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| West-Southwest

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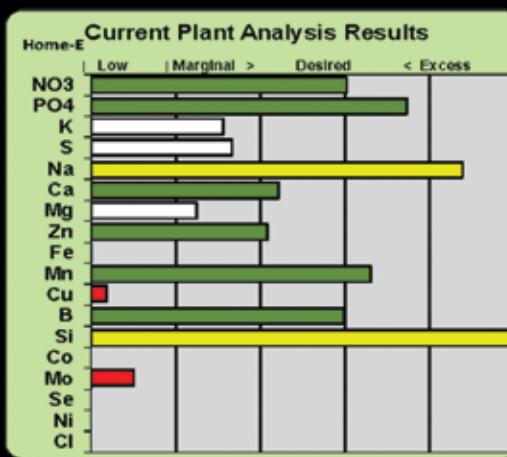
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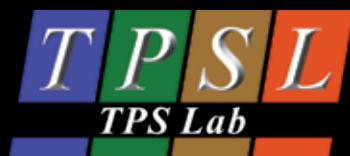
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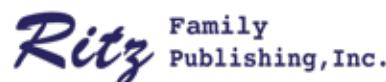
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agriculture



Rice field in northern California.
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There's a lot more to your irrigation water than just water

Larry Zibilske, Ph.D.

Vice-President of Research, Texas Plant & Soil Lab

What do you know about the water you use to irrigate your crops? One may ask, "What difference does it make? Water is water". Well, it often isn't. Water that goes into the soil to nourish plants comes from somewhere else. The sky provides some, or all, of the water needed for crops in some regions, but many farmers must supplement that with water from wells, streams, or surface impoundments. Everyone using water from these sources should be concerned because irrigation water quality can vary greatly, and poor quality water can really harm crops. As water becomes scarcer, as in the current widespread drought, quality is often reduced, compounding the shortage problem. We have been seeing water quality generally decline for some years with the falling aquifers as mineral salts become more concentrated in the remaining water.

What's In Your Water Becomes Part Of Your Soil®

How can water harm crops? Water contains some amount of dissolved elements. These chemicals, most often natural constituents of rocks, are dissolved when water comes into contact with rocks and sediments around the natural environment of the water source. Problems arise when those rocks and sediments have a high content of elements that are easily dissolved and affect other nutrients that the plant needs. Regional soil and bedrock differences lead to large differences in the quality of the ground water derived from those sources.

Generally, waters west of the Mississippi River are more likely to contain larger amounts of sodium, calcium, magnesium, and carbonates. These reflect the generally higher pH of soils and sediments in the more arid west. By contrast, in more easterly regions, iron, manganese, and zinc are common in ground waters, reflecting the more acidic nature of the soils. However, water from most all regions often contains a wide range of elements. Dissolved elements are not normally considered a problem, but how the water is used can lead to chronic problems with crop growth. The more we know about water quality, the better equipped we will be to manage it to minimize the problems. We can develop a feeling for water quality if we understand the effects of dissolved elements on plants and soils. To do this, it may be useful to review the fundamental relationships involved.

At the most basic level, plants (and all other living things) carry out their metabolic reactions in a soup of dissolved substances—dissolved in water within the cells. This part is easy to grasp—no water—no metabolic reactions—no life. Plants obviously acquire water through their roots, extracting it from the soil and transporting it up to the green parts to keep cell soup well supplied and the plant alive and active. Roots pull water out of the soil and away from soil particles

by using energy provided by the photosynthesizing leaves. Water in the leaves is used for the cell soup, but it also evaporates to the stomata, taking with it heat from sun exposure on the leaves. This keeps the plant cooler, and helps in "wicking up" more water from the soil.

Thus, water uptake is an energy-intensive activity. As the soil dries out, the plant must use more and more energy to pull the water away from the soil particles. But plants have limits. They reach a breaking point when they can no longer generate enough energy to pull up the water. The result is a wilted plant. Water shortages tax the plant's ability to carry out proper metabolism and result in decreased vigor, or worse.

As a result of moving water from the soil to the roots, water soluble nutrients (including fertilizers) in the soil tend to move along with the water and into the plant. Nitrogen, phosphorus, potassium, along with the required minor and trace elements are carried along with the moving water into the plant root, providing the building materials to continue plant growth and development. The amounts of these nutrients moving into the plant depends two things: 1. How much of the nutrient is in the soil and, 2. What portion of that nutrient is soluble in the water at that time. If it is chemically inhibited from dissolving, it can't be moved to the root via water uptake. So what determines how much nutrient dissolves?

Properties of both the soil and water affect the nutrient solubility. For instance, in a high pH soil, the solubility of phosphorus is reduced because there are other chemicals, especially calcium and magnesium, which easily bond with phosphate and make it almost insoluble. The amount getting into the plant may be insufficient. Even if there is a large amount of phosphorus in the soil, the high pH severely limits how much can go into solution. This is why an appropriate soil test is so necessary.

If your test results are based on a very strong, acidic extractant you may see a large amount of the nutrient reported, but your high soil pH will not allow enough nutrient to get into the plant. It pays to know what tests are performed on your soil. No amount of water movement can get nutrients into the plant if they can't dissolve into the water first. Keeping just the right amount of nutrient in solution for the stage of growth of the plants results in the most efficient use by the plants. That calls for special attention to nutrient and water application practices and results in healthy, productive crops.

Of the elements leached from surrounding bedrock or from other sources, we are most interested in calcium, magnesium, sodium, chloride, carbonate, sulfate, iron, boron and manganese but there are also others. Excessive amounts of these

Continued on page 16

Frosty Berseem Clover: A Cold-Tolerant Cover Crop & Forage Option

You've probably heard about Frosty Berseem Clover (*Trifolium Alexandrinum*), the first cold-tolerant berseem clover. In early testing, Frosty withstood lows of 5° F without snow cover, thus earning its "frosty" claim to fame. It combines the best of berseem clover's Mediterranean genetics and adds a later maturity, cold tolerance, productivity, and nutritional forage value.



Frosty offers planting flexibility. Because of its quick establishment, Frosty can be incorporated into a cover cropping rotation to help suppress weeds. It can be underseeded in small grains in the spring because of its frost tolerance, and it can be used in a mixture for interseeding into standing row crops in summer or fall. Speaking of fall, Frosty will grow deeper into the fall than regular berseem.

With the potential for four tons of dry matter per acre in a two-cut system and a crude protein content of up to 21.5 percent, Frosty also is an excellent non-bloating option for direct grazing livestock. Another obvious appeal for a legume like Frosty is, of course, nitrogen fixation. Trials at Penn State showed that Frosty Berseem Clover fixed up to 150 pounds of nitrogen per acre.

Frosty is growing in popularity as an alfalfa-boosting companion. In fact, Frosty shares alfalfa's dry-down characteristics, remaining green for forage or hay. To make the most of Frosty's companionability with alfalfa, plant using a seed mixture ratio of 80 percent alfalfa to 20 percent Frosty; however, thanks to Frosty's cold tolerance, you can frost seed it directly on frozen ground before planting alfalfa. Frost seeding gives Frosty a headstart for rapid establishment in spots where alfalfa has winter killed.

Frosty prefers slightly alkaline loam alkaline, or "basic," soils, which is perfect for the western U.S., but really loves silty to medium-loam soils. It also produces more biomass than crimson clover on heavy soils. When planting with a drill, use a depth of ¼ inch at a rate of 15 pounds per acre for monoculture and about six pounds per acre in mixes.

As a berseem clover, Frosty has a low hard-seed count, which means you're not likely to get overrun by unwanted Frosty, and you would need to replant for future plantings.

To learn more, contact Albert Lea Seed (800-352-5247) or visit our website at www.alseed.com

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The advertisement features a blue background with white text. On the left, there is a stylized white illustration of three wheat ears. To the right of the illustration, the words "ALBERT LEA" are stacked vertically, and "SEED" is centered below them. On the right side of the ad, the word "SEED" is written in large, bold, white letters. Below "SEED", the words "FOR BEEF & DAIRY" are written in a smaller white box, with "BEEF & DAIRY" in blue. Below that, the word "FARMERS" is written in large, bold, white letters. At the bottom of the ad, a brown and white cow is shown grazing in a green field under a clear blue sky.

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Stukenholtz Laboratory Inc.

Celebrating 48 Years of Agricultural Testing

In 1970, there were no commercial soil and plant testing laboratories in Idaho. Farmers applied fertilizers based upon educated guesswork. Dr. Dale Stukenholtz and his wife Joyce saw an opportunity to build a business and started a soil and plant testing laboratory and field consulting service based in Twin Falls, Idaho. Dr. Stukenholtz had an unusually diverse background as an educator at the University of Nebraska, an agronomist in the fertilizer industry, and a farmer, and he saw a need for more modern fertilizer recommendations to produce greater yields at less cost. His clients were the growers, so he could make unbiased recommendations that maximized economic return to the farmer. After extensive field research, he developed these improved fertilizer recommendations that quickly became popular with growers and form the basis for nearly all fertilizer applications in the intermountain west area. Stukenholtz Laboratory clients include growers from all neighboring states and several foreign countries including Australia, Canada, Egypt, Russia, Mexico and New Zealand.

Stukenholtz Laboratory provides 1 to 2 day service, including picking up and delivery time, across Southern Idaho from St. Anthony and Grace to Parma and Homedale. Results can be delivered, mailed, faxed, or pulled from the Laboratory's webpage: www.stukenholtz.com. To improve their service, Joyce and Dale Stukenholtz expanded the laboratory 21 years ago, installed the latest in computerized instrumentation and quality control, and made it the most modern and well equipped agricultural laboratory in their market area.

Critical to the success of Idaho's most efficient laboratory and largest field consulting firm has been its personnel. Dr. Stukenholtz has had a PhD in Soil Fertility and Plant Nutrition since 1964 and his son and Laboratory Manager Paul has nearly completed his own. Consulting agronomists include

J.P. Kruckeberg of American Falls, a 39 year veteran of field consulting and the most successful single agronomist in the state, and Bart Kunz. The Laboratory and office staff are equally good.



Analysis room at Stukenholtz Laboratory Inc.

Stukenholtz Laboratory continues with research and improvement. In conjunction with the Idaho Crop Production Association and University of Idaho CFEP research project, Stukenholtz Laboratory has helped to ensure that fertilizer recommendations in Idaho are the most cost efficient possible and produce the maximum economic yield while protecting the environment. Stukenholtz Laboratory personnel have conducted field research on over 40 different products and continue to be the experts at "cutting edge" agricultural technology. As we end our first 47 years of business and begin our next, we would like to thank our current and former employees for their dedicated work and our customers and clients for their years of support.



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RadiCoat Seed Treatment: A Radicle Approach to Supersizing Seed Germination

The radicle is the first part of the embryonic seed, the initial root growth, and has a substantial amount of production potential riding on its fate. But what do we need before the radicle can begin growing and absorbing nutrients for the plant to be? Germination. There are many factors that may have an effect on the germination of a plant and many companies spend a great deal of time and resources trying to figure it out. The major question is, will the seed have the resources it needs to germinate and flourish, or will it wither?



By introducing RadiCoat, we have answered this question. RadiCoat delivers several components directly to the surface of the seed waiting to build the ideal micro-environment when the radicle emerges. Imagine, if you can, that every seed in the field has the micro nutrients, trace minerals, organic acids, and beneficial microbes and fungi necessary to build a protective and nutritive microbiome. It would be an industry changer — and it is. It is no longer necessary to apply all nutrients in-furrow and hope that they still exist in an available form when the plant is ready to use them. How much more efficient can you get?

RadiCoat is a seed-coating polymer, but nothing like the majority of industry standard polymers. There are two types of polymers: natural and synthetic. Synthetic polymers make products like polystyrene, nylon, acrylic, polyethylene, polyester, and epoxy. They are typically not biodegradable or sympathetic to the environment, and use chemical solvents and wetting agents for manufacturing and/or forming films.

Natural polymers are made from raw materials found in

nature and their uses are driven by a growing demand with mostly pharmaceutical and medical applications. RadiCoat Seed Treatment uses natural organic polymers formulated for growing vigorous plants compatible for use in agricultural soils from where they originated.



Panoramic view of treated vs untreated Treated on left – Untreated on right

Natural polymers are biodegradable with a direct nutritional benefit when combined in microbial populations, and can be used as a seed coating system for actually delivering microbes and nutrients to the exterior on all types of seeds. It has been proven that the best opportunities for successful microbe and seed germinations are created from placing the microbes “on the seed” along with nutrients. This also increases the overall efficacy for performance of the seed as opposed to treating soil proximities.

RadiCoat has been applied to all small grains, cotton, and high-value crops like potatoes and sugar beets. Many different application systems were tested to ensure that a producer with nothing more than a pump-up sprayer and a cement mixer can accurately apply RadiCoat. The ease of use and inclusion into almost any program are factors that make RadiCoat so valuable.

In one of our outstanding field trials coordinated through our distributor, Rocky Mountain Agronomics, RadiCoat Seed Treatment was applied to potato seed pieces through a liquid applicator system at standard rate. The RadiCoat treated half of the field emerged five days sooner than the control and total emergence was contained to a window of just 48 hours. Treated plants were more uniform and robust than the control. The RadiCoat treated portion of the field yielded more sacks per acre, and 71% of the treated yield was 10 oz. and above compared to the control where only 52% were 10 oz. and above. Such a large return for so small an investment, RadiCoat is a true economizer for your production system.

Don't let your production fall short in the coming seasons, contact Bio S.I. Technology today and redefine your average yield with RadiCoat.

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Noel Garcia, CCA Technical Director, Texas Plant & Soil Lab

Typically, most growers have post-harvest or early spring soil tests performed then apply pre-plant fertilizer based upon the recommendations of the soil report and assume that the one application will pretty much supply the crop's nutritional requirements for the remainder of the season with perhaps supplementing Nitrogen sometime mid-season.

There are several problems with this approach:

1. Much can happen to your fertilizer after it hits the ground to make it unavailable to the crop:
 - A. Your native soil chemistry can rapidly tie-up fertilizer components into chemical compounds which the plant can't absorb.
 - B. Irrigation water high in mineral salts not only changes your soil's chemistry and damages its structure, but it also neutralizes plant-absorbability of many fertilizers by changing their chemistries into plant-unavailable compounds. Water quality is really critical in spray mixes or fertigation.
- "What's In Your Water Becomes Part Of Your Soil."™**
- C. Chemical interactions between the fertilizer components themselves can render them unavailable to the plant.
- D. Loss due to the weather – leaching due to heavy rain, high soil temperatures, etc.
- E. Volatilization of Nitrogen into the atmosphere – especially true when next year's N is applied in the Fall.

The pre-season soil test provides a starting point for determining what the soil needs to get the crop off to a good start. The soil may have several issues that need to be dealt with in a coordinated manner to ensure the critical early part of the growing season is managed for the best results. But after that...

2. Nutritional demands of many crops vary widely throughout the growing season. ***The wrong fertilizer in the wrong form applied in the wrong place in the wrong amounts at the wrong time is simply wasted – along with your money*** – often leaching into nearby waterways.

But worse – your crop ends up being malnourished resulting in yields and quality often far below your crop's potential.

And even worse, crop malnourishment results in a stressed crop, making it vulnerable to diseases and insects (requiring insecticides and fungicides) – and requiring more water, making it more susceptible to drought and heat – and to hail damage and to cold (late frosts). "Nature always eats the weakest with bugs and disease." ***So, you end up spending a whole lot more to get a lot less.***

3. Popular soil testing methods used today (Mehlich III and others) by most labs extract nutrient compounds that are both plant-available and unavailable to be interpreted for subsequent recommendations to you.

(Sidebar: Reports on some soils often show Phosphorus, Potassium, Calcium or Magnesium as being consistently adequate or high, year-after-year. *How can that be?*)

Most of those soil nutrients that are not lost due to the weather are either absorbed by the crop or are converted to plant-unavailable compounds by native soil chemistry or chemical reactions between themselves. Calcareous soils, particularly, are very efficient in tying-up most nutrients, making them water-insoluble and not immediately available to the plant. Accordingly, these insoluble compounds can build up in the soil over time.

By including at least some of these plant-unavailable compounds in the laboratory analyses, the proportions of what is, and what is not, available to the plant cannot be measured with the popular extraction methods.

This means that the lab has to estimate (guess) what is actually available to your crop, based upon its experience with your soil and render fertilization recommendations often based upon crop nutrition standards published in the early 1950s.

Because interpreting the analysis numbers from the soil testing methods used by most labs is highly-dependent upon the many variations in soil types its clients may have, it is not generally practical for the lab to attempt to calibrate lab numbers against actual plant uptake as can be done using an extraction method that duplicates the way plant roots take up nutrients in any soil.

And the problem with relying on 60+ year-old standards is that they do not reflect new varieties, new discoveries in plant nutrition and deteriorated soil quality (especially high soil salts, low organic matter content and collapsed structure).

All this explains why your soil test reports give you pretty much the same results and recommendations, year-after-year – even as your yields and quality stay flat or decline while your costs go up.

Balanced and Complete Plant Nutrition Goes Way Beyond N-P-K

About 18 elements have been identified so far as being necessary to plants – the number of which depends upon the plant. It has been only fairly recently that the importance of micronutrients (Iron, Copper, Zinc and Manganese) to plant health and quality started being promoted – and a few trace elements have been known for a while

to be necessary for certain crops or their consumers. With ongoing research, discoveries are being made regularly about the importance of heretofore ignored trace elements – most recently, SILICON.

A few years back, Silicon was acknowledged as being “beneficial” to mostly small grains, as it helps prevent lodging by hardening cell walls. However, ongoing research reveals that the benefits to very many crops and soils go far beyond that:

- Insects and disease are discouraged by hard cell walls.
- Research suggests that an extremely thin physical barrier forms on root hairs, thus discouraging nematodes and disease.
- Improves nutrient uptake.
- Improves drought resistance.
- Improves soil permeability.
- Many, many other benefits – and more to be discovered.

But there's more: A nutritionally-balanced crop is much better able to withstand stresses put upon it by adverse growing conditions (cold or hot, dark or bright, wet or dry, etc., weather). And – as we've experienced in the field, *maturity time can be shortened by as much as three weeks!*

When we encounter a field with disease or insect problems, the first thing we want to know about is the complete nutritional status of the crop, especially the secondary nutrients, micronutrients and trace elements – as these problems are typically only symptoms of plant stress brought on by nutritional imbalances.

But correcting nutritional problems alone won't necessarily fix a field already in distress – especially when there is disease or crop damage. Diseased or damaged plants require some intensive care.

A Lot More Than Just The Elements and Basic Chemistry

Biological Inoculants (microbes), sugars, hormones, humates, organic acids and more are game-changers and need to be an integral part of your season fertility program – but especially, ***biological inoculants*** because the populations and diversity of the native biology in many of today's soils have been decimated.

Biology – both soil and plant – does a lot:

- Converts plant-unavailable soil nutrients into plant-available.
- Controls soil and plant pathogens.
- Conditions soil, regenerating structure.
- Helps remediate salty soil.
- Transforms raw organic matter into humus – a material with complex physical and nutritional qualities – and releases plant-available nutrients during the process. Good levels of humus are essential for thriving plants.
- And a whole lot more...

Sugars stimulate biological activity to reduce excessive vegetative growth of plants caused by excess Nitrogen.

Hormones and Organic Acids are essential components of accelerating plant development – and are especially effective when dealing with crop damage (due to hail, etc.) and to assist in establishing crops in inclement springs.

We see many times a year, that these other things, in addition to basic nutrition, can restore a hailed-out crop within two or three weeks and very rapidly (often, in one season) turn bad fields from disasters into successes!

Plant Tests

Plant tests provide you with “closed-loop feedback” about your crop's nutritional condition – because you really don't know about how much of your expensive fertilizer has been absorbed by the crop and you don't know what its immediate needs are for eventual end-of-season success.

Plant tests are actually tissue tests from leaves, petioles (leaf stems - plant sap) or the whole plant. What leaves/petioles are taken, the stage of growth, when they are taken and the crop nutritional standards used are critical as to how lab results are interpreted and reported. The primary difference between labs is in how the lab analyses are interpreted and the recommendations rendered.

Leaf or Petiole? Very generally speaking, leaves contain the historic nutrient content of the plant. Petioles contain the nutrients flowing (plant sap) within the plant as of the moment the sample was taken. With some crops, there are only leaves.

Many farmers act only after they see visual signs of crop nutritional problems in the field.

But the problem there is, by the time problems can be actually seen with the eye, yields and quality have already been lost for the season. The best that can be done by then is damage control – to hopefully prevent further loss. And “*Hidden Hunger*” is, by definition, invisible...

Plant analysis allows you to correct nutritional problems seven to 21 days *before* they can be seen in the field. Testing is done at specific stages of crop development, ranging from every week or two for fast-growing or high-value crops to two to five times a year for others. But it is critical that your lab reasonably knows what the nutrient content is supposed to be these days at the stage of growth when the samples are taken.

More To It Than Nitrogen

We have a number of clients who are interested only in plant Nitrogen content. Even though N-compound tests are cheap and certainly N is very important, from our perspective N-only tests are still a waste of money and effort, as there are so many more critical nutrients to be accounted for. Consider “von Liebig's Law of the Minimum”.

Do Your Plant Test Reports Include Everything That Is Important To Your Crop?

We've already seen that there are a lot of nutrients required for proper and balanced plant nutrition – only a few of which have been mentioned here – much more than just N-P-K. Accordingly, for you to get a complete picture of your crop's nutritional status, you need to know about the secondary nutrients, micronutrients and trace elements. Different crops have different nutritional needs and some crops have special nutritional requirements – especially for trace elements.

Does your lab include these in its reports? Does it have plant tests for your specific crop, including its special nutritional requirements? Does your lab have the capacity to interpret the data to provide you with good recommendations?

Crop Loss: Prevention and Cure –

Very often, crop loss due to late frosts can be avoided or

Continued on page 17

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New products and new features can sometimes lead to new problems. At Jones Manufacturing, we maintain a relationship with local operators to be sure that all features and designs are field-tested in the same environment our customers face. This same relationship gives us important feedback so that new designs and innovations are the result of experience, not marketing hype.

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For more information on the Mighty Giant Line by Jones Manufacturing Co., please visit us online at www.mightygiant.com, or call us at 402-528-3861. If you're in the neighborhood, stop in and visit us at 1486 12th Road, Beemer, NE 68716.

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UNDER WATER MOUNTING

Some farmers prefer mounting water valves under water to keep animals from playing with them and also to prevent them from freezing. We have two options to mount our valves under water. First is an arm that goes up instead of down. We have these available for the three largest valves. The other is a hybrid valve. We put a steel weight on the arm to turn the valve into a naturally open valve and then use a chain attached to a float to close it. This option the valve can be placed near the bottom of the trough.

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There's a lot more to your irrigation water

Continued from page 8

elements can affect other nutrients' access to plants and can chemically react with soil particles resulting in conditions of poor soil structure, water infiltration rates, and generally a less hospitable environment for plant roots. Hard water characteristically contains high levels of calcium and magnesium, and soft water contains greater amounts of sodium.

Because all these elements are ions (atoms or molecules of elements that carry an electrical charge), the water containing them conducts electricity better than pure water. This can be measured by a test called electrical conductivity, abbreviated EC. This number is high where many ions are dissolved in water, and low where not. A high number indicates that many ions are there, but not what ions are present. That takes a chemical analysis of the water to determine. But why do we need to know the EC and elemental content of our water?

Understanding the information on a water test report can be confusing. The performing laboratory should provide some interpretation of the results. Recommendation for action should also be included. If you've provided information to the lab about cropping plans, water usage and history, you should be provided enough actionable information to manage any problem that appears on the test report. We often get frantic calls from growers who have results from another lab that indicates a problem with their water, but nothing in the way of what to do about it. For instance, you received a lab report on your water that indicates it is very high in sodium. What now? What do I do? Will it harm my plants? Let's examine the effects of some of these ions to address some of these questions.

Sodium (Na)

Excessive sodium causes problems with plant water relations because it can interfere with plant metabolism. High sodium around plant roots tends to kill leaves when absorbed in excessive amounts. It can also dry out the root cells enough to stop root activity. High sodium also causes soil problems. Soil structure is often negatively impacted, rendering the soil highly erodible or as hard as concrete and virtually impervious to water—conditions that are hardly conducive to good plant growth. Sodium is often accompanied by high levels of chloride, and together produce one kind of soil salinity.

Calcium (Ca)

Calcium is a strongly reactive element in the soil. When hard water is used on plants, the calcium will begin to react mainly with phosphate and sulfate in the soil, forming insoluble compounds that rob the plant of necessary nutrients. Excessive calcium also causes soil structure problems, collapsing a well structured soil into a hard mass that roots can't penetrate or from which little water can be absorbed.

Magnesium (Mg)

Magnesium is another hard water element that causes soil and plant problems similar to calcium. Affected soils can become unmanageable when wet, clodding terribly and exhibiting the same hardening and sealing effects seen for calcium when soil dries out. Tilling these soils is maddeningly difficult, requiring a lot of horsepower, tractive effort and fuel to accomplish.

Carbonate (CO₃2-)

Carbonate dissolves out of rocks in many areas, but it is mainly problematic in soils west of the Mississippi. Lime-stone-based soils often carry carbonate into solution, as well as calcium. Carbonate reacts with calcium, magnesium, iron, zinc and other essential plant nutrients, reducing the availability of those essential nutrients to the plants. Carbonate compounds formed affect long term availability of several nutrients because they tend to accumulate in soils where high carbonate water has been used for irrigation. As they accumulate, direct detrimental effects on plants begin to appear. Plants can't take up enough trace metals to meet their needs, so deficiencies appear in the leaves.

However, by the time deficiencies become visible, the plant has already been stressed for some time. This stress manifests as reduced yield and quality, often accompanied by increased disease and insect pressures.

What can be done if I have too much of these elements in my water? There are treatments for all of these problems, and which treatment is right for you depends on the specific problem and on your use of the affected water. For instance, high calcium and magnesium in hard irrigation water can be treated with sulfur addition. This acidifies the water and the soil so that calcium and magnesium are less prone to form insoluble chemical compounds.

Adding humates to such water also helps buffer the system to reduce their tendency to become plant-unavailable once in the root zone. An important treatment component for many of these problems is soil biology. It might be a bit counterintuitive, but an active soil microbiota keeps the soil open and draining, facilitating the downward movement of ions through the soil, reducing their retention in the plant root zone. In addition, during microbial activity, many organic molecules that provide some additional buffering are released into soil water. Sometimes, however, just strong leaching is the answer. High sodium problems can often be fixed by just leaching the soil with better quality water. If better water is not available, other things can be done. Sodium moves very easily in a moving water front, so leaching it beyond the root zone is often helpful.

Some of these problems arise from improper irrigation practices. Using water of marginal quality can be successful as long as enough is used to wash out salts retained in the soil from the previous watering. This prevents a process called "wicking" in which salts added with minimal watering remain near the soil surface. As the soil dries out by evaporation, the salts move to the soil surface with the evaporating water and accumulate there, making a white sheet or row at the highest point from where water evaporates. Growing plants in such affected soil is difficult.

Living with water of marginal quality is difficult but it can be managed. By treating the water according to recommendations, you can reduce at least some of the adverse affects of having to use lower quality water. In addition, managing the soil can make a remarkable difference in plant productivity. Further, studies have shown that plants with good nutrition can require often considerably less water.

Soil organic matter is a marvelous buffer. The presence of

organic molecules can moderate some of the directly harmful effects of excessive elements. This is another role that spotlights the importance of maintaining soil organic matter levels. By promoting soil structure, organic matter promotes good drainage through the soil. This facilitates moving the excessive ions out of the root zone while maintaining good moisture retention for plants.

Drought continues in many parts of the country. Many growers are being forced to figure out ways to reduce water use and how to manage agricultural production with marginal quantities and qualities of water. Awareness of the issues and attention to the effects on soil and crops are necessary to keep soils functioning and agricultural enterprises in business. Achievement of these goals depends on how much we know about the condition of our soil and water, and on how we manage those resources.

But all these considerations aside, water chemistry can seriously impact the effectiveness of many fertilizers and herbicides. Additionally, hard water can plug drip irrigation emitters and change the geometry of spray nozzle patterns. Salty water can be corrosive to pumps and piping.



Miracles of Balanced Plant Nutrition

Continued from page 13

minimized with a correct (and inexpensive) foliar spray applied even within hours of the expected event. Hailed-out crops can also often be quickly recovered with foliar sprays of hormones, sugars, microbial inoculants, amino acids, micronutrients, trace elements and other things.

Comprehensive Plant Tests Are The Cornerstone...

...for maximizing your crop's potential under the prevailing growing conditions and solving serious crop problems – especially when there are diseases and insects. Your lab should be able to provide you with recommendations for each stage of plant development for a successful season-long crop nutrition program. Providing your crop with balanced nutrition throughout the season is the biggest factor in field performance – and your bottom-line!

What To Take Away From This Article:

- If your lab's soil reports and recommendations are pretty much the same, year-after-year, there's something wrong, someplace.
- If you follow your lab's plant test recommendations and things haven't much improved, there's something wrong, someplace.
- If your fields have disease or insect problems, there's something wrong, someplace.
- If your yields and quality are flat, mediocre or are generally declining and you're not doing very well, there's something wrong, someplace.
- If the quality of your soil isn't improving with each year, there's something wrong, someplace.
- The Devil is always in the details – especially the smallest ones.s.



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Continued on page 22

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While struggling through the hard times, redesigning to incorporate new ideas and improving on old ones, and building a strong customer base one customer at a time, Art managed to build his back-yard business to a point where he was able to open his first shop. By 1985 the business was large enough that he began the process of incorporating it. Later, needing more space to meet customer demand, he bought a larger property, and moved the business to its current location in Klamath Falls.

When health problems forced Art to take a step back and de-stress his life, he wanted to find the perfect person to take the reins. Ed Majors took over as GM in 1998 and in 2003, began the process of buying the company from Art. Today, Ed officially owns it.

Sunny D Today

From those humble beginnings in 1971 to the 21st century, Sunny D Manufacturing Company Inc. has grown to a business totaling 15 employees. Welders, fabricators, mechanics, a painter, and various support personnel create from bare metal the machine that called “The Oregon Roadrunner.” What used to be only available in white with your choice of stripe, a customer can now choose their color and design. For more information, call 1-541-884-2361, or write 4343 Highway 39, Klamath Falls, OR 97603.

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Even though the Processor's design is viewed as the superior portable corral on the market, John believes that there are still those who will want a smaller, more affordable

system. Enter the Rawhide Original, which is a blend between the two designs he has offered throughout the years and has a bumper hitch with permanent transport wheels. The Original is only offered in the Standard and Large sizes.

The Processor is offered in three sizes for the convenience of ranchers and cattle producers throughout the world and the main difference with this design is the ability to customize the corral upon ordering by including a hydraulic alley, head gate or loading chute. Whether you simply want to catch your cattle or process them on site and load them into a trailer from the pasture, you are able to do so with the Processor.

The design of the Processor continues to impress cattle producers with its versatility and ease of use. The permanent sheeted adjustable alley aids with working your livestock, whether it is done on site or in the

field. The adjustable alley can be sized from thirty (30) inches down to sixteen (16) inches; either manually or hydraulically.

The most notable features of the Rawhide corrals are that they are easy to set up and they are easy to transport. We mean it when we say that one person can open up the corral without lifting a panel. This will continue to be the model as we move forward with our newer designs.

The key is one person can handle it all by themselves. Customers can manipulate the panels so it is not just one big pen, but two, three or even four pens for sorting, as one can never have enough pens when it comes to working cattle.

John's design was the first portable corral on the market to offer the hydraulic lift option. This has been so popular that we now offer customers the option to buy the Hydraulic Lift

Continued on page 30

The First Hydraulic Corral and still the Largest!

Rawhide Original

Rawhide Processor
by John McDonald

- Pull on highway at speed limit.
- Fits through any gate your pickup will.
- Stable on uneven terrain.
- Wheels on each panel and electric over hydraulic jack eliminates lifting—saves time.
- Frame gates for sorting.
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- Permanent sheeted adjustable alley.

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Over thirty years ago Dr. Garth Sasser was a professor of Animal Science at the University of Idaho. In his research he discovered a pregnancy specific protein in the maternal bloodstream of ruminant animals that is only elevated when that animal is pregnant. He developed a test called BioPRYN (Pregnant-Ruminant-Yes-No) that measures the concentration of this protein in blood and can provide an extremely accurate determination of pregnancy status in cattle, goats, sheep, bison and other ruminant animals very early in gestation (28 days post breeding).

A growing number of dairy and beef producers and their veterinarians are utilizing blood-based pregnancy testing in unique ways to complement traditional pregnancy detection methods and because BioPRYN is a proven, convenient, accurate and cost-effective way to check your animals for pregnancy that eliminates subjectivity. Some progressive producers that are using embryo transfer or synchronization protocols with artificial insemination will use BioPRYN as an early "open check" at 28 days post breeding to identify if the animal needs to be reintroduced to the synchronization program. Other producers and their veterinarians will use a BioPRYN check to supplement monthly or biweekly herd health checks to identify those open cows as early as possible and to avoid the entire herd being locked up for extended amounts of time on pregnancy-check day. BioPRYN is also a useful tool for a reconfirmation pregnancy check later in gestation to identify the small percentage of cows that will experience embryonic loss and not carry to term.

The process consists of drawing a small blood sample, usually from the tail vein, and delivering or sending samples to one of the 45 BioPRYN Affiliate Labs that have been trained and certified to provide consistent and accurate results so that you can trust the results and manage your animals accordingly.

For blood collection supplies and more information about BioPRYN and the BioPRYN Affiliate Lab network please visit bioprync.com or call 208.882.9736.



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DODA ME / Electric motor pumps are ideal for hog, dairy, or beef reception pits, water, sewage, syrup – the list goes on! Pumps can be used to agitate, transfer or to fill hauling units. Parts in stock in our USA facility to build pumps in various lengths from 4'-20', additional lengths available upon request. Pumps can be run with motors from 5hp – 50hp 3phase or single phase. c-face electric motors eliminates belt & pulley problems. Hot dipped galvanized is standard – stainless steel components are available upon request. Cast iron impeller housing with venturi design & adjustable pressure plate creates high pressure to move the slurry as far or fast as you need.

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SweetPro Feeds of Walhalla, ND produces Vitamin, Mineral and Digestive Aid supplements for livestock and has pioneered the use of Distillers Grains (DDGS) on rangeland.

Dried Distillers Grains (from ethanol production) as a carrier for supplementation provides significant benefits to the Rancher, the Feeder, the Consumer and the Land itself.



Although used in feedlot and dairy settings, until SweetPro's patented non-molasses DDG block became available for rangeland applications, the benefits of feeding Distillers Grains were unavailable to these non-bunk fed livestock.

Historically many small farmers steeped barley before feeding it to their animals. While this practice faded due to various influences such as economies of scale, elements relating to this fermentation of grain have been refined by SweetPro Feeds. SweetPro has overcome the historic mechanical limitations and taken the science to new levels with stabilization for open range feeding, organic complexed trace minerals, four classes of viable digestive enzymes and prebiotics to deliver maximum performance potential. Feed efficiency is improved by 25%.

Additionally, a blend of cereal grains (wheat, oats, and barley malt) plus flax are used in the proprietary fermented blend additive, "ProBiotin." This assures that the most complementary amino acid profile is available.

SweetPro complements a forage based diet by NOT using starch or sugar (which can create a rumen Negative Associative Effect) as the main ingredient.

SweetPro blocks also produce a unique dynamic which both influences the total protein and the type of protein available to the animal. Total protein is improved, not just from the protein in the supplement, but also from the rumen microbes (single cell protein). SweetPro blocks contain three classes of prebiotics to feed and keep robust these rumen microbial populations. The better the microbials perform, the more single-cell protein is available to the cow when the microbe's short life-cycle ends.

The other protein dynamic in SweetPro is high bypass protein. This is protein not used in the rumen but available directly by the animal. This is most important during the two key times when the cow's protein demands are greatest, late stage pregnancy and peak milking demand.

When these protein and fiber oriented energy benefits are combined with SweetPro's strong vitamin and mineral pack-

age, ranchers have a solid tool to help reclaim the losses they'd otherwise absorb when forage is poor. Even poor quality forages can be fully utilized with pastures stretched or more animals run on the same ground.

SweetPro benefits the Rancher by improving feed efficiency 25% while promoting better herd health and fertility. Heavier "growthy" calves can be expected at weaning along with labor and fuel savings (blocks are only placed out every 10 days). It also benefits the producer by providing new options for grass finishing and putting more "Pounds on Pasture" per day than older means of vitamin and mineral supplementation.

SweetPro products also help the Feeder by allowing them to bring in healthier and heavier calves. These calves need only half the time to finish as in years past. With 25% improved feed efficiency, 400 to 800 pounds less corn is needed in the finishing process.

The Consumer benefits through a healthier meat that has much better mineral deposition and a better taste. The Land itself also gains advantages. With 25% improved feed efficiency, stress on pastures is reduced while the more efficient digestion allows for an even spread of softer stools that are much easier for dung beetles to work into the soils. Soil fertility is increased markedly over only a few years time.

SweetPro Feeds' combination of a healthy and cost-efficient vitamin and mineral delivery system along with a 25% improvement in forage feed efficiency has impacted ranching, feeding and the nation positively. www.sweetpro.com

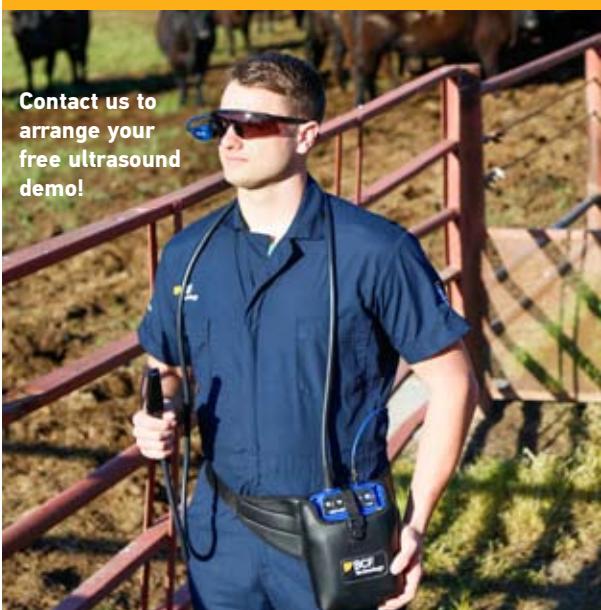
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A promotional graphic for SweetPro Feeds. It features a bag of "Fresh Start" feed, a blue tub of "SWEETPRO", and a yellow tub of "SWEETPRO". To the right, a list of benefits is displayed in red text: "4 Classes of Enzymes & PreBiotics", "Organic Complexed Trace Minerals", "Macro Minerals & Vitamins", "Rumen Friendly Protein", "Reduced Labor", and "More Pounds on Pasture (4/10th more pounds per day)". Below this is a large headline "25% BETTER FEED EFFICIENCY NO MOLASSES!". A photograph of two black cattle is shown, with one wearing a yellow ear tag and another with a blue tub labeled "PROBIOTIN". A phone number "888-229-0475" is on the left. At the bottom, the website "SweetPro.com" is written in a stylized font, and there is a small inset image of cattle in a pasture.



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Rawhide Portable Corral

Continued from page 26

Kit with or without the battery so that they may upgrade existing equipment of their own. A lift kit includes the jack, power unit, solar panel and of course the option of including a battery at time of purchase.

John and his wife Mary run the family business at their manufacturing plant in Abilene, Kansas, which is the only place where a Rawhide may be purchased outside of South Texas, where we now have a dealer in Hempstead.

Please check out our website for more information and to view our videos: www.rawhideportablecorral.com or find us on Facebook. Phone # 785-263-3436. ☎

Northern Livestock Video

Northern Livestock Video, headquartered at Billings Livestock Commission, Billings, MT is engaged in the livestock auction business through Video Satellite & Internet Marketing and is produced by a capable Northern Livestock staff. Pat Goggins introduced the video concept of selling livestock to the industry years ago and conducted the first in the world sales during the mid-1970s. Video & Internet marketing has since become a viable, legitimate tool for merchandising feeder cattle and breeding cattle.

The most important factor is to receive national competitive bidding on your livestock. The Northern Livestock Video Sales are broadcast on Satellite and Internet. In addition, the sales are aggressively promoted nationwide in the best read livestock publications around the country and nationally recognized auctioneers' will sell the sale. As a consignor, being involved in one of our Video events affords your herd more exposure than you could possibly gain on your own efforts. This is buying power.



Northern has on staff the best group of knowledgeable Representatives of any video sales company in America. They come with excellent qualifications and have firsthand knowledge of cattle breeding, feeding & carcass quality. You can work knowing they will personally represent you from the moment you sign the consignment form until the day your cattle are delivered. They are bonded, reputable, conscientious cattlemen with many years of experience in the industry. But most important they understand marketing at all levels. They will become your best friend!

The sale is conducted just like an ordinary auction sale only the livestock are not on the premises. Most of the sales will be physically held at the Billings Livestock Commission in Billings, MT where television monitors will be set up for viewing, or you can view the sale in the comfort of your home or office. Buyers will be on the seats to bid and a bank of phones will be manned to take the call-in bids from the video broadcast. They are fast paced auctions with nationwide bidding. Keep in mind when you consign your livestock to a Northern Livestock Sale, it will be broadcast across the North America continent on Satellite as well as on the Internet. Anyone who has a "dish" or computer at home, in the office or feedlot can view the sale and bid on the livestock in "real time."

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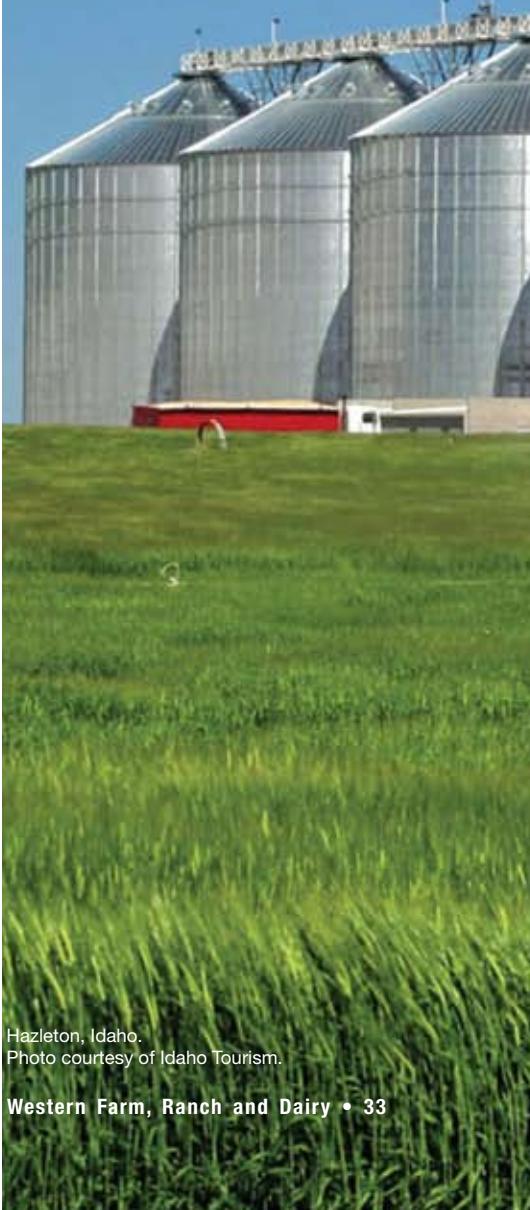
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