

Treating Ca & Mg Deficiency (without “calmag”)

"Calmag" products are typically used to treat calcium (Ca) or magnesium (Mg) deficiencies. However, I prefer to treat those deficiencies individually because:

- Ca & Mg should exist together in a ratio 2:1 to 4:1. A deficiency in either could be due to a ratio problem. Adding *both* when only one is required could perpetuate a ratio problem.
- I don't need the nitrogen (N) which most (nitrate-based) "calmag" products contain. Nothing wrong with N. But, if I need more, I prefer giving it from [a more organic source](#) (fish emulsion, blood meal, bat guano). Whenever I have the choice, I prefer to put things in the soil that are beneficial to the microbes.
- Calcium nitrate-based "Calmag" acidifies my nutrient mix. By not using "calmag" I was able to **stop pH'ing my nutrient mix**.¹ (That simplifies my life.).
 - Carbonate-based "Calmag" products exist. The only one I've looked at was General Organics CaMg+. It seemed to be carbonate Ca & Mg dissolved in vinegar. I wasn't keen on adding vinegar to my nutrient mix (when I enjoy not pH'ing it). Since other options exist, why do it?
- I don't like to add unnecessary salts to my soil -- which is what using "calmag" does when used to treat a single deficiency.

Note: All quantities below are **per gallon**. PPMs are calculated (measuring the solution is likely to be different).

1. What I Use

I use the following to treat Ca & Mg deficiency in cannabis because they're cheap and easy to find.

1.1. Gypsum

For calcium deficiency, I use [gypsum](#).¹ It's found at the local garden center. By weight, gypsum contains 23% Ca, 19% is sulfur. Gypsum is slightly water soluble (3.0 to 3.5g/L). It dissolves *slower* in hot water.

Alternate: I sometimes use [calcium acetate](#)² (dissolved eggshell³). This contains 20% calcium by weight. (It's not pure calcium acetate. Eggshells contain phosphorous too. Therefore, the amount of calcium may be lower.). It is highly water soluble (347g/L).

1.2. Epsom salt

For magnesium deficiency, I use [epsom salt](#).³ It's found at the grocery store or pharmacy. By weight, epsom salt contains 10% magnesium, 13% sulfur. Epsom salt is highly water soluble (351g/L).

Alternate: [Langbeinite](#) ("sul-po-mag")⁴ is a source of magnesium & potassium. I typically raise potassium during the entire grow using potassium sulfate. Therefore, langbeinite is a good (more

1 1g/gal gypsum produces: Ca 61ppm & S 49ppm.

2 1g/gal calcium acetate produces: Ca 60ppm. (However, dissolved eggshells are not pure calcium acetate. They may contain phosphorous. Perhaps less calcium.).

3 1g/gal epsom salt produces Mg 26ppm & S 34ppm.

4 1g/gal Dr. Earth Langbeinite produces Mg 29ppm, S 58ppm, K 58ppm.

organic) alternative to potassium sulfate when I need to add magnesium. By weight, Langbeinite contains 11% Mg, 22% S and 22% K. Langbeinite slowly dissolves in water (up to 240g/L).

2. How much to use

A safe way to understand how much to use is to consider 1) how much “calmag” is recommended for deficiencies. Or, 2) how much epsom salt is typically recommended.

- Using Botanicare Cal-Mag+ as an example: slight deficiencies are typically treated with 5ml/gal. That produces 45ppm Ca, 17ppm Mg (and 28ppm nitrogen). A serious deficiency: 10ml (double those PPMs).
- For magnesium deficiency alone: epsom salt is recommended. 1/4 tsp/gal (1.25g) for slight deficiencies, which produces 33ppm Mg (and 43ppm sulfur). Moderate to severe deficiencies are treated with 1/2 tsp (2.5g), which is 65ppm Mg. Extreme deficiencies: 1 tsp (5.0g). 130ppm Mg.

2.1. Calcium deficiency

- **Slight:** 0.75g gypsum = 46ppm Ca (37ppm sulfur).
 - Alternate: 0.75g calcium acetate (dissolve/dehydrated eggshell) = 45ppm Ca (and no sulfur).
- **Significant:** 1.5g gypsum or calcium acetate = 90-92ppm Ca.

Those are the same amounts of calcium as the customary “calmag” dose.

2.2. Magnesium deficiency

- **Slight:** 1g epsom salt = 26ppm Mg (34ppm sulfur).
 - Alternate: 0.9g Dr. Earth Langbeinite = 26ppm Mg (52ppm potassium & sulfur, each).
- **Moderate to significant:** 2g to 4g epsom salt = 52-104 ppm Mg (69-137ppm sulfur).
 - Alternate: 1.8g to 3.6g Dr. Earth Langbeinite = 51-103 ppm Mg (105-209 ppm potassium & sulfur, each).

Those amounts of magnesium are *between* the customary “calmag” dose & epsom salt dose.

IMPORTANT: If using gypsum (or calcium acetate) to treat Ca def too, you should use 1/3 less epsom salt (or langbeinite). Cannabis likes a Ca:Mg ratio 2:1 to 4:1.

Note: When I use any of the above, I pre-dissolve it in a plastic container (like a used plastic water bottle), and shake to dissolve. I pour the bottle into the empty nutrient mixing bucket. I then add sufficient water to mix my nutrients. (Remember: gypsum is only soluble to 3.0-3.5g/L. If you are mixing 5gal of nutrients, and need to dissolve 5g gypsum, you should pay attention to how much you're trying to dissolve. You will probably have to break it up into separate shake sessions, or use a larger water bottle.

3. Chronic deficiencies a sign of poor soil?

You shouldn't have to rely upon the above deficiency treatments too much. Soil should contain calcium & magnesium sufficient for growing, and can be [fortified with dolomite lime](#).

ENDNOTES

i How to stop PH'ing your nutrient solution.

Whether you can grow without pH'ing your nutrient solution may depend on the soil you use, the nutrients, whether you feed too strong, how much runoff you have. Your water quality may be a factor.

The problem with pHing nutrient solution (for soil) is that the typical ph-up/down products contain nutrients. (They aren't shown on the label because they aren't sold as fertilizer.). Typically, people feed too strong in soil. Unused nutrients build up in the soil ("salt buildup"), acidifying the soil. They see the runoff pH dropping. They use *more* pH-up hoping their nutrients will compensate for the soil's lower pH. That adds *even more* salts to the soil. (A vicious cycle.).

What I found for myself: [by not feeding too strong](#), it doesn't take much ph-up to raise the nutrient solution's pH. This indicates that the nutrient solution won't have much influence on the soil's pH.

Plus, feeding the correct strength reduces the chance of salt buildup. And, if I feed/water with enough volume for 10-20% runoff, I have even *less* chance of salt buildup.

Plus, I add 1-1.5 Tablespoon dolomite lime (Fertilome Hi Yield Agricultural Lime) to every gallon of [my soil mix](#).

I also noticed that my soil's pH *swings* one full point (or more) from wet to dry. It doesn't need to be precise (like hydroponics). I noticed this using a fairly expensive soil pH probe (Control Wizard Accurate 8).

Another thing I noticed: my runoff PPMs are a good indication whether salt buildup is occurring, which *also* tracked my soil pH dropping. In veg this isn't too meaningful. But, in transition and early flower, the runoff PPMs rise quickly and seem to jump easily. As they do, I saw the soil pH dropping. If runoff ppm reached 2400-2500ppm, that's where "lockout" occurs (soil pH 3.5-4.2). In flower, I try to keep runoff PPM around 1600-1800ppm. If they rise above 2000ppm, I feed weaker and/or more volume for greater runoff (a mini-flush). If they go above 2200, that's the danger zone. I would feed 1/2 strength and volume for 100% runoff. (I might do 1/2 strength two feedings in a row.).

In the end: by not feeding too strong, and paying attention to the runoff ppms, I was able to dial in the right strength/runoff. At that point, I didn't need to pH the solution. Its pH didn't influence the soil pH. The dolomite I add to my soil may also play a role. And, my [150ppm water](#) may play a role as well.

ii How to make calcium acetate:

1. Crush egg shells into small pieces. Perhaps no larger than 1/4" (6mm). Smaller is better.
 - Some people rinse their egg shells as they collect them. I didn't.
2. Lightly toast these broken pieces. I do it just for a minute to get some brown discoloration.
 - I don't know what this does. But, two references I found on the internet say to do this.
3. Place in a jar and add white (distilled, acetic) vinegar.
 - Be careful not to overfill. It will bubble furiously for an hour or two, and could overflow. You can place this in your grow tent and give your plants some carbon dioxide.
4. Eventually the boiling will die down. Place a cap on the jar, but **leave it loose so gas can escape**.
5. Set the jar out of the way for 2-3 weeks.
6. After 2-3 weeks, strain the liquid through a paper coffee filter and into a wide bowl.
7. Let this bowl sit and evaporate over a few days.
8. When completely evaporated, break up the crusty residue into a fine powder. Store in an airtight jar.