Cooperative Extension Service
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WHITE PAPER: Evaluation of Various Pathogen Remediation Strategies for Soil and Soilless Farming Systems in Anticipation of the New Food Safety Guidelines

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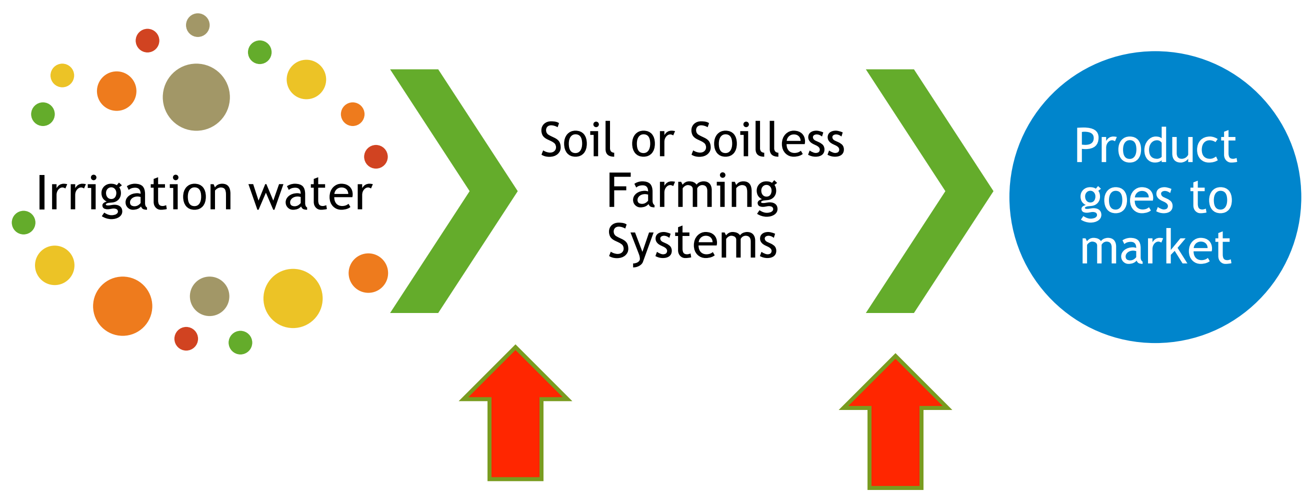
OBJECTIVE: Evaluate various pathogen reduction steps for soil and soilless farmers to consider when *E. coli* action thresholds are surpassed (non-contact irrigation water).

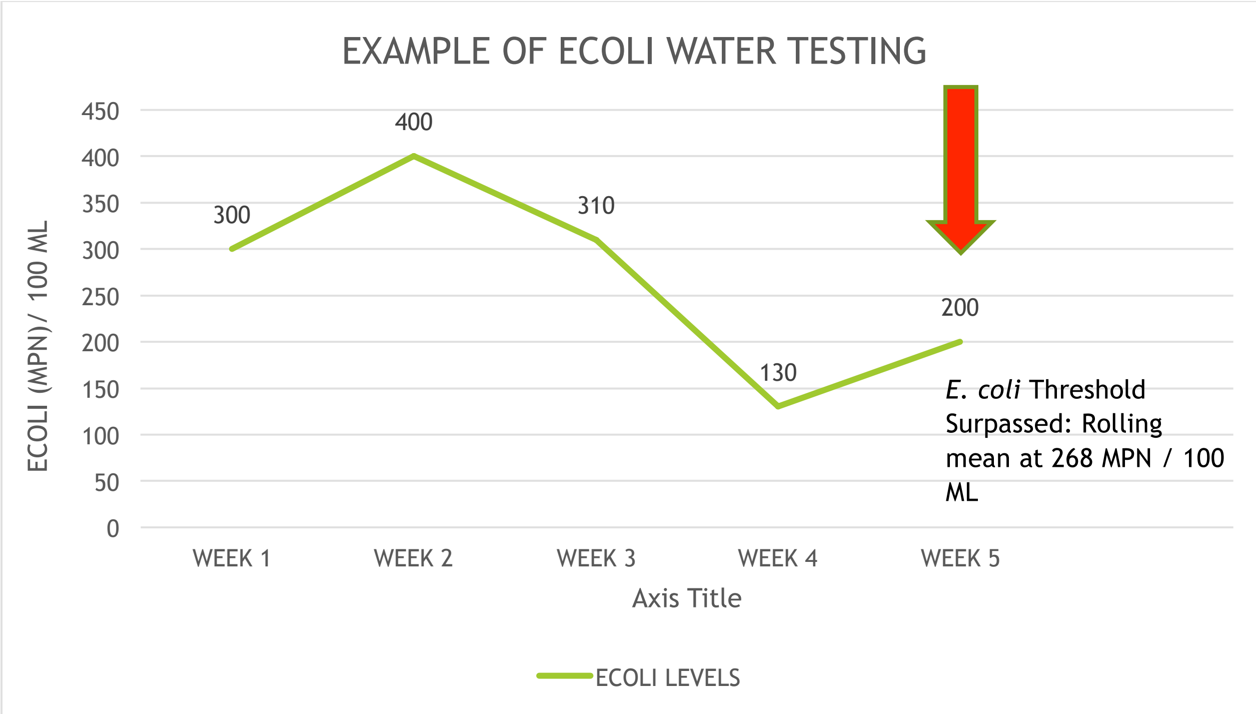


PATHOGEN REDUCTION STEP #1
If the rolling geometric mean (n=5) or any one sample exceeds the acceptance criteria, then the water shall not be used whereby edible portions of the crop are contacted by water until remedial actions have been completed and generic *E. coli* levels are within acceptance criteria:

≤126 MPN /100 mL (rolling geometric mean n=5) and
≤576 MPN /100 mL for any single sample.

PATHOGEN REDUCTION STEP #2: Post Harvest food grade sanitizer

We utilized a hypothetical situation where the weekly water samples caused the rolling geometric mean to EXCEED acceptable levels.



7/7/14-Water testing results: *E. coli* 200 MPN/ 100 ML

6/11/14-Water test results: *E. coli* 130 MPN / 100 ML

5/9/14-Water testing results: *E. coli* at 310 MPN / 100 ML

REMEDIAL ACTION: IMPLEMENT & EVALUATE VARIOUS PATHOGEN REDUCTION CORRECTIVE MEASURES

BOD 5 day, EPA 405:1, MDL 1.0 mg/L: <1

Chemical Oxygen Demand: EPA 410:1, MDL 5.0 mg/L: 7.3

Total dissolved solids: EPA 160:1: MDL 1.0 mg/L: 36

CHLORINE TREATMENTS: 200-400 ppm

Scenario #1: Chlorine 200 ppm with 2 in line filters (120-175 micron) and 1 coffee filter (mimic sand filter)

Scenario #2: Chlorine 200 ppm with 2 in line filters

Scenario #3: Chlorine 400 ppm with 2 in line filters and 1 coffee filter

UV TREATMENT

Scenario #4: UV treated with 2 in line filters (120-175 micron)

OZONE / UV TREATMENT

Scenario #5: Ozone treated with 2 in line filters (120-175 micron) FIRST then UV treatment

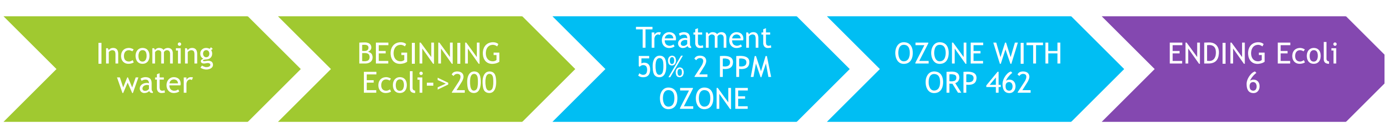
OZONE TREATMENT: 1 HOUR UNIT

Scenario #6: Ozone mixed with irrigation water with 2 in line filters (120-175 micron)

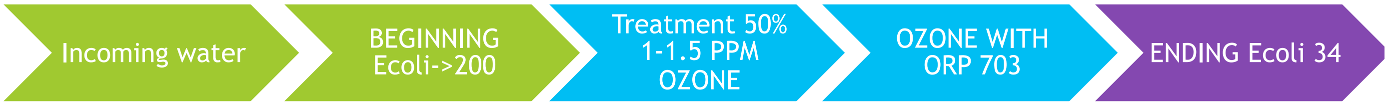
BOD 5 day, EPA 405:1, MDL 1.0 mg/L: 2.5

Chemical Oxygen Demand: EPA 410:1, MDL 5.0 mg/L: 7.5

Total dissolved solids: EPA 160:1: MDL 1.0 mg/L: 68

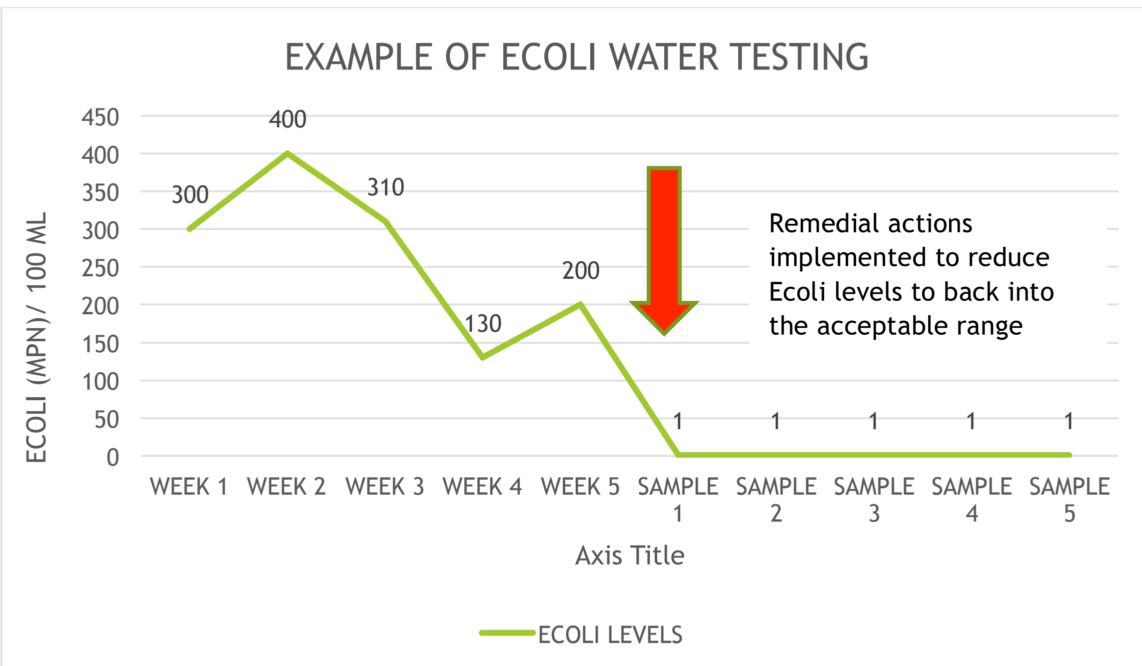


OZONE TREATMENT: 4 HOUR UNIT



PERACETIC ACID: 3 PPM

Scenario #7 Peracetic acid (OMRI APPROVED) shocked irrigation water with 2 in line filters (120-175 micron)



Summary:

We evaluated different corrective measures such ozone, UV, chlorine and peracetic acid to reduce the microbial activity of *E.coli* in irrigation waters. All remedial treatments evaluated hold promise for soil and soilless farming systems. Water quality issues need to be taken into account when implementing a remediation program. Remediated water should be re-tested for before it is permissible to reinstate its use. If a single sample has E. coli levels greater than 576 MPN / 100 ML, the remedial treatment should be repeated. Do not utilize contaminated water or have it in contact with the edible portion of crops until remedial actions have been completed and generic *E. coli* levels are back within acceptance criteria ranges:

≤126 MPN /100 mL (rolling geometric mean n=5) and **≤576 MPN /100 mL** for any single sample.

PROCESS: 2 inline filters



3rd filter as a coffee filter to mimic sand filter. Utilize chlorine and ORP meters



CHLORINE STRIPS, ORP METER, OZONE MACHINE


UV SYSTEM, THEN OZONE + UV

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