

The Safe Way in Sanitizers;

Neutralises:

- Fungal
 - Bacteria
 - Spores
 - Viruses

An Introduction to

Electrolyzed Water Anolyte

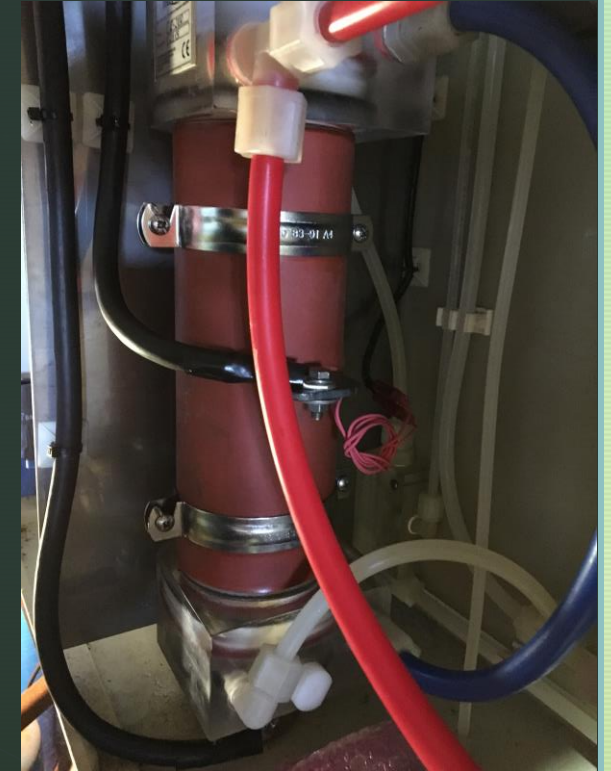


What is Electrolysed Water?



Electrolysed Oxidising Water (EW) Technology

A safer and sustainable alternative to chemical sanitisers in food production and processing

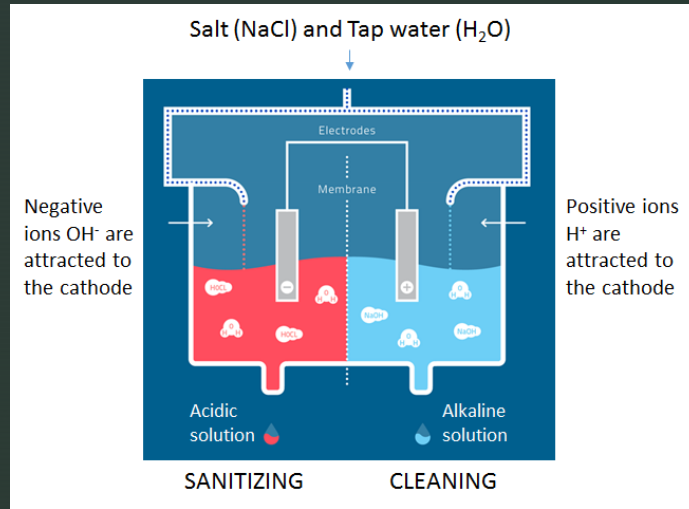


Key Points

- Innovative and ecofriendly technologies for ensuring safety and extending the shelf life of fresh fruit, vegetables and meat.
- EW technology has great potential to provide an alternative to traditional sanitiser chemicals both in the factory and in the field.
- EW is a pH neutral oxidising solution of hypochlorous acid produced from salt, water and electricity
- EW has strong antimicrobial effect at low concentrations against bacteria, fungi and spores
- EW can be used in organic production systems

Introduction

Here in Australia we need to protect our image for having clean green produce. Continuing to improve the shelf life and quality of our fresh fruits, vegetables, meat and fish is important for maintaining a competitive edge in our markets. Reliably controlling microbial spoilage and human pathogens in foods starts at production. EW can be produced on-farm for application by spraying or via irrigation and aquaculture systems to reduce microbial pathogens in our water, soil and on plants. After harvest, EW can be applied to sanitise equipment and produce to help maintain shelf life to market. Research is underway looking at applications of EW determine the effectiveness and impacts of the technology in innovative solutions for agri-food applications. EW has the potential to clean and sanitise processed fruit and vegetables safely, efficiently, economically and sustainably.



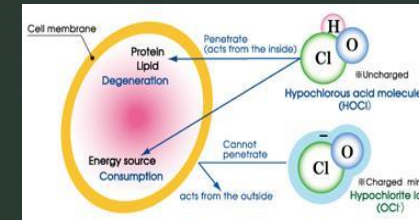
EW is produced by applying an electrical charge to a mixture of tap water and salt. Two solutions are generated by this process:

- Anolyte: pH range 2.-8.5, high ORP up to +1100 mV – used for sanitising purposes

- Catholyte: pH range 10.5-11.5, low ORP -900 mV – used for cleaning purposes.

Catholyte is about 10% of the Anolyte production

- Management of diseases in field and greenhouse
- Equipment cleaning and sanitation
- Seed decontamination; Produce washing
- Aquaculture, Hydroponics, Compost safety



Efficacy

- Contains the active ingredient, hypochlorous acid (HOCl), which is effective against bacteria, viruses, spores and fungi.
- HOCl is also produced by neutrophils in the human body to fight infections.
- EW also contains hydroxyl radicals, which are highly reactive with organics and could provide additional penetrative power.
- Concentration and treatment level depends on the amount of organic matter present, contact time, pH, temperature, agitation and the presence of protective biofilms.

Bacterial

Safety

- Non corrosive.
- Low toxicity and irritant levels.
- No stores of concentrated sanitiser needed.
- Major chemical is common salt
- No residues – once the HOCl has been used, the solution decomposes back into dilute saline solution.

EW machine

- Many brands exist. TIA has an Envirolite portable system that produces 400 L per 10 hours at 500 ppm chlorine.

Electrolysed Water on Farm Usage Pre-Harvest and Water Quality

- Application for Anolyte EW
 - Controlling Diseases in a multitude of crops
 - Phytophthora root rot in avocados and olive trees and hedging
 - Phythium root rot in carrots, beet roots and ginger.
 - Pepper spot in avocados
 - White rust in broccoli
 - Rust in blue berries
 - Sclerotinia in beans
 - Blight and mildews in onions
 - Powdery and downy mildew in lettuce and poppies
 - Anthracnose in avocados on stems and fruit

- **Application Methods of Anolyte or EW**
 - **Fertigation or soil born and leaf Diseases**
 - Through Trickle, Sprinklers, Laterals and Center Pivot Irrigation Methods.
 - 750lts ≥ 1000lts/ha.
 - **Boom Spray Application**
 - 10% to 100% of your water volume used /ha
 - **Treating Irrigation Water from Rivers, Creeks, Dam, and Ponds.**
 - Depending on Organic Matter Load
 - Unfiltered water around 1.0% of water volume used.
 - Filtered water around 0.5% of water volume used.
 - ORP levels to be ≥ 450.
 - **Treating water for stock, piggery's and poultry industries.**
 - Reducing in house diseases by treating the water and removal of the biofilm from out of the water system.



Rates of Application of Anolyte EW

Dilute 1:1	For cuts, abrasions and skin problems
Dilute 3:1	For indoor fogging
Dilute 20:1	For wash and spraying foods
Dilute 100:1	Treatment of animal drinking trough
Dilute 1000:1	For non and potable water treatment
750 ≥ 1000l/ha	For soil born disease (via irrigation)
	Weekly, Fortnightly, Monthly
10% ≥ 50% of the	Folia spraying on most plants
water volume used	Use as a preventative or knock down
Active Ingredient: less than 1% HOCl	

Cost Per Litre to Make Electrolysed Water

- Examples of cost effectiveness:
- 3 cents per litre to make Anolyte EW.
- 1000lts/ha of Anolyte EW = \$30.00/ha for fertigation for soil treatments
- Average spray application of 250lts of water used per ha :
- 10% of 250lts/ha of water used - 25lts x 0.03c = \$0.75 cents/ha for a boom spray application.

What's Happening Under the Soil, After 12 Months Use

THE BEST ON EARTH

JOHN FERGUSON

Soil Consultant

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Laboratory Report To: Lockyer Agronomics
Location: Hampton Orchards
Sample Submitted By: Mr M Parkinson
Date Sampled: 26/05/2016
Laboratory No.: 6759
Sample Type: Farm Soil. "Transplants"

ORGANIC BIOMASS RESULTS OF MICROBIAL READINGS						
Type Of Biomass	Reading ug/ml	Desired Range	Protozoa	Total No ml	Desired Range	
Active Bacterial Biomass	220	100-400	Flagellates	17,000	10,000+	
Total Bacterial Biomass	406	300-700	Amoebae	12,000	10,000+	
Active Fungal Biomass	1.9	2-10	Ciliates	58	20-80	
Total Fungus Biomass	5.3	5-20				

Hypthal Diameter (um) 2.4. This indicates limited true fungi. Most are actinobacteria.

Microscopic microbial viewing of a prepared slide of the above material.
Numbers reported as per Laboratory Reading Scale of 0 to 20 plus.

Nitrogen Fixing Bacteria	General Bacteria	Fungi	Decomposers	Growth Promoters	Desirable Species	Undesirable Species
10	18	12	14	15	18	2

Remarks:

While there is still some room for improvement in biomass numbers, when viewed under a microscope, visual observation was that they are fairly active.

Signature: *John Ferguson*

Date: 17 June 2016

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SOIL BIOLOGY ANALYSIS

Laboratory Report To: Lockyer Agronomics. Location: Hampton Orchards. Sample Type: Farm Soil. "Transplants".
Laboratory No.: 6759 Date: 26/05/2016

Total Numbers as per Laboratory Reading Scale <1 to 20+

Nitrogen Fixing Bacteria		General Bacteria		Fungi		Decomposers etc.		Undesirable Species		Nematodes (per gram of soil)	
Azotobacter	15	Thiobacillus	20	Trichoderma	8	Cellulomonas	15	Thiobacillus	0	Bacterial Feeders	
		Thiooxidans		Koningii		Denitrificans					
Azospirillum	5	Penicillium	12	Fusarium	2	Cellulolytic	6	Desulfovibrio	<1	Cephalobus	0
Nitrosomonas	<1	Heterotrophic	2	Oxysporum	<1	Chaetomium	2	Fusarium SPP	4	Chiloplacus	0
Nitrobacteria	10	Azotobacter	9	Heteriophic	4	Penicillium	18	Pythium	2	Prismatolaimus	0
Bradyrhizobium	6	Bacillus S	4	Gliocladium	5	Streptomyces	5	Rhizoctonia	<1		
Rhizobium	8	Pseudomonas	0	Beauveria	<1	Lactobacillus Casei	0	Verticillium	<1	Fungal Feeders	
				Verticillium	10					Prodorylaimus	0.1
				Bacillus P	20+					Eurylaimus	0
										Thonus	<0.1
										Growth Promoters	
											Desirable Species
										Aporcelaimellus	0
										Bacillus SPP	20+
										Pseudomonas	10
										Xanthomonas	5
										Root Feeders	
										Streptomyces	10
										A Conoideus	15
										Ditylenchus	0
										Xanthomonas	<1
										P Lilacinus	20
										Tylenchus	0
										Bacillus SPP	18
										Helicotylenchus	0
										Predatory Nema	0

Signature: *John Ferguson*

Date: 17 June 2016

Some Verbal Experiences

- Troys - Beetroots
- Waynes - Carrots
- Lynes - Onions & Green beans
- Hampton's - Orchards
- Olive Products Australia - Hedging

Electrolysed Water Usage for Packing Sheds and Post-Harvest Treatments.

Uses of Anolyte EW water

- Use of Anolyte EW water for food processing and equipment .
- Use of Anolyte EW water for vegetables.
- Use of Anolyte EW water for fruits.
- Use of Anolyte EW water for poultry and meat.
- Use of Anolyte EW water for sea food.
- Use of Anolyte EW water for cool room sanitising.
- Use of Anolyte EW water for hydro-coolers.
- Use of Anolyte EW water for water source sanitisation to produce potable water.
- Use of Anolyte EW water for sterilising refrigerated vans and containers.

Achievements

- Anolyte is proving itself as high end disinfecting or sanitising agent for controlling fruit and vegetable pathogens after harvest.
- Unequaled self life durability.
- Unequaled in disease suppression on fresh produce
- Cost effectiveness.
- Very Safe for the work place and the environment.

General applications of EW maintained by ORP meters

- **Water conditioning**
 - Water sources
 - Biofilm remove and suppression
 - Food Sanitiser
 - Shed washing and equipment
- **Hydro coolers**
 - 1% of water volume
 - Use ORP meter to maintain levels
- **Foggers**
 - Cool rooms
 - Refrigeration vans and containers
- **Ice Machines**
 - Ice water pretreatment
 - Slow release oxidant by the thawing process during transport



Pathogen Test Results and Analysis

Presented By: Mark Parkinson of TFA, Lockay and Enviroilte
Leaders in the promotion of biological, sustainable and organic farming systems

Pathogens Targeted

- Escherichia coli
- Salmonella spp
- Listeria spp
- Two different results over time showing the same out-comes.
- All test results came back in favour of EW, well under speck.
- A great result for all involved in the trials
- 10 days after the first test. No degeneration due to pathogens in any of the veggie samples.
- Self life still excellent

CERTIFICATE OF ANALYSIS

CERTIFICATE NO.: 580720
ISSUE DATE: 2/08/17
REVISION NO.: 01
 This certificate supercedes any previous revisions

JOB INFORMATION
 Description: Fruit & Veg
 Date Received: 31/07/2017 12:30
 Testing Commenced: 31/07/2017
 Order No: 46099
 Sample Info: Fruit & Veg

CONDITIONS OF SAMPLE ON RECEIPT
 Receipt Temperature: 2.5 °C (Surface Temperature taken by infra-red)
 Storage Temperature: 4 °C

RESULTS OF ANALYSIS
 Sample(s) were analysed as received, and the results pertain only to the submitted sample(s).

CODE	SAMPLE DESCRIPTION	Escherichia coli cfu/g	Salmonella spp. /25g	Listeria spp /25g
580720 -1	VA-Cauliflower	<10	ND	ND
580720 -2	VA-Broccoli & Cauliflower Rice	<10	ND	ND
580720 -3	VA-Broccoli Florets	<10	ND	ND
580720 -4	VA-Broccoli & Cauliflower Fkrets	<10	ND	ND
580720 -5	VA-Carrot & Broccoli	<10	ND	ND
580720 -6	VA-Carrot & Pumpkin Noodles	<10	ND	ND
580720 -7	VA-Diced Butternut Pumpkin	<10	ND	ND

M8.8 ADAC 991.14 M16.4 AOAC RI 071101 M13.4 AFNOR NF (Bio-12/33-05/12)

DEFINITIONS: += Greater than <= Less than ~ = Estimated ND = Not detected MPN = Most probable number CFU = Colony forming units
 - = Not tested TBA = To be advised * = Test not covered by scope of NATA accreditation RP = Result Pending, confirmatory testing in progress

TREATED WITH ANALYTE START OF SHELF LIFE

Daniela Butluemir, Team Leader
Microbiology (Biosci)

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The results of the test, collaborations and/or measurements included in this document are traceable to Australian/national standards.
 Accredited for compliance with ISO/IEC 17025 - Testing.
 NATA Corporate Accreditation No.: 2455
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Symbio Laboratories Pty Ltd ABN 82 079 445 015
 • Brisbane: 52 Broad Street, Eight Mile Plains QLD 4113 • Tel: 1300 703 146
 • Melbourne: Unit 15, 640-642 Greening Rd, Brooklyn VIC 3025 • Fax: +61 3219 0333
 • Melbourne: 2/1G Marine Parade, Abbotsford VIC 3067
 • Sydney: 2 Sibus Rd, Lone Cove West NSW 2066
 • Rockhampton: Unit 3, 191 Bennekov St, Bennekov QLD 4701
 • Wagga Wagga: Unit 5, 10-12 Koolingal Rd, Wagga Wagga NSW 2650

CERTIFICATE OF ANALYSIS

CERTIFICATE NO.: 583952
ISSUE DATE: 16/08/17
REVISION NO.: 00
 This certificate supercedes any previous revisions

JOB INFORMATION
 Description: Fruit & Veg
 Date Received: 9/08/2017 11:00
 Testing Commenced: 9/08/2017
 Order No: 47602
 Sample Info: Fruit & Veg

CONDITIONS OF SAMPLE ON RECEIPT
 Receipt Temperature: 3.0 °C (Surface Temperature taken by infra-red)
 Storage Temperature: 4 °C

RESULTS OF ANALYSIS
 Sample(s) were analysed as received, and the results pertain only to the submitted sample(s).

CODE	SAMPLE DESCRIPTION	Escherichia coli cfu/g	Salmonella spp. /25g	Listeria spp /25g
583952 -1	VA - Cauliflower Rice	<10	ND	ND
583952 -2	VA - Broccoli & Cauliflower Rice	<10	ND	ND
583952 -3	VA - Broccoli Florets	<10	ND	ND
583952 -4	VA - Broccoli & Cauliflower Florets	<10	ND	ND
583952 -5	VA - Carrot & Broccoli	<10	ND	ND
583952 -6	VA - Carrot & Pumpkin Noodles	<10	ND	ND
583952 -7	VA - Diced Butternut Pumpkin	<10	ND	ND

M8.8 ADAC 991.14 M16.4 AOAC RI 071101 M13.45PP AFNOR NF (Bio-12/33-05/12)

DEFINITIONS: += Greater than <= Less than ~ = Estimated ND = Not detected MPN = Most probable number CFU = Colony forming units
 - = Not tested TBA = To be advised * = Test not covered by scope of NATA accreditation RP = Result Pending, confirmatory testing in progress

Treated with analyte End of Shelf Life

Lockay
Chief Scientist and Technical Microbiologist

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How EW performed against other Sanitisers



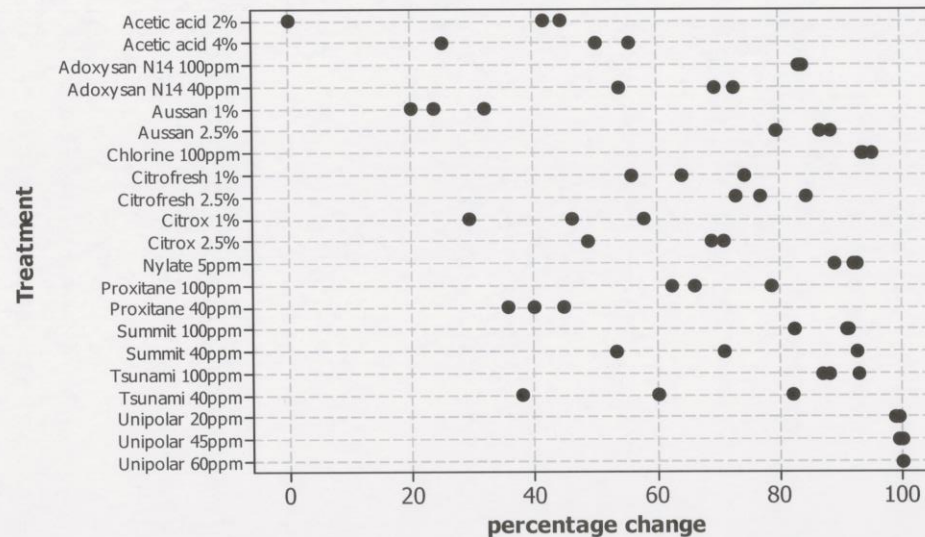
**Unipolar is the Anolyte or EW.
EW is the Winner**

- Has superior efficacy
- Microbial perspective
- Product shelf life
- No chemical(s) to be added.
- A safe working environment
- ECO Friendly &
- Cost effective



% CHANGE IN SPINACH TPC – WATER VS SANITISER WASHING

Individual Value Plot of percentage change from water
Food = spinach



▶ Pictures of different crops under Anolyte spray programs for disease suppression



Presented By: Mark Parkinson of TFA, Lockay and Enviroilte
Leaders in the promotion of biological, sustainable and organic farming systems

Continued



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20/11/2017

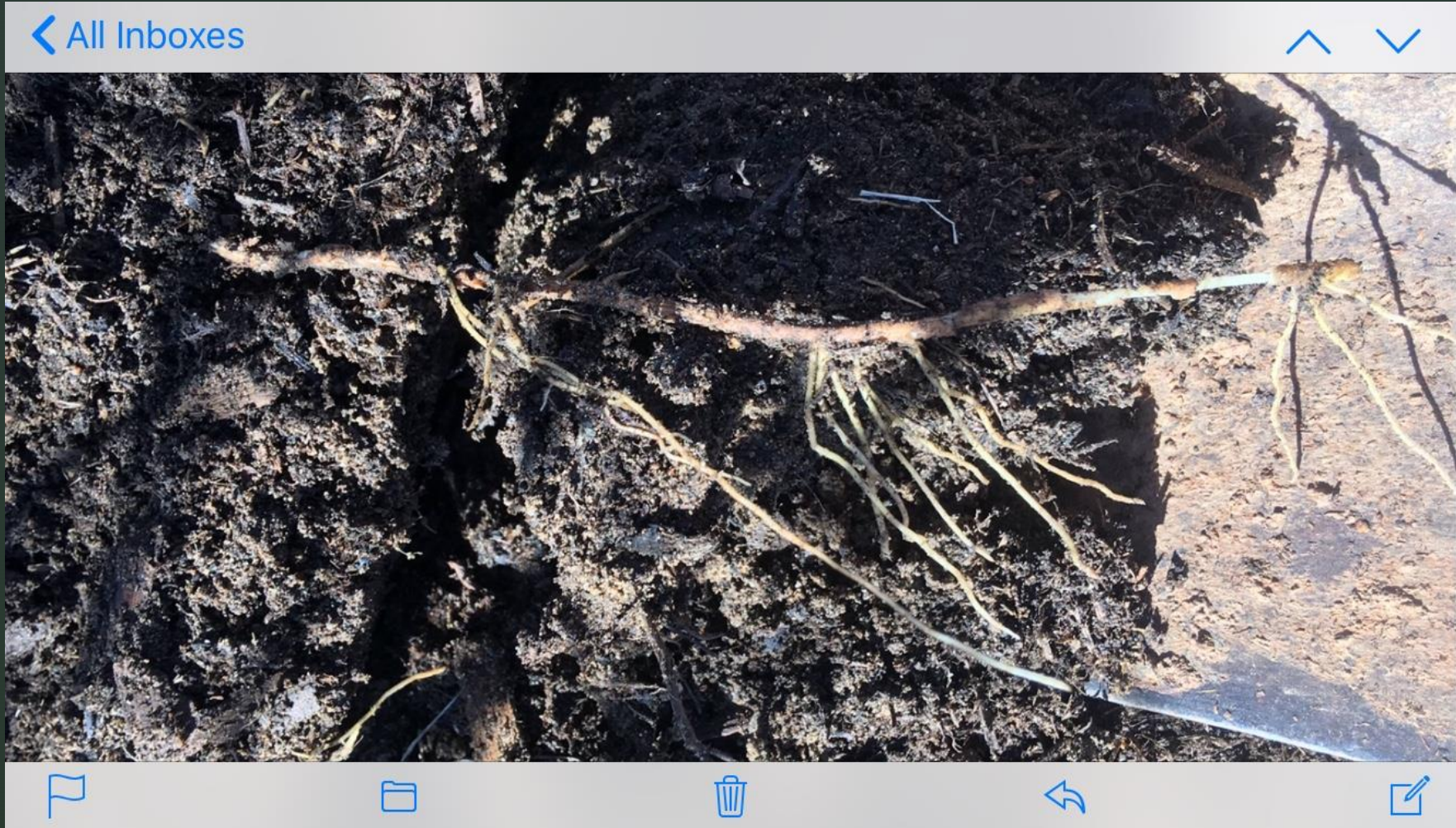
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20/11/2017

Olive Roots 2 Weeks After 750lts/ha of Anolyte EW Though Trickle.



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20/11/2017