Glycine Technology – The answer to Zinc and Boron applications.

Global competition is increasing the pressure on agriculture to produce higher quality, affordable produce. The grower who prospers in the future must use their resources productively, manage risk wisely, and maximize their returns on the investments to their crop. Fertilisers are an important investment each grower makes. In order to maximize the returns on this investment, growers must balance the needs for Nitrogen, Potassium, and Phosphorous with the crops' requirements for secondary and micro nutrients. Without adequate amounts of each element available at each growth stage, the maximum potential of the crop can not be achieved. The importance of micro nutrients has been thus far underestimated.

Mobilisation of minerals from the soil and corresponding uptake by the root are also related to the quantity of root surface that comes in contact with the mineral[1]. Because plants sometimes grow at rates that are faster than the ability of the roots to absorb and translocate minerals to the critical leaf and or berry tissues, foliar sprays can often help overcome a deficiency or maintain optimum nutritional levels of those critical tissues. Therefore foliar application can be used as an adjunctive method of plant nutrition.

Zinc and Boron – how important are they?

Zinc is taken up by plant roots as Zn^{2+}. A major factor which affects Zinc uptake is restricted root growth. Any factor which affects root development or the rates of diffusion of zinc in the soil may cause zinc deficiency, e.g. soil compaction, high water tables, container grown plants. Cold weather may also restrict root development and reduce microbiological release of zinc from soil organic matter[2].

Zinc has a low mobility within plants. The ease with which zinc is transferred to younger tissue is depressed further in zinc deficient plants. Zinc deficiency symptoms include decreased stem length, reduced number of buds, resetting of terminal leaves, small misshapen leaves and often, chlorosis. Zinc applications are best made two weeks before flowering as Zinc influences flowering and fruit set. A common disorder in grapes linked to Zinc deficiency is "Hen and Chicken" .

Image 1. Hen and Chicken disorder in winegrapes, linked to Zinc and Boron deficiency.

Boron is taken up by plants from the soil as un-dissociated boric acid. It plays a role in cell wall development, and is important in pollination, berry development and the translocation of sugars. An adequate supply of Boron is important at flowering, and in seed set. Boron deficiency occurs more commonly in dry weather. This is because

microbial activity in the soil is reduced, and the movement of Boron in the soil solution to plant roots is restricted as Boron is reliant on microbes breaking down organic matter to release plant available Boron[3].

Within plants, boron is relatively immobile. It is not readily relocated from old to young plant tissue. Plants are therefore dependent on continuous uptake of boron during the growing season. In this respect, its behaviour in plants is very similar to calcium (both are immobile) and the deficiency symptoms can be confused.

Frequently occurring symptoms include, distortion, thickening and cracking of canes, canes may also be hollow or brittle. Thickening, twisting and failure of roots to spread out or develop properly. Cuttings may fail to take root and the dropping of buds or flowers may occur[3].

Boron has also been linked to "Hen and Chicken" in grapes, however, unlike Zinc, the range between deficient and toxic levels of boron is very narrow.

Traditional trace elements superseded by Glycine technology

There are a myriad of different formulations of Zinc and Boron available to growers at present. Oxides, sulphates and EDTA chelates are the most commonly recognized formulations of Zinc. However, these formulations have been superseded by Glycine technology. What is Glycine technology? It is a patented process of chelation whereby every Zinc or Boron ion is bonded with two Glycine (smallest amino acid) molecules creating a fully chelated Zinc product (see figure 1). The plant recognizes this molecule as a proteinaceous molecule allowing it to travel in the phloem quite readily to the growing points such as flowers and berries where is it required, as well as replenishing leaf levels. Glycine chelation technology allows Zinc and Boron to be a mobile element whereas elemental Zinc and Boron have low mobility within the plant.

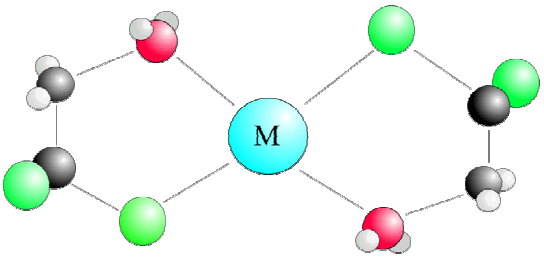

Figure 1. Glycine chelated mineral.
M = mineral (such as Zinc or Boron)

The method of delivery of these 'Bio-Available' minerals are not conventional, like the delivery methods of products such as oxides, sulphates and EDTA based trace elements. The latter products can marginally reduce Zinc or Boron deficiencies, but the speed by which the elements are released from these products and transported into the growing points is very slow compared to the transportation of elements in the Glycine form[4].

This form of chelation has provided tremendous advantages because of increased absorption and translocation of the minerals within the plant.

They are highly systemic, non-phytotoxic, 100% soluble, and economical due to the high availability. Glycine chelates are generally registered by organic certifies, therefore organic growers can also take advantage of the technology.

Summary

Global competition is increasing the pressure on the production of high quality winegrapes. Fertilisers are an important investment each grower makes in their production systems, however the choice of the right product between the myriad of foliar fertilisers existing in the marketplace has made it more difficult for the grower to choose the right product for the right results. The greatest advantage in foliar nutrition is the ease of application, however always choose a fertiliser which is highly soluble. If the product is not 100% soluble, this results in supplying the mineral onto the plant, not into the plant where it is required. Glycine Technology has revolutionized the application of elements such as Zinc, Boron and Calcium, which in elemental form have low mobility. This patented technology has enabled these elements to enter the leaf tissues, with systemic action and mobilise to the growing points where they are most needed. The application of Zinc and Boron is best applied two weeks before flowering in winegrapes in order for the vines to best utilise these elements before the most critical stage of growth has passed, thus reducing the incidence of "Hen and Chicken" and maintaining vine levels of these elements which are important during all growth stages.

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