BIODOX™

CONCENTRATED LIQUID STERILIZER

Is The Fusarium Pest Your Hidden Opportunity?

Two different species of Fusarium can be found in the top ten fungal plant pathogens[1] list, making it one of the most potentially devastating pests in agriculture. And since about eighty percent of microbial spoilage of fresh fruits and vegetables is caused by fungi, this basically means that if fusarium is present, the chances of other fungal infections to be either latent or active is high. Rather than an opportunity, this may sound like the telltale of disaster.

The Fusarium genus is complex, with over a 1500 identified and estimated species that have spread throughout the world[2], affecting a wide range of host plants, even jumping to new ones leaving farmers paralyzed when this happens, especially when the symptoms are unknown, meaning the cures or ways to control them are also unknown or non-effective. Which of the 36+ species is the one affecting a given crop? Does it matter? Not, if one considers that they are all fungi and that they can all be controlled with Biodox™.

Biodox™ is a type of aqueous chlorine dioxide especially designed for your agricultural needs across the board. Biodox™ is highly effective for various types of applications, from root drench and soil sterilization (the main places where Fusarium and other fungal life-forms thrive), to direct foliar and stem applications, all the way to surfaces, equipment and even environmental sterilizations.

Specifically for Fusarium, various studies have proven the efficacy of chlorine dioxide in a wide range of applications, from stored potatoes[3] to hot water treatments of Daffodil Bulbs[4], to the inactivation of Fusarium spore inactivation inoculated[5] with chlorine dioxide in fresh chestnut kernels, among others.

The question is not whether chlorine dioxide—and in this case Biodox™ (do consider that not all chlorine dioxides are created equal)—is effective against Fusarium, regardless of species, but how and when to apply it.

Biodox™, being a gas in solution, needs specific ways of application depending on the particular type and area of the problem—soil, stem, leaves, environment, tools and equipment—as well as the magnitude of the problem, the type of crop, time of year, and other considerations.

For example, Is it a latent problem or a severe pest that is getting out of control? Does it need a root drench, soil sterilization, or an emergency application of the entire plant? What is the appropriate concentration or dilution rate for each? All these questions have easy and straightforward answers. The first one is that yes, Biodox™ is effective against any type of Fusarium.

The second question regarding how to apply it depends on the type of crop, magnitude and contamination stage (latent, chronic, or acute), as well as whether its seedlings or harvest time, or whether its in storage or during transport. If these variables are known—and they usually are (except perhaps when the problem is still only latent and therefore invisible)—then a solution depends simply on the farmer's decision to act quickly, in case of an emergency, or follow Integrated Pest Control protocols to not only hit the problem at harvest time, but avoid it all together.

Where is the opportunity in all of this?

As mentioned above, even though you may be concerned about one of the many Fusarium species, it most likely isn't the only pathogen that is affecting your investment. Biodox™ will aid in not only controlling or eradicating Fusarium, but it will also prove effective toward other latent, chronic or acute microbial spoilage since it's affective not only against fungal infections like Fusarium, but it's the most potent biocide in the market that has no health or environmental side effects, and against which germs cannot build a resistance.

BioCentric Solutions

Manufactured in the USA by BioCentric Solutions
12400 Loma Rica Dr. Grass Valley, CA 95945
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The BioCentric Solutions Ethos

BioDox™ was developed by BioCentric Solutions, a company that believes in creating the most effective solutions to dangerous pathogens without harming people or our planet. Our mission is to create safe and effective solutions that improve the health of the world around us.

BioDox™

Pathogen Prevention

Plant Life Cycle	CLONE		VEG				FLOWERING							
WEEK			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
Soil Sterilization	25ppm		25ppm											
Root Drench		2.5ppm		2.5ppm		2.5ppm	5ppm		2.5ppm					
Foliar Spray			25ppm			25ppm		25ppm		50ppm		50ppm		50ppm

Infection Outbreak Control

Plant Life Cycle	CLONE		VEG				FLOWERING							
WEEK			W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
Soil Sterilization	25ppm		25ppm											
Root Drench		2.5ppm			5ppm		5ppm		5ppm		5ppm			
Foliar Spray		25ppm		25ppm		25ppm		25ppm		50ppm	50ppm	50ppm	50ppm	50ppm

Soil Sterilization

Soil Sterilization is a critical step to insure that colonies of pathogens are reduced or eliminated before the plants are introduced to the soil. This is accomplished by using a 25ppm solution of Biodox in the water system for the farm. This solution travels from the water tank through the pipes and emitters to then fully saturate the soil. Depending on conditions, 60-80 gallons per yard is applied and allowed to completely dry back. It is recommended to allow the product to dissipate for three days before introducing new plants into the soil. Biodox is a gas in solution and will completely dissipate. Additional benefits of this approach include cleaning the tank, lines and emitters of biofilm. Soil Sterilization is recommended at the beginning of the growing season, or between harvesting and planting the next round.

Root Drench

Root Drench is a soil treatment with Biodox performed while the plant is in the soil. The dosage is one tenth of the dosage used for soil sterilization. A preventative approach includes using a 2.5ppm solution regularly and a 5ppm solution if there are symptoms of infection. The root drench method allows for colonies of pathogens to be reduced without destroying good microbes or causing lock out. This allows the beneficial microbes an opportunity to dominate the terrain. Apply product through the watering system during the watering cycle between feedings. Allow the soil to dry back as much as possible until plants begin to shows signs of wilt, then resume watering and feeding as usual. For preventive maintenance use a 2.5ppm (1oz per ten gallons)solution every other week throughout Veg and the first six weeks of flowering. If there is an infection, use Biodox at a 5 ppm solution (2oz per ten gallons) every week until symptoms subside and then every other week until harvest.

Foliar Spray

Foliar applications are critical to maintain a sterile environment. Third party studies show that using Biodox as a plant wash removes biofilm from the leaves allowing for greater photosynthesis, creating higher yields and terpenes. Most importantly, Biodox targets pests like PM, Boytritis, and many others agricultural pathogens by selectively oxidizing them in a way no other chemical does. It discourages and oxidizes small pests like mites, aphids and thrips without toxicity or residue. Biodox can be used during the curing phase after harvest to discourage spider mites or pm without reducing THC or terpene content. Biodox is completely non-toxic and made of compounds not tested for in DCC testing, making it ideal for the last weeks of flowering.

[1] Dean, Ralph, et al. "The Top 10 Fungal Pathogens in Molecular Plant Pathology: Top 10 Fungal Pathogens." *Molecular Plant Pathology*, vol. 13, no. 4, May 2012, pp. 414–30. DOI.org (*Crossref*), https://doi.org/10.1111/j.1364-3703.2011.00783.x.

[2] Arie, Tsutomu. *"Fusarium Diseases of Cultivated Plants, Control, Diagnosis, and Molecular and Genetic Studies." Journal of Pesticide Science*, vol. 44, no. 4, Nov. 2019, pp. 275–81. *DOI.org (Crossref)*, https://doi.org/10.1584/jpestics.J19-03.

[3] Olsen, Nora L., et al. "*Efficacy of Chlorine Dioxide for Disease Control on Stored Potatoes.*" *American Journal of Potato Research*, vol. 80, no. 6, Nov. 2003, pp. 387–95. DOI.org (Crossref), https://doi.org/10.1007/BF02854250.

[4] Chastagner, G. A., and K. L. Riley. "POTENTIAL USE OF CHLORINE DIOXIDE TO PREVENT THE SPREAD OF FUSARIUM BASAL ROT DURING THE HOT WATER TREATMENT OF DAFFODIL BULBS." Acta Horticulturae, no. 570, Feb. 2002, pp. 267–73. DOI.org (Crossref), https://doi.org/10.17660/ActaHortic.2002.570.34.

[5] Chen, Z., and C. Zhu. "Modelling Inactivation by Aqueous Chlorine Dioxide of Dothiorella Gregaria Sacc. and Fusarium Tricinctum (Corda) Sacc. Spores Inoculated on Fresh Chestnut Kernel: Modelling Inactivation by Aqueous Chlorine Dioxide." Letters in Applied Microbiology, vol. 52, no. 6, June 2011, pp. 676–84. DOI.org (Crossref), https://doi.org/10.1111/j.1472-765X.2011.03061.x. //
Chen, Zhao. *"MECHANISM OF FUSARIUM TRICINCTUM (CORDA) SACC. SPORE INACTIVATION BY CHLORINE DIOXIDE."* Journal of Microbiology, Biotechnology and Food Sciences, vol. 4, no. 6, June 2015, pp. 542–45. DOI.org (Crossref), *https://doi.org/10.15414/jmbfs.2015.4.6.542-545*.

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