

# EXHALE HOME GROWN CO<sub>2</sub>

first carbon dioxide bags in the world



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## RESOURCES

## The Birth of ExHale

Some 20 years ago I realized the biological function of mycelium. Before that for 25 years I had lived a life of a seed breeder's son. My father always had a saying; "First the Seed", when I was young we would plant thousands of crosses hoping to get 20-30 that showed promise of actually becoming a hybrid worth offering to the public. This process would be years in the making.

That same philosophy went into creating ExHale. It is well known that mycelium releases CO<sub>2</sub> just like humans. When looking into the possibility of utilizing mycelial-cultivated CO<sub>2</sub> for plant production it was obvious to me, it has to be a special strain that only wants to produce CO<sub>2</sub>. With most cultivated mushrooms, your goal is to get mushrooms. Go figure. After you have harvested your crop what you have left is fairly valuable, mostly for compost, which in itself produces CO<sub>2</sub>. The gig is a mycelial strain that produces little or no primordia has more vigor and therefore produces more CO<sub>2</sub> for a longer period of time. Just like a mother plant, ExHale just keeps cranking as if there is no end to the day. ExHale came out of a true love of agriculture and out of the need for a less expensive, easier, safer and more harmonious way to provide your plants with CO<sub>2</sub>.

**Good growing, Glen.**



## How its made

What began as an idea many years ago in a small workspace where I lived has now turned into a full-time occupation. Garden City Fungi is located close to the city of Missoula, MT and was founded in 1995 with a focus of producing fresh, healthy, organic mushrooms. Producing mushrooms is not all we do. I would like to welcome you to our farm as we go on the journey of how the ExHale Homegrown CO2 bag came to be.

The development of the ExHale Homegrown CO2 Bag began over a decade ago. Wendy and I, along with a university graduate research student, traveled to China in early 2002 in search of mushroom strains. We spent close to a month traveling the countryside, procuring and learning about many different mushroom strains. We collected and returned to the United States with more than 200 strains. One of these strains eventually became the ExHale strain.

When producing mushrooms your goal is to find a strain that produces mushrooms easily and consistently. When looking at a strain for CO2 production the reverse is true. A strain that is non-fruiting will produce more CO2 for a longer period of time. After a strain actually produces a fruiting body, CO2 production falls off as vigor drops. The mycelium knows that reproduction has taken place and realizes that its genetics will be passed on. Basically the mycelium becomes lazy.

We began testing strains and looked at a number of characteristics including speed of colonization, strength of mycelial threads and the inability to fruit. The amount of CO2 produced by each strain was also tested. After a long and vigorous process we focused in on one strain that we believed held great promise. Through a process of tissue transfers from petri plate to petri plate we sub-cultured this strain a number of times. With a trained eye you can notice desirable characteristics and selectively transfer this thread of mycelium into a new plate insuring that characteristic is preserved. The ExHale strain is now stored in a number of strain vaults that we operate here at the farm as well as off-site locations, one of which stores the strain cryogenically at -70F.

When working with mycelial cultures, we must continually be working in a sterile environment. The mycelial cultures for ExHale begin their life

inside a petri plate; the substrate is potato dextrose agar. Once the mycelium has colonized the plate it's time to move to a more nutritious substrate. Cereal grains are the perfect choice for the second phase of mycelial growth. The substrate is autoclaved at 250°F for one hour to insure sterilization. There are many choices of grain but most use rye, wheat or millet. Mycelium is transferred to the cereal grains and allowed to grow out completely.

Once this second phase is complete, we begin to prepare the final substrate for the purpose of CO<sub>2</sub> production. We have developed techniques here that are on the cutting edge. Our scientific discoveries have been published in scientific journals and presented at scientific conferences world-wide. The science lies in the carbon/nitrogen ratio or C/N ratio. Most mushroom producers pay little attention to this; however it may be the single most important factor when it comes to a good substrate. The ExHale substrate is fortified with more nutrients than normal mushroom substrates which allows for more CO<sub>2</sub> production over a longer period of time. The substrate is blended and water is added to achieve a moisture content of around 65%.



After blending, the substrate is placed into a heat tolerant bag prior to being autoclaved. This bag contains a micro-porous breather patch that will allow the bag to breathe after it is inoculated. Once sterilized, the bags are allowed to cool in a HEPA filtered environment to maintain sterility. Once cooled, the bags are inoculated with the ExHale strain and the bag is sealed using a high-heat continuous belt sealer. The bags are pressure tested to insure a good seal and allowed to sit in our incubation room while the mycelium recovers from the transfer. After a few days mycelial growth is evident and it is now time to label and date each bag. Each bag receives a replace by date and is packed and is now ready to ship. ExHale is made to order, we ship within 1 week of inoculation. We ship to a number of stores direct as well as utilizing a number of distributors. Within the next few weeks the color of the bag changes from the brown color of the substrate to the whitish color of the mycelium. This white color means optimum CO2 production.

### ExHale Flow Rate - CO2 Flow Information

+/-0.5 ft<sup>3</sup> per minute of 2500-3000ppm enriched CO<sub>2</sub>.

130,000 cubic feet 2500-3000ppm enriched CO<sub>2</sub> over 6 months.

ExHale was created with the grower in mind. We are here to help those in our industry succeed. ExHale was created by farmers for farmers. We believe that customer service is key. They always say the "customer is right"; our motto is if the end user of our product is not happy then we are not happy. We welcome calls from anyone who has questions or concerns about the ExHale bag. When you call us, you talk to someone who cares about your concerns. That is just the way we operate. So the next time you see an ExHale CO<sub>2</sub> bag you will know a little bit more about us and know a little bit more about how it's made.

## **The Truth of ExHale**

Growing plants of any kind is a labor of love. We as humans are drawn to this because of our desire to survive and provide for ourselves. ExHale is here to help you grow. ExHale is knowledge. Our proprietary strain outperforms the competition every time. Whether in a bag, a bucket or anything else the ExHale strain is what drives our product, not the container.

The ExHale strain was developed for the purpose of CO2 production. There are other products that claim CO2 production, and while they do produce CO2, they are actually strains that are meant for food production. ExHale provides you with the most all-natural ppm's on the market. The competition can't meet our substrate standards; we developed techniques years ago that are now highlighted scientifically worldwide.

I hear of "you are buying a mushroom kit in a bag" and I think if anyone should know mushroom kits it would be us, we introduced the first retail ready packaged mushroom kit many years ago. ExHale is not a kit in a bag, ExHale is a stand alone product, the Original CO2 Bag that is the number one all- natural CO2 production unit on the market.

As a farmer, I wish to you the best in your growing and always know that we are here for you. ExHale was developed by farmers for farmers.

**Good Growing, Glen**

