CONTROL OF FIRE BLIGHT WITH SODIUM CHLORITE/CHLORINE DIOXIDE

Presentation to IR-4 IS00368
Anne Crow, Ph. D
September 23, 2019

Seeking EPA Registration for Use on Growing Food Crops

- Preliminary results spraying chlorine dioxide treated water on apple orchards shows promise in controlling fire blight (*Erwinia amylovora*)
- Residual levels of chlorine dioxide in range of drinking water and organic standards
- Applications to vineyards, pome, stone crops

Sodium Chlorite/Chlorine Dioxide Overview

- Chlorine dioxide is powerful antimicrobial

- Sodium Chlorite + Acid → Chlorine Dioxide
  (EPA Reg.)

- Chlorine dioxide is NOT: chlorine or bleach.
- Chlorine dioxide does not produce halogenated by-products.
- Degrades in sunlight to chloride, chlorite, chlorate

Regulatory Overview

Sodium chlorite/chlorine dioxide currently registered as antimicrobial for use in many applications, including:

- Human drinking water
- Agricultural post harvest
- Agricultural irrigation water systems

➢ We are seeking EPA registration for use on growing food crops

Preliminary Results Promising

- Lab tests on *Erwynia amylovora*

  Amit Dhingra, Ph. D., Biotechnology Program, Washington State University

- Field Tests
  - Apple trees, foliar spray
  - 2 to 25 ppm chlorine dioxide in water solution
  - 100-300 gallons treated water solution per acre
  - From pre-bloom to petal fall, any blight incidents

Field Test Results

Neighbor

Trial Orchard

2ppm	5ppm	10ppm	25ppm	Entire Ranch
2 strikes per area	0 strike per area	1 strike per area	1 strike per area	Averaged 4-5 blight strikes per tree

Application Residuals

October 2018

Collection Point	ClO2 (ppm)
Spray tank	18.3
Tree Drip	0.13
Ground	0.14
Drinking Water MRDL	0.8

Drinking Water and Certified Organic

EPA United States Environmental Protection Agency

Comprehensive Disinfectants and Disinfection Byproducts Rules (Stage 1 and Stage 2): Quick Reference Guide

Regulated Disinfectants	MRDL[3] (mg/L)	MRDLG[3] (mg/L)	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 as Cl_2	4	Unchanged[2]	Unchanged[2]
Chloramines	4.0 as Cl_2	4	Unchanged[2]	Unchanged[2]
Chlorine dioxide	0.8	0.8	Unchanged[2]	Unchanged[2]
[1]A new analytical method for bromate was established with the Stage 2 DBPR.				
[2]Stage 2 DBPR did not revise the MCL or MRDL for this contaminant/disinfectant.				
[3]Stage 1 DBPR included MRDLs and MRDLGs for disinfectants, which are similar to MCLs and MCLGs.				

NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 60 - Drinking Water Treatment Chemicals - Health Effects

Sodium Chlorite [CL]			
Aqua-Clear 15	Disinfection & Oxidation Oxidant	35	mg/L
Freeze Fresh 15	Oxidant	35	mg/L
IVR-SAN 15	Disinfection & Oxidation Oxidant	35	mg/L
IVR-SAN 7.5	Disinfection & Oxidation	70	mg/L

[CL] The residual levels of chlorine (hypochlorite ion and hypochlorous acid), chlorine dioxide, chlorate ion, chloramine and disinfection by-products shall be monitored in the finished drinking water to ensure compliance to all applicable regulations.

WSDA

PO Box 42560, Olympia, WA 98504-2560 Ph (360) 902-1805
In accordance with Chapter 15.86 RCW and Chapter 16-160 WAC

Washington State
Department of Agriculture

MATERIAL REGISTRATION CERTIFICATE

is issued to:

CH2O, Inc.
8820 Old Hwy 99 SE
Tumwater, WA 98501
United States

The products listed below have been verified to comply with the USDA National Organic Standards (7 CFR Part 205):

#	Product Name	Sub-Type	Type	Annotation
1355	IVR-SAN 7.5	Chlorine Material	PH	Must be used for the generation of chlorine dioxide only. Residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act.

Types: CPA - Crop Production Aid, DPC - Disease and Pest Control, FSA - Fertilizer and Soil Amendment, LPA - Livestock Production Aid, PH - Processing and Handling

WSDA Registered Company #: 84
Issue Date: 01/07/2019
Registration valid through 10/31/2019

Brenda Book
Organic Program Manager
DEPARTMENT OF AGRICULTURE
AGR 2291 (R/3/16)

REGISTERED MATERIAL For Use In Organic Agriculture Washington State Dept. of Agriculture

Proposed Tolerance Amendment

Current Tolerances:

- 40 CFR 180.940(b) and (c) –oxychlorospecies in antimicrobial formulation exempt when applied to dairy and food processing equipment and utensils
- 40 CFR 180.1070 –sodium chlorite is exempted from the requirement of a tolerance for residues when used in accordance with good agricultural practice as a seed-soak treatment in the growing of the raw agricultural commodities vegetable, brassica, leafy, group 5, and radish, roots and radish, tops.

Proposed Tolerance Amendment:

- 40 CFR 180.1070 –sodium chlorite is exempted from the requirement of a tolerance for residues when: (a) used in accordance with good agricultural practice as a seed-soak treatment … (b) used as a microbiocide in accordance with good agricultural practice on the growing crops pome fruit, stone fruit, tree nut, and grape.

Proposed Label: AQUA CLEAR 7.5

- Sublabel A- Antimicrobial/Industrial Uses
  - All industrial uses currently approved
  - Substantially similar to EPA Reg. No. 9150-7

- Sublabel B – Agricultural Food Crop Uses
  - Control fire blight in apples, pears, cherries, almonds
  - Control gray mold, sour rot, powdery mildew, Phomopsis in grapes

Proposed Label (cont'd)

AQUA CLEAR 7.5

Use Rates

- Chlorine dioxide solution concentration 0.25-25 ppm
- Solution per acre 100-300 gal
- Equivalent lbs chloride dioxide per acre 0.0002-0.06
- Maximum yearly application rate per acre 3.75 lbsClO2
- Maximum single application rate per acre 0.06 lbsClO2
- Retreatment interval 24-hr (during blossom)
  7-days (thereafter)
- Pre-harvest interval 0 days
- Re-entry interval 4 hours

Where Do We Go From Here?

21CFR173.325
Raw Agricultural Commodities → **Proposed**

Contact: Tony McNamara, President, CH2O, Inc.