR may be needed for reseeds below pH 5.0

Summary

Please note that laboratory pHs can be different from field pH due to three principal reasons, firstly analysis in the lab is performed on a dried, ground sample not a fresh sample, secondly it is partly related to the more controlled environment and more sensitive equipment used in laboratory conditions and thirdly the averaging effect of taking a sample from the whole field area may miss acid hotspots.