

LIME QUALITY

A brief background page 1

A. How to determine lime quality in view of its price

The main goal of liming is to neutralize the soil pH. In this regard, the agricultural index determines limestone quality, i.e. the time frame needed for a given limestone product to neutralize soil pH.

$$\text{agricultural index} = \frac{\text{fineness rating} \times \text{neutralizing power}}{100}$$

1. **Fineness rating:** It is the different sizes of lime particles. The smaller the particles the more they are in contact with more soil and water to rapidly neutralize the pH.

Each lime granule > 2.0 mm has a neutralizing effectiveness of zero. Lime granules of size between 0.15 and 2.0 mm have an effectiveness of 0.6. While those < 0.15 mm are 1.0 effective (ref. BNQ). Nutrite lime has a fineness rating of 93% calculated as follows:

$$\begin{aligned} 5\% \times 0 &= 0 \\ 5\% \times 0.6 &= 3.0 \\ 90\% \times 1.0 &= 90.0 \end{aligned}$$

If its neutralizing power (listed on the label) is 95% then, the agricultural index is:

$$\text{agricultural index} = \frac{93 \times 95}{100} = 88.35\%$$

If you do not know the neutralizing power of your lime or if the label does not state the percentage particle size > 2,0; 0,15 - 2,00; < 0,15 mm; send a sample to the soil laboratory of the Ministry of Agriculture for testing.

2. Price of lime based on its agricultural index:

Example: lime A, agricultural index 88% at \$7 per 20 kg bag.
lime B, agricultural index 93% at \$12 per 25 kg bag.
Which one of these two liming materials is more efficient in view of its price?

Solution: One must convert limes A and B to the same agricultural index and at the same weight (per metric tonne) to compare both prices.

$$\text{lime A} = \frac{\$7 \times 1000 \text{ kg}}{20 \text{ kg}} = \$350 / \text{tonne}$$

$$\text{lime B} = \frac{\$12 \times 1000 \text{ kg}}{25 \text{ kg}} = \$480 / \text{tonne}$$

If the agricultural index of lime A were 100% it then must cost $\$350/0.88 = \$397.7 / \text{tonne}$.
If the agricultural index of lime B were 100% it then must cost $\$480/0.93 = \$516.1 / \text{tonne}$.

continued

LIME QUALITY

A brief background

page 2

Conclusion: Lime B is more expensive than lime A. Even if the agricultural index of lime B is slightly higher than that of lime A, this difference is not significant in neutralizing the soil pH.

3. Regardless of the agricultural index, it is important to consider the concentration of each lime in Ca and Mg. However, a limestone of 20% Ca does not make an agronomic difference compared to another limestone testing 22% Ca.
4. In case the soil has an adequate pH for a particular plant, if the soil tests medium in Ca and Mg, it contains sufficient levels of these nutrients for plant uptake in one season provided that soil fertility is balanced in K, and the other plant nutrients.
5. Do not rely on soil testing alone in Ca and/or Mg to spray very expensive Ca or Mg products compared to the same Ca and Mg provided from limestone that starts to breakdown shortly after liming. Do foliar analyses before liming to make sure that deficiencies in Ca and/or Mg are evident.

B. Does soluble lime exist?

Scientifically, the particles or crystals of a product are considered water soluble when they dissolve in water to the point they are no longer seen.

Put some crystals of table salt in a glass of water. Agitate for a moment. Since table salt is water soluble, you no longer see any crystal in the glass. Likewise, fertilizer 20-20-20 is water soluble because its crystals are no longer seen in water after agitation.

On the other hand, lime is a different case. Put some lime pellets in a glass of water. Agitate for a moment and you still see deposits in the glass along with a colloidal suspension confirming that lime pellets break down in water without being fully soluble. The point to make is that **water soluble lime does not exist** with the exception of potassium carbonate, sodium carbonate, and ammonium carbonate that are very rarely used. Some trade mark limes are partially water soluble. To remove the uncertainty, ask the manufacturer for a technical sheet of his lime stating the percentage of lime that is water soluble at 20°C.