

"Wise Agriculture will win" - *is not just a slogan* - It is the practical necessity!

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Prolog -

The plants reached their present shape and their balanced physiology some hundreds of million years ago. Subjected to their primary impulse to grow, they produce the nutrients needed to activate their physiological processes, (1) and they are organized well enough to be the sole suppliers of the essential organic nutrients and the vital free atmospheric oxygen. Their essential nutrients nourished the entire biological world, directly or indirectly via the 'Food-chain'.

And "The Man" invented the 'Agriculture' (*Sickle & Hoe*); and we - the growers - a small drip in the world were chosen to carry on the important 'Social mission' - Raising plants and supplying food for the world population. Consequently, we are deeply busy some thousands of years in this project, finding ourselves cultivating, controlling, selecting, breeding and improving growing techniques that serve the plants, preparing them for this important, almost sacred mission.

Growing plants efficiently today means 24 hours of plants-nursing: supplying water and minerals, protecting them from diseases, pests and weeds, changing the micro environment for them etc. We do it, as it is our vital interest that the plants we grow will produce more and more, high above their own needs.

Along the history of Agriculture, we selected plants' types and mutations that produce upgraded higher yields. Nowadays we continue to do it as before, but mostly by genetic work, looking for better, stronger, resistant varieties, etc.

But - Let us not forget, that for getting the desired production and qualities of these improved varieties, it is our responsibility, as growers (and researches), to control the environmental conditions in the roots media that will assure the ability of the 'Secondary roots' (2) to supply the real quantities of water, oxygen and minerals in real time, any time along the 24 hours cycles, when the plants are active, need it and use it. The AutoAgronom concept deals with this practical necessity.

Wherever plants grow, they are concerned about their genes that would ensure their existence. **Thus, in nature**, the plants control, independently, their physiological reactions coordinated with the frequent changes in the environmental conditions, depending on the limitations of water presence in the roots' media, and on the ability of their 'Secondary-roots' to absorb and use the 'Soil-solution'. Wild plants are built for that - on a daily and seasonal basis.

In agriculture, the growers took responsibility, and they are supposed to take care for their crops. Therefore, they are occupied over and over again, trying to create and control the optimal growing-conditions for their productive plants: supplying water, fertilizers, energy (*light, heating, cooling*), and much more.

On the whole, it is complicated, and requires high professional responsibility.

And "The man" invented drippers, sensors and automatization, and here is, the modern agriculture.

The Uniqueness of the new "AutoAgronom a proven sustainable concept "

in which I am deeply rooted - **is its ability to synchronize, automatically, the fertigation (3) with the plants vital actions** - in real time - when the plants perform their physiological activities, and they need and use water and oxygen.

The AutoAgronom system ('AA') does it continuously, 24 hours a day, collects accurately data of the decisive parameters related to the plants' actual activities, and also some of the physical and chemical values, that are changing in the roots'-media while the roots absorb the soil solution. The 'AA' reacts on these changes **only when it is needed**, by Fertigating small quantities of the feeding-solution which will replace the small volumes of the soil-solution that have been used by the plants.

Therefore, under 'AA' automatization the '**Water-Tension values**' in the roots media are always close (but above) the 'Saturation-Point' of the growing media. As a result the effect of extreme environmental conditions on the plants is moderated and the plants continue to act efficiently, night and day, almost in any kind of difficult situation.

By that it controls the narrow bounds of what we call the 'Optimal Growing Conditions' in the roots media.

Preserving the optimal growing conditions enables the well-developed secondary roots systems to do their important mission: be able to supply accurately, and in real-time, the soil-solution **that holds in it the dissolved oxygen** and the vital feeding minerals.

We already explained (4) the importance of the oxygen to the entire biological world. We described there the sophisticated way the oxygen does: **It starts** as part of the global CO₂ that enter the plants leaves. **Then, free Oxygen** molecules, *as a product of the photosynthesis process*, are released from the leaves to the atmosphere. **And then it** dissolved into the soil solution, **and flow back into the leaves** via the transpiration processes.

We explained there, why and how easily and efficiently the 'AA' plants absorb the soil solution, and utilize the **natural elements C, H, & O that exist for free in the air and in the water**. Please remember that these 3 elements compose the photosyntates' primary fresh sugars that accumulate in the plants tissues.

Please note that plants in nature are fed only by natural resources: water, light, atmospheric-gases, and soil-minerals. And they are doing it quite well without growers.

Note also that modern agricultural varieties have exactly the same exclusive and unique organs - their Secondary-roots and their Leaves - which are functioning the same way as the plants in nature, using the same natural resources, plus the water and the minerals added via the supplied fertigation quantities.

The 'AA' results, wherever it uses, show clearly that the quantities of fertilizers & water recommended by the official institutions are exaggerated, as they are high above the plant's real needs. Subsequently it causes '**Salinity conditions**', and moderates the plant's activities. **Being concerned about these facts**, official institutions and Fertilizers-Companies direct the growers - **with Clear Conscience** - to include excess water quantities in their predefined irrigation programs, in order to remove the excess minerals. Practically it means that the extra minerals are washed downwards and contaminate the aquifers.

AutoAgronom general advantages -

Accumulated experimental data of many 'AA' Intensive-crops (5), shows the following facts: In comparison to other conventional modern irrigation systems, 'AA' plants produce efficiently and in shorter time, the essential nutrients needed for their maximal growth.

They produce better qualities, use 50% less fertilizers, 50% less water, and there is no need to washout the minerals – as compared to the same crops, fertigated by the commonly-used irrigation control systems.

An example that illustrates the AutoAgronom advantages versus Conventional dripping systems is presented in the table below. The table represents the results of 'growing Pepper experiments' in the Israeli Arava areas, (6) (Moshav Paran). September 2012 - April 2013.

The figures in the table calculated and estimated for 30,000 Dunam (7) of Pepper, seasonally grown in the Arava area.

Fertigation Pepper experiments in the Israeli Arava area, Paran 2012 / 2013 season.

Legend: **A** - Officially recommended quantities. **B** - Actual *estimated 'AA'* quantities

A - Water supply = **30 million cu.** (1,000 cu. /1 Dunam) ~ \$ **15 million.**

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

A - Fertilizer supply = **22,500 tons** (750 gram/1 cu. water) ~ \$ **35 "**

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

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

This experiment demonstrates clearly that the 'AA' pepper's plants produced the same yield as the controlled plots. They proved that the exaggerated fertilizer quantities supplied by the common feeding program did not increase the pepper production, (8) but rather **severely increased the contamination of the Arava aquifer by the unused excessive fertilizers.**

The bottom line:

Israeli growers in the Arava, used in 8 months-season about 14 million cu. of water just for contaminating their own Arava aquifer by 19.000 tons of Israeli-made fertilizers.

Economically it means a yearly waste of ~\$ 75,000 per typical farm of 60 Dunam.

(Errors and omissions accepted).

Epilog -

It seems Logical that saving fertilizers and water is a priori the plants and the growers' interest, as exaggerated fertilizers and exaggerated water eliminate the oxygen present in

the roots' volume, and create salinity conditions. -

And what the Israeli growers do to avoid salinity? They are wasting water and money and contaminate their drinking water - **and it is a priori -Not Logical.** (9)

Is it tolerable? - Economically, Nationally or Environmentally

Notes -

1. The 'Essential Nutrients' - the Carbohydrates, the Proteins, the Fats, and their Derivatives, all originated from the primary photosynthetic products - the 'Sugars'. The sugars' raw materials, are the Carbon and the Oxygen which exist for free in the air (CO₂), and the Hydrogen in the water (H₂O).
2. The 'Secondary-Roots' develop on the main roots or on the adventitious roots. They are in charge of absorbing the Soil-solution (*water, oxygen and minerals*), and supplying it into the plant's vascular system. (The link to the presentation "The roots do the work" is: [The Roots Do the Work](#)).
3. Fertigation – Irrigation containing water and fertilizers
4. 'AutoAgronom - A proven concept' - A Lecture given on November 2015, in the International course: "Crop production under saline stress", The Hebrew University of Jerusalem, Faculty of Agriculture. (The link to the lecture is: [Autoagronom Main Presentation - Oct. 2018](#))
5. Flowers - Gerbera, Roses, Lilies, Hippeastrums, Carnations, Chrysanthemums, Geraniums, Cyclamen and Strelizia (bird of paradise).
Vegetables - Broccoli, Fennel, Beet, Lettuce, Kohlrabi, Mangold, Kale, Parsley, Spring Onion, Strawberries, Tomatoes, Potatoes, Eggplants, Cabbage, Cauliflower, Carrot, Spinach, Pea, Celery, Pepper, Pumpkin and Chives.
Spicing Plants - Basil, Mint, Rosemary, Sage, Coriandrum, Thyme, Ginger and Cannabis.
Field crops - Wheat, Corn, and Melon.
Trees and Bushes - Roses, Figs, Vine, Avocado, Palms, Apples, Oaks (*Quercus ithaburensis*), Papaya, Lemon and Guava.
Gardening plants - *Rhus crenata*, *Adenium*, Ananas, bougainvillea, and many others.
6. The Israeli Arava climate is hot and dries the year round. 30,000 Dunams of various vegetables (mostly pepper), were grown yearly as winter crops for export from this area.
7. One Dunam = 1000 sq. meter.
8. [The 'AA' Pepper](#) yielded 9.8 tons/Dunam, **the recommended** Pepper yielded 9.5 tons/Dunam
9. It is quite possible that these instructions are used in agriculture in many other countries too.

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