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PRODUCT INFORMATION

TRI ADD

NUTRIENT BUFFER • ACTIVATOR • SPREADER

MODERNIZING MOLECULES

The practice of creating modern formulations is becoming increasingly challenging. New pesticides, fungicides and herbicides are highly specific, have very high unit activity, are costly to manufacture, and growers expect that their applications will be delivered in a single tank mix.

Effective pesticide application require attention to factors that influence product performance: product selection, label instructions, equipment calibration and application timing.

However, one factor that does not get much attention is water quality. Water comprises 95% or more of the spray solution.

Research clearly shows that water quality can affect agro chemical (pesticide, fungicide and herbicide) performance.

What types of problems can poor water quality cause?

SUSPENDED SOLIDS - Such as silt, clay and organic matter that are suspended cause turbid water.

Pesticides, fungicides and herbicides have indexes called soil sorption coefficients (Kd) and soil organic carbon sorption coefficient (Koc). Both coefficients reflect how strongly the spray chemical binds (absorbs or sticks) to particles suspended in water and soil. The higher the suspended solids and organic matter in the spray tank water, the less activity does the agro chemical have for uptake by pest or plant material.

DISSOLVED MINERALS - All water sources in nature contain dissolved minerals, concentration of minerals such as Ca, Mg and iron are important in water quality and hardness. The higher the concentration of Ca and Mg, the harder the water.

Sodium and calcium chloride (saline water) also affect spray tank water quality and are often overlooked.

Saline water is common in arid regions with irrigated crops and areas of salt rich soils along seacoasts.

ppm/mgL Hardness (TDS)	World Health Organization Classification
0-114	Soft
114-342	Moderately hard
342-800	Hard
>800	Extremely hard

Hard water cations can bind to spray chemicals to create molecules, which cannot enter the target pest or plant, or enter at a slower rate or precipitate out of solution. Minerals with the greatest binding potential are:

Aluminum +3
Iron +3 and iron +2
Magnesium +2
Calcium +2
Sodium

The characteristics of agro chemicals in spray tanks change once the spray chemicals combine with hard water minerals, which disrupt the biological functions or performance of the agro chemical.

WATER pH Pesticides normally are formulated as weak acids or neutral to weakly alkaline products, herbicides and fungicides perform best in slightly acidic water pH 4-6.5.

A & L WESTERN AGRICULTURAL LABORATORIES
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REPORT NUMBER: 18-151-048 CLIENT: 1361-D
SUBMITTED BY:
SEND TO: GROW MORE
15600 NEW CENTURY DRIVE
GARDENA, CA 90248-
GROWER:

DATE OF REPORT: 06/04/18

IRRIGATION WATER ANALYSIS REPORT

PAGE: 1

Sample ID	Lab Number	Sodium Na meq/L	Calcium Ca meq/L	Magnesium Mg meq/L	Carbonate CO_3 meq/L	Bicarbonate HCO_3 meq/L	Chloride Cl meq/L	Conductivity E.C. dS/m	pH	Copper Cu ppm	Iron Fe ppm	Manganese Mn ppm	Zinc Zn ppm
GIOVANNI	61502	2.61	4.29	2.14	0.00	3.77	1.35	0.89	7.97				
MARTINEZ	61503	5.74	3.79	3.45	0.00	3.13	5.44	1.39	8.18				

Sample ID	Phosphorus P ppm	Potassium K ppm	Nitrate NO_3 ppm	Sulfate SO_4 ppm	Boron B ppm	Dissolved Solids ppm	Adjusted S.A.R.	Langelier Saturation Index	NOTES:
GIOVANNI	0.05	2.5	4	155	0.22	612	1.77		
MARTINEZ	1.81	12.8	20	221	0.31	890	3.35		

This report applies only to the sample(s) tested. Samples are retained a maximum of thirty days after testing.

Rogell Rogers, CCA, PCA
A & L WESTERN LABORATORIES, INC.

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Spray tank water outside this range can compromise product performance and hydrolyze or degrade agrochemicals in a matter of hours or minutes by acid or alkaline hydrolysis.

Acid, Bases and Buffers

Controlling pH is a simple and cost effective way to improve spray chemical performance and create additional efficiencies. Because the pH of agro chemical formulation varies greatly, farmers should not have to worry about the acidity or alkalinity of the spray tank and chemical dealers do not need to advertise to customer about potential problems, because Grow More, Inc. has developed a dual carboxylic acid buffer that gently acidifies spray tank water in the preferred pH range between pH 5 and 6.5. The **"Tri Add"** buffers are a special class of pH adjusters that stabilize pH, and resist the effect of hard water minerals and bicarbonates to change pH. A small dose of **Tri Add** (425 mL) when added to 400 Ltrs of hard water (612 mg/Ltr TDS) with a starting pH 7.97 lower the water pH to 6.26.

Tri Add contains components that can act as both, hydrogen donors and acceptors that prevent large pH changes to spray tank water and maintain optimum performance.

Adjuvants That Improve Performance

Another important feature of **Tri Add** is the spreading or wetting component. **Tri Add** has the advantage of being nonionic (non-reactive), which provides faster penetration and spreading. Nonionic spreader surfactants tank mixes with pesticides penetrate more quickly through waxy and oily barriers such as leaf cuticles and cell membranes than do ionic (anionic, cationic) spreaders/surfactants.

Anionic surfactants ionize into negatively charged ions in water and are positively attracted and may react with some pesticides and fungicides.

Cationic surfactants ionize into positively charged ions in water and most cationic spreader/surfactants are phytotoxic.

Tri Add utilizes nonionic spreader/surfactant which does not have ionic charges (+ or -) and therefore is less likely to form unwanted complexes with hard water, rnicronutrients or other ions.

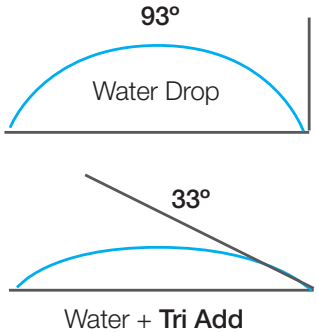
Surfactant/Spreader Wetting Ability

Due to the importance of achieving complete spray coverage on the wide variety of waxy or pubescent (hairy) plant leaves, stems, other small openings, leaf sheaths and under bark scales and to help move systemic chemicals through tissue, the ability of a surfactant/spreader to wet surfaces is a key performance property in agricultural application.

Contact angle is the measurement of a drop (of water, oil or wetting agent) in contact with a solid surface. When **Tri Add** is added to the water, the surface tension of the solution is reduced and spreads out over a greater area. The flatter the droplet has a lower contact angle (CA). Plain water has a CA of 93 degrees, a superior wetting agent will have a CA of 45 degrees or less.

CONTACT ANGLE

Water	93-94°
Water + **Tri Add**	35°
Silicone Super Wetter	24°
Crop Oil Concentrate	58°



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The Draves wetting test correlates to how well agro tank mix solution will wet and spread on a solid surface and is a widely used laboratory procedure for ranking the relative efficiencies of products.

	GIOVANNI		MARTINEZ	
Dosage	Start pH 7.97	Time	Start pH 8.18	Time
0.125%	6.26	24 seconds	6.53	28 seconds
0.25	5.57	11	6.11	10
.0.50	4.62	3	5.38	5

* See A & L Western Agri. Lab's report for hard water details.

Tri Add was subjected to a timed determination of the wetting ability under different dilution with hard water. The shorter wetting time or lower wetting agent concentration are indicative of better wetting efficiencies. A superior wetting agent will require less than 20 seconds for wetting to occur at a 0.25% vol/vol.

Surface tension is the measurement of force required to pull a floating ring of the surface of a solution, for the purpose of evaluating a surfactant / spreader wetting ability. It is a measurement of coverage on a surface. Since surfactant / spreaders affect tension the lower the dynes/CM the better the coverage.

The surface tension of water is about 74 dynes/cm.

Super wetter range 10 to 30. Most agro surfactant/spreader range 30 to 50.

	dynes / CM
Water	73-74
Water + **Tri Add**	32
Silicone Super Wetter	27
Crop Oil Concentrate	36

Tri Add provides outstanding wetting and spreading characteristics under conditions of hard water.

Tri Add simplifies the complex interaction of water quality and agro chemical tank mixes into a cost effective nutrient buffer-spreader providing:

- Maximum wetting and spreading on most all plant surfaces
- Low surface tension at low concentration to dramatically lower surface tension of water,
- Facilitates absorption of systemic pesticides and fungicides.
- Improves herbicide effectiveness.
- Non-ionic

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OTHER GROW MORE SPRAY ADJUVANTS

N-90 SPREADER ACTIVATOR	90% active function agent - Ethoxylated Nonylphenol + Anti foam Economical non-ionic adjuvant for pesticide or herbicide applications. Use rates: Pesticides 0.03 to 0.25% / vol. Herbicide 0.03 to 1% / vol. Non-ionic
EZ WET SA	50% active Glucopyranose (sugar based) + anti foam spreader wetter that enhances spray tank efficiency with improved coverage. Organic approval is pending review. Non-ionic.
ENTRADA	100% active modifies methylated vegetable oil ± organosilicone surfactant. Designed and formulated to produce transluminar effect to boost performance, and absorption on pesticide and fungicides on plants with waxy cuticles or hairy leaf surfaces.
ORGANO BREAK	94% active polydimethyl silioxane silicone formulated to increase the translocation of systemic products.
EZ WET ENTRY	Contact pesticide - fungicide, 84% active vegetable surfactant & citrus seed oil (terpenes). Effective on a wide variety of soft bodied insects.
SUPER KOTE CROP OIL	Contact insecticide - miticide, 93% active vegetable oil. Effective against scale, aphids, white fly, mites, mealy bugs.