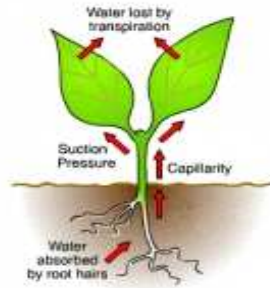


Water Stress in Crops: The Mitigating Role of Seaweed Extract Biostimulants

Courtesy: <http://betterfarmingbetterfuture.wordpress.com/>

February 25, 2010

All living matters are comprised of 60-70% water. Aside from water being the transport medium of the nutrients and photosynthetic products to various parts of the plant, photosynthesis also depends on water. Absorption of applied nutrients are also dependent on water.



Soil nutrients are brought to the root in a solution of water; they enter the root dissolved in water and are carried through the plant in sap composed largely of water. The process of water evapotranspiration also keeps plants from overheating.

Water Stress: Drought

Since water is a main factor in biological and metabolic processes in plants, moisture deficiency during critical growth stages will adversely affect the growth and development of crops which may therefore reduce the quantity and quality of yield. If there is drought, the soil cannot provide enough moisture to maintain the water movement in the plant. This triggers the special cells around the stomata's called "guard cells" to be filled with water, swell and block the stomata's to prevent water loss, stopping also the absorption of nutrients from the soil and the entry of CO₂ for photosynthesis. Crop under moisture stress will therefore close its stomata's and eventually stop photosynthesis. Because photosynthesis provides the plant's food supply, limiting or completely stopping it can lead to a general decrease in the development of the plant. This is usually observed in a drought-prone area where the crops are smaller than the same type where water supply is sufficient. If not relieved, drought leads to interrupted reproductive development, premature leaf senescence, wilting, desiccation and death (Hsaio, 1973; Schulze, 1986). Drought therefore, is a major limiting factor in farming.

Drought Tolerance

For crops growing in a drought/water stress prone areas, drought tolerance is very important. Aside from the precautionary measures being taken by the growers and different agencies to mitigate the effect of drought, the plant itself has ways of coping with water stress. To cope with water deficiency, plant adjusts by stopping leaf expansion, decreasing the assimilation process, reducing the ion availability and other alteration in growth and development patterns.



In most of these plant adaptive responses to water stress, plant hormones are observed to be involved. Inhibition of shoot growth as an adaptive response to water deficit results in limited area for evaporative moisture loss and diversion of essential solutes from growth requirements to stress-related functions like osmotic adjustment that improves cell water retention and turgor maintenance (Chapin, 1991; AArchard et al, 2006). In maize, Saab et al. in 1990 observed that stress-induced abscisic acid (ABA) accumulation appeared to promote root growth in addition to its effect on stomatal closure. Other hormones like cytokinin and the plant compound betaine are also involved in plant survival mechanism.

Water Stress and Vegegrow Biostimulants

Plant hormones are defined in plant physiology as **natural organic substances** produced in one part of the plant and translocated in other parts where at very low concentration stimulates physiological response. On the other hand, substances that elicit the same response but are **chemically synthesized** are called **plant growth regulators (PGR's)**.

Water stresses, as mentioned earlier, results in altered level of plant hormones and plant growth. Although these alterations and adjustments enable plants to survive during stress, with regards to cultivated plants, these adaptive mechanisms still result in low productivity and losses. It is therefore imperative to help crops increase their water stress resistance. One way is exogenous application of plant hormones through biostimulants. **Biostimulants** are defined as materials, other than fertilizers, that promote plant growth when applied in small quantities; they are also referred to as metabolic enhancers. Biostimulants contain one or all of the following: carbohydrates, amino acids, macro & micronutrients, vitamins, plant hormones, plant compounds

such as betaines etc. It is important to note however, that not all biostimulants are natural/organic. Vegegrow Seaweed Extract is considered a biostimulants because it contains these beneficial compounds plus well-balanced and readily available macro & micronutrients.

Application of vegegrow throughout the critical growth stages can help crops withstand a biotic stress such as drought. The plant hormones and beneficial compounds like betaine in vegegrow can help improve drought tolerance in crops. It is best to start vegegrow application as early as possible to help crops establish in the field by promoting vigorous roots and healthy shoots. Continuous application, in small concentration but more frequent, maximize the efficacy of the product. Vegegrow also produces a synergistic effect with other inputs that are applied in the crops. This means better protection by enhancing and promoting the natural defense mechanism of the crops when stress is imminent. While exogenous application of vegegrow provides plant hormones that trigger this defense mechanism, the crops are also provided with the essential nutrients that the crops cannot take by root absorption, since vegegrow is at the same time a plant food source. It is important to remember however, that the mitigating effect of biostimulants is building up and triggering of natural defense mechanism and acquired resistance, the action is preventive, and intervention must always start at earliest possible time to have the best results.

Vegegrow is a proudly Philippine made product by Amebocyte Cell Co., Inc.(ACCI) based in Cebu, owned by **Mr. Ed Castro**. For details and more information contact **Rey C. Divinagracia** at **09196141540**. Watch out for more detailed discussion on the effect of the beneficial compound components of Vegegrow.

REFERENCES:

1. J. Benton Jones Jr. Plant Nutrition Manual. (1930)
2. H. Griffins and M.J. Parry. Plant Response to Water Stress. <http://aob.oxfordjournals.org>
3. I.Jeannin, J.C.Lescure and J.F.,Morot-Gaudry. The Effects of Aqueous Seaweed Sprays on the Growth of Maize. *Botanica Marina*, 34, 469-471. (1991)
4. P. Neumann. Coping Mechanisms for Crop Plants in Drought-prone Environments. <http://aob.oxfordjournals.org>
5. M. Pessarakli. Handbook of Plant and Crop Stress. (1999)