VERDE SMART

THE SOLUTION FOR THE SMARTFOOD ECOSYSTEM

FERTINNOWA conference:

Sharing fertigation best practices across Europe

Aguadulce Congress Hall, Almeria, Spain

3-5 October 2018



3-OCTOBER: 15H 20: Technologies to Improve Water and Nutrient Use Efficiency on Vegetables, Fruits and Nurseries

A WORLDWIDE PROBLEM

Groundwater is getting **contaminated with nitrates by agriculture** and livestock, affecting to the health of millions of people and even causing cancer.

Developed countries have established **control procedures by law** to reduce fertilizer use, **but this contamination** level's on ranches and farms **cannot be measured**...



HOW BIG IS THIS PROBLEM? It's huge...

140 MILLION TONNES OF FERTILIZER

are used by farmers every year

...and based on intuitive decisions!

USA is just an example.





OPPORTUNITY COST

WE PLANIFY (fertilization plan)

LACK OF DIAGNOSIS INDICATORS

IN ALMERIA WE HAVE 3-4.000 €/HA YEAR WE ARE TALKING ABOUT ANUAL COST OF **70M €/HA** YEAR

WE ARE GOING TO SHOW SAVINGS OF NUTRIENTS OVER 50%

THE SOLUTION

The first soil nutrition management tool

NUTRISENS

A special sensor to measure NITRATE & POTASSIUM in the soil: a gelatine filter the nitrate and potassium

POTASSIUM



NITRATE

THE SOLUTION The first soil nutrition management tool



NUTRISENS

A special sensor to measure NITRATE & POTASSIUM in the soil can detect:

IF PLANT IS UPTAKING NITRATE

OVER OR UNDER NITRATE

UNDERSTAND HOW WEATHER CONDITIONS AFFECTS NUTRIENT UPTAKE



WHAT IS THE PROBE MEASURING?

- Measures NO3-, not other nitrogenous forms
- The concentration of nutrients in the soluble fraction (PORE WATER)

| + Móvil + Bioaccesible | FRACCIONES DEL SUELO | | | | - Móvil - Bioaccesible |
|--|---|------------------------------|---|---|--|
| SOLUBLE | INTERCAMBIABLE | ASOCIADA A CARBONATOS | ASOCIADA A ÓXIDOS DE HIERRO Y MANGANESO | ASOCIADA A MATÉRIA ORGÁNICA (M.O.) Y | RESIDUAL |
| | Potasio bioaccesible | | | SULFUROS | |
| Potasio biodisponible Fácilmente accesible | Potasio bioextraible Potencialment | te accesible | | | |
| | CONCENTRACIÓ TOTAL | | | | |
| | | | | | |
| Solubles en aigua. | Movilizable por cambios de pH o de composición iónica. | Sensible a cambios de pH. | Movilizable bajo condiciones anóxicas. | Movilizable bajo condiciones oxidantes. | Solo movilizable bajo condiciones extremas. |



NEW PROPOSAL OF NUTRITION MANAGEMENT

- 1. WE HAVE THE FERTILIZER SOLUTION FOR EACH PHENOLOGY AND THE STANDARD INJECTION RATIO
- 2. THE CONCENTRATION OF NITRATE AND POTASSIUM IS MEASURED IN THE DRIPPER WITH HORIBA

3. *DIAGNOSIS*: THIS CONCENTRATION IS COMPARED WITH THE CONCENTRATION IN THE NUTRISENS PROBE IN ROOTS AND DRAINAGE

4. ACTION: FERTILIZATION IS CHANGED FROM THIS DATA

TO BE ABLE TO DO THIS, **NUTRISENS** MUST BE CALIBRATED FOR EACH TYPE OF SOIL: WITH **SUCTION PROBE + HORIBA (Laquatwin) METER**

QUICK ANALYSIS OF NO3- IN DRIP AND RHIZON

I.F.A.P.A. Instituto de Investigación y Formación Agraria y Pesquera

Maria Milagros Fernández Fernández



CALIBRATION OF NUTRISENS IN EACH SOIL

At least **3 suction probes** should be used per Nutrisens probe.

Solution is extracted from the soil at least 2-3 times in 1 h of suction and this value is used to calibrate the probe





syringe extracts PORE WATER

Porous polymer

DIAGNOSIS FOR CALIBRATION AND OTHER EXTRA POINTS IN GREEN HOUSE



THE CONCENTRATION OF NITRATE AND POTASSIUM IS MEASURED IN THE DRIPPER WITH HORIBA



THIS CONCENTRATION IS COMPARED WITH THE CONCENTRATION IN THE NUTRISENS PROBE IN ROOTS AND DRAINAGE WITH SUCTION PROBES





TOMATO EXPERIENCE WITH PARQUENAT 16-17

FRANCISCA FERRER GROWER



INCREASE NITRATE NOV-DIC







IN JANUARY AND FEBRUARY WE HAVE MAINTAINED THE CONCENTRATION OF 12 MEQ IN ROOTS AREA (IN 15 CM)



STRESS AND ITS INFLUENCE IN THE ABSORPTION OF NITRATE AND POTASSIUM FROM PLANT ROOTS

ANY TYPE OF **STRESS** PROMOTES A STOMATIC CLOSURE ON THE PLANT AND THIS PRODUCES:

- LOWER NITRATE CONSUMPTION
- HIGHEST POTASSIUM CONSUMPTION

STRESSES CAN BE BY COLD, BY SALINITY, WATER STRESS AND BY HIGH VPD (HIGH TEMPERATURE AND LOW RELATIVE HUMIDITY).

WE WILL BE ABLE TO UNDERSTAND THE INFLUENCE OF STRESS IN NUTRITION WITH THE DAILY TRENDS OF THE PROBES



COLD STRESS IN TOMATO: DECIDES TO PROVIDE LESS NITRATE WHEN DETECTING LEACHING





COLD STRESS TOMATO: DECISION TO INCREASE POTASSIUM CONTRIBUTION BY DETECTING THE INCREASE OF ITS CONSUMPTION IN SOIL



THE PLANT INCREASE POTASSIUM CONSUMPTION WITH THE COLD, MATCHING WITH THE STRONG NITRATE WASH



OPTIMIZATION OF INPUTS





11% OF BETTER OF FRUIT SIZE I-G COMPARED WITH 2016



WE HAVE INCREASE THE NUMBER OF HOURS OF THE PLANT "WORKING" WITH THE STOMATA OPEN IN THE STRESS CONDITIONS AND LET THE PLANT TO TAKE MORE WATER TO PRODUCE MORE FRUIT SIZE. WATER WAS IN FULL CAPACITY, THIS IS FIX FACTOR, BUT WE MUST HELP THE PLANT TO UPTAKE THIS AVAILABLE WATER



GRACIAS

