



The Growing Edge

Improving Agriculture Through Science & Nature
A Quarterly Newsletter Produced by Ag Tech Services, LLC
for HUMA GRO Clients

March 2015
Volume 8, Number 1

Understanding Plants and Soils

sometimes find it difficult to think about planting season when the fields are full of water. But we all know that the weather and soil conditions can change very quickly so we should be talking planting even now.

What I want to discuss in this article concerns soil-applied pesticides and soil fumigants. Soil fumigation is not big in Western Washington but it is very big in the national crop production arena. We do use soil fungicides and insecticides on the west side and this will pertain to those as well.

I have heard from growers on both sides of the mountains that some soil-applied crop protection products do not seem to work as well as they used to. This should not be a surprise to anyone as biological systems, both beneficial and pathogenic, will build up resistance to chemical pesticides over time. It is how nature works and it is how nature will continue to work. Soil diseases will develop resistance because chemicals can never kill 100% of the species. There are always survivors that will change in ways to fend off the chemicals. When those survivors reproduce, now you have a lot more that will be resistant to the chemical. This is why there are so many products on the market with different modes of action for managing soil pests.

Now we come to the main topic of discussion: essential oils. There are so many essential oils on the market today it would not be possible to talk about all of them. I will concentrate on thymol which is a monoterpene phenol compound extracted from the common thyme plant. It is; however, proven to be very effective in killing both plant and soil bacteria and fungi. This is a compound that the pathogen cannot defend against. Thymol acts as a cell wall disruptor so it kills by actually destroying the outer layer of tissue on the insect, nematode, or disease pathogen. The product itself is called PROMAX™ and it is made by the BioHumaNetics, Inc., people. It is OMRI certified and has been on the market for about ten years.

If you want to take it another step, there has been a lot of good research showing thymol at a lower rate with a chemical insecticide or fungicide also at a lower rate. This is a very complimentary combination that performs actually better than the full rate of either one alone.

I bring all this up because I think it is time to examine our total dependence on synthetic chemicals. There are so many alternatives on the market but we just need to try some and see where they fit.



Planting

Rudy's Corner



Last year at this time I wrote my second article on Unmanned Aerial Vehicles (UAVs) looking at the way technology is moving in the ag industry. This year there really isn't much to report on UAVs so I think we will look at more low-tech aspects of the ag industry.

I travel quite a bit for our business and I have seen and heard things that really don't make a lot of sense to me. Take a perennial crop like an orchard or cane berry field and run a soil sample on it just once every third year. When I

asked about the results, the comment was "well the samples always look about the same but the plants are weaker." then I took a look at the lab report. The lab was somewhere in the Midwest and they were using Midwest lab techniques for a northwest soil.

I have seen this throughout my 39 year career in the various states in which I have worked. There is no one soil/tissue testing facility that is best suited for all geographic areas. They may say they are the best with the lowest prices but how can a grower really tell? My suggestion is to stay local. If not in your own geographic area, at least use a lab as close to your geographic area as you can find. The testing procedures and reagents used for extractions are best for local soils and climate. It may cost the growers a few dollars more but they will be getting good, solid data for their decision making process. And you are supporting a local business.

Another low tech aspect of the production ag industry is the role of the dealer field salesperson. You can't say "fieldman" any longer as there are many good, qualified women in the industry today. I have seen a big difference between the independent dealer "sales rep" and the same position in a large national/international company. When it comes to the service aspect, I feel that the grower gets more direct attention from the independent dealership. They seem to have a closer relationship with the growers and are more concerned with the grower's profitability. This is not to say that the larger company does not have caring sales reps. It's just that sometimes the makeup of a large/corporate company makes it harder for the sales rep to have that close association. In the end, however, it is the grower who decides where he does business.

So much for an overview of the old school stuff. Let's just keep our head screwed on straight and have a good spring.

Potato Production

Instead of looking at the major nutrients that are needed for potato production, I would like to focus on those minors that play a major role in potatoes.

We all know well the story of calcium. Bear with me for a small update. Calcium is critical for cell wall development in the plant by strengthening the middle lamella of the cell. Parasitic fungi produce enzymes that attack the lamella but increased amounts of calcium help prevent infection. Along with calcium, copper (Co) and boron (B) in above-adequate numbers help keep the level of phenolic and flavonoid compounds high in the outer level of the leaf tissue. This also keeps parasitic fungi from infecting the plant.

While we are on the subject of calcium and resisting the impact of parasitic fungi, there is a very strong correlation between calcium and silica. Silica is a very minor element in respect to what the crop needs but it is very major in what it does. The combination of silica and calcium makes much stronger cell structure than either one by itself. Silica is the second most abundant mineral in the earth's crust. That being said, it is also tied up in the sands, silts, and clays of the soil surface. We have found that a foliar application of a monosilicic acid form of silica works the best. It mixes easily with other fertilizers or pesticides so it is not a problem integrating it into your program. A rate of four ounces per acre in five applications will do wonders on your potatoes, especially yellows and whites.

So we have touched on calcium, boron, copper, and silica. Now I want to look at manganese (Mn). Mn is one of those minor elements that plays a big part in both plant nutrition and disease suppression. Mn is very active in plant respiration, photosynthesis, and nitrogen accumulation. This alone is enough to make sure Mn is in your fertility program. However, Mn in the plant must be in the Mn^{++} with two positive charges. If it is in a high valance, $+3$ or $+4$, it must be reduced for the plant to utilize. Fortunately, the family Bacillus bacteria are the main players in this reduction.

Disease reduction is based on work that has shown Mn to reduce both common scab and fusarium. Again, this needs to be on the 2^+ valence or it will not work. Like everything else in farming, this is not a guaranteed program but we do have an advantage in our acid soils. Acidic soils do increase the availability of Mn but it is important to add Mn to your program as our soils normally have a low concentration.

Looking into the 2015 planting season, along with a good base fertility program certain minors must not be left out. Let us help you get the right players together for a successful crop year.

Vegetable Seed

So far we have seen some cabbage seed fields that look like the November freeze took them out. I'm not sure where the spinach seed acres are going to wind up but I'm sure there will be some in the valley. One thing I am sure of is the beet seed crop looks better at this time than it did last year.

You may wonder how I can make a statement about a crop that is still in the hills waiting to be planted. Well, during the winter of 2014 we did some grow outs on beet bulbs grown in 2013. Some of the results were not very good. This year's grow out looks a lot better due to more vigorous beet bulbs which should result in a better crop.

We will keep you posted in developments but for now, we need a drying trend to get the fields ready.

The Growing Edge (ISSN 1942-2520)
is published on line quarterly by:

Ag Tech Services, LLC
Rudy Allen, CPAg, CCA-NW
1219 Eaglemont Place
Mount Vernon, WA 98274
Office (360) 848-1595
Fax (360) 848-6265
Mobile (360) 708-3590
agtech@comcast.net
www.agtechservicesllc.com
A copy of the newsletter can be downloaded at
www.biohumanetics.com

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Fruit Production

Most of our perennial small fruit crops set their bud and flower primordia in the fall. The cold weather events that come our way through winter stress both the plants AND the farmers. Assuming that the basic fertility and cultural practices are in place, what can be done to improve yields and quality? Here are a few key items we have learned to watch and control.

Watch your soil salinity levels. By the time we have made it through a growing season and all of the nutrients in the soil along with the fertilizers added have been acted on, we will always see an increase in salinity. It is crucial during the fall period of internal microscopic

bud and flower part formation that this form of stress is controlled or at least mitigated. We have run into resistance with this idea of treating soil salinity in the fall. Some think that it is not necessary as we get enough rainfall in winter to "auto-correct" minor salinity issues. This does occur, and with a grass field or golf green this is a "free" function of nature.

However in small fruit crops this timing is too late! We need to ensure that the cell division and differentiation that are taking place is a strong and complete process. The pre-flowers and fruit spurs will weather winter better when their cells have been created under low stress with optimal amounts of available silicon, calcium, and boron.