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HOW DOES EKOGEA BIOCOMPLEX WORK?

Introducing BioComplex ("BCx") to the horticulture community is difficult because BCx is automatically grouped together with other products made from marine algae, products with an algae component, or products containing plant regulator molecules. BCx is quite different.

For experts working in intensive agriculture production, it is difficult to believe harvests can be increased in quantity and/or quality – normally by a minimum of 10% and often significantly more - after one or more application(s) of our product. The fact is: BioComplex results in tremendous yield increases, regularly proven by our own trials, by those of our customers and independent institutes worldwide.

So how does BCx work? The answer is multi-layered, and this paper provides insight into the essential activities within a plant which mutually complement and strengthen each other – a synergy between:

- **Light Photon Exchange**: This overlooked scientific discovery of the past was made by Alexander Gurwitch and his wife in the 1920's. They proved that living cells were guided by organism exchange instructions and information, within and without the cell walls, via light photons (at the speed of light) – not by hormones as conventionally believed.

- **Oligosaccharides:** These are minute carbon-based structures found in plant cell walls which act as stiffeners. Oligosaccharides are plant hormones, in alpha or beta-glucosidal linkages, that are bound to small sugar molecules. Oligosaccharides were proved (by an international research group led by Prof. Albersheim and Dr. Darvill at the University of Georgia U.S.A. in 1985), to de-activate (through photon signals) the repressors on a plant's DNA. These repressors can act to block the sequence for increased root growth when this function is no longer needed in the plant's evolution. Plant Hormones vs. Oligosaccharides: It is accepted belief that the cells of all living things including plants, are production units for various types of protein that in turn create the characteristics and functions of the living thing itself - herein lies the theory of the System of Hormones. It is our belief, as verified by the biophysicist Prof. Dr. Popp in the 1970's, that the conventionally-accepted hormones-as-messages theory does not tell the real story.

Biological sciences (medical, veterinary and botany) are in a developmental cul-de-sac regarding cell communication via hormones - and we believe this theory does not serve the furthering of scientific advancements, especially in the field of botany. Since the discovery of Prof. Gurwitch, his wife, and Prof. Albersheim, it is likely that blocked DNA sequences can be activated via the correct Oligosaccharide - and through this intervention, a plant's growth, height and density, fruit size and quantity, early or late ripeness, the number of grains in an ear, and the defense systems against fungi or insects etc. can be deliberately steered from outside the plant. We accept that this theory may be considered controversial by members within the plant and soil science community. Oligosaccharides in Ascophyllum nodosum marine algae: Normal extraction methods used to make products from marine algae are well known. The extraction method and subsequent treatment used to produce BioComplex is completely different from conventional methods. Without divulging our proprietary extraction and production technologies, Ekogea's BCx has proven to be significantly more bio-active and provide significantly more bio-available nutrients than any other marine algae-based products. Through our proprietary extraction and treatment, we have been able to extract from the cell walls of marine algae, the activator for Oligosaccharide that signals the plant to produce more hair roots.

Technical Bulletin 2 Bio-dynamics at Work in Crops & Soils The discovery of Dr. Gurwitch, his wife, and Prof. Albersheim et al explains why all plants, after exposure to BCx, switch over to root growth. For instance, under experimental conditions we have forced treated plants to produce 400 % more roots than the control. For plants that form part of our diet, this experiment results in no harvest because the treated plants switch to root growth, to the detriment of all other functions. However, by controlling the precise application of BioComplex to specific food-producing plants (at the 2-leafstage, with 1-2 subsequent sprayings), we can ensure optimal results for various flowers, seeds, and fruits. Other plants (ornamental trees, bushes, shrubs, grass, etc.) are treated at regular intervals throughout the year to produce the desired growth and appearance.

Effects of BioComplex: Our product increases the root system which leads to a dramatic uptake and utilization of nourishment and water which improves vigour and survival, even under stressful conditions like drought and disease. When plants and soils are well supplied with nitrogen (N), the increased root system automatically allows for higher-yield harvests in both quantity and quality compared to untreated plants which cannot utilize the available nutrients.

Increased fertility and biological activity in soil after BioComplex application is further explained by the following mechanism: During Ekogea's algae extraction process, oligosaccharides are activated and long-chain molecules, known as polyuronic acids are released.

- Oligosaccharides, a previously neglected class of molecules, are emerging as biological tools, and they are considered to be important precursors for the formation of humic acids.

- Polyuronic acids from marine algae were examined by Prof. Dr. Selman A. Waksman* in the 1930's when he found that their molecular structure is identical to those of the grey humic acids found in top soil. Humic acids are the fertility carriers in top-soil. They make up, in combination with the finest inorganic particles in the soil, the 'clay-humus-complex'. The half-life of humic acid is measured in centuries, and they are produced over a period of between 10-150 years through the microbiological/composting process in soils. Humic acids have a molecular structure that is, biologically unalterable and can reach an age of up to 2,500 years in the soil. Humic acids are responsible for buffering the soil (neutralizing the chemical components between the plant roots and the micro-biology of the soil, as well as furthering the ion exchange capability). They are responsible for water retention, and for forming the insoluble crumb structure which allows for aeration of the soil. These biologically permanent structures and fertility carriers are greatly reduced when the soil's micro-biology is impeded. A substantial fraction of the mass of humic acids is in carboxylic acid functional groups, which endow these molecules with the ability to chelate (bind) (precipitate in some media, make solution in other media) positively charged multivalent ions (Mg^{2+}, Ca^{2+}, Fe^{2+}, Fe^{3+}, most other "trace elements" of value to plants, as well as other ions that have no positive biological role, such as Cd^{2+} and Pb^{2+}). This chelation of ions is probably the most important role of humic acids with respect to living systems. By chelating the ions, they facilitate the uptake of these ions by several mechanisms, one of which is preventing their precipitation, another seems to be a direct and positive influence on their bio-availability.

With the application of BCx and the oligosaccharide content which both mimics and stimulates humic acid formation, soil sustains it biological productivity. The minerals and microbes in BioComplex serve to 3 Bio-dynamics at Work in Crops & Soils Ekogea's full product line is certified 'ORGANIC' under the European Economic Community EEC 2381/94, EG 8342007, and EG8992008 which governs organic production, labelling and control of animal and human feedstuffs. All of Ekogea's products can be used in the eco-systems of agriculture in all member states of the European Community without special permission. filter, buffer, degrade, immobilize and detoxify harmful organic and inorganic materials while nourishing the plant and soil system in a comprehensive and complex manner.

Another very positive attribute of BioComplex usage, (and of no less value than yield increases), is demonstrated over time: Farmers who use our product regularly will notice improved fertility of their land over the course of 3-4 years. Soil conditions, crumb structure, water holding capacity, seed germination and resistance to wind and water

erosion will all noticeably improve. The stability of the soil aggregate is maintained, and the overall vitality of the soil is increased.

Additionally, plant disease associated with concentrations of harmful microbiology (fungi, nematodes, etc) should reduce.

Example: After just two applications on sugar beets (in total 4 litres BCx900 per ha) it was established during scientific trials with Zagreb University, that the eggs and larvae in the nematode cysts from the treated areas had a very high (+30 % over control) parasitic infestation. This demonstrates that the biological activity in the soil increased in the first year of the application of our product and produced a better balance between harmful pests and useful microbes. The increased biological activity in the soil also means that plants receive not only more nitrogen (N), but also more carbon dioxide (CO2).

Many greenhouses in Holland and Germany regularly deliver CO^2 to the enclosed environment because CO^2 positively influences a plant's cellular structure. Increasing available CO^2 makes plants more resistant to drought stress, allows them to build a larger cell mass and produce more sugar which in turn improves their overall health and makes them more valuable as a food product. BioComplex is as much about microbiological stimulation as fertilization. By creating a spontaneous increase in the activity of the micro-biology, Biocomplex subsequently:

- Strengthens the soil's CO^2 production and the plant's Nitrogen (N) uptake;
- Increases a plant's root-mass;
- Enriches the grey humic acids in the soil which together with the increased root mass stabilizes and improves top soil fertility;
- Produces a better balance between harmful pests and useful microbes; and
- Improves soil condition for long-term vitality, durable erosion protection and sustainable production BCx is a natural, certified organic product, safe to handle, easy to administer, and low-cost solution to crop and soil productivity.

BioComplex is a natural, certified organic product, safe to handle, easy to administer, long-life storage and low-cost solution to crop and soil productivity.

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