SPRAYGRO LIQUID FERTILIZERS
ABN 47 007 974 496

Crop Nutrition and Bio-Inorganic Farming

Plant nutrition is an exact science. It all started with the observation made about two centuries back that plants grow well if they are supplied with nutrients in addition to water and carbondioxide. Since then, several experiments have comprehensively demonstrated the role of essential nutrients in crop production. Taking advantage of hydroponics technology, scientists have shown the essentiality of 17 elements in plants to successfully complete its life cycle. Any element alone or in combination with others constitute a fertilizer. Fertilizers can either be inorganic or organic or biodynamic in nature. Plants absorb water and carbondioxide, which provides essential skeleton building components such as carbon, oxygen and hydrogen. The other essential nutrients such as nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, molybdenum, boron and nickel are absorbed from soil through roots. These nutrients, according to their requirements, have been classified into two categories. Those that are required in larger quantities are called macronutrients or major nutrients, and those required in relatively small quantities are called micronutrients or minor nutrients. Some nutrients such as silicon, selenium, sodium and tungsten have been classified as beneficial nutrients for a certain group of plants. Iron, zinc, manganese, molybdenum, copper, nickel, boron and cobalt (only in legumes) are examples of micronutrients. It has recently been realised that in most agricultural soils, the micronutrient levels are declining due to non-replenishment of these nutrients back into the soil. This has led to what is called "hidden hunger" in crops, which is partly responsible for decline in crop yields and quality.

These essential nutrients are absorbed in their ionic forms irrespective of their mode and form of application. For instance, potassium is absorbed as K+, calcium as Ca++ and zinc as Zn++. Growers are very familiar with urea application in the paddocks. Urea is a nitrogen fertilizer and it must be converted into nitrate form through the action of certain soil bacteria. Plants under aerobic conditions absorb all of their nitrogen from soil in the nitrate form. Now, if you apply any biodynamic or organic nitrogen fertilizer, it first has to be converted into the nitrate form for plants to absorb the nitrogen. One exception to this rule is the application of selective low molecular weight amino acids, which can be directly absorbed by the roots. The second example is the application of phosphorus fertilizers. Plants absorb phosphorus in phosphate (PO4) form through the roots. Application of polyphosphates, DAP, MAP and Potassium phosphates release their phosphate for immediate absorption through the roots. Many organic fertilizers contain phosphorus bound to sugar, protein and nucleic acid molecules, a very large and complex compound; in fact, a storage form of seed phosphorus, in many plants. This phosphorus can only be released through the action of certain bacteria in soil. Plant roots do not recognise this form of phosphorus for uptake, it must first be converted to phosphate form. Hence, no matter what you apply, the nutrients will always be absorbed in their inorganic soluble ionic forms. The organic fertilizers are no doubt slow release forms of nutrients. Their conversion into plants available forms depends upon many soil and climatic factors. Most of the time the critical stages of crop growth suffers with a single or multiple nutrient stress as there is not enough soluble/ absorbable form of nutrient present around the root zone to support plant growth. Many growers suffer yield penalty as a result of this slow release of nutrients from typical organic fertilizers.

On the contrary, the soluble inorganic fertilizers provide constant release of nutrients for absorption by roots. However, these fertilizers may leach out of the root zone and pollute

water table. The leaching of soluble nutrients is accelerated with heavy irrigation and/or rainfall after the application of the fertilizer. Careful application of inorganic fertilizers, both immediate and controlled release, provides nutrients on time to support a healthy crop growth. No doubt that the organic fertilizers deliver carbon back into the soil. Carbon or organic matter helps improve soil aggregates, water retention, water infiltration pattern

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and soil aeration. These physical properties of soil have been believed to be deteriorated over time due to extensive use of fertilizer chemicals, pesticides, fumigation and deforestation. True, inorganic fertilizers do not replenish soil carbon, but if used in conjunction with liquid humic acids, proves far superior than typical organic fertilizers. Growing crops for soil incorporation does exactly the same job. This type of fertilizer practice/ formulation can be termed Bio-inorganic. This encompasses the judicial use of inorganic fertilizers along with the humic acid extracts to grow better crops without suffering yield penalties and preventing further deterioration of soil physical, chemical and biological properties.

Growers using humic acids in combination with inorganic fertilizers may practice either organic or inorganic plant protection methods as plant protection also comes under the umbrella of organic farming techniques. Fertilizers are just a part of the organic farming, however, they produce the most significant impact on crop growth, productivity and quality because they essentially determine growth rates and development of plant. Using humic acids with soluble inorganic fertilizers, the leaching problem as mentioned above, can also be controlled. Carbon acts as a base plate in the soil where all macro and micronutrients are attached. On an average, it takes at least 3-4 years for a farm to convert from inorganic to organic way of crop cultivation. What it means is that the paddock or farm cannot be profitably cultivated during the transition period of 3-4 years. Bio –inorganic farming is an immediate answer to such situations to grow more and profitable crops in a sustainable way.

To illustrate SprayGro Liquid Fertilizer's commitment to liquid Bio-inorganic fertilizer production, we have chelated our micronutrient range, calcium and magnesium with lignosulfonates. Lignosulfonates are the by-products of the pulp and paper industry, derivates of lignin: an organic compound found naturally in hardwood plants. Apart from supplying micronutrients at controlled rates to the crop, lignosulfates also restore the carbon balance in soils. These compounds can be applied both on the foliage and through the roots. We also manufacture 12 and 18 % humic acid in liquid form alone or blended with nitrogen fertilizer. We also have the necessary expertise and facilities to custom mix Bio-inorganic fertilizers, inorganic liquid fertilizers and can provide valuable suggestions for crop improvement through nutrition.

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