
SHOULD YOU BE INTERESTED IN CARBON DIOXIDE?

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Fertilizing greenhouse atmosphere with carbon dioxide can be compared to other recent greenhouse industry milestones such as steam sterilization, constant fertilization, mist propagation, and automatic watering. Why should you be interested in carbon dioxide fertilization? Because the structures of today are tighter than they were years ago, and the use of organic mulches such as manure is almost a thing of the past. There no doubt is less carbon dioxide in greenhouses today than 10 years ago. Carbon dioxide starvation in the plant can be compared to oxygen starvation in the human being. Skiers who exercise at altitudes above 7,000 feet do not operate with very much vigor. World War II fliers know how weak a person becomes when he flies without supplemental oxygen at altitudes of more than 10,000 feet. There simply is not enough oxygen in the

blood system to properly burn the sugar to create energy. A similar process operates in a plant -- only in an opposite direction. Without proper amounts of carbon dioxide in the greenhouse atmosphere, the plant cannot manufacture proper amounts of sugar.

Wide Application

Very seldom does any subject come up at these short courses which is applicable to all people attending. But carbon dioxide fertilization affects all of you: rose growers, pot plant growers, chrysanthemum growers, carnation growers, spring bedding stock growers -- all of you can benefit from the use of carbon dioxide in your greenhouses.

It is difficult to conduct comparative research on carbon dioxide because this gas is very diffusive, and it is difficult to segregate growing areas into the various levels. This is especially true for commercial greenhouses.

Any grower who installs carbon dioxide should plan to pay for the cost of installation through increased revenue. This can be done in several ways. It will be difficult to sell his produce for more money, but the crop time required when growing under proper carbon dioxide levels is noticeably reduced, thereby lowering the cost of production. Crop spacing can be generally adjusted because of this shorter time requirement on the bench. Lower night temperatures for chrysanthemums are recommended, thereby lowering heating costs.

It is necessary to increase the fertility program when growing crops under adequate supplemental carbon dioxide. Generally it is recommended that the winter program be doubled, which will be the equivalent of a full summertime fertilizer program. When proper carbon dioxide levels are maintained, the fertility level must be balanced accordingly or the maximum benefits from adding carbon dioxide will not be realized. It is amazing just how much fertilizer can be added during the winter months with the addition of carbon dioxide.

When to Use

Carbon dioxide should be injected into the greenhouse atmosphere starting 2 hours before dawn and continuing for 8 to 10 hours. Photosynthesis is at its most active stage in the early morning, and the pull of carbon dioxide from the atmosphere goes on at a phenomenal rate. It is impossible to build carbon dioxide levels to the recommended level (1,500 p.p.m. average for most crops) when starting from a low point at 8 a.m. If the sun rises at 7 a.m., injection should start at 5 a.m. so the atmosphere is at 1,500 p.p.m. when it starts getting light.

Relative to heat generation, carbon dioxide starvation is greatest when vents are closed in cold weather. It is at this time that greenhouse heat costs are so high. By maintaining the proper amount of carbon dioxide from combustion, a temperature rise of from 4 to 6° will result. This is an advantage, not a disadvantage. Carbon dioxide moves at an unbelievable speed when it is warm. As it cools, it settles around the plants in an efficient manner.

I will cover individual crop advantages separately; at this stage I would like to encourage every grower who plans to be in business for more than 2 years from this date to get some firsthand experience so he will have an early understanding of what carbon dioxide fertilization will do for him. It is not enough to wait until universities or competitors prove its great advantage to you before you try it yourself. With several of the methods now recommended, cost cannot be an excuse. Installation of carbon dioxide fertilization should pay for itself within one growing year. Regardless of how long you wait to make up your mind about the advantages of carbon dioxide, you will have to go through an adjustment on a small scale, and the sooner done the further ahead you will be. This by the way applies to all newer growing techniques. GET STARTED AS SOON AS YOU CAN ON AS SMALL A SCALE AS POSSIBLE. THEN YOU WILL NOT GET HURT AND MAY VERY WELL BE A FULL YEAR AHEAD IN REAPING THE BENEFITS OF THESE NEWER GROWING TECHNIQUES.

Specific Crops

Advantages of carbon dioxide by individual crops is as follows:

ROSES: Longer and heavier stems, faster return from holiday cuts, better color, with breaks coming from older hard wood low on the plant. Carbon dioxide can very well make the difference on a Christmas cut returning for Valentine's Day.

CARNATIONS: Stronger stems, flowers open faster in dark weather, faster return on the second crop -- this is very important to the carnation grower who wants to cut heavily for Christmas and still have a heavy return in this part of the country for April and May -- more uniform grades and heavier breaks.

CHRYSANTHEMUMS - Pot Plants: Up to 25 percent more breaks on Princess Anne varieties, better flower color, one week to 10 days shorter crop time, newly planted cuttings become established very rapidly, plants can be grown and finished at closer distances because of the heavier growth. Flower buds will set at 56 to 58° F. even on stubborn varieties.

CHRYSANTHEMUMS - Cut Flowers: Indianapolis and Mefo varieties will set flower buds at 56° whereas 60 to 62° was recommended heretofore. Crops can be finished at cool temperatures with no quilling or pinking. Fred Shoemith varieties will be as much as 46 percent taller. On all nine varieties tested last year there was an increase in height of 22 percent and an increase in fresh weight of 20 percent. There is a possibility of running the more popular 10-week varieties of chrysanthemums straight through the winter without any weakness.

SNAPDRAGONS: Faster crop time by as much as 2½ weeks, stronger and firmer stems. Spikes are longer and are not brittle, more uniform and more rapid cut-off of the crop, less trouble with root rot and stem rot problems. A faster come-back on a pinched crop also results.

SPRING BEDDING PLANTS: Geraniums are very responsive to carbon dioxide. With a well grown cutting it is possible to finish a good 4-inch geranium in 6 to 7 weeks. Geraniums also come into bloom faster with added carbon dioxide.

PETUNIAS: Petunias are stockier and more heavily branched when carbon dioxide is added. In general spring bedding stock responds noticeably well when carbon dioxide is injected into greenhouses.

In all the research that has gone on to date there is no one I can find who does not praise the use of carbon dioxide. The potential is so great that I cannot see any reason why any grower who looks into the facts that are now so readily available would not put in at least a good commercial test of this new and wonderful growing advantage.

Certainly cost is not an argument. There are a number of sufficient, safe, and reasonable methods available to you. Please, let's not procrastinate, but let us get started now -- this season.
