CHOOSING A LIMING MATERIAL

FACT SHEET

All limestone materials are not alike. When choosing a limestone material it is important to understand the ECC rating (Efficiency Calcium Carbonate rating), of the material you are applying. ECC is determined by the CCE (Calcium Carbonate Equivalent) times the Fineness Factor which is determined by the amount of lime that passes through a certain series of screens as described below in Table 1.

The actual amount of a given liming material required to achieve a desirable effect on raising soil pH is influenced by its total neutralizing power (TNP), which is also referred to as calcium carbonate equivalent rating (CCE) and the fineness of grind. The effective calcium carbonate rating (ECC) of limestone is the product CCE (or purity) and the fineness factor.

The latter is the sum of the products of the percentages of limestone on various mesh sizes multiplied by the percentage of effectiveness, which that particular size is assigned. The more surface area in a given weight of liming material, the faster that material will devolve and helps to assist in adjusting the soil pH.

The TNP or CCE that comes with most limes is only an indicator of the quality of the lime in its ability to supply nutrients and raise the pH of the soil. The CCE (Calcium Carbonate Equivalent) does not indicate to you the solubility or the availability of the component nutrients. This is determined by multiplying the CCE by a fineness factor, which is determined in the lab with screens. The true value of the lime is the Effective Calcium Carbonate rating, ECC.

Standard Ag ground limestone should have greater than 90% +, TNP or CCE equivalent and fineness of 40% passing through a 100 mesh screen, 50% through 60 mesh, 70% through 20 mesh and 95% through 8 mesh.

Relative efficiency factors have been established for various particle sizes shown in the following table.

Table 1

	Particle Size	Relative Efficiency Factor
PASSING	**100 Mesh**	**1.00**
	60 – 100	**0.78**
	40 – 60	**0.55**
	20 – 40	**0.27**
	8 – 20	**0.13**
	0	**0.05**

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A & L recommendations are based on an assumption of 90% + effective Calcium Carbonate Equivalent (ECC).

To determine ECC:

Fineness Factor x CCE = ECC

Example:

Particle Size	% passing	Relative efficiency Factor	Fineness Factor
100 mesh	60	1.0	60
60 – 100	10	0.78	7.8
40 – 60		0.55	
20 – 40	25	0.27	6.75
8 – 20	5	0.13	0.65
0 - 8			

Fineness Factor 75.2

Therefore due to the coarseness of the lime it would require.
100/75.2 = 1.3
1.3 x 2000 = 2659 lbs. lime

CALCITIC VS DOLOMITIC LIME

When selecting the form of lime to use it is essential to consider all the cations. Although dolomitic limestone usually has a greater TNP than Calcitic it has not got the same amount of soluble Ca that Calcitic lime has or is usually not as fine as Calcitic. See table 2.

If a soil has low Mg, less than 10% base saturation, and lime is required. Then Dolomitic is the lime of choice or because Dolomitic is more available and less expensive it is usually the lime source of choice. However if Mg% is approaching 20% saturation adding more Mg may only cause problems with crop production and nutrient uptake, therefore Calcitic lime would be the lime of choice. In soils or crops where we are needing a high % Ca and pH change then the choice of lime will be Calcitic lime.

ALTERNATIVE CALCIUM SOURCES

In some cropping cases where we need more soluble Ca in a soil but do not want to increase pH, Ag gypsum can be used as a Ca source. However all gypsum is not the same. Some of the gypsum materials are not soluble and will not dissolve and release the Ca required. The solubility of the Ca in the material should always be checked. Quality product is just as important when buying.

If you are using gypsum, make sure you know the total soluble Ca of the material. Total Ca may not indicate what is available.

Never make a lime recommendation from just the water pH test. The soil pH test can fluctuate through the season and may not be a true indicator at a given time of the soils real buffering capacity. The SMP buffer test is a more precise indication of the soils true lime requirements.

Making lime recommendations from water pH test may cause us to over apply lime, which may create more serious problems.

Application Rates:

The application rate is based on quality of the lime plus an adjustment for the depth that the lime will be worked into the soil.

At any given time it is not recommended to apply more than 3 tonne per acre in a given season. On courser soils I would suggest no more than 2 tonne. If more lime is required it is suggested that a new test is taken in about 2 years once the lime has time to work and a new recommendation for lime application be made at this time.

On course soils with high P levels where the crops to be grown will be transplanted, i.e. tobacco, tomato, lime should not be applied in the cropping year. High lime application in the planting season can release energy levels high enough to kill the transplants. Apply lime in these fields in the rotation year for best results.

When making a recommendation for exact tonnes required of a lime material you need the following information:

TNP or CCE

Fineness Factor

Plowing Depth

NEUTRALIZING FACTOR

TNV	NEUTRALIZING FACTOR (NF)
110 – 119	**.83**
100 – 109	**.90**
90 – 99	**1.00**
80 – 89	**1.12**
70 – 79	**1.27**
60 – 69	**1.46**
50 – 59	**1.73**

DEPTH FACTOR

PLOWING DEPTH (INCHES)	DEPTH FACTOR (DF)
2	**.25**
4	**.50**
6	**.75**
8	**1.00**
10	**1.25**
12	**1.50**

FORMULA FOR CALCULATING LIME REQURIED

Adjusted lime rate = A & L Rate x FF x NF x DF

TABLE 2

CALCIUM AND MAGNESIUM MATERIALS

Material	% Ca	% Mg	TNP*
Calcium Limestone	32	3	85 - 100
Dolomite Limestone	22	11	95 - 108

***Total Neutralizing Power**

TABLE 1. A & L CANADA LIME STANDARDS

%Passing Mesh Size				%TNV	Plowing Depth
8	20	60	100		
95	70	50	40	90-99	8

TABLE 2. FINENESS FACTOR

	% PASSING MESH SIZE				
TYPE OF LIME	**8**	**20**	**60**	**100**	**(FF)**
SUSPENSION	**100**	**100**	**100**	**100**	**0.60**
AG-SUPERFINE	**100**	**100**	**95**	**80**	**0.63**
AG-PULVERIZED	**100**	**95**	**70**	**60**	**0.76**
AG-GROUND	**95**	**70**	**50**	**40**	**1.00**
AG-FINE MEAL	**85**	**60**	**40**	**30**	**1.19**
AG-COARSE MEAL	**80**	**50**	**30**	**20**	**1.45**
AG-FINE SCREEN	**80**	**45**	**20**	**10**	**1.77**
AG-COARSE SCREEN	**80**	**40**	**15**	**5**	**2.03**

Table 3. NEUTRALIZING FACTOR

TNV	NEUTRALIZING FACTOR
100-119	0.83
100-109	0.90
90-99	1.00
80-89	1.12
70-79	1.27
60-69	1.46
50-59	1.73

TABLE 4. DEPTH FACTOR

PLOWING DEPTH (IN.)	DEPTH FACTOR (DF)
2	.25
4	.50
6	.75
8	1.00
10	1.25
12	1.50