



## Technical Data Sheet



- Contains ALL essential plant nutrients in a highly concentrated liquid.
- Cations are fully chelated with organic acids; the form plants naturally use to absorb nutrients. Chelation protects against precipitation and scorch which are common features of micronutrient fertilizers based on sulphates.
- Suitable for all crops and all growing systems. Particularly suited to amateur hydroponic cultivation as OPTIGROW does away with 'A' and 'B' fertilizers and the need for pH correction.

### Delivers calcium;

- without any calcium phosphate precipitation. This blocks filter nozzles, leaves a residue on the crop, and locks up the calcium and phosphorus that was meant to fertilize the crop.
- It has been demonstrated in numerous studies that calcium is essential to maximising yield, quality, prevent disease, and increase shelf life in numerous crops. See the attached document or even the marketing material of competitors' 'calcium only' products for the many reasons you need calcium in your product!
- All 'calcium only' products are incompatible with NPK fertilizers meaning separate applications and increased labour costs. 'Calcium only products' are also not applied with the frequency of the NPK/micronutrient applications, and with calcium not being phloem-mobile, calcium addition in one big 'hit' may be of no use and symptoms of deficiency still occur.
- The product is produced by Plater Bio at our UK plant using our in-house (Plater Group) pure ingredients. The NPK is 9-5-16. No other producer has/is making anything comparable. Hydroponic 'one part' fertilizers are the closest, but these are extremely weak (typical NPK of 1.0-0.7-3.0), contain insoluble and troublesome precipitate and/or are suspensions. For this reason, they have never been used commercially.
- In addition to being fully chelated, the nutrients in OPTIGROW are further protected from precipitation by OPTIGROW's strong buffering capacity. Competitor products may be pH 3.0 in the bottle, but quickly turn to pH 7.0 once diluted. In comparison, Gold Leaf will keep fertigation feeds at the same pH even at a 1:500 dilution ratio.
- The product is produced by Plater Bio at our UK plant using our in-house (Plater Group) pure ingredients.
- Free of inferior chloride ingredients.
- Completely new for 2017; we are now seeking exclusive distributors to establish OPTIGROW in all sectors and in all countries.
- Can be used as a foliar spray, root drench or 'one part' hydroponic fertigation. Tank mix compatible with most agrochemicals, except alkaline products and sulphates. Conduct bucket test to confirm.

### Calcium in Plants

Calcium is an essential macronutrient, required in large amounts in plants for many fundamental processes. Despite this, it is almost completely absent from commercial fertilizers. This absence is not due to plants not needing or responding to its addition, but due to fertilizer companies failing to invent products that can deliver calcium without forming precipitants with other nutrients. This is also the reason hydroponic fertilizers have, until now, had to be split into 'A' and 'B' versions, with the A containing the calcium.



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Calcium is essential for the formation of strong cell walls. In the cell wall calcium binds to pectin and thus is essential for providing strength to the wall's matrix. It is for this reason that an adequate supply of calcium improves the shelf life of fruit/vegetables. In disease resistance calcium limits the action of pectinolytic enzymes exuded by the pathogens that attack the cell wall in the pathogen's attempt to breach the wall.

Additional roles for calcium in plants include ensuring cell membrane integrity and being essential for the process of cell division. So when combined with its role in cell wall structure, if deficient, the active growing tissues are the first to show symptoms.

Another reason that the growing points are the most prone to showing signs of calcium deficiency is because calcium is immobile in the phloem and thus cannot be recycled and moved around the plant. This feature means that an adequate supply of calcium needs to be delivered from the moment the seed germinates through to harvest to prevent necrotic lesions forming which render any horticultural crop unsalable. Common physiological disorders caused by calcium deficiency include;

- **Strawberry**; Tip burn, malformed (cupped) leaves, and small, malformed and insipid fruit.
- **Apple**; bitter pit and water core.
- **Tomato, pepper, melon**; blossom end rot.
- **Celery**; black heart.
- **Poinsettia**; bract necrosis.
- **Peanut**; empty pod.
- **Orchard crops**; cracking of fruit after irrigation/rain.
- Tip burn **in numerous crops**

A further process that calcium is known to be integral to is cell signalling. It has long been known that calcium plays a central role in controlling the aperture of stomata, and numerous other responses to environmental stimuli and stresses. Two stresses that it is known that calcium ions regulate the response to is cold acclimation and heat stress. Therefore, if temperature stress is imposed (such as a frost or a glasshouse getting very hot) calcium levels need to be adequate. It is not just the signalling that calcium is involved with during periods of stress, with the ion itself also acting as an osmoprotectant when stored in the plant's vacuole and thus protecting against osmotic stress during drought and salt stress.

It is not just internal plant signals that calcium is important for. It is now known that calcium ions are a key signal in the communication that occurs when plants form symbiotic relationships with mycorrhizal fungi and nitrogen-fixing bacteria.

Finally, calcium is essential for the creation and maintenance of a good soil structure. Calcium flocculates soil aggregates that have been damaged by compaction or salt stress. This is particularly important in clay soils. This is one of the main reasons for the widespread use of lime (calcium carbonate) and gypsum (calcium sulphate) in agriculture. However, with lime and gypsum being insoluble, they are not suitable for liquid fertilizer addition and need working into a soil.