

Talk to your Nutrien Ag Solutions representative about adjuvants that can correct water quality issues:

1. Water conditioning



- Performs with three modes of action: sequestering, synthetic chelating and complexing
- Reduces effects of hard water on herbicide performance without the use of AMS
- Effective on all hard water cations



- Multiple sequestering and complexing agents bind multiple hard water cations, such as calcium, manganese, magnesium and potassium
- Liquid formulation provides convenience of treating 1,000 gallons of spray solution with 2.5 to 5 gallons of liquid instead of 100 to 200 pounds of dry product
- Compatible with all forms of glyphosate

Hardness	Pints Choice Trio per 100 gallons	Pints Choice Weather Master per 100 gallons
up to 300 ppm	2.25 (36 oz)	2.25 (36 oz)
400 ppm	3.00 (48 oz)	3.00 (48 oz)
500 ppm	3.75 (60 oz)	3.75 (60 oz)

2. pH adjustment



Leci-Tech technology provides these benefits to pesticide spray solutions:

- **TO** the plant: Drift reduction with right-sized droplets.
- **ON** the plant: Droplet retention by adhesion and spreading.
- **IN** the plant: Increased penetration without cuticle disruption.
- Acidification properties reduce spray solution pH, preventing pesticide degradation and maximizing performance.

3. Other Loveland adjuvants for water quality:

Weather Gard Complete
Strike Force®
Vader®

Amaze Gold®
Flame®
Gunsmoke®

Surfate®
Thrust®

Water Quality and Pesticide Performance: Managing Water Hardness and pH

ALWAYS READ AND FOLLOW LABEL DIRECTIONS.

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LOVELAND PRODUCTS, INC.® | P.O. BOX 1286 | GREELEY, CO 80632 | www.LovelandProducts.com



Water Quality Issues and the Effect on Pesticide Performance

There are many factors that can affect pesticide performance, but one that is often overlooked is water quality. Water is the primary carrier for pesticide applications and makes up over 90% of most spray solutions. Every effort should be made to get the most return from your pesticide investment, so be aware of the effect that water quality can have on pesticides.

It is important to note that water hardness and water pH (alkalinity) are two separate issues, each affecting pesticide spray performance differently.

The best way to tackle water-related pesticide efficacy issues is to first know your water source, and then take the necessary steps to correct water quality issues.

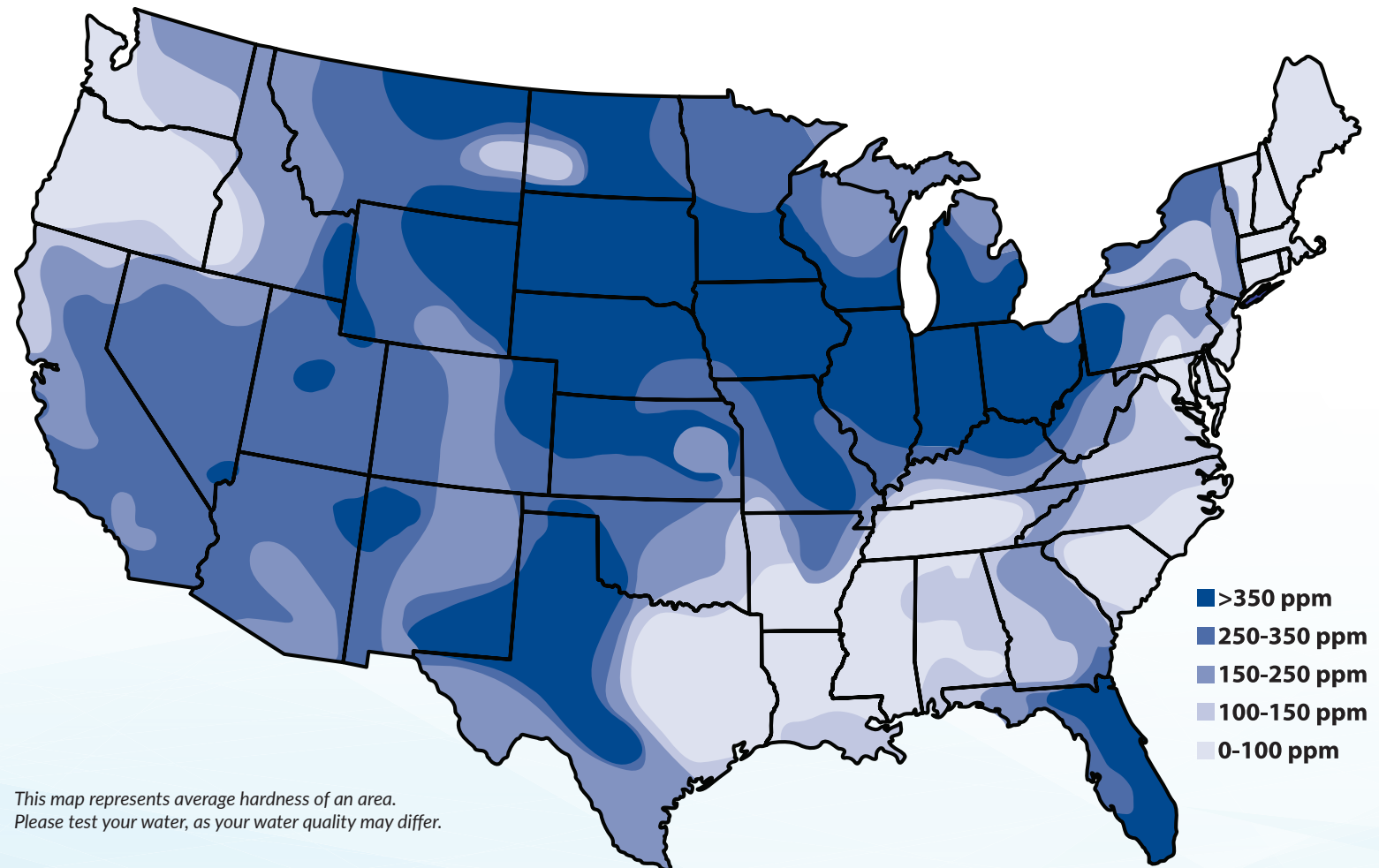
1. Water Hardness

Defined: Water hardness is a measure of the total concentration of hard water ions, primarily calcium (Ca²⁺) and magnesium (Mg²⁺), which is often expressed as parts per million (ppm), grains per gallon, or milligrams per liter. Other hard water cations include iron, sodium and aluminum.

Problem: Hard water cations react with certain pesticides, especially herbicides, thereby reducing overall pesticide efficacy. Products most affected (but not limited to) are weak acid herbicides like glyphosate and 2,4-D.

Solution: Using a water conditioner such as Choice[®] Trio or Choice[®] Weather Master (see back page) that combats the hard water cations that negatively affect weak acid herbicides. Comparatively, ammonium sulfate (AMS) will combat only calcium hard water ions.

Who is affected by hard water?



This map represents average hardness of an area. Please test your water, as your water quality may differ.

2. pH (Alkalinity)

Defined: pH is the value that describes the relative acidity or alkalinity of any solution. pH >7 is basic, pH =7 is neutral, and pH <7 is acidic.

Problem: Water pH plays an important role in the stability and efficacy of pesticides. A pesticide can begin degradation or breakdown the moment it is introduced to the spray solution. This process is called alkaline hydrolysis, which is permanent and irreversible. Alkaline hydrolysis is a process that breaks chemical bonds holding pesticides together and can reduce the life of a pesticide, and this reaction is significantly affected by water pH. Insecticide chemistries are most susceptible to alkaline hydrolysis from high water pH.

Solution: Use an adjuvant with a pH reduction component such as LI 700[®] (see back page) that will reduce the pH of the spray solution to around 5 which, in most cases, will take care of any disassociation issues. Do NOT reduce the pH of the spray solution when using sulphonylurea (SU) chemistries.

TESTING your WATER is as easy as 1-2-3

Identifying hardness and pH in water can be done in seconds with instant-read test strips; or, you can get a more detailed report from a certified lab.

Talk with your Nutrien Ag Solutions representative about which option best suits your operation.

1. Determine the water source that you want to test.
2. Determine what testing method you would like to use and test it or send it in for testing.

Methods:

- Simple Test Strips that measure only pH or only water hardness or a combination of both.
 - Send water samples to a certified lab.
3. Determine the right product to use to correct the water quality issues you might have.
 - Water hardness: Water conditioners like Choice Trio or Choice Weather Master
 - pH: Adjuvant with acidification buffer like LI 700

Things to remember:

- **Water quality can change.** It is important to test water 2 to 3 times per year, especially well water.
- **Instant strips measure total hard water cations as a group, not individually.** Measurements of hardness on instant-read hard water test strips are given in terms of the calcium carbonate equivalent (CaCO₃). This number represents all hard water cations, but some labs can and will break these out to each individual cation.
- **Always add the water conditioner to the tank first.** This allows the water conditioner to combat hard water cations before they can react with pesticides, which maximizes spray performance.