

"Wise Agriculture will win" - is not just a slogan!

Some facts related to the 'AutoAgronom concept'

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Plants physiology & evolution -

It's about some hundreds millions years that the plants reached their shape, and their balanced-physiology. Ever since they are organized well-enough to be the Solely suppliers of the free atmospheric Oxygen. The plants are also the Solely producers of the essential organic-nutrients, that they and we and the entire biological world are consuming, being nourished by the plants directly or indirectly, via the 'Food chain, that start from the original producers, and then through plants-eaters it continuous through the predators and ends by the bacteria activities. The nutrients, supply the plants the energy and the materials needed for executing their physiological-activities.

Thus; if the plants' leading impulse is to grow and to produce for their own needs the essential nutrient, then after so many years they do not need any one to advise them what to do, how to do, or when to act.

And the man invented the agriculture, and we, the growers, a small drip in the world population, were chosen to carry-on the important social mission: "To grow and to raise plants for supplying food for the world population".

Consequently; we are deeply busy some thousands years already in this project, finding ourselves nursing, controlling, breeding and improving step by step growing techniques. Growing plants efficiently today, means 24 hours of plant's nursing; supplying water and minerals, protecting from many kind of diseases, pests and weeds, changing the micro environment for them etc. We do it as it is our interest, that the plants we grow will produce more and higher above their own necessities.

Along the history of mankind we selected the plants' types and mutations that will produce more and more. In our modern times we are pressing up our crops, mostly by genetic work, for better, stronger, resistant varieties. The released-results tell us about improved new varieties that are able to produce very high saleable products. But let us not forget that improving the production and quality is only one side of the equation. The other side of the equations should deal with the ability of the roots systems of these new productive varieties to supply easily the water on real time, any time when water is used by the plants.

And here again the AutoAgronom computer is built to collect data, to inform it and to react automatically to these accurate critical timing. Not to supply only water, but to control in the roots media the narrow bounds of what we call the "optimal growing conditions". The AutoAgronom systems create and preserve the optimal growing conditions' helping the 'secondary roots' to do their important work of supplying the soil-solution on real time.

Please note that the vast majority of the flora species in nature do well without the help of growers. They are fed only by nature resources: water, light, atmospheric-gases, and small quantities of soil-mineral. Technically they do it with their exclusive and unique organs, the roots and the leaves. Note please that modern varieties have exactly the same organs that use the same nature resources, and they are functioning the same way the plants do in nature.

The plants' vital goal, where ever they grow and can survive, is keeping their 'Genetic Species-Continuity'. Therefore they control their physiological reactions on daily and seasonal basis, according to the frequent environmental conditions changes, considering water presence in the growing media, and the ability of their roots to absorb it and supply it. Under AutoAgronom control, the effect of extreme environment conditions on the plants' activities, is moderated and the plants continue to act efficiently.

The 'Essential Nutrients' - The Carbohydrates, the Proteins, the Fats, and their derivatives, all originated from the primary photosyntates products - the "Sugars". The primary "Mono-sugar" the "Glucose" ($C_6H_{12}O_6$) is composed of Carbon (C), Hydrogen (H), and Oxygen (O).

Please note that carbon and oxygen are available for free in the air!

The Carbon (a metal), due to its chemical structure is the basis of the "Organic chemistry" which actually is the precondition for the entire existing biological life. It exists in the air - 0.04% as part of the CO₂ dynamic gas.

The Hydrogen (a gas), together with oxygen they built the water (H₂O).

The plants are able to split the H₂O molecules and to use the pure hydrogen in the process of producing the Sugars.

The Oxygen (a gas), is 21% of the air capacity. Its accumulation started from zero, hundred millions years ago, when the plants started to act on our globe.

The oxygen originated from the CO₂, as an outcome of the photosynthesis process in the plants' leave and by the sea- Algae'. The Oxygen molecules are released from the leaves to the atmosphere via the leaves' stomata.

Important Notes: 1. despite the fact that the plants are the solely producers of the free-oxygen, they are not able to use it back through their leaves.
2. The oxygen is absorbed into the plants' tissues only by the roots systems.

Small amounts of the free oxygen dissolved into the soil solution, and while the secondary roots absorb it the oxygen is there.

3. The small oxygen quantities (up to 10ppm.) that dissolve into the soil solution and move through the plants' vascular system will activate the plants' physiology actions.

4. Therefore the presence of air in the capillary soil structure is highly important.

Practically it means that the irrigation should be controlled in a way that keeps the right air / water relations in the growing media. Here again the AutoAgronom is accurately controls the right relations.

We already explained* that 'AA' plants absorb and utilize easily the natural free elements C, H, and O, and compare to the conventional irrigation systems, 'AA' plants produce efficiently, and in shorter time, the essential nutrients needed for the maximal plant's growth. The outcome is also an improvement of the soil-elements' absorption.

The Plant's Dry Matter -

The dry weight of the plants' tissues (after dehydrated in a laboratory oven) is called the "Dry Matter". In annuals the dry matter comprises only 5% - 10% of the fresh weight, and the rest 90% - 95% is the water.

The net dry matter comprises 85% - 92% organic materials that are produced by the plants, and it comprises 8% - 15% of pure elements absorbed by the plants from the soil-solution. These chemicals are usually called the "soil- minerals", despite the fact that most of them are supplied by the growers as fertilizers.

The Macro-elements: N, P, K, Ca, Mg, S, and the Microelements: Fe, Zn, Mn, Cu, Mo, Bo, and more.

"Leaf-analysis"

Leaf-analysis is an accurate routine laboratory-technique, identifying the important minerals presented in the leaves while executing the analysis. The technic is commonly used in modern agriculture for evaluating the efficiency use of different 'Feeding formulas'. The calculated values are % of the total dry matter.

Please note: 1. the common Leaf-analysis do not supplies data for 85% - 92% of the organic materials, produced by the plant and built its' structure, as the dehydration process turns it into ashes.

2. It supplies data only for the soil-minerals presented in the analyzed-leaves.

3. Leaf analysis can't show the seasonal accumulation of the fertilizers-ingredients in the plant's tissue.

Experimental data of Pepper grown as commonly advised for the Israeli growers, versus Pepper controlled by an Autoagronom system show **clearly and undoubtedly** that the exaggerated fertilizers quantities supplied by the common feeding program did not increased the pepper production in compare to the 'AA' results (***much less minerals and water and the same yield***). The fact is that according to the recommended predefined fertigation programs - guided by the practical experience that salinity will develop sooner or later - the exaggerated quantities that might cause salinity are

washed downward to the local aquifer - within the irrigation course - by the exaggerated water quantities programmed ahead.

Down here are the results obtained from 3,000 hectares of Pepper grew in the Arava region, Israel*. It proves that 'AA' plants supplied only with 15% - 20% of the fertilizers commonly used for Pepper, did well and yielded **98 tons** /Hectare, while the Pepper fertigated with the recommended fertilizers quantities (100%), yielded **only 95 tons**.

Estimated economical-figures for 3,000 hectares of Pepper grown in the middle-Arava, Israel, September 2012 - April 2013 season;

A - Conventional recommended quantities.

B - Autoagronom irrigation control system.

A - Water supply = **30 million cu.** (10,000 cu. / Hectare) ~ **15 million \$.**

B - Water supply = **16 million cu.** as controlled by 'AA' system ~ **8 million \$.**

A - Fertilizer supply = **22,500 tons** (750 gram/cu. water) ~ **35 Million \$.**

B - Fertilizers supply = **3,500 tons** as controlled by 'AA' system ~ **5.5 million \$.**

Estimated results = **19,000 tons fertilizers were washed to the aquifer ~ 30 million \$.**

The peculiar bottom line is:

Israeli Pepper-growers are using in 8 months-season ~ 14 million cubic water just for contaminate an Israeli aquifer by 19.000 tons Israeli fertilizers.

Economically it means a yearly waste of ~ 75,000 \$ per farm size of 6 Hectares.

Is it tolerable: Economically, Nationally and Environmentally.

Epilog - Logically it would seem that **saving fertilizers and water is a priori the plant's interest**, as exaggerated fertilizers and water quantities - eliminate the oxygen presence in the roots' volume, create salinity conditions, moderate the plant's growth, and decrease the yields.

* 'Autoagronom - A proven concept' a lecture given on November 2015
The Hebrew University of Jerusalem, Faculty of Agriculture, Israel.
The International course "CROP PRODUCTION UNDER SALINE STRESS"

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** The Arava climate is hot and dries the year round.