

# COPPERGRO

## FREQUENTLY ASKED QUESTIONS

### What is CopperGro?

CopperGro is an organic natural mineral nutritional supplement for plants that dramatically boosts growth through two avenues. As a Specialty Fertilizer, it delivers key nutrients to increase overall plant health; and serves as a natural defense against chief stressors on plants. The net result is that plants not only enjoy a richer diet of nutrients, they can also deploy a greater proportion of those nutrients for growth, rather than fighting off disease.

### Is CopperGro Regulatory Approved?

CopperGro is considered a Specialty Fertilizer for Cannabis grown indoor, outdoor, in greenhouses and in tents by the Canadian Food Inspection Agency (CFIA).

### How does CopperGro work?

The key to CopperGro is nutrient bioavailability. Nutrients found in growing media, like soil, are not always fully available to a plant. If iron in soil is only 60% bioavailable, for example, 40% of the soil's iron content will not be taken up by the plant; it will simply sit in the ground and contribute nothing to the plant's growth.

The problem of bioavailability is a longstanding one. Throughout the history of modern agriculture, scientists have striven to increase nutrient bioavailability for crops, with varying success. For plants, CopperGro has solved this problem. CopperGro radically increases the bioavailability of copper, a nutrient that is a key contributor to plant growth. Not only does copper constitute a vital nutritional element for plants in and of itself, it also increases the bioavailability of other critical nutrients including iron, manganese, and calcium. This amplification of overall nutrient bioavailability is the secret to CopperGro's effectiveness.

### But lots of other nutritional supplements also contain copper. Why is CopperGro different?

A supplement's effectiveness doesn't depend simply on the presence of copper; it depends on the bioavailability of that copper. This is where CopperGro differentiates itself. **Unlike the copper in the vast majority of other supplements, the copper in CopperGro is ionic,  $\text{Cu}^{2+}$ , and 100% bioavailable.** This degree of bioavailability represents a dramatic breakthrough in plant science. It's why we called the product CopperGro.

### Is 100% bioavailability really that important?

Yes. A copper solution that is 100% bioavailable is 100% efficient. That means you need to use much less CopperGro to deliver a given level of copper than you would using an inferior product; for example, a supplement with only 20% copper bioavailability such as copper sulfate (bordeaux mixture), would require five times more volume than CopperGro.

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## What advantage does 100% bioavailability confer?

There are two vital advantages that 100% bioavailability confers: lower cost and better for the soil and environment. The need for a lower volume of product to achieve a given level of copper in plants translates into a substantial cost saving. The absorption of 100% bioavailable ionic copper ensures that the growing medium in which it is deployed (i.e., soil) remains healthy, zero copper residue accumulation.

## Please explain that last point in more detail. How does the soil stay healthy?

Any solution in which an element is not 100% bioavailable will leave behind the corresponding percentage of that element; a 20% bioavailable copper solution, for example, will leave 80% of its copper in the growing medium. This poses a major problem for soil management. Regularly feeding soil with a copper solution that is not fully absorbed by plants will damage the soil over time. As the amount of copper in the soil accumulates, the soil will become harder, less hospitable to plants and ultimately toxic. A grower would then have to remediate the soil or dispose of it in a safe manner. This represents a significant cost in terms of time, soil monitoring and money.

## So, CopperGro is not just good for the plant's growth, it's also good for the environment?

That's correct.

## How does CopperGro encourage the uptake of other nutrients?

CopperGro activates other nutrients through absorption and transportation:

**Absorption:** In their solid, neutral form, nutrients are often not available to plants; in their ionic form however, they become much more readily absorbable.<sup>1</sup> For example simply adding iron to soil will not significantly affect plant growth because only a small amount of it will be taken up by the plant. In the presence of CopperGro, the iron will be converted into an ionic form that becomes bioavailable to the plant which is key to photosynthesis.

**Transportation:** CopperGro regulates enzymes and proteins that transport elements through a plant's structure. For example, by activating the transporter protein within plants (known as transferrin), CopperGro facilitates the uptake of critical nutrients including iron, manganese, and calcium. Thus preparing micronutrients for use by the plant and delivering them where they are required.

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<sup>1</sup> (In ionic form, an element has a deficit or surplus of electrons that allows it to bond more easily with other elements and form a compound. This facilitates delivery of the element within a plant.)

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## **How does CopperGro deliver an increase in yield of up to 25%?**

As noted above, CopperGro is a vital micronutrient for plants and part of the enzyme responsible for the absorption of other nutrients. The dramatic increase in available nutrients stimulates growth.

That growth is further enhanced by CopperGro's role as a natural defense against chief stressors on plants. By fighting off stressors that can drain energy from a plant, CopperGro ensures that the already elevated level of micronutrients in the plant can be used for growth. Taken together, these two features of CopperGro deliver an increase in terpenes, an increase in cannabinoids, a yield increase that is as much as 25% greater than a control crop that has not been treated with CopperGro and up to a 2% increase in THC levels.

## **Copper is a heavy metal. Doesn't that make it dangerous to human health?**

No. When scientists talk about the toxicity of heavy metals, they're referring to things like lead, mercury, arsenic and cadmium. They're not referring to things like iron or copper.

Copper is found in all body tissues, notably the liver, brain, heart, kidneys and skeletal muscle. It plays an essential role in making red blood cells, and it facilitates the uptake of iron and the formation of collagen. We receive copper from many foods in our diet, including shellfish, whole grains, beans, potatoes, yeast, dark leafy greens, cocoa, fruits and nuts.

Both copper deficiency and copper toxicity in humans are rare and a plant will only absorb as much copper as needed.

## **QUESTIONS ABOUT APPLICATION**

### **Should I use as a foliar spray, irrigation supplement, or both?**

We recommend doing both! Foliar spray will aide as a natural defence to plant stressors and irrigation feeding maintaining water reservoirs free of microbials and pest, providing clean water and keeping water lines free of scaling and biofilms, making the nutrients in the growing medium bioavailable and helping plants uptake nutrients.

### **Can I apply CopperGro by foliar spray with the lights on?**

We recommend foliar spaying with the lights off. This minimizes risk to the plant under intense light.

### **Can I use CopperGro with a surfactant?**

Yes, although it is not necessary, by wetting the plant you will increase absorption and efficiency.

### **Do I need to adjust my pH levels?**

CopperGro in its natural form has an approxomite pH of 2. For best results we suggest to prepare the desired application rate and to bring the dilution to a level not less than 5.4 pH. When growing in

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soils, the pH of the irrigation water will not always affect the soil pH. In fact, most of the time –it won't, especially in soils with high carbonate content.

## Will any pH up product work?

We advise to use a pH Up product that does not contain a **hydroxide** such as **potassium hydroxide**. Hydroxide's bond with ionic copper and the net result will be less efficacy and you will find copper particles floating in the solution. It may not be clear which pH Up products contain hydroxide's, the following products use Potassium Hydroxide: Advanced Nutrients pH-Up, General Hydroponics pH Up Liquid and Technaflora pH Up. We do not recommend use of those products. Products we recommend for use include: Green Planet pH Up Base Solution (Potassium Carbonate), TNB Naturals Granular pH Up (Potassium Acid Carbonate), and Earth Juice Crystal pH Up (Potassium Bicarbonate) to name a few or products where the active ingredients are: Trisodium Citrate, Sodium Citrate, or Ammonium Sulfate.

## How do I apply CopperGro?

CopperGro application varies by type of plant and whether or you have existing abiotic stressors. The application rates are listed on the accompanying chart.

<b>For routine plant maintenance, use once weekly:</b>	
<b>Foliage Application Rates</b>	
Week	mL per Litre of Water
1	2.5
Vegetative	
1-2	12.5
Flower	
1-2	25
3+	50-100

<b>For plants with existing stressors use once every 4 days:</b>	
<b>Foliage Application Rates</b>	
Week	mL per Litre of Water
Seedling	
1+	2.5
Vegetative	
1+	25
Flower	
1+	50-100

<b>Soil/Hydro Application Rates</b>	
Week	mL per Litre of Water
1-15	0.5

Ensure full leaf coverage , including under the leaf

Evaluate plant conditions after 3<sup>rd</sup> application, move to plant maintenance, weekly application if plant is healthy.

In all scenarios, test plant sensitivity by applying to one leaf and observing impact, slight curling is expected and should be monitored for plant with existing stressors.