

# Plant growth boosted with water-based carbon dioxide

The Canadian system allows hoop-structure growers to use carbon dioxide as a growth enhancer

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*Growers who use hoop houses can use the CO2 GRO technology even though they don't have an entirely closed environment. Photo: Lilian Schaer*

An Ontario company has patented technology to dissolve carbon dioxide into water and apply it to plants to make them grow faster while also reducing disease problems.

Toronto-based CO2 GRO launched early in 2018 and has sold systems to growers of crops like lettuce, peppers, tomatoes, cannabis and microgreens.

Although many greenhouse growers are already using CO2 treatments in their sealed facilities to help boost plant production, the CO2 water-based delivery makes it possible for growers using hoop houses or shade structures to use carbon dioxide as a growing tool as well.

***Why it matters:*** Adding additional carbon dioxide to the growing environment means larger plants in less time, bigger yields and fewer pathogen issues. Traditional CO2 supplementation is expensive, however, and only suitable for sealed greenhouse environments.

“This has worked on every type of plant we’ve tested, from lettuce and peppers to relatively short cycle greens and cannabis,” says Aaron Archibald, vice president of sales & strategic alliances at CO2 GRO Inc. “We’ve also put the system into floriculture where it helps root systems get bigger and stronger, which means fewer (plant) returns to growers from retailers.”

The system applies the CO2 through a very fine water mist that covers plant leaves. It can be integrated into existing sprayer technology.

Matt Julius is a professor in biological sciences at St. Cloud State University in Minnesota who was involved in research related to CO2 GRO’s technology during its development phase. He has since taken a sabbatical to work more closely with the company to validate and expand its technology, including adapting it for use in outdoor environments.

The application frequency is fairly high as the amount of CO2 going onto the plant each time is still relatively small, but Julius says good efficacy is seen if plants are sprayed hourly. An added side benefit has been the discovery that these treatments seem to inhibit pathogen growth. That’s because when CO2 is added to water, the pH level drops and then rises again as the plant absorbs the CO2. This creates an unstable environment that keeps plant diseases from growing well.

Powdery mildew, a common disease in many plant crops, is one pathogen that will grow more slowly in this type of environment, according to Julius, making it easier for growers to isolate and manage infected areas more rapidly.

To date, the company's focus has been on North America, where Archibald expects the American hemp industry to soon become their number one client sector. However, they've also seen significant uptake in the Middle East, where the hot, dry climate means most plants have to be grown indoors.

"Heat is a big issue there and since we deliver the CO<sub>2</sub> through a water mist, it also cools the plants. That, along with higher yields, faster plant cycle times and pathogen reduction, is helpful," Archibald says.

Although it depends on the crop, he estimates the technology delivers on average about a 25 per cent yield increase and a 25 per cent decrease in the time it takes a crop to grow from seed to harvest maturity.

"The decrease in crop loss is harder to measure as it's still in fairly early stages, but we've definitely seen a slowdown in spread of powdery mildew in cannabis," he says.

The cost depends on many variables, from size of the structure to whether or not existing spray or misting infrastructure is in place. Currently the company offers small scale sales and leases to growers willing to try the technology, but expects to be transitioning to solely full-scale roll-outs in the future.

Julius is now also conducting research into the technology's ability to serve the emerging biopharming industry that looks to plants and animals to produce pharmaceutical substances for use in human health.

"This is our ability to identify and stimulate growth of new biochemical compounds produced by plants, bacteria or fungi that have some impact on human health," Julius explains, adding there's a lot of potential in being able to deliver oxygen on demand to different points on the plant that will direct its metabolism to perform specific biochemistry.

CO<sub>2</sub> GRO received early stage start up support from former Ontario Agri-Food Technologies President Gord Surgeoner, who now sits on the company's board. Research into the technology was also conducted at the University of Guelph.

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