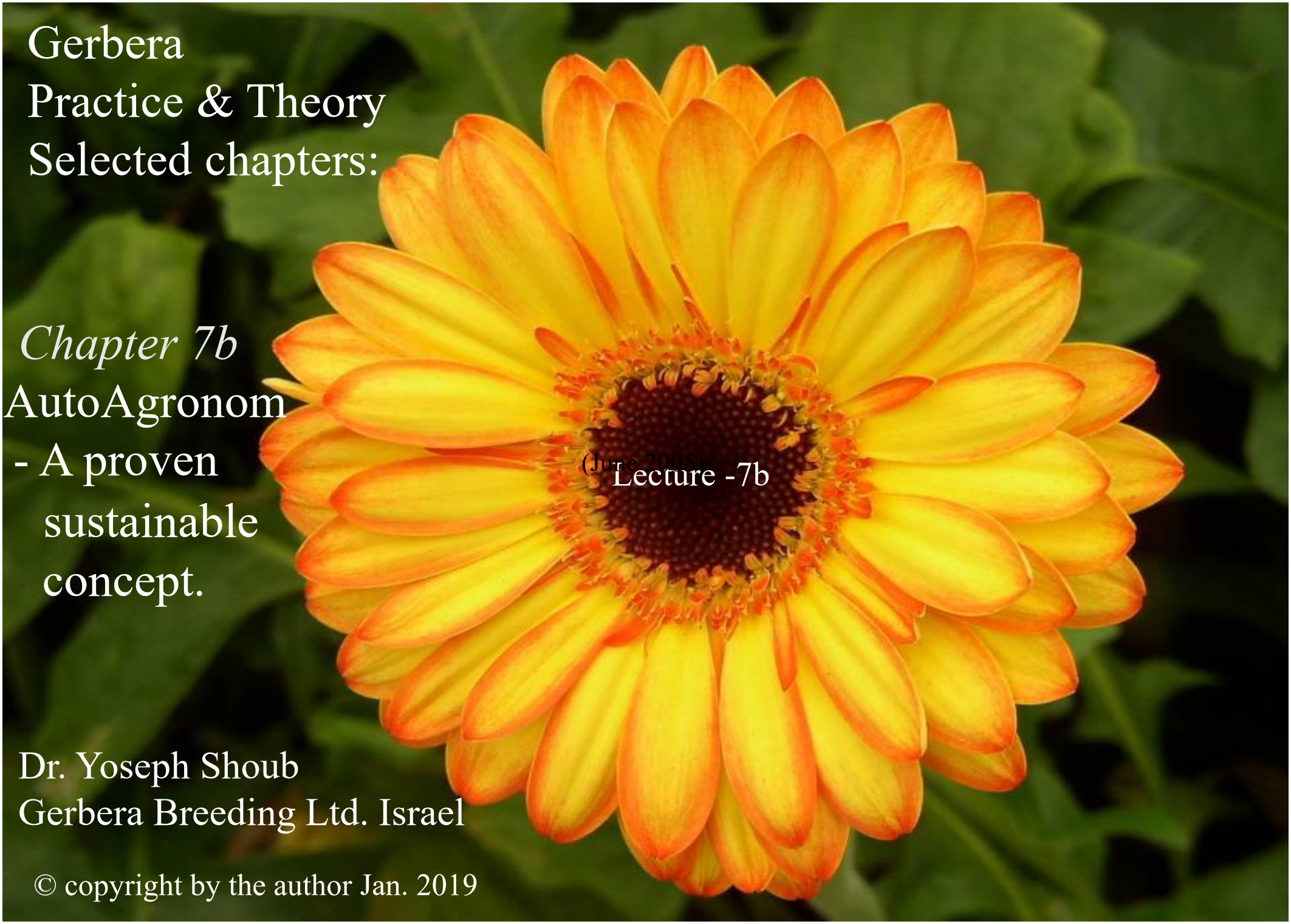
Gerbera
Practice & Theory
Selected chapters:
Chapter 7b
AutoAgronom
- A proven
sustainable
concept.
(June 2005)
Lecture -7b
Dr. Yoseph Shoub
Gerbera Breeding Ltd. Israel
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AutoAgronom - A proven Sustainable Concept

A presentation by Dr. Yoseph Shoub

Gerbera Breeding. Ltd. Israel

A user of the AutoAgronom system since 2005

www.gerberaisrael.com

A lecture given on November 10, 2015 for the International course
"Crop Production Under Saline Stress"
The Hebrew University of Jerusalem, Faculty of Agriculture, Israel.

Revised Nov. 2018
Photos Y. Shoub.

www.autoagronom.com

"The man is not the Crown of the Creation, its origin might be the ape"

Charles Darwin - On the Origin of Species (1859)

And so said Wester Bishop's wife about Darwin's ideas:

"Let us hope it is not true, but if it is, let us pray it does not become widely known"

"Wise Judgment comes from Experience, but Experience comes from Wrong Judgment".

My dear late friend Prof. Naftali Zieslin

Abstract -

The quantities of water and fertilizers used for agricultural crops are considerably exaggerated.
As the predefined irrigation practices used today, are carried out regardless the natural rhythm of the plants' physiological activities, and their real water and oxygen requirements.
The exaggerated quantities eliminate the oxygen presence in the roots' volume, create 'salinity conditions', moderate the growth of the plants, and decrease the yields.
At the same time, precious natural resources are being wasted while the grower does not meet his income potential.
Moreover; millions of tons of excess fertilizers leaking every year, contaminate the aquifers all over the world.

With such picture intensive-agriculture, despite its achievements, requires an essential change in order to eliminate its economic and environmental inefficiencies.
The 'AutoAgronom' concept aims to response these inefficiencies.

Thus, as most of the plants' activities find always expression in water usage, the AutoAgronom systems which are synchronized to the plant's activities, detect and control the essential physical and chemical parameters related to the 'Optimal Growing Conditions', appropriate for the roots - the suppliers of the soil solution.

'AA' controlled-plants, utilize efficiently the 3, free of charge, unlimited vital elements C, H, & O, used by the plants, in the course of the photo-assimilates production.

The main 'AA' results are: saving 50% of the water, saving 60 -70% of the fertilizers, increased produce volumes and quality, and reducing soil and ground water environmental stress.

Crowded secondary roots of Pepper in 'Loess soil', 5 months after planting. Controlled by the new 'AutoAgronom irrigation control system'. Irrigated with the local salty water (3.6 milimhos), Ein Yahav, Middle - Arava, Israel March 2005.

‘AutoAgronom’ advantages achieved in our gerbera breeding program, in comparison with previous irrigation control systems.

---

1. Tripled the seeds production.
2. Growing 4 seedlings in 4L. container, instead of 1 plant in the same container.
3. 110 days versus 200 days from planting to replanting the newly selected seedlings.
4. 3 growth-cycles per year (**12 plants** / container / year) instead of **1.7 plants** per year.
5. Saving 40% - 60% of water per plant.
6. Saving 60% of the fertilizers.
7. Saving totally the greenhouse heating-costs through winter nights.
8. Adding cold-resistance to our selecting parameters list.

Gerbera seeds May 2013

‘AA’ Gerbera-seedlings in our breeding greenhouse 8 weeks after planting, June 2014.

On planting day
(15.02.2016)

4 Gerbera seedlings,
in 4 L. ‘Rosier’ container.

78 days later
(03.05.2016)

21.8cm

Adventitious roots

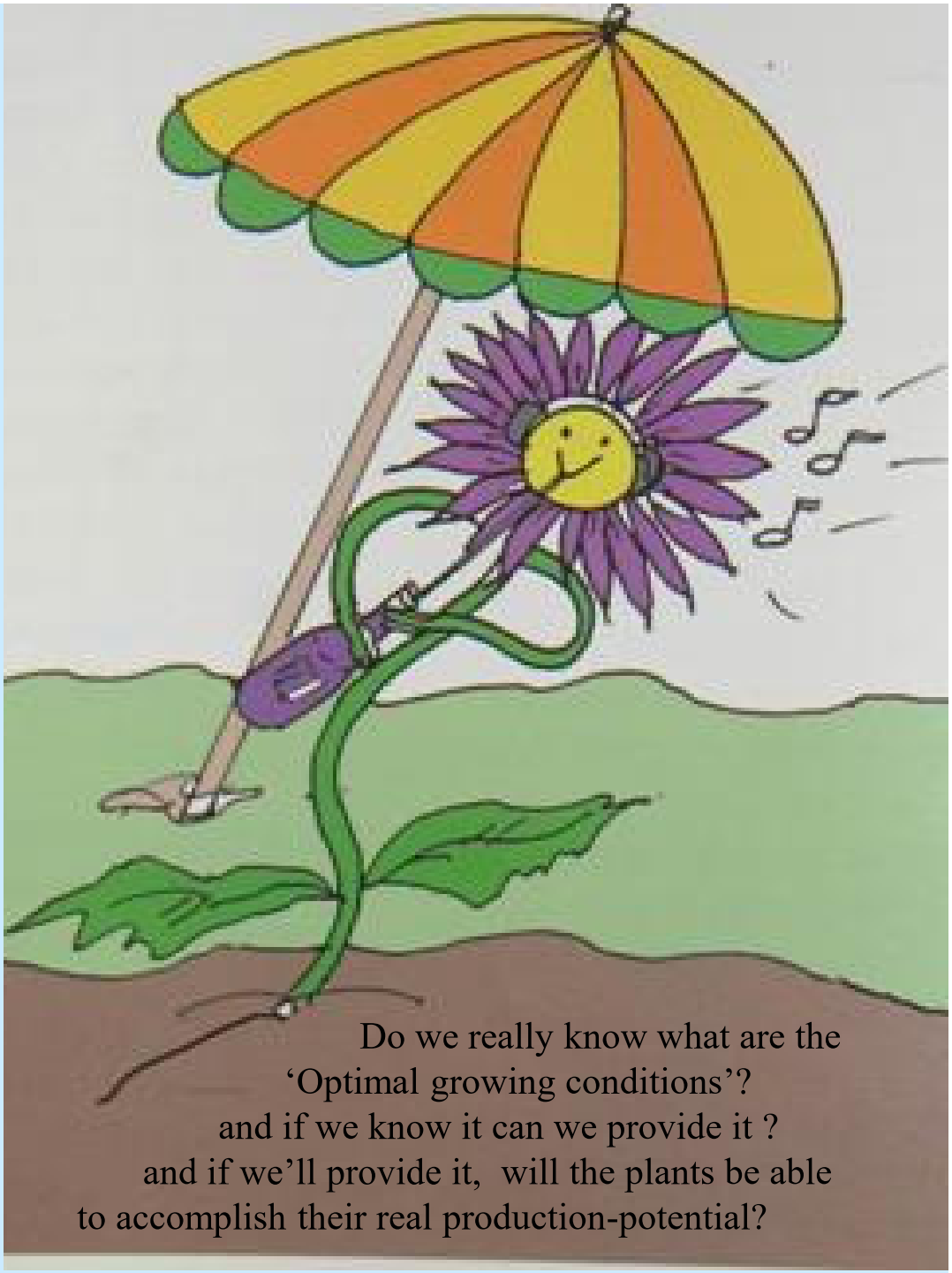
Secondary roots

Shoub’s gerberas are efficiently and successfully controlled in our greenhouse by an ‘AA’ system for almost 13 years.

Continuous-growth of 'Intensive-plants' depends: on the presence of adequately secondary roots.
on the ability of these roots to absorb and transport water, oxygen & minerals to the above soil organs.
And on the ability of the above soil organs to supply continuously the assimilates products to all the developing sites.

Therefore they probably would declare: that in order to achieve their 'production-potential' all they need are:

'Optimal growing conditions'
(or at least as close as possible to it.)



Theoretically, plants are able to develop their secondary roots in any soil, or media type, even in the air or in water - on condition that - 'Optimal-ratios' of water, air and minerals in the 'Soil Solution', are presented in the root's volume.

Thus, one can say - The plant is interested **only** in the '**soil solution**'!
The growing media is a physical factor, and it is the **grower's concern!**

Secondary roots' performance of Bananas in clay soil, the Jordan Valley, Israel October 2010.

Under Conventional irrigation program.

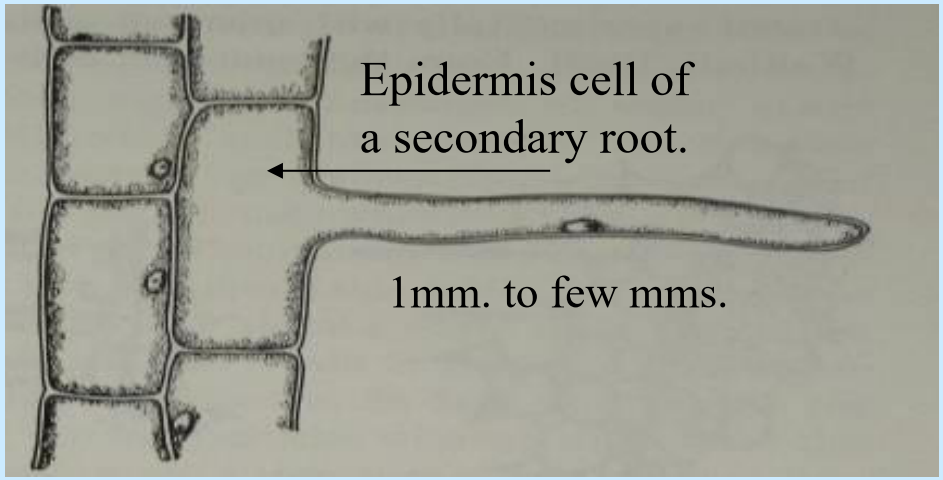
Under AutoAgronom system.

It looks clearly that roots of t Bananas, grown in the same original clay soil but irrigated differently, develop their absorbing system differently.

Once more: "The plant is interested in the soil solution! The soil type is the grower's concern".

The ‘Root-hairs’ do the work.

Root hairs are elongated epidermis-cells located on the secondary roots.
Their function is to absorb the soil-solution (*water, oxygen and minerals)* into the plant’s vascular system.



A scheme of a root hair

Secondary roots of ‘AA’ Allium schoenoprasum,
3 years after planting. May 2010.

The productivity of intensive crops depends, to a great extent, on the continuous activity of the root-hairs.

Close up of ‘AA’ apple’s secondary root covered with countless root-hairs. Dec. 2010.

The root hairs are vital organs of the plant. Yet, they are very sensitive to the growing conditions of the root’s media as they are physically exposed and not protected like the other organs.

Root hairs of intensive crops develop optimally on the secondary roots’ tissue, in the upper soil layers, as they are highly influenced by the water / oxygen relations.

'AA' systems combined with 'Micro-irrigation' systems, create and control the optimal conditions for the secondary roots. It enable them to absorb efficiently and easily the soil-solution, anytime when it used and when it needed - 24h a day.

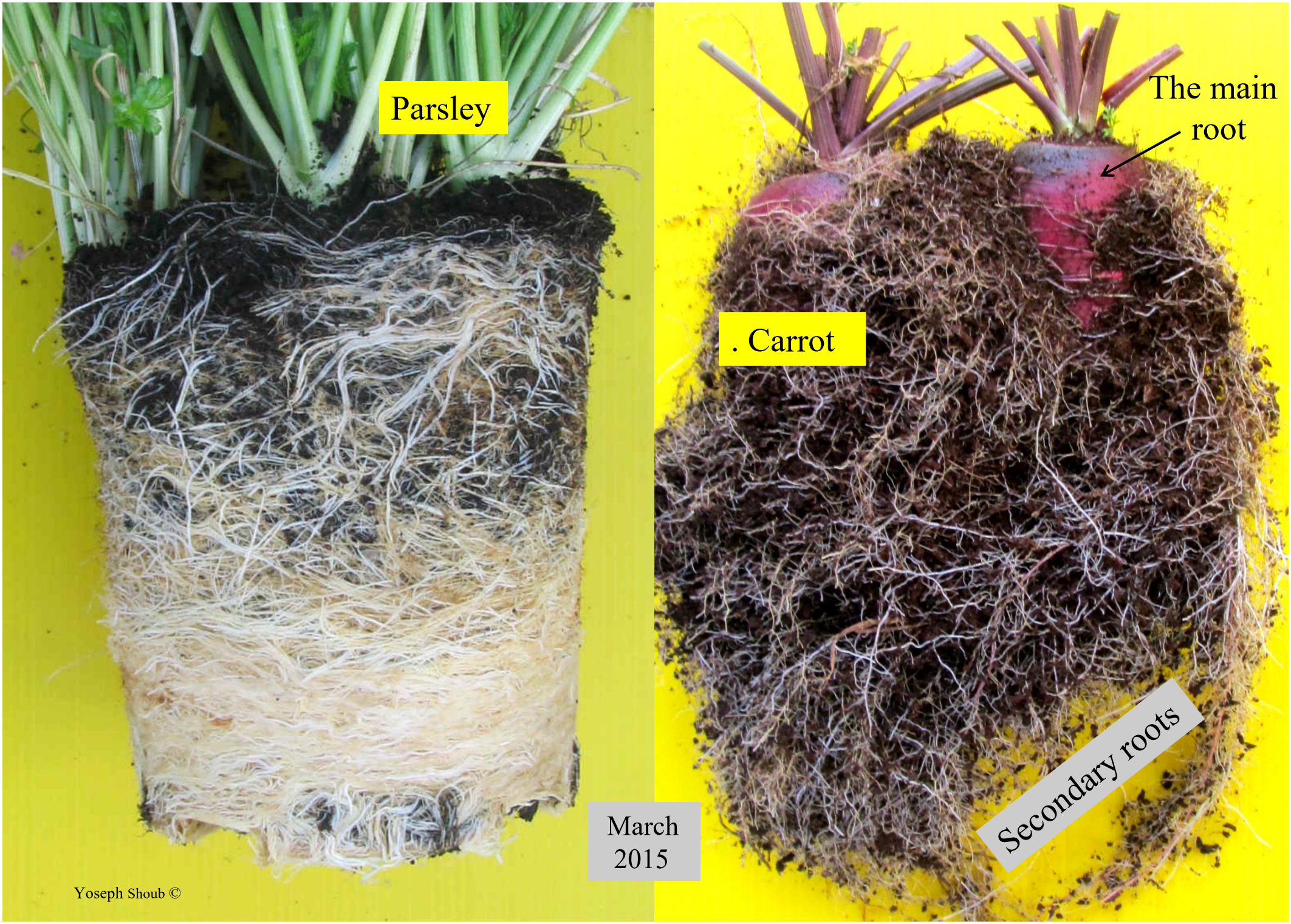
Roots' systems of various AutoAgronom crops:

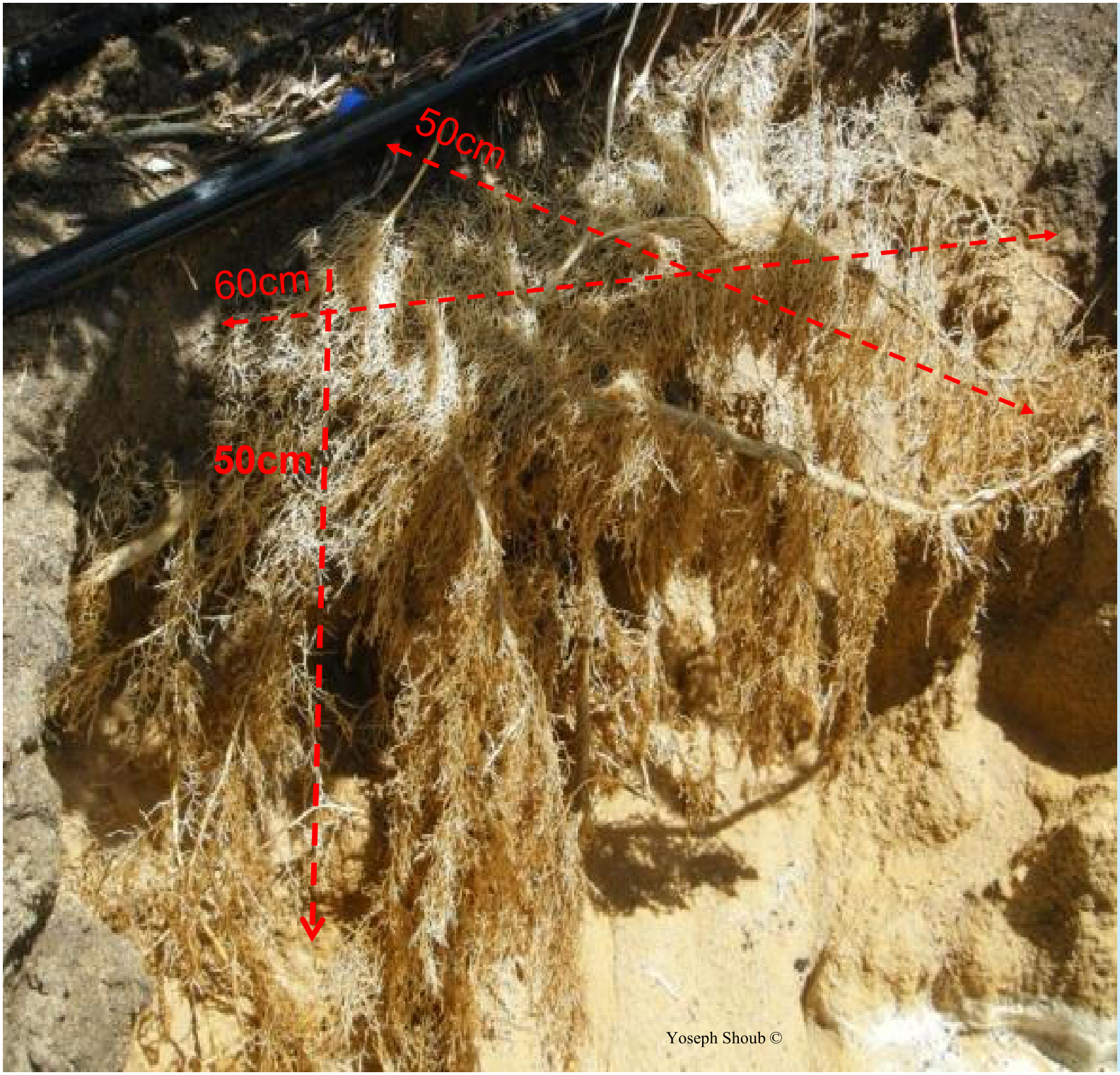
Roots of 2 month old Cauliflower.

March 2015

Roots of 18 months old Eggplant.

Chlorophytum comosum variegatum under ‘AutoAgronom’ conditions Feb. 2017.


Parsley
. Carrot
The main root
Secondary roots
March 2015
Yoseph Shoub ©



Secondary roots of 3-year-old Citrus tree in soil controlled by 'AA' system.

Australia,

January 2010.


Yoseph Shoub ©
Tomato
Spring onion
Celery
Kohlrabi
Broccoli
Coriandrum
Kale
Celery
Wheat
The roots do the work!
No matter to whom they belong,
they all do the same work, they are built for it.
So let them do it the easy way,
the AutoAgronom way.
Yoseph Shoub ©

However - *A question.*
Why the five commonly recommended practices for intensive crops - based on countless experiments, and on personal experience - are still under survey?:

1. When to irrigate? 2. How much to irrigate?
3. When to fertilize? 4. How much to fertilize
and 5. What fertilizer to use?

An answer.
They are still under survey, because predefine irrigation programs do not supply information on the quantities of water, oxygen and minerals used by the plants, and on the real time when the roots absorb the 'Soil-solution'.

And some questions by an 'AA' user:
How come? that the most vital actions in agriculture, having the greatest impact on the plants' growth - supplying water, oxygen and minerals - is done according to predefined irrigations schedules, without even considering the plant's physiological activities 'rhythm'.

How come? that salinity occurrences are solved by washing the salts into the aquifers.

Wrong practices examples of running conventional drip irrigation -

Mexico, June 2012

'Soil-solution' drain, between 2 soil-beds of Cucumbers, irrigated according to predefined program, by conventional drippers.

The picture demonstrates that conventional predefined drip irrigation, enriched with fertilizers, is endangers agricultural crops and the growers' income, as:

Feeding-solution' is wasted.
Oxygen presence is prevented.
Growth is moderated.
Soil born diseases develop.
Salinity conditions develop,
and besides -
The Soil and the Aquifers are being contaminated.

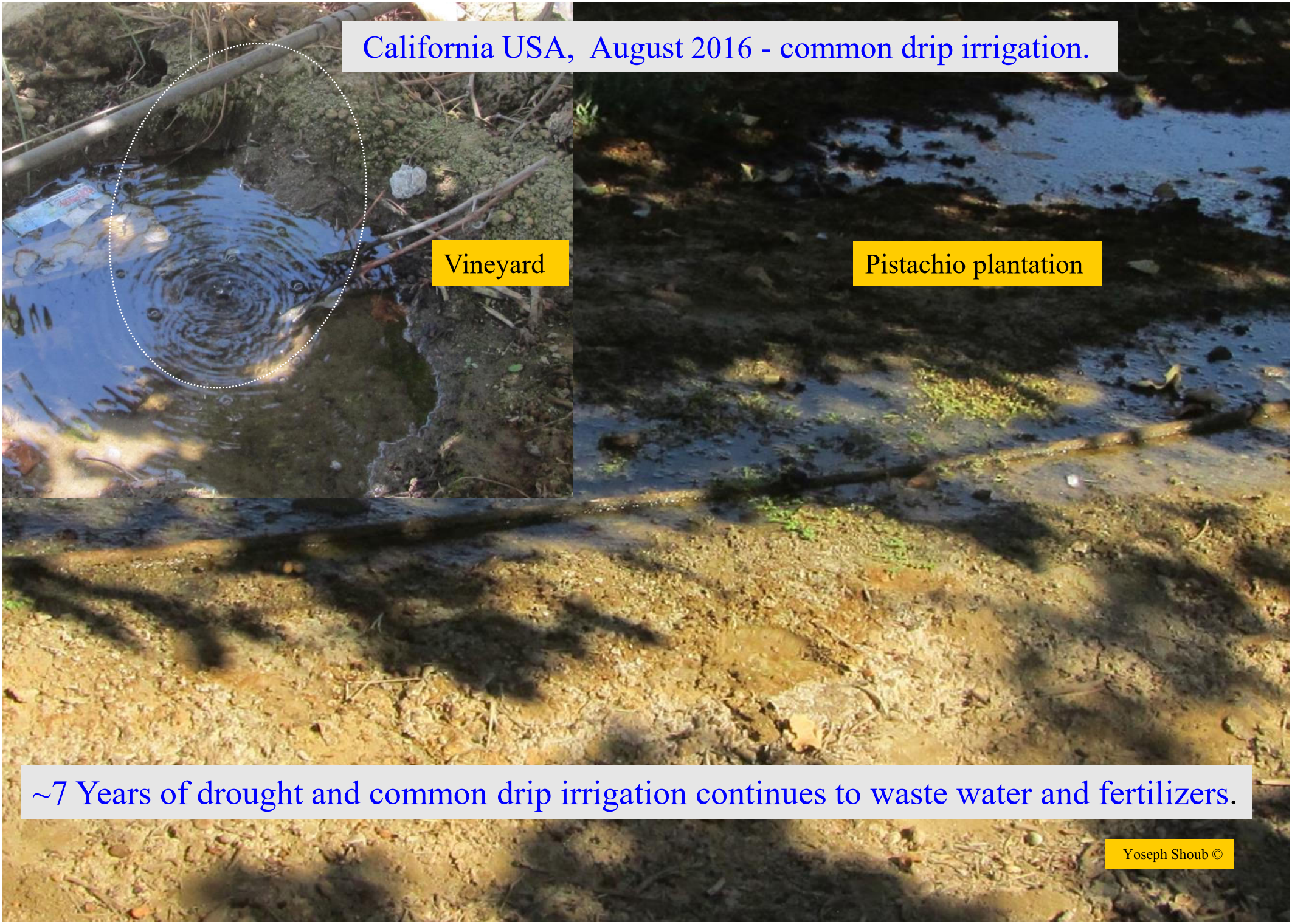
Yoseph Shoub

India, June 2009 - Severe salinity damage in gerbera soil beds, caused by supplying excess fertilizers.

Salinity-conditions in agricultural soils are not necessarily the result of the soil character.

It caused mostly by - Chemicals accumulated in the roots'-volume, as results of the predefined dripping schedules, enriched with exaggerated fertilizers quantities.

Mexico, Feb. 2008 Salty layers in the soil-bed.


California USA, August 2016 - common drip irrigation.
Vineyard
Pistachio plantation
~7 Years of drought and common drip irrigation continues to waste water and fertilizers.
Yoseph Shoub ©


“Predefined rich fertigation programs contaminate the aquifers”.
Winter crops greenhouses -
Farhan, Middle-Arava, Israel, Dec. 2012
Yoseph Shoub ©

Exaggerated quantities of fertilizers and water are used in Pepper culture

Middle-Arava, Israel.

Experimental Data for September 2012 - April 2013.

Water & fertilizers input for Pepper Controlled by 'AA' - Versus - Conventional method. *

The 'AA' pepper yielded 9.8 tons / Dunam. The recommended Pepper yielded 9.5 tons / Dunam.

Water:

Recommended water supply > **30** million cu**.** (*1000 cu. / Dunam/ per season*) ~ **15** million $

'AA' (*estimated figures*) > 16 million cu. (**53%**) (*14 million cu. to be washed to the aquifer*) ~ **7** million $

Fertilizers:

Recommended fertilizer supply > **22,500** tons. (*750 gram / cu. water*) = ~ **35** million $

'AA' (*estimated figures*) > **3,500** tons (**15.5%**)**.** (*19,000 ton. to be washed to the aquifer*) ~ **30** million $

**Actual figures, estimated for the 2 treatments as for 30,000 Dunam, the real Arava vegetables area.*

Summary: 14 million cu. water were used just for wash 19.000 tons fertilizes to the local aquifer. And besides, it means an annual loss of ~ 7,400 $ per farm of 60 Dunam. *Can we afford it?*.

Salinity experiments in Avocado: 'AA' - versus - Common fertigation, Jordan Valley, Israel 2009.

The same variety, the same climate & soil, the same water & fertilizers, and the same grower.

Avocado

Salinity damage

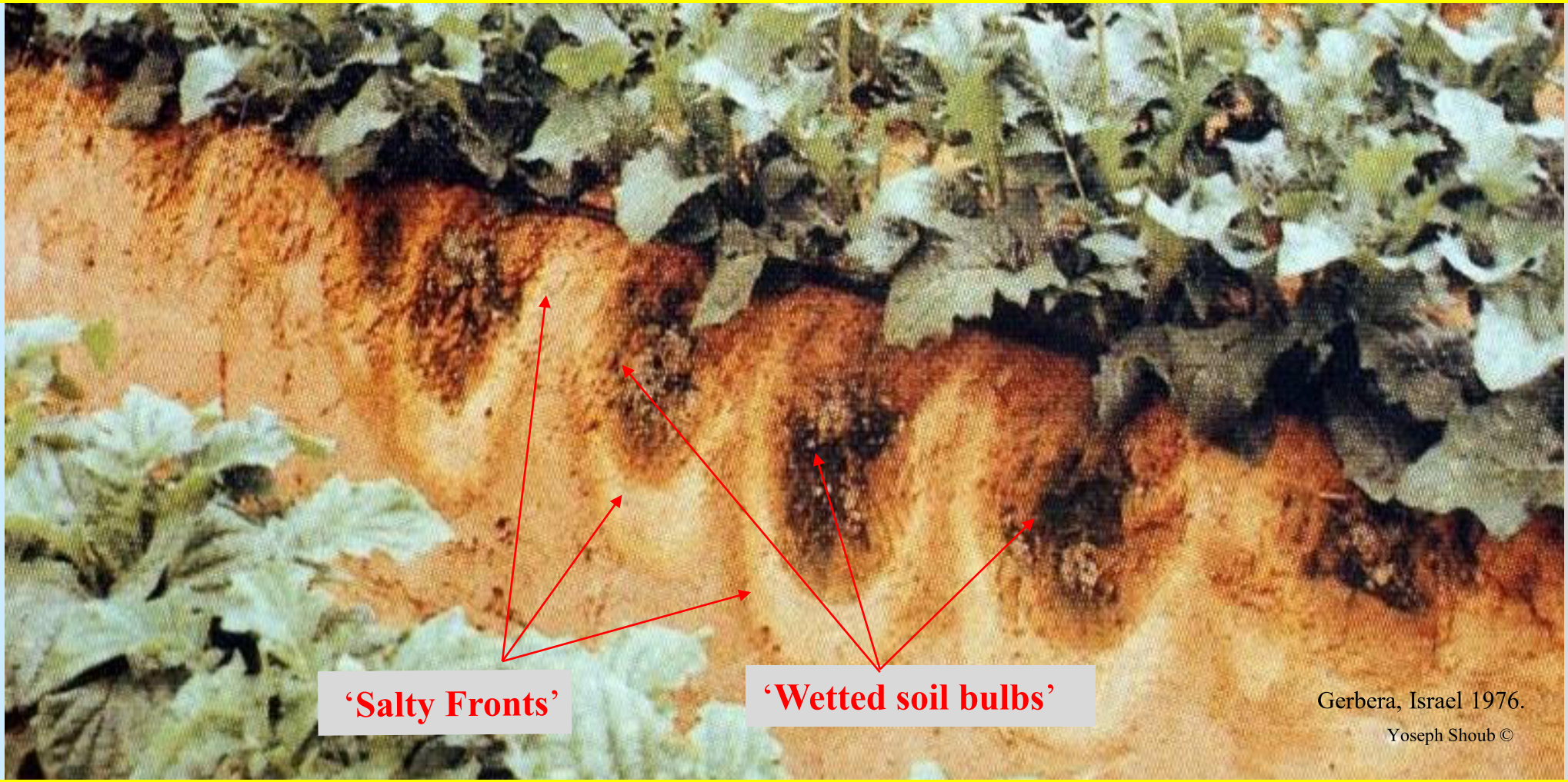
'AA' - Water 3,5 cubic / Dunam /day / in pulses.
- Fertilizers 30 kg. May to October 2009.

Common fertigation - Water 7 cubic / Dunam /day (once in 4 days 28 cubic). - Fertilizers 70 kg. May to October 2009.

‘Salty Fronts’ -

‘Salty fronts’ formats; are undefined flexible soil-layers enriched with fertilizers minerals. They develop in the soil beds, under conventional drippers along the fertigation season, around the so called‘Wetted-soil bulbs‘. It follows the Gravity movement of the dripping Fertilizers-Solution, and the Capillary movement of the Soil-Solution moving away from the wetted soil bulbs.

Usually growers do not see the ‘Chromatography’ formats, as seen here on the soil-bed-wall.

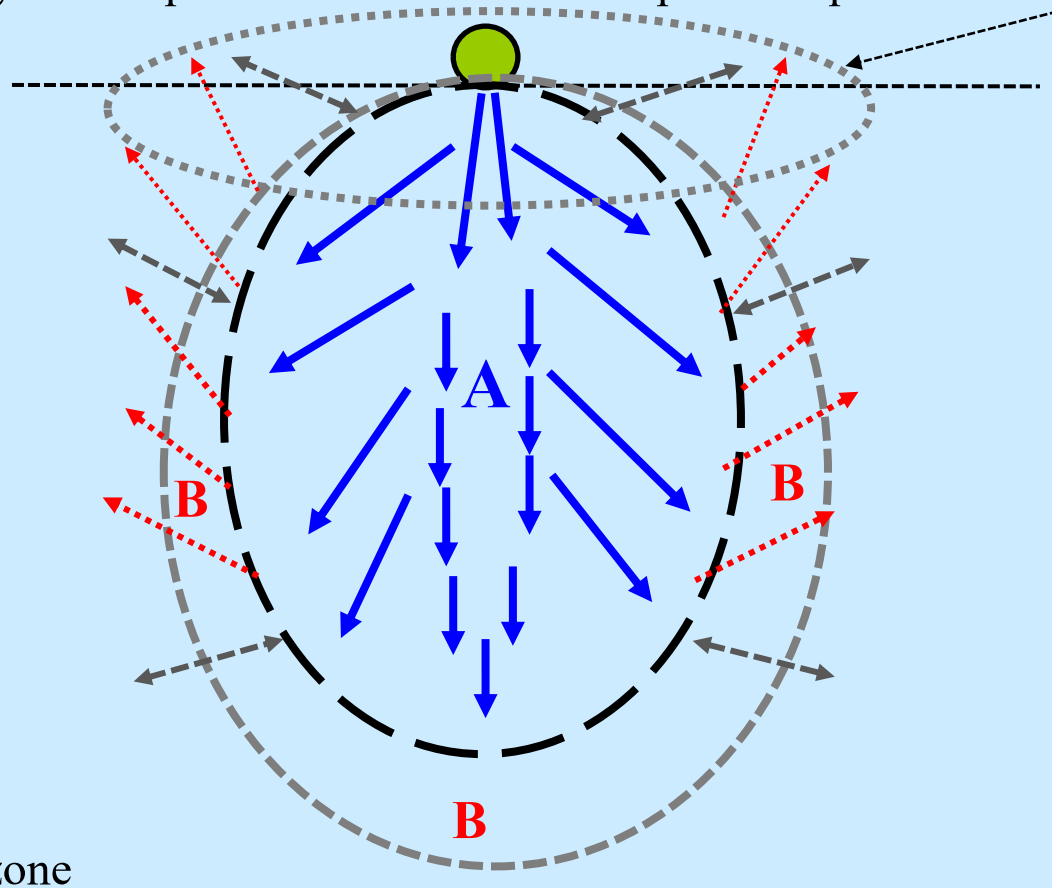


Shoub y. 2004, International Water & Irrigation, vol. 24, 4.

The chromatography on the soil-bed-wall represents the actual minerals-layers inside the soil-bed.

Gravity and Capillary movement in the roots zone - *(a scheme of conventional dripping.)*

It describes the effect of the gravity movement of the Fertilizers-Solution on the development of the 'Wetted soil bulbs' (**A**). and the effect of the followed capillary movement of the Soil-Solution on the development of the 'flexible Salty fronts' (**B**) (←- - -→), and on the 'salty halos', which are affected also by the evaporation and the osmotic-pressure processes.



zone

A - Gravity movement of the Fertilizers-Solution.

B - Capillary movement of the Soil-Solution.

Raised sandy soil-beds for gerbera.

The ‘Salty halos’ are the edges of the ‘unseen Salty-Fronts'.
They are generated by the upward ‘capillary movement’ of the excess fertilizers’ minerals.

Fertilizers salts-halos in Olives, 'Loess soil’,
Negev area, Israel 2009.

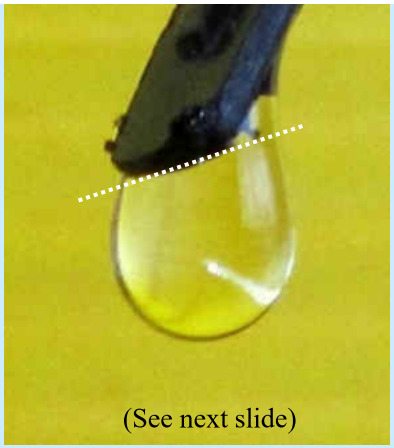
Fertilizers salts-halo in Gypsophila, 4 weeks after transplanting. ‘Heavy soil’, Ecuador 2005.

Fertilizers ‘Salty halos’ in public garden, ‘Loess soil’, Yeruham, Israel 2018

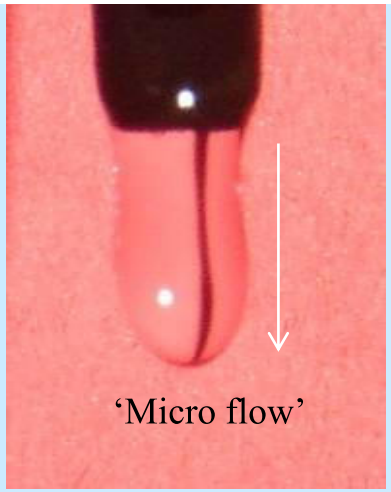
Physical advantages of 'Micro-dripping'

'Micro-dripping' advantages are characterized by the following physical values:

1. Increasing - Water area-surface.
2. Creating - Capillary water movement.
3. Intensifing - Air and oxygen availability.



'Micro-dripping'
200cc/h of separated water drops, enables Capillary movement.



Conventional dripping
2000cc/h of micro-flow creates Gravity movement.

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1. Micro- dripping systems create separated drops (~ 6000 drops / Liter) and an intervals of (1.0 - 1.5 Sec. between the drops). Thus; the total 'Area-surface' of a given water volume dripped by Micro dripping system, is much greater than the total 'area-surface' of the same given water volume, dripped by Micro-flow systems, sand as a result; the micro dripping intensifies the permeability of the oxygen into the irrigated water.

2. Dripping the separated drops into a stable wetting point, enables and encouraging the capillary movement of the irrigated feeding-solution, both transversal and downwards directions.

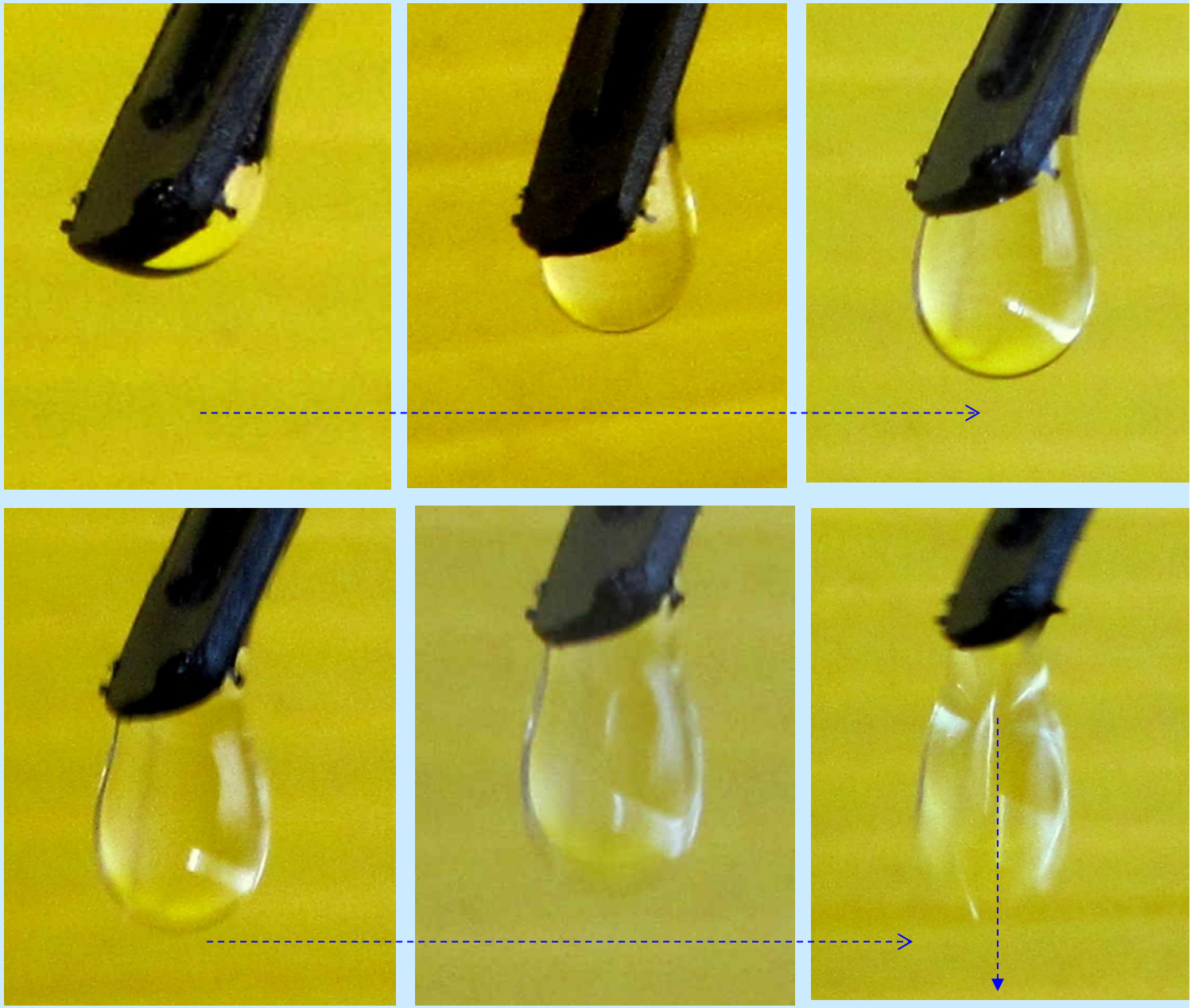
3. The great water area-surface and the slow water movement in the aerated roots media, intensifies the dissolving-process of the oxygen into the feeding-solution, and it increases the oxygen availability.

Born of a ‘feeding-solution’ Drop, produced by micro-irrigation systems -

Its maximal volume will be ~ 0.166cc

The next drop start to develop ~1 second later, and it released ~ 1 - 2 seconds after the previous one.

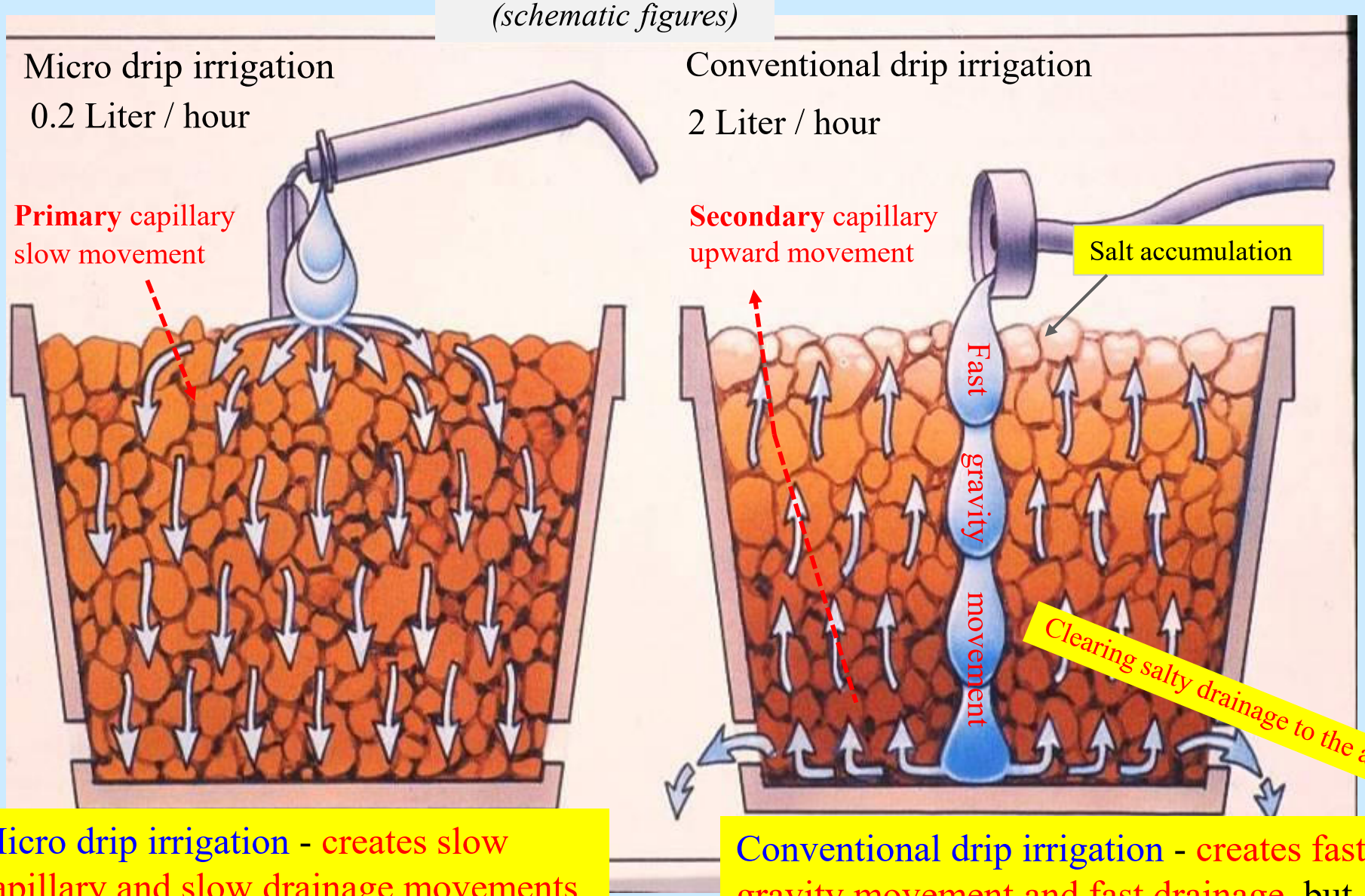
The small water volume and the slow water movement create the ideal ‘Capillary movement’.



Getting separated drops - is the first step towards ‘Sustainable Precision Agriculture’.

Capillary and Gravity movement in containers, micro dripping versus conventional dripping.

(schematic figures)



Shoub y. 2004, International Water & Irrigation, vol. 24, 4.

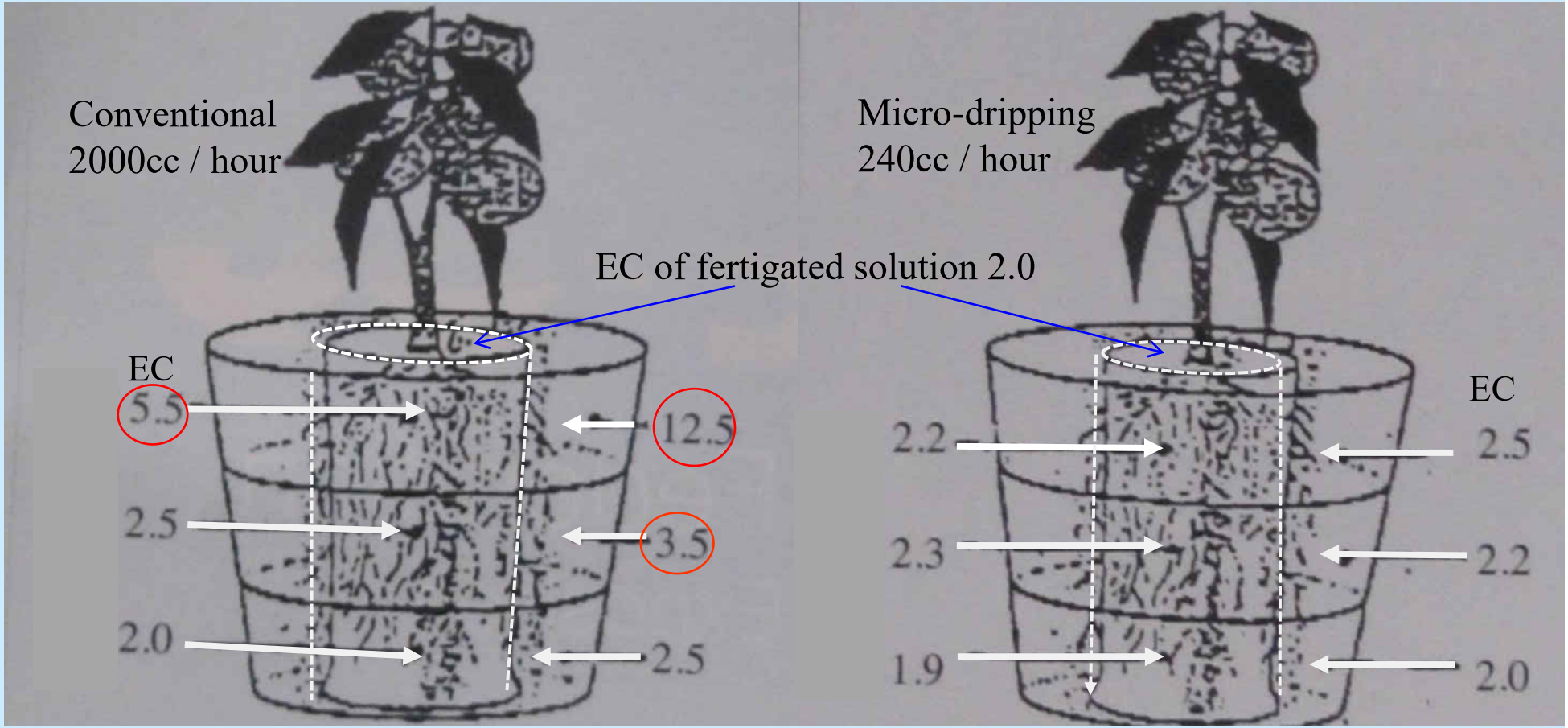
Micro drip irrigation - creates slow capillary and slow drainage movements through the entire root volume, and helps to avoid salinity damage.

Conventional drip irrigation - creates fast gravity movement and fast drainage, but at the same time promotes upward capillary movement of minerals, and causes 'Salinity'.

Salinity in Potted Gerbera - Conventional dripping versus Micro-dripping).

EC values of the soil-solution *(in coco-peat)* in 6 media compartment (vertical and horizontal).

Shoub y. 1999, International Water & Irrigation, vol. 19, 2.



Conventional drip irrigations, caused severe salinity 6 weeks after planting.

Micro drip Irrigations didn't cause salinity even 4 months after planting.

Practically; the 'AA' concept deals with supplying water 'on real time', back to the roots volumes from where and when the water has been taken, (About 15 - 40cc / irrigation).

Theoretically; the 'AA' concept is far more sophisticated; as it deals 24 hours with the plant's physiological activities that affect the water consumption processes and the associated photo-assimilates movement throughout the phloem cells' tissues..

Under 'AA' control, the wetted volumes of the roots' media are limited, but full loaded with active secondary roots, occupied practically in supplying continuously ***W.O.M****.

4 litters, packed full with 'AA' gerbera's secondary-roots, 3 months after planting.

*Water, Oxygen & Minerals.

The ‘Essential Nutrients’ - The organic ingredients *(Carbohydrates, Proteins, and Fats)* are the plant’s photo-assimilates products. They are considered Essential for the plants themselves and for all who are nourished by them.

4 Important notes -

> The organic material share 85 - 92% of the plant’s Dry Matter. *

> The dry material is originated from the primary photo-assimilates, the sugars.

> The primary Mono-sugar, the ‘Glucose’ $C_6H_{12}O_6$ originates from

Carbon (C) as CO_2, Hydrogen (H), and Oxygen (O).

> And these Three widespread Elements are For Free in the air and in the water.

* while the rest 8 -15% of the dry matter comes, partly, from the fertilizers, the ‘(Soil minerals).

Leaf analysis -

Mineral content of Bean leaves, (Almeria, Spain).
Conventional feeding formula (control), versus 'AutoAgronom' reduced formula.

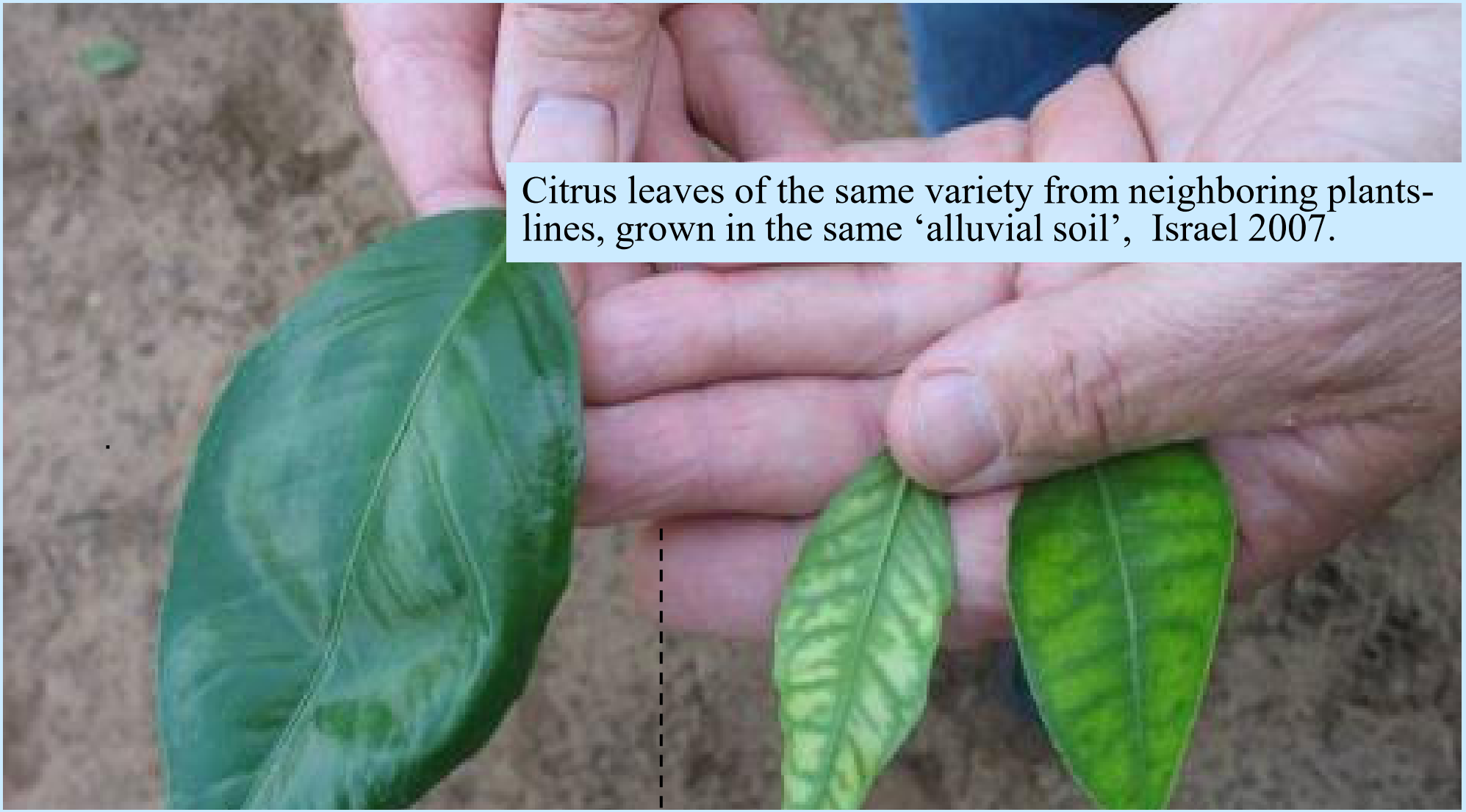
(Sampling date 20/01/2010) Fertilizers milligram / Liter		Control 800 100%	'AA' 300 38%
Macro elements % of total Dry matter.	N	3.6	4.0
	P	2.0	4.5
	K	1.6	1.95
	Ca	3.5	3.2
	Mg	0.8	1.6
% of total Dry matter		11.5	15.3
Microelements ppm.	Fe	59	82
	Zn	29	38
	Mn	42	70
	Cu	3.6	5.5
		100%	147%

Leaf analysis of some crops.
% Elements of total dry matter.

* 'Soil testing and plant analysis - 1973'
** Self information

Gerbera**	Peanuts*	Tomatoes*
2.9	3.6	3.5
0.5	0.28	0.6
3.1	2.56	3.1
1.2	1.3	4.5
0.5	0.4	0.7
8.2	8.1	12.4
180	160	13
40	45	2
126	182	62
21	12	7

Leaf deficiencies identified by ‘Leaf analysis’ are not direct evidence of mineral deficiency in the soil, but difficulties of the roots to absorb minerals.



Citrus leaves of the same variety from neighboring plants-lines, grown in the same ‘alluvial soil’, Israel 2007.

Leaf of a tree irrigated by ‘AA’, 20 L / day (in pulses), with only 8.5 L fertilizers throughout the season.

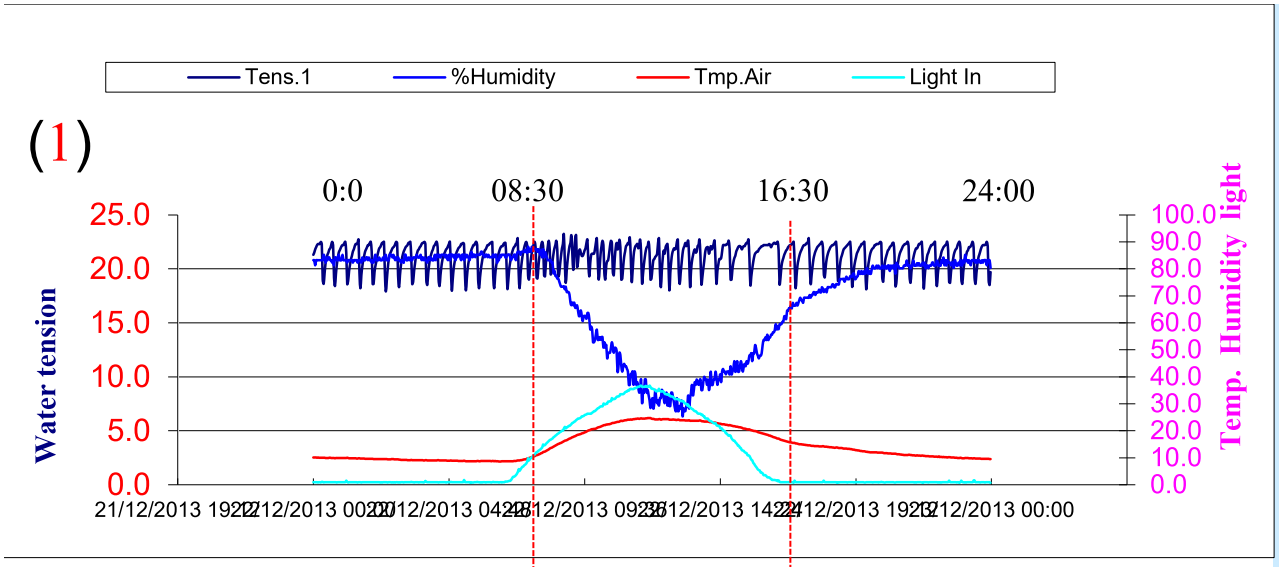
Leaves of a tree irrigated according to pre-defined irrigation programs, 60L / day (240 L every 4 days) with 95 L fertilizers throughout the season.

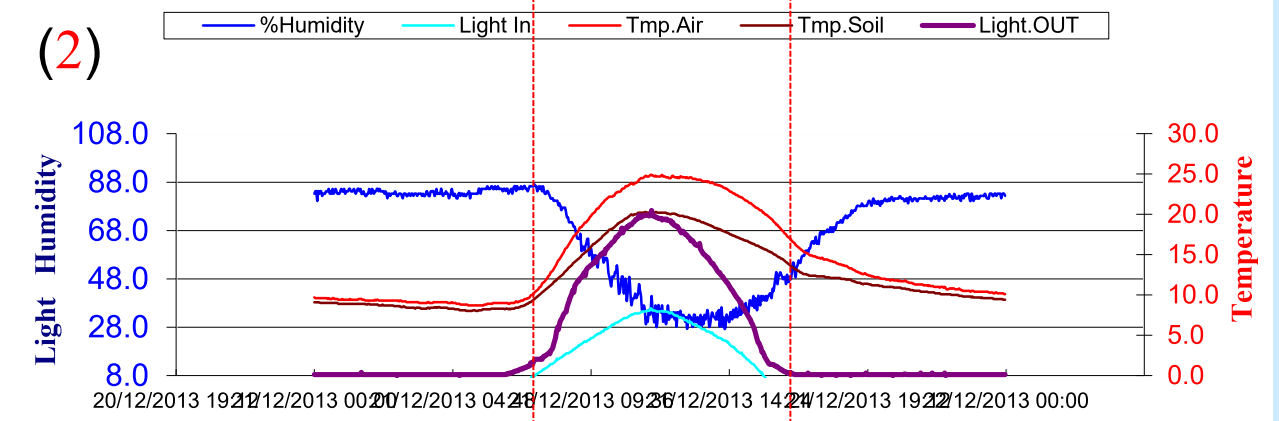
The AutoAgronom Tensiometer measures accurately the micro-changes of the 'Water tension' in the roots media, while the plant uses the water for perform its activities. Under optimal growing conditions the roots absorb the soil-solution, and compensate the plant's needs on real time.

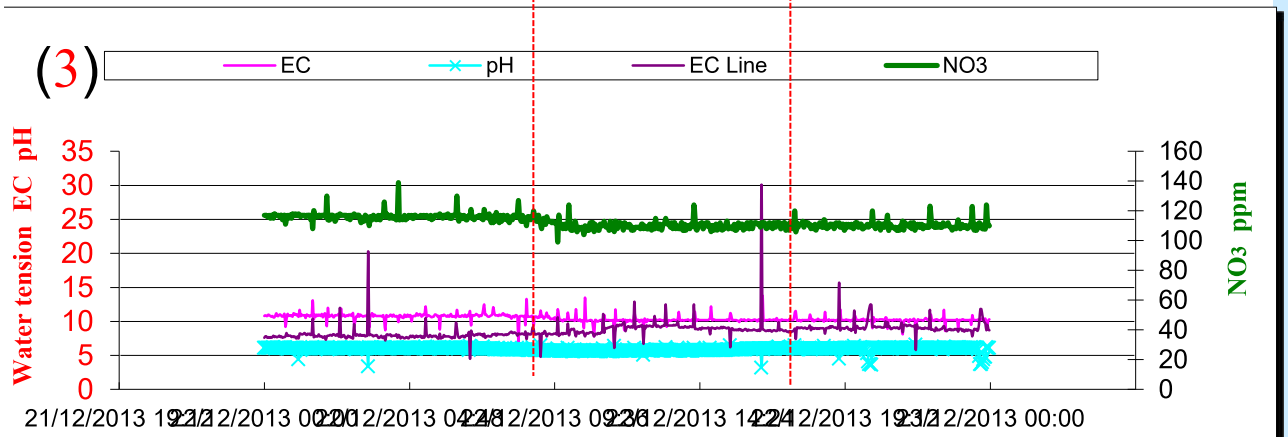
It precisely synchronizes the fertigation schedules to the rhythms of the plant's physiological activities.

Practically; absorbing the soil solution Increase the water tension, and Irrigation pulses Decrease the water tension.

The high accuracy of the 'AA' sensors, allows it to maintain in solid roots-media, almost 'Hydroponic Conditions Values.'







AutoAgronom daily data

(22.12.2013) *

Growing conditions values controlled by 'AA' system in our gerbera' greenhouse.

(1, 2) 6 Physical values

- water tension (Milibars)
- relative humidity (%)
- air temperatures (c)
- soil temperatures (c)
- light out (1000 lux)
- light in (1000 lux)

(3) 4 Chemical values

- NO_3 - drainage (ppm.)
- EC - drainage (mS/m)
- EC - feeding solution (mS/m)
- pH - feeding solution
- Oxygen availability (%)**

---

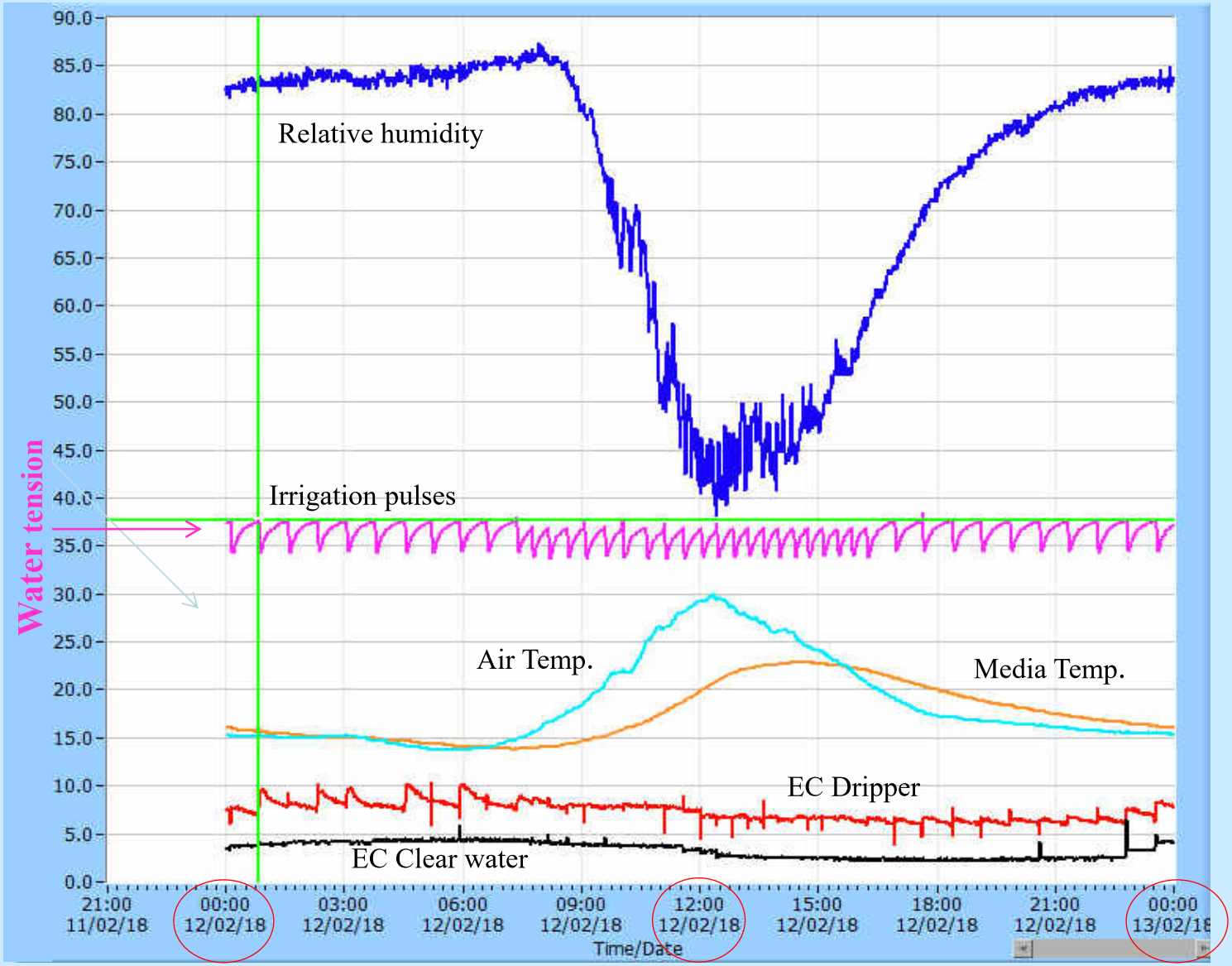
* *A Date without definite reason.*

** *Oxygen availability is not displayed in these graphs*

00 ←→ 00 - Day by day in the greenhouse - Dec. 02, 2018 <u>total irrigation pulses</u> 41

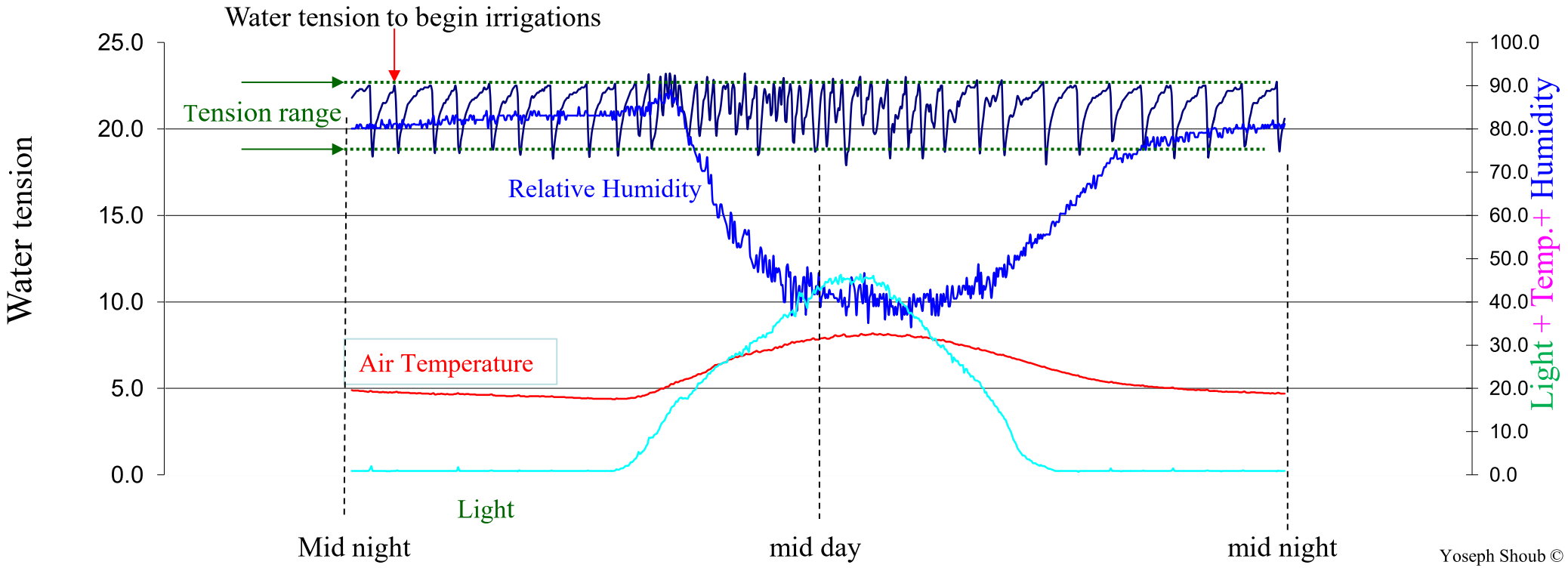
Nigh irrigations 20

Day irrigations 21



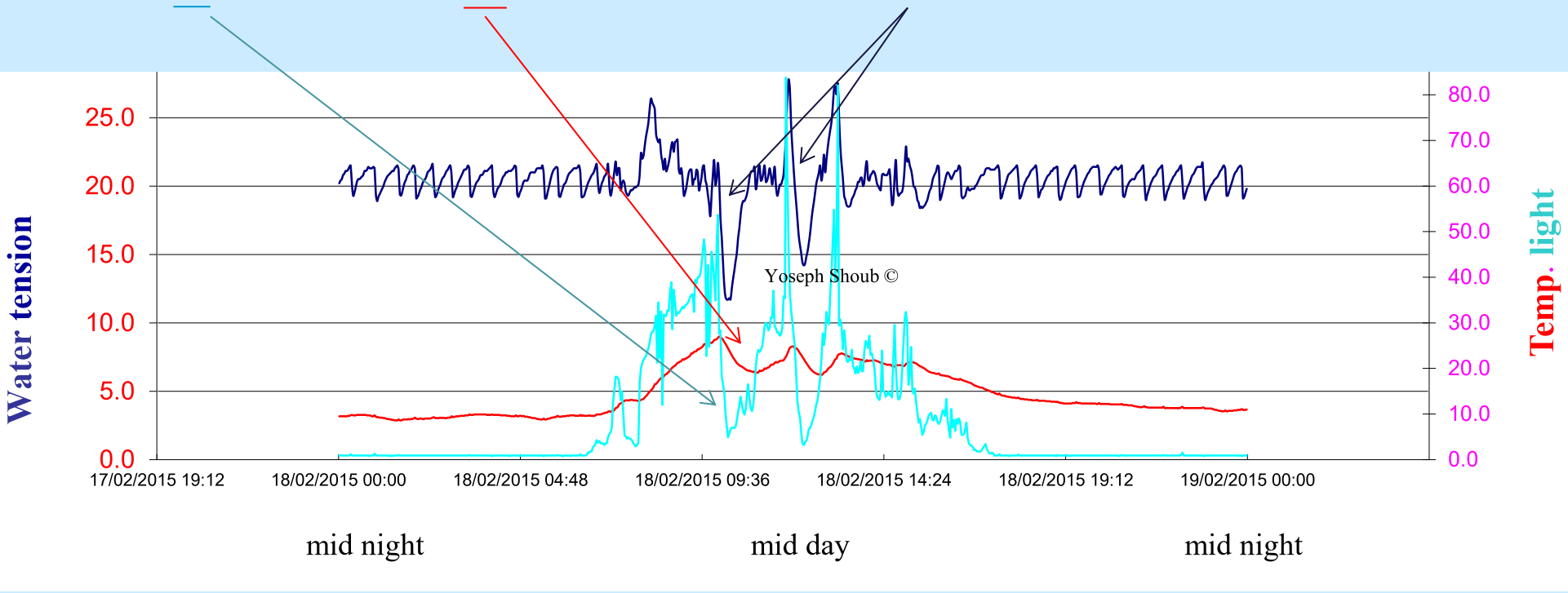
The daily rhythm of the plants' activities is affected mostly by 3 vital environmental conditions: the Light, the Temperature, and the Relative Humidity.
These 3 parameters, in addition to other parameters, are recorded by the 'AA' sensors, controlling 24h the optimal growing conditions matching our plants needs.

In the graph: *Water tension cyclic-changes in the roots media of a well developed gerbera plant, throughout an Israeli autumn day (13.10.2014).*



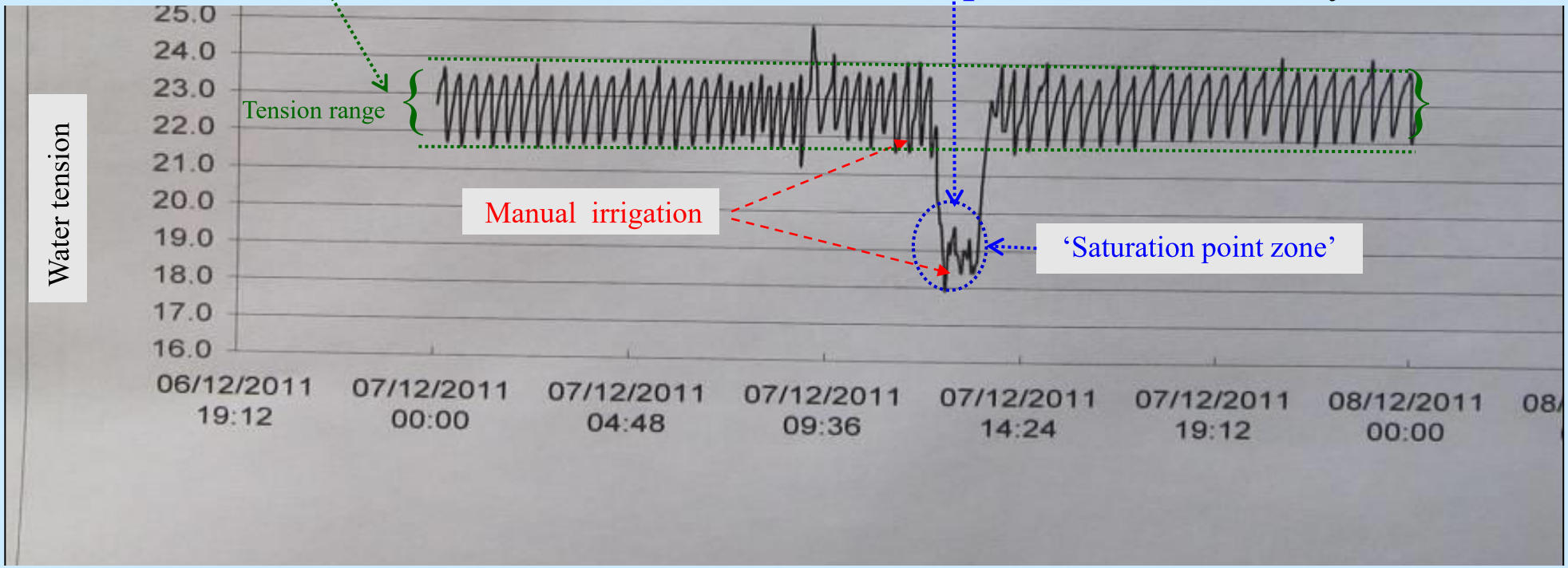
Significant changes in the growing conditions, as in the light intensities and in the temperatures, affect immediately the plant's physiological activities.

When light and temperature dropped down, it cuts immediately the water consumption.



Note: While the plant's activities are affected by the environmental conditions, they are affected also by 'Internal growing factors'. For example; absorbing water when it needed over 24 h, for the energy used for transporting the assimilates through the phloem cells' membranes.

The optimal water tension ranges of the 'AA' irrigations-pulses are close to the 'Saturation-point', but are always above it.



Definitions:

Saturation point - Physical state in which all the capillary spaces in a media are filled with water.

Optimal water tension values - Growing conditions that maintain the optimal-ratio of water, air *(oxygen),* and minerals in the root's media, the chosen ranges depend on the media structure. We found that water-tension-ranges around ~ 21 - 24 millibar are the optimal values for our 'Coco peat' media, used for our gerbera. While the Saturation point zone is about ~ 18-19 millibar.

We named these kind of water tension ranges: "Close to the Saturation point".

Water consumption during the night by 'AA' controlled crops. -

The phenomenon of water consumption during the night was discovered in all the 'AA' controlled crops.*
Thus we may carefully say, that the active phenomenon of water consumption over the night, as during the day, is an integrated physiological activity of intensive-crops, and the highly sensitive 'AA' Tensiometer just exposed it, and bring it about to our consciousness.
Therefore we should not ignore it. **

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* *Surprisingly there is almost no information in the scientific literature, regarding the active night water consumption by plants.*

** *Only lately, a PhD. thesis by Alena Prusova, "Light on Phloem Transport", submitted (on 2016) to Wageningen University, Holland,* clarifies the information of the newly findings of the AutoAgronom systems. It enlighten the continuous flow phenomenon of the Phloem sap and the Xylem solutions, over 24h, *(by using the MRI tool)*.

Water supply as related to Physiological and biochemical processes -

Physiological activities occur in plants over 24 h. It occurs on condition that the plant's tissues preserve aqueous solution containing oxygen and minerals.

The soil-solution is the water reservoir, and it absorbed by the secondary roots.

Water is used during the day for:

Transpiration - Absorbing and suppling water that transpire via the leaves as pure water-vapors, targeting to cool the plant's sensitive green-tissues, for preventing radiation and heat damage.

Photosynthesis - Supplying water that convey the oxygen and the hydrogen needed for the sugars production.*

Sink - Allowing the Translocation of the photo-assimilates products to the developing sites.

Water is used during the night for:

Sink - For the same action as during the day. The absorbed-water is used for emptying the photo-assimilates, translocating them towards all the developing sites of the plants.

* The oxygen is used in these actions also as a primary energy source for the executing the complicated processes. The 'AA' controls the water use, supplies and creates the optimal conditions for absorbing the oxygenated water.

24h Ongoing processes, summary - *

Breathing - Cellular respiration
Water absorption and usage - Water movement
Transportation of the photo-assimilates - Sink
Cell division and cell elongation - Growth.
Hormonal processes - Growth control.
Converting and activating the assimilates to the essential nutrients - Carbohydrates, Proteins, Fats, Vitamins and the Hormones - Metabolic processes.

* Thus the AutoAgronom responses are adjusted to the Plants' physiological rhythms, then it involves and controls most of the plants' activities.

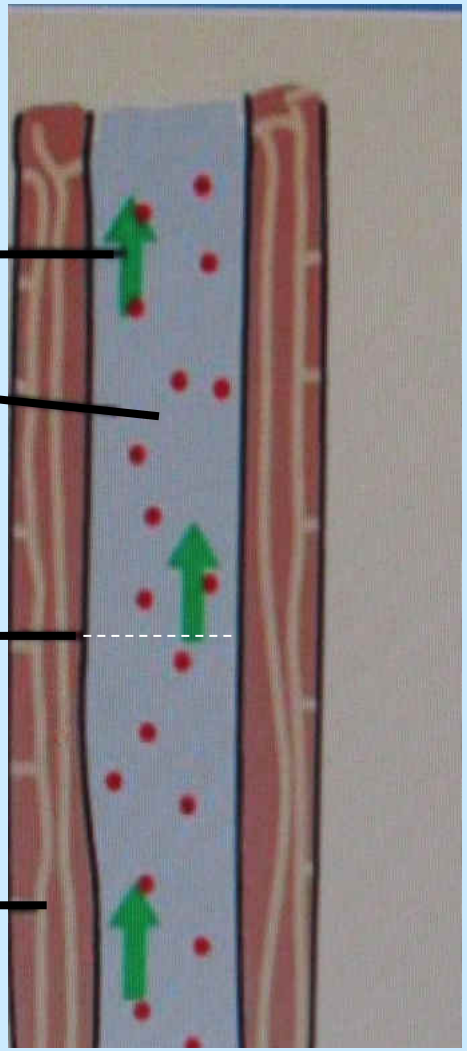
Two types of water movement involved in the plant physiological activities:

1. Passive movement - Conducting soil solution carrying oxygen and minerals, via the xylem vessel (*by physical forces)* for transpiration and assimilation.

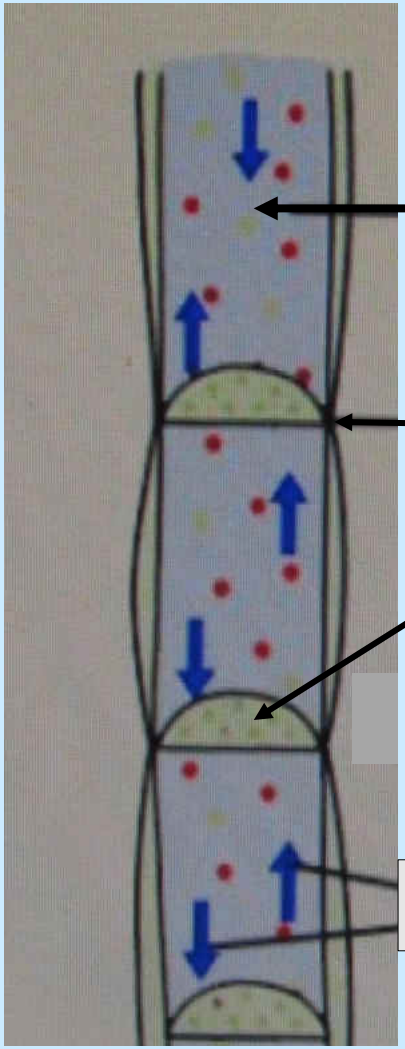
2. Active movement - Transportation of assimilates and minerals to the developing sites, passing through the cell's membranes of the phloem vessel.

The active movement uses energy that requires continuous oxygen supply.

Schematic figures of xylem & phloem vessels functioning.



Xylem vessel
Passive movement



Phloem vessel
Active movement

Water stress in plants - definitions and remarks:

- Plants under water stress slowdown their physiological activities.
- Avoiding early stages of water stress means avoiding accumulated water deficit.
- During water stress the plant's transpiration rates are higher than the root's ability to retrieve adequate water volumes.
- The roots' ability to supply water is faster than the water movement rates in the soil.
- The plants reactions to water tension's changes in the growing media, are faster than the reaction of the commonly used measurements appliances *(tensiometer types)*.

The AutoAgronom system detects even small changes of water tension in the growing media, and reacts in 'real time' by balancing back the water volume by small accurate water doses, without reducing the Oxygen availability.

Absorbing Oxygen - Important note!

Even though plants are the producers of the oxygen, they are not able to absorb the oxygen by their leaves, *(the way it released to the atmosphere)*.

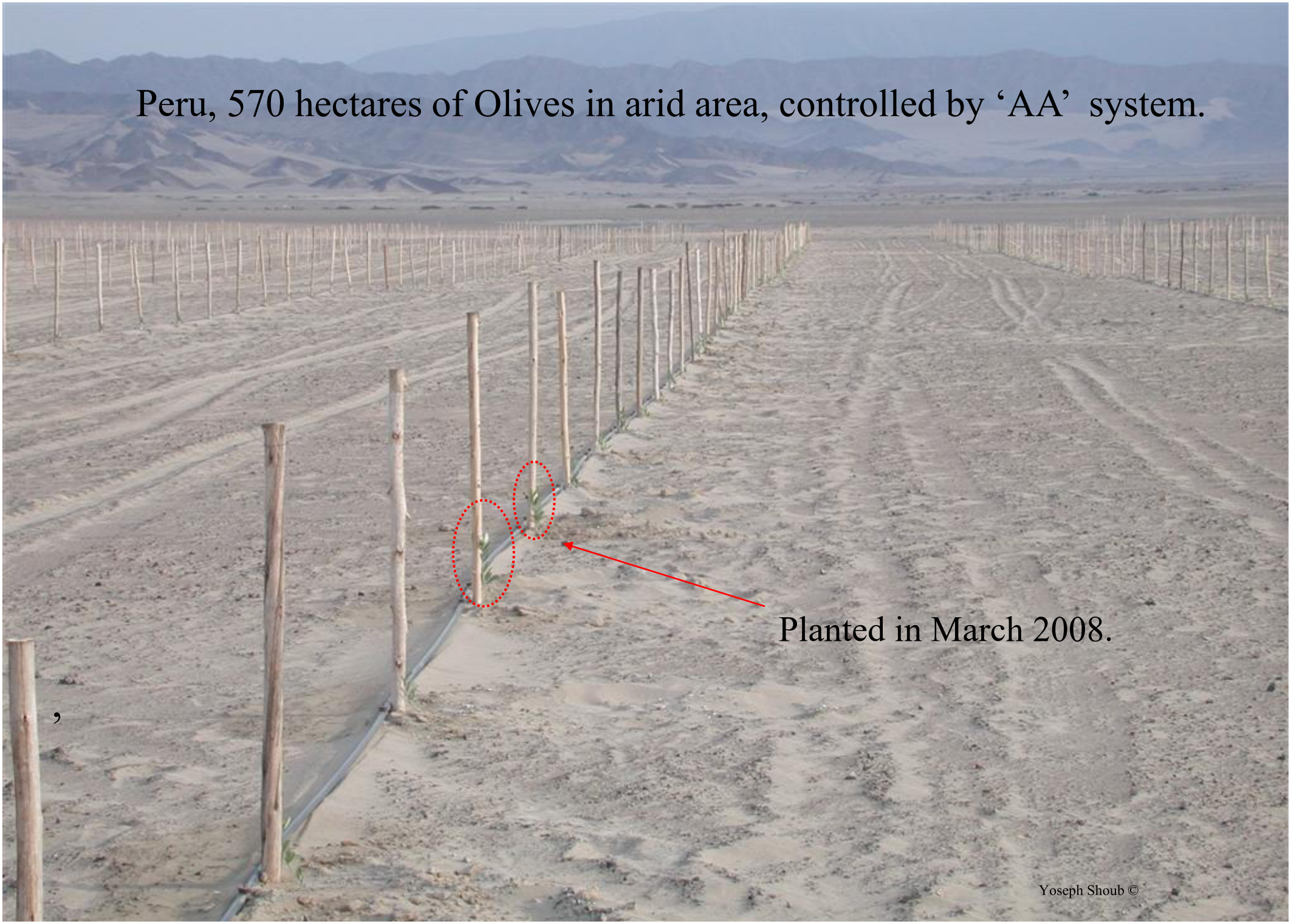
It should be clear, once and for ever, that the plants absorb oxygen only by their roots! when oxygen is dissolved into the soil-solution.

Therefore; air presence in any root's media, and the oxygen availability in the media-solution, are essentially vital for the roots of agricultural crops!

However, most of the conventional drip irrigation methods are not able to maintain 24h a continuity stable oxygen supply, as they do not maintain a stable water/air ratio in the root zone, as micro irrigation does.

First greenhouse Cherry-Tomatoes under ‘AA’ control, August 2009 Israel.

Irrigated with 1,200L./ Dunam/day compare to the 5,000L./ Dunam officially recommended.


Peru, 570 hectares of Olives in arid area, controlled by ‘AA’ system.
Planted in March 2008.
Yoseph Shoub ©

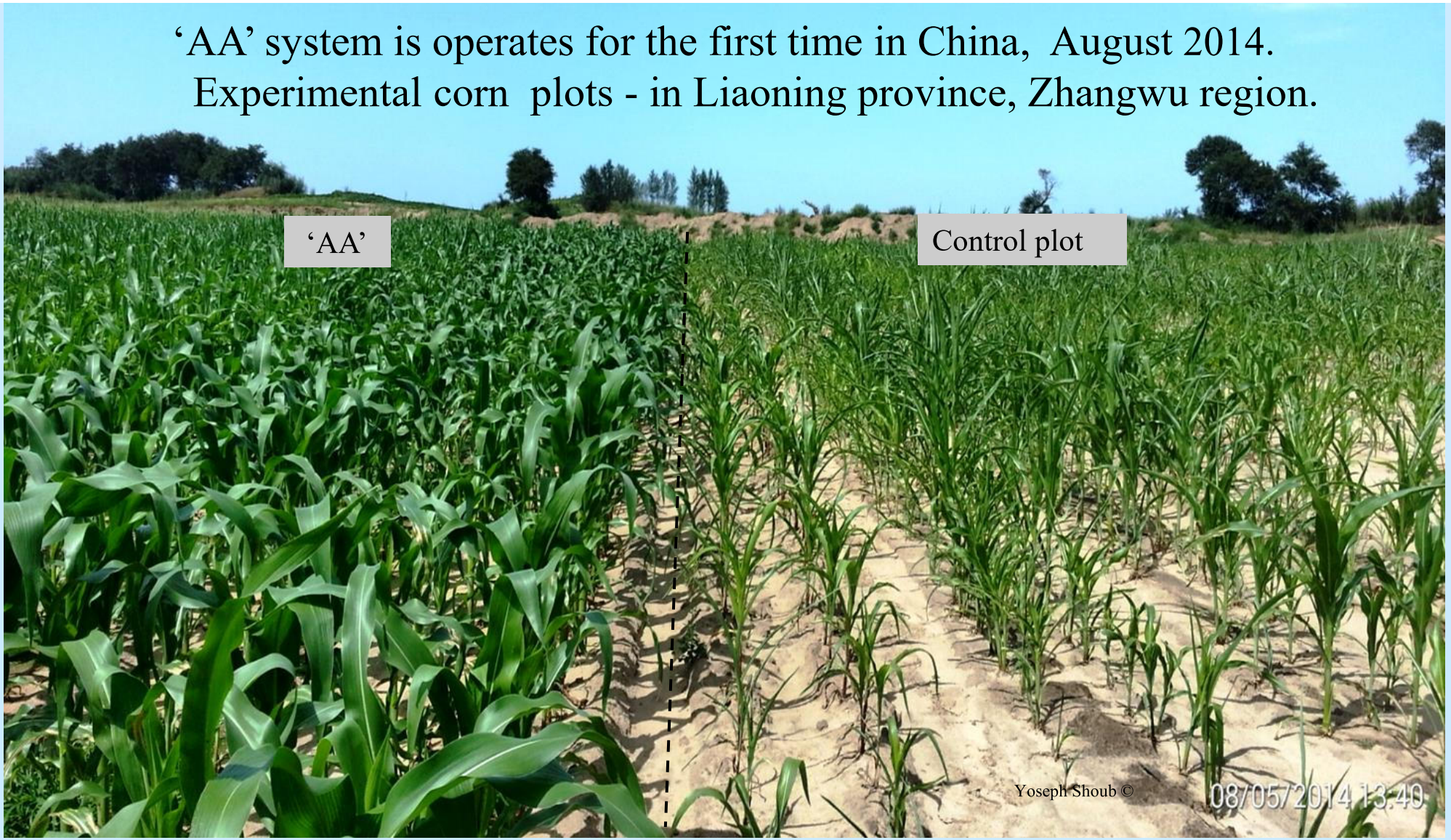
The same olive trees June 2009

Exposed roots, July 2010.

1.5 years old ‘AutoAgronom’ Olive trees. Hula valley Galilee, Israel December 2011.

Precise agriculture supports the plant’s activities and *serves the grower’s economy.*

‘AA’ system is operates for the first time in China, August 2014.
Experimental corn plots - in Liaoning province, Zhangwu region.



Comparative experimental corn plots (*7 replications*), grown in uniform sandy soil, irrigated with the same water, using the same fertilizers, and the same compensated drippers.

Right - controlled by irrigation system known in China for getting good results. Total yield 1.0
Left - ‘AA’ controlled system. Total yield 1.7, with 50% of the water used for the control plots.

China - August 2015 -- private corn plots

‘AA’ Strawberries’ in tunnels in growing media, and in soil.
Cyprus January 2010.

‘AA’ Tomatoes in ducts of coco peat, Malesia February 2009.

5 weeks after transplanting

2 weeks after transplanting,
4 plants in 4L. Containers.

‘AA’ controlled gerbera seedlings in coco peat, winter season.

"The man is not the Crown of the Creation, its origin might be the ape"

Charles Darwin - On the Origin of Species (1859)

And so said Wester Bishop's wife about Darwin's ideas:

"Let us hope it is not true, but if it is, let us pray it does not become widely known"

"Wise Judgment comes from Experience, but Experience comes from Wrong Judgment".

My dear late friend Prof. Naftali Zieslin

‘Wise Agriculture will win’

By the courtesy of the happy-growers of ‘AA’ Bananas’
Shaar-Hagolan, Jordan Valley, Israel October 2010.

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