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The Berry Patch

The Berry Patch web site is going into its second season and anyone wishing to continue with this site should contact the laboratory and renew their subscription. A new pass code will be required March 1, 2001.

The information in the Berry Patch is for top production and it requires that you follow all the suggestions. The more we push a crop the more it will be prone to disease and quality problems, therefore do not cut corners all the inputs are required to balance out the nutritional requirements of the crop under these conditions.

The use of Nitrogen to give us the yield and size that we are looking for and keep the crown healthy is a balancing game with Ca. It is important the you use tissue test to gauge this or too much N will increase disease pressure such a botrytis. Nitrogen availability to the plant is a difficult one to monitor as the nitrogen cycle changes every year. Following a program of planned application is only a base plan; with nitrogen we must monitor its input and make judgment calls based on growth and appearance to the crop. Plants respond to Nitrogen application faster than any other nutrient input.

Existing patches that have had crown damage or disease pressures in the previous season will not respond in the first season as well as we would like. It takes a year or two to repair some of the problems and get these old patches turned around. Be careful pushing these fields too much as disease issues are already established.

In most cases the greatest success comes from a new field that starts with the program from the beginning. Follow all the recommendations and if you have any questions or concerns email me at AgInfo@al-labs-can.com.

Summary of Last Season

Last season was full of challenges with the cool wet beginning and the amount of rainfall we all experienced throughout the crop. Any time that a field is continually under water and the root cannot get oxygen disease will be a problem and there is not much we can do. In some cases you will need to assess the extent of root damage and maybe get ride of these fields. If you need to keep a field because you need the acres it will be important that you examine these fields for crown damage and follow the winter fertilization program to rebuild as many roots as possible. Remember it takes about 6 weeks prior to vegetation for this to take place.

In a spring when there is not a long enough period between soil thaw and vegetative emergence the winter fertilization may not work. However we cannot predict this and must go forward with the program.

If you do not intend on keeping the patch except for this season our strategy on nutrition is different. We do not concentrate on maintaining a good crown and the amount of inputs will be less. I will outline this strategy in another newsletter when we develop a calendar for this season.

Last spring with the cool wet soils Potassium problems began early and followed throughout the season. As you will read later in this article potassium has a lot to do with disease suppression in a crop. Also as I have mentioned cool wet soils make it difficult for a root system to function properly.

In a season such as this it is important to respond to the environmental issues that restrict nutrient uptake early. Early diagnosis of this requires a tissue test early enough to pick up these trends

and modify our foliar program to address these concerns.

The calendar this year will likely increase the early foliar P and K and will become a recommended treatment for most seasons. The success that we had this year would suggest that it is a cost effective treatment for any season.

Calcium applications this season had varying success depending on the age of the patch and root health going into the season. Older patches that where introduced to this program for the first time this season had more problems than patches that had been on the program and had less root damage or nutrient stress. Those patches that had the large healthy crowns seemed to be able to overcome some of the water saturated conditions for a longer period.

For the most part growers that where aggressive with the calcium treatments had a lower incidence of botrytis than growers that did not follow a program.

This season distribution of calcium or coverage showed up to be a big factor. Growers applying calcium sprays by sprayer and changing direction of application each time to ensure better coverage had lower botrytis levels than those using the irrigation system. In any case it seemed an endless battle with the amount of rain that we had last season. Lets hope for a better season.

Effects Nutritional Status on Resistance of Plants

Both disease and insect resistance can be influenced by nutrition and health of plants. This complex mechanism of nutritional balances takes place in both above and below ground parts of any plant. Too much of something can be as detrimental as not enough, this is why I continually work on a balanced nutrition to accomplish what we are trying to achieve.

Plants receiving an adequate and balanced supply of nutrients are able to respond more rapidly and effectively by defense mechanisms that are triggered by the pathogens or insects themselves. These built in mechanisms are part of the metabolic process within the plant and therefore very much influenced by mineral nutrition.

These mechanisms are well defined and described in the literature. The following is a description of the various mechanisms that a plant uses to defend itself from its environment.

Synthesis of phytoalexins; these are fungistatic agents synthesized in the plant tissue as a reaction to fungi or their metabolic products.

Hypersensitivity; this denotes the rapid death of cells around the point of infection, thus preventing the disease from spreading.

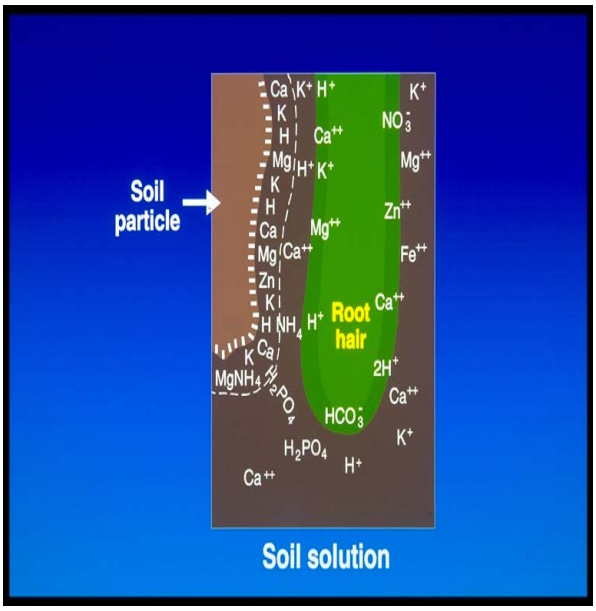
Preeimmunity; after a mild primary reaction the plant may become resistant to secondary infection (similar to immunization in human medicine)

Demarcation; this denotes the isolation of the point of infection by suberification as a reaction to the wound.

Other reactions that I have mentioned in other newsletters are part of these processes such as the plants ability to change the sap in a wound area so that it is of the same consistency as glue that will repair damage and insects do not like it.

All living plants also have a complex system that is occurring below ground that is also influenced by nutrition.

In order for a plant to take up nutrients it must have a healthy root system, anything that causes damage or poor growth to the root system restricts nutrient uptake. Root hair growth particularly as it is the root hair growth that increases the surface area (absorption are) of the root by 20 times. These tiny little root hairs only remain active for about 6 days therefore we must continually be promoting the production of new root hair formation. The biological activity in the root zone is critical.



Sugar production, carbohydrate production by the plant, moving to the root system stimulates new root growth. During times of stress carbohydrate movement to the root system will stop and the valuable life force enzymes produced in the root system also stop, making the root system go dormant or activity slows down. This happens during times of extreme dry weather or wet weather where root activity and nutrient uptake is limited or in times of stress or heavy fruit load when nutrition is inadequate.

Factors that can cause stress and reduce root activity are;

-Droughty soils
-Flower initiation
-Heavy crop demand
-Heat/cold
-pH imbalance
-Chemical application causing phytotoxicity

Foliar feeding a plant through these stress periods helps maintain high sugar levels in the plant to help the root system during stress. Under heavy production systems a root system cannot meet the demands of the fruit therefore it is important to supplement. However supplemental nutrition has to be in place before a problem occurs. Responding to a problem is usually too late.

The soils health is also critical. There are a number of bacteria in the soil, some parasitic and some beneficial. The balance between these bacteria is critical.

Two identical fields may not have the same level of beneficials. Good nutrition helps increase beneficial bacteria populations. This is because a healthy plant exudes amino acid, growth hormones, vitamins, and enzymes that stimulate good bacteria to grow. The symbiotic relationship is part of the delicate ecosystem. Anything we do to destroy this will effect how our crop performs. This good bacteria not only destroys the parasitic bacteria but is also helps in the uptake of nutrients by roots by breaking organic nutrients down into the available form for plant uptake and in some cases aiding in the uptake of nutrients into the plant. Harsh chemical applications (i.e. soil fumigation) can destroy good bacteria and if the population of bad bacteria is established it may flourish.

Another factor in the regulation of these soil organisms is that in a stressed plant as the system shuts down it will exude compounds that feed the parasitic bacteria and not the good bacteria allowing the population of the bad guys to grow and destroy the plant growth in the area. It not only destroys the existing crop but also allows for the population of the pathogen to build to a high level that will cause problems for future crops. Even healthy crops will eventually have difficulty in tolerating the pathogen at high levels.

This is a factor we often do not pay attention to but as we upset the delicate balance in a field it sometimes takes longer for us to turn things around as we not only have to increase the nutritional status but we have to bring these biological populations within the soil back into balance.

Therefore for these reasons we have identified yet another balance of nature that plays a major role in crop production and is very much influenced by nutritional balance.

It is well documented that there is a multitude of functions performed by mineral elements within plants and it is quite reasonable to suggest that they can influence both plant resistance to disease and insect damage. It is also reasonable to suggest that based on some of their other

cumulative responses that happen that we cannot simply assume that the “optimal” use of fertilizer in the terms of economic yield is necessarily also best from the phytomedical standpoint.

Plant nutrition becomes a delicate balance and too much or too little creates problems where the same amount in proportion would not.

An example of this is the N: K balance and its effect on insect damage. It has been well documented that the increased application of Nitrogenous materials has a great effect on the mortality of chewing insects largely the larvae of most insects because of the changes in the sugar content within the plants that these insects cannot digest. On the other hand excessive Nitrogen application will promote the severity of attack from sucking insects unless large applications of Potassium is given at the same time because K has a specific inhibitory effect on sucking insects.

Another research group concentrating on plant pathogens has documented that many pathogens depend on the soluble sugar and amino acid concentration in the plants they attack, plants with above normal concentrations of these compounds are often found to have relatively high nitrogen and relatively low potassium contents. Also plants with elevated nitrogen levels have been linked to reduced levels of phenolic compounds, which are toxic to pathogens.

As you can see from this brief description of N: K balance the nature and mechanisms within a plant promoting or inhibiting pests and pathogens differ and therefore timing, balance, placement and observation become a management puzzle that we have to solve.

Analyzing the old crowns in the field has shown where certain deficiencies have caused the decline of crowns and production. Why these deficiencies occur becomes another piece of the puzzle.

We do know that Nitrogen application will suppress a plants immune system and reduce the levels of phenolic compounds, which are toxic to pathogens, where Boron applications reverse this process. Therefore in season application of Boron becomes a management tool when we are using Nitrogen to push production.

The relationship between disease and nutrition although well documented often becomes confusing because there is a lot of overlap between nutritional disorders and related disease. One disease caused by more than one nutritional disorder.

In our own fields we have identified disease pressures that I have outlined before but I have included again for your reference. I will discuss a few as we see them and how the application of some nutrients often helps.