ARE BORON CHELATES **REALLY CHELATES?**

Boron is one of the essential micronutrients required for sugar transport, optimum cell wall development and growth of crop plants. The most commonly used boron compound in liquid fertilisers is boric acid, H3BO3. Note that the formula for boric acid can be written B(OH)3, as boron hydroxide. If boron were a normal metal, the hydroxyl (OH) ions would separate in water, creating the trivalent boron ion B+++. This, however, does not happen to the smallest degree, and boron does not form ionic bond. Now the question arises whether boron hydroxide is capable of forming chelates? Let us examine the chelation properties of true metals such as iron. When iron sulfate dissolves in water it forms iron and sulphate ions, each existing as a separate entity. The iron molecule binds with the chelating compounds such as EDTA, EDDHA and polyphenols to form a chelate. Boron hydroxide on the other hand cannot combine with the chelating molecule since it cannot satisfy the coordination number of 2 to form a stable chelate. However, it can form a stable **complex with sugar alcohol and nitrogen atoms.** In fact, the sugar-borate complex is the most translocatable compound in plants. Boron can also form complex with aminoacid nitrogen for its translocation within the plants. Some growers must have seen the chelated boron health products in the pharmacies. These products essentially use arginine and glycine to so-called chelate boron for optimum availability. It's in fact a complex. The main difference between chelate and complex is that chelates are relatively more stable under adverse conditions while complexes are less thermostable, and release the atom quickly under adverse reactions.

Lignosulfonates form weaker complex with boron. Boron is attached with the sulfonation groups of these compounds. Pure boron atom can combine with the intense negative charge of the carboxylic and phenolic atoms of the lignosulfonate molecule. This interaction should involve reorientation of the complex lignin molecule in order to bind with three positive charges of the pure boron atom as indicated above. This, however, does not happen. If it happens then we can safely call it a boron-lignosulfonate chelate.

Boron hydrides are widely recognised to form boron cage compounds called boranes. These boranes are highly complexed, chelated compounds. The boron is so actively caged that it is not available for plant to absorb and translocate.

It would thus not be incorrect to surmise that boron from boric acid is not capable of forming a chelated compound. Boron can form complex with nitrogen and sugar alcohols. Boranes are not suitable as a source of chelated boron for plants. The SprayGro Boron 15 is a sugar and nitrogen complex product.

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