2023 UCCE Northern San Joaquin Valley Processing Tomato Meeting

Efficient water and fertilizer management in processing tomato using AI to interpret field data

8-Feb. 2023

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DXAS

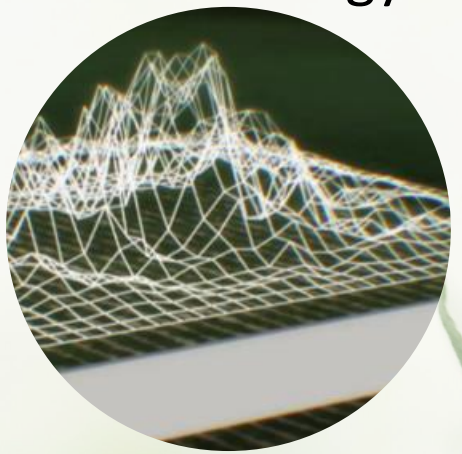
Agricultural Technology

Innovate the world's agriculture with DX solutions

Agronomy

KAGOME

IT Technology



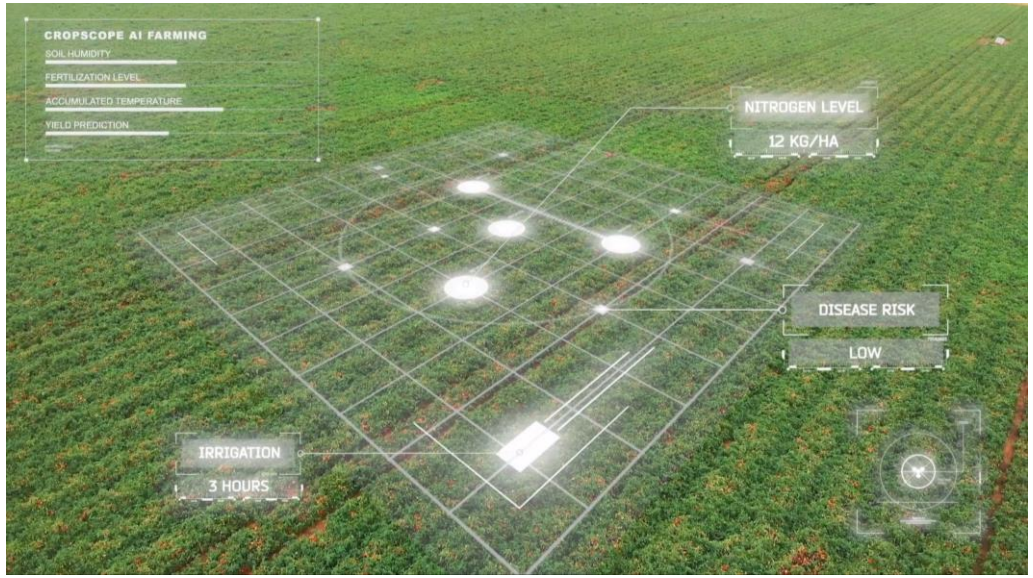
NEC

CropScope

Points to be strengthened in DXAS

- Accelerate creation of new value and enhancement of services from accumulated AI technologies
- Deployment of agronomy skilled personnel in each country to support optimal service proposals and technology application

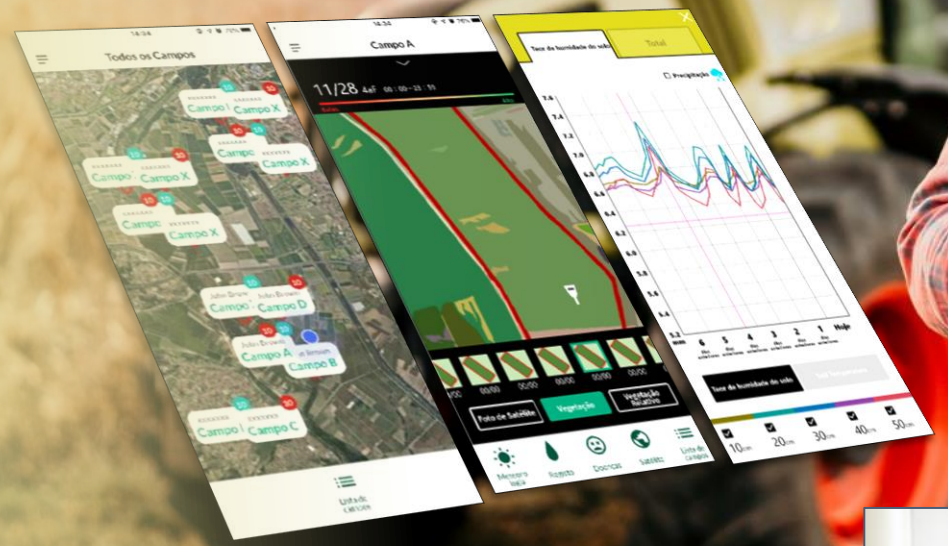
Acceleration of Technology Development

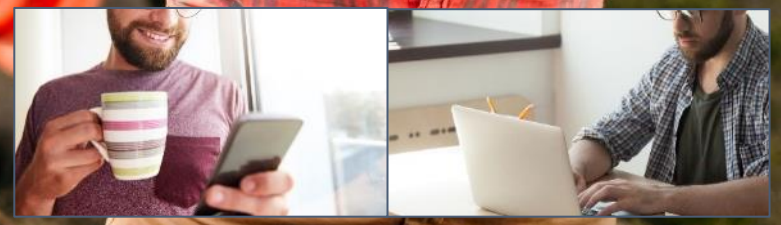


Strengthening of Service Delivery Organization

Product

CropScope





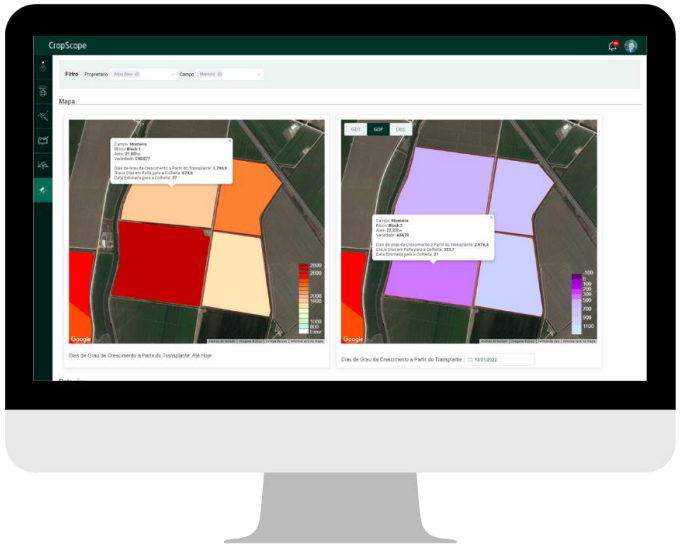
- Smart Management -
by using AI and Data driven farming

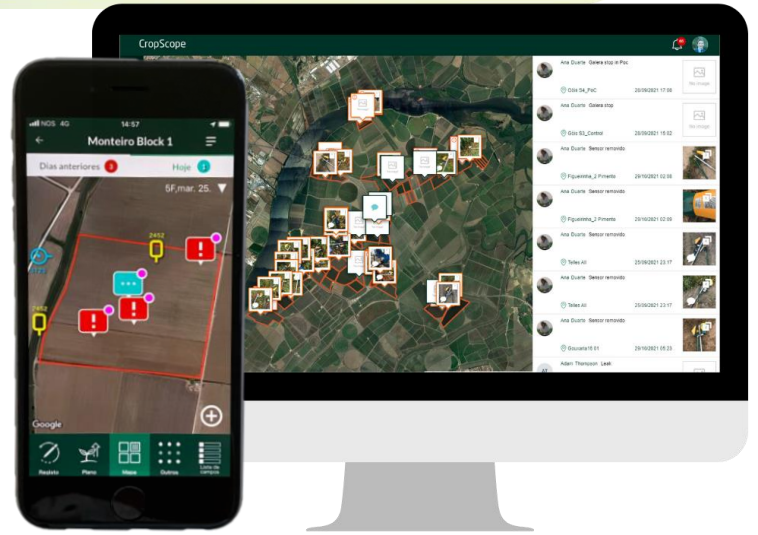
Centralization Automatically recording weather, crop growth status, soil moisture, disease status and work record. Changing field status can quickly be confirmed by smartphone.

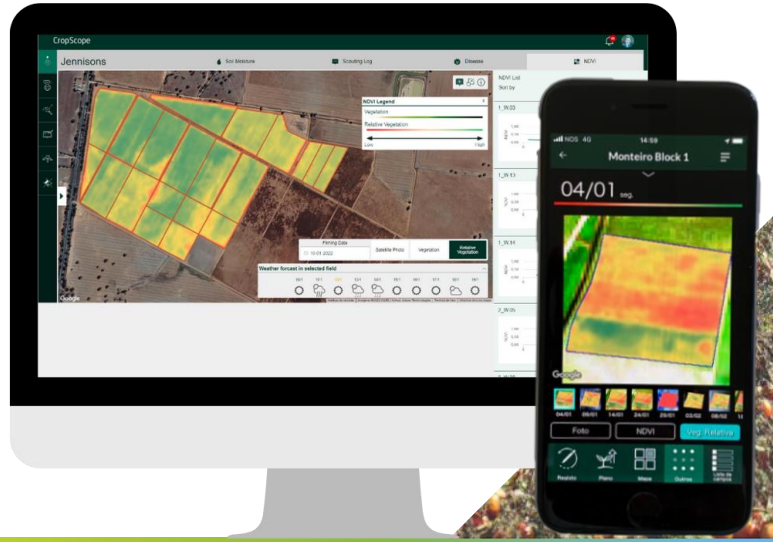
Insight Field data and work record are shared with grower and farming instructor, effective advice is provided in timely manner.

Growth Farming know how is accumulated and utilized for the effective control of more and more fields.

Services : Visualization Field Analysis





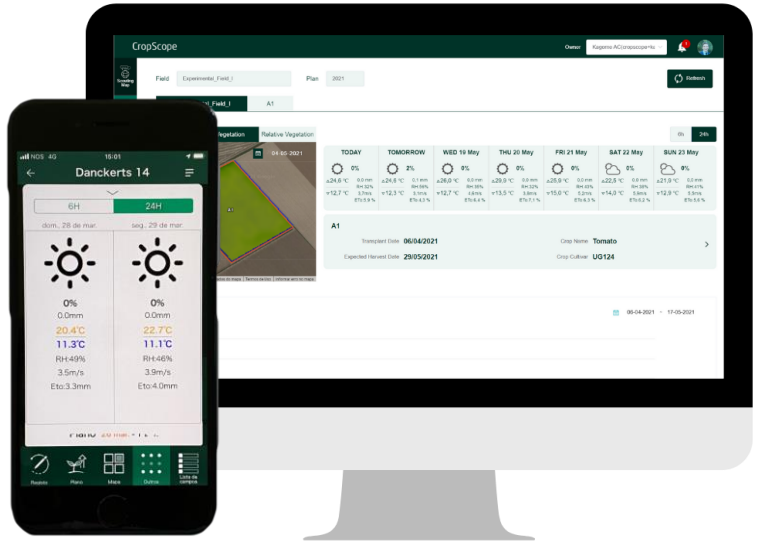


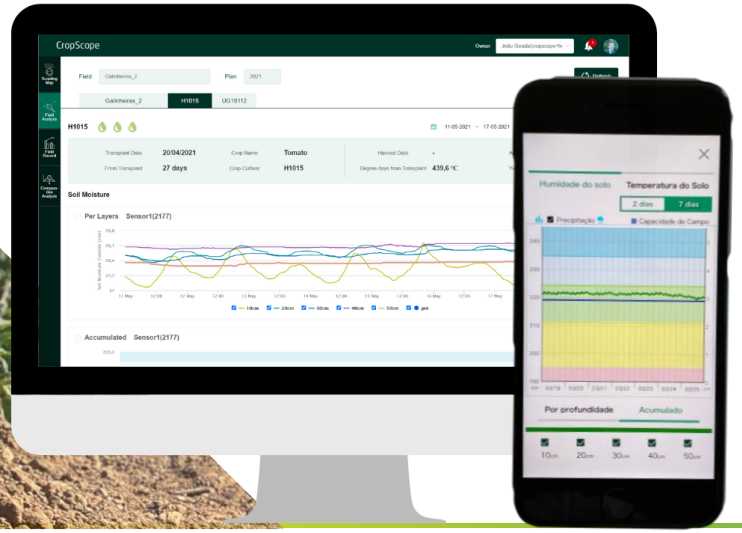
VISUALIZATION

Field Analysis

- Degree Day Map (DDM)
- Farm Register
- Field Analysis (Alert / Commentary Function)
- Satellite Maps (NDVI, NDRE)

Services : Visualization Remote sensing





VISUALIZATION

Remote Sensing

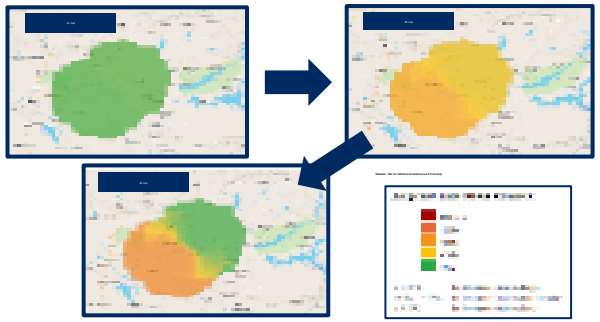
- Measurement of Irrigation Flow
- Meteorological Information
- Soil Moisture
- Soil Temperature

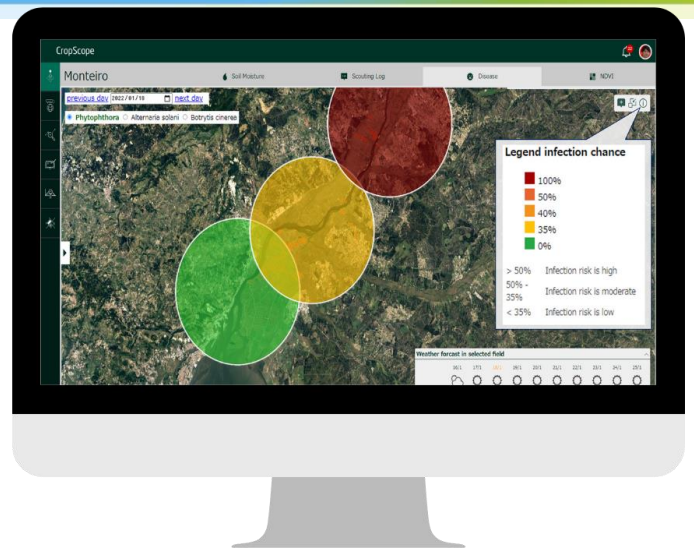
Services : Visualization Disease

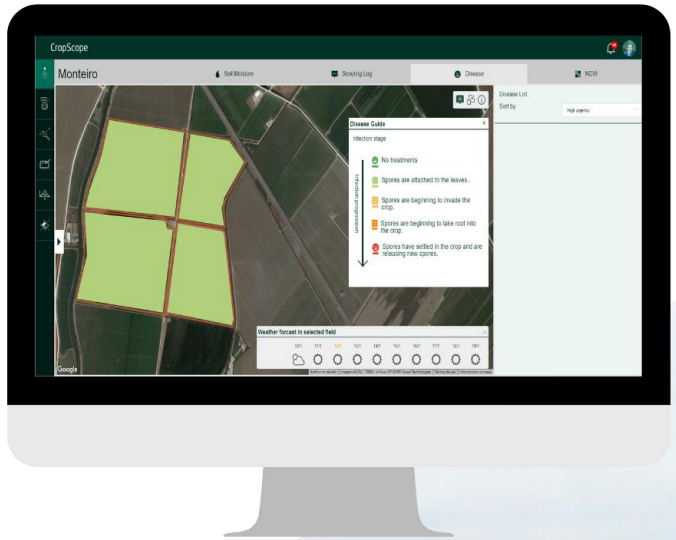
VISUALIZATION

Disease Prevention

- Disease risk information







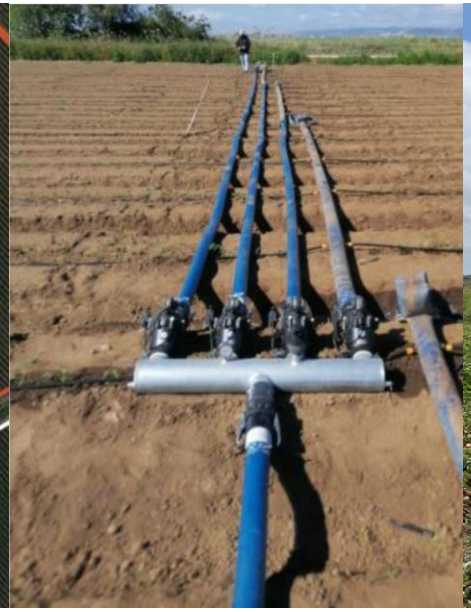
History

- NEC and Kagome has tried AI evaluation for 7 years aiming to achieve Low Input/High Output and proved master grower equivalent result in 2019
- CropScope keep continue to improve AI and Data driven farming decision and adapting each local farming policy

	2015	2016	2017	2018	2019	2020	2021	2022
	Desktop trial	**Real-time AI recommend evaluation**		**Prototype evaluation**		**Improving AI fertigation**		
	・Data collection ・Status capture	・**Irrigation/Nitrogen AI analysis trial** ・**Surface/Subsurface calibration**	・Field supervising service started ・**Machine leaning for master grower know-how**		・New service release ・**Successful AI trial**			・**AI guide released** ・Pulsing irri. trial
Tech Activity	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe
		US	US	US	**Focus on trial in Europe**			US
	AU				AU	AU	AU	AU

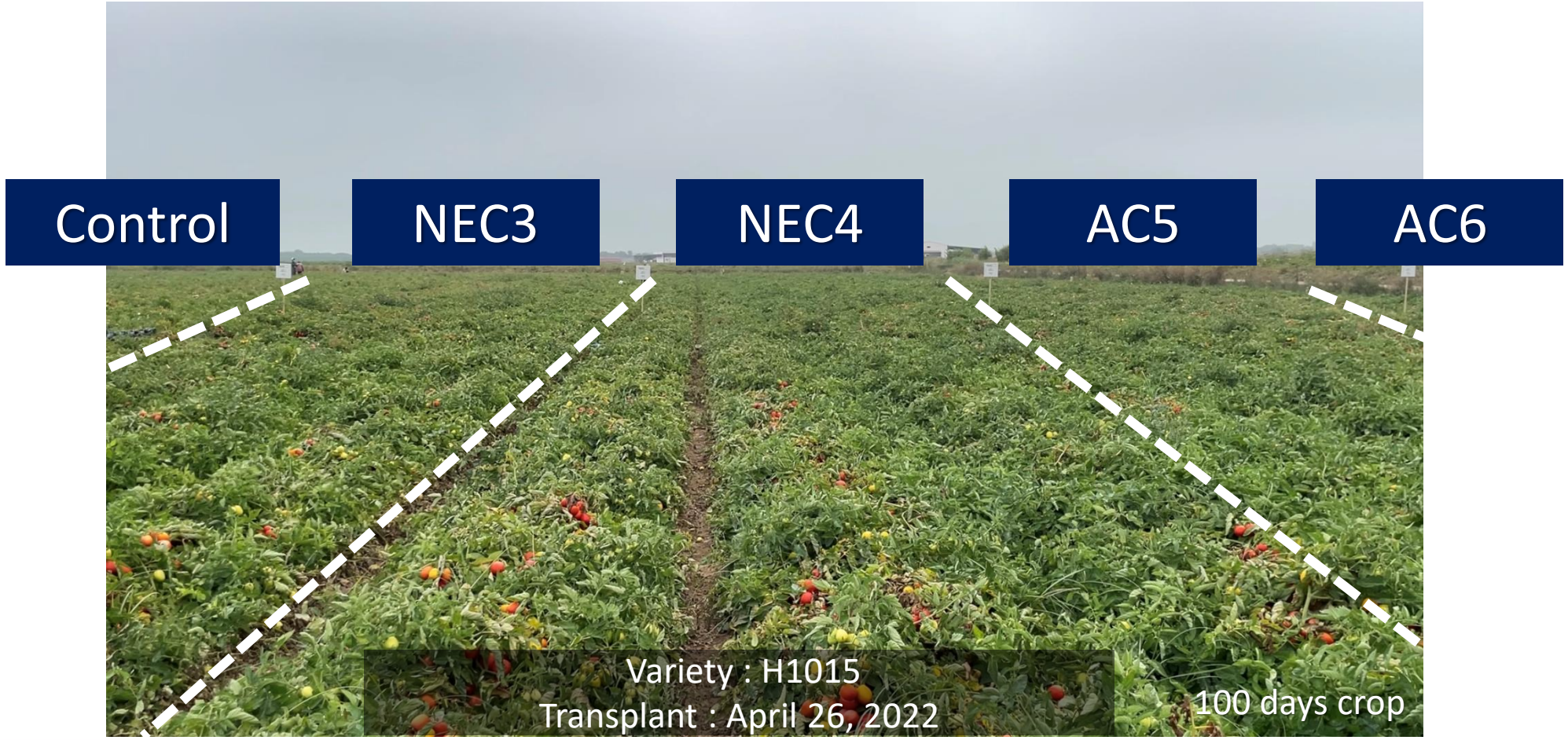
2022 Trial design in Portugal

	Exp. 2 (Control)	NEC3	NEC4	AC5	AC6
Planner	Kagome Agri-Center	NEC	NEC	Kagome Agri-Center	Kagome Agri-Center
Pulse irrigation	No	No	**Yes**	**Yes**	**Yes**
Surface or Sub-surface irrigation	Surface	Surface	Surface	Surface	Sub-surface



2022 Trial design in Portugal

- Evaluating 4 types of farming decided by CropScope data-driven fertigation management engine
- CropScope recommends weekly water amount for each block, applying water along with grower's irrigation timing



2022 Trial Results in Portugal

	Control	NEC3	NEC4	AC5	AC6
Planner	Kagome Agri-Center	NEC	NEC	Kagome Agri-Center	Kagome Agri-Center
Pulse irrigation	No	No	**Yes**	**Yes**	**Yes**
Surface or Sub-surface irrigation	Surface	Surface	Surface	Surface	Sub-surface
Irrigation amount (mm)	451.0	468.1 (+3.8%)	414.1 (-8.2%)	384.8 (-14.7%)	384.8 (-14.7%)
Fertilization amount (kg N/ha)	260.4	265.5 (+2.0%)	265.0 (+1.8%)	250.6 (-3.8%)	250.6 (-3.8%)
Yield (t/ha)	**95**	**120 (+26.3%)**	**142 (+49.5%)**	**120 (+26.3%)**	**124 (+30.5%)**

Our proven values & Commercialization

DXAS Agricultural Technology

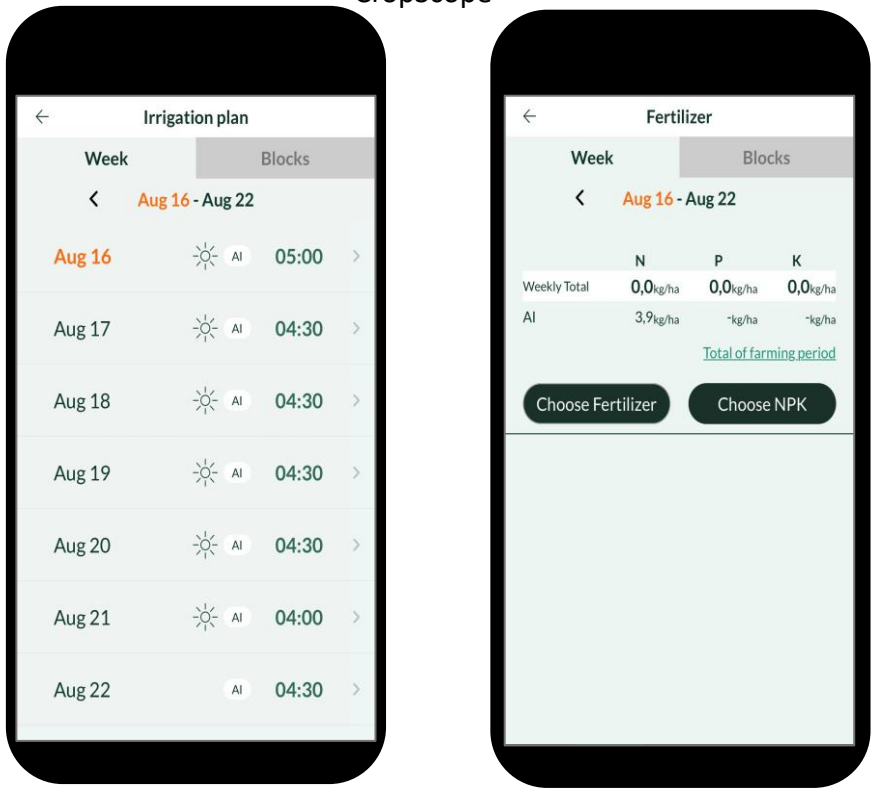
Yield
↑ 20% UP

Water
↓15%Down

AI farming proven values
(FY2022 in Portugal experimental field)

Powered by

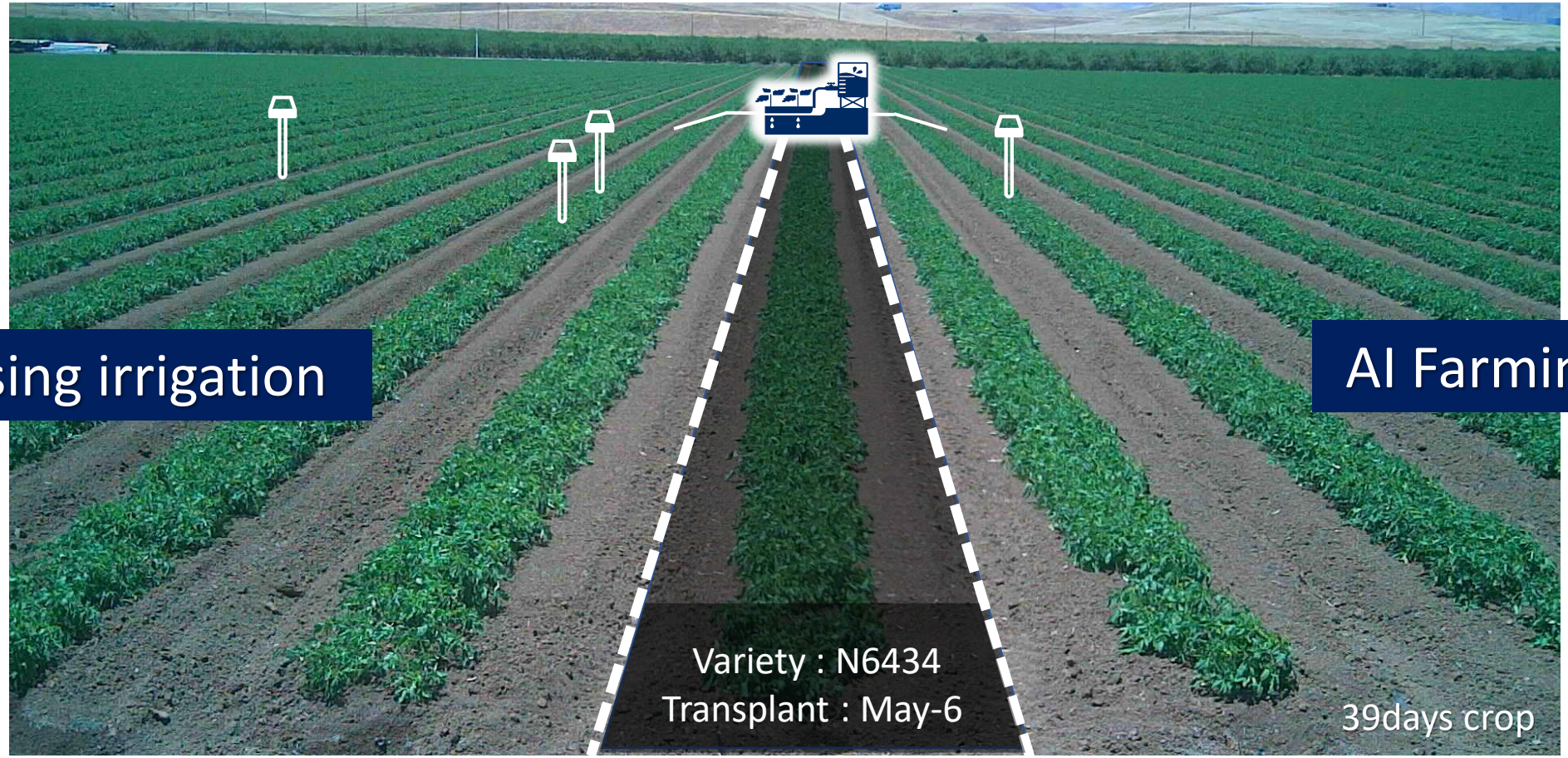
CropScope



AI guide commercialization

2022 Trial design in California

- Evaluating 2 types of farming decided by CropScope data-driven fertigation management engine
- CropScope recommends weekly water amount for each block, applying water along with grower's irrigation

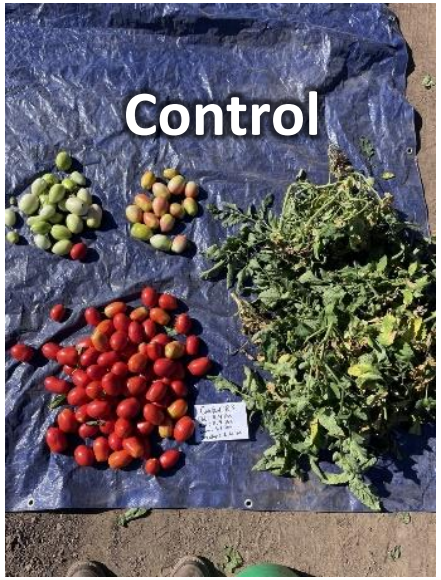


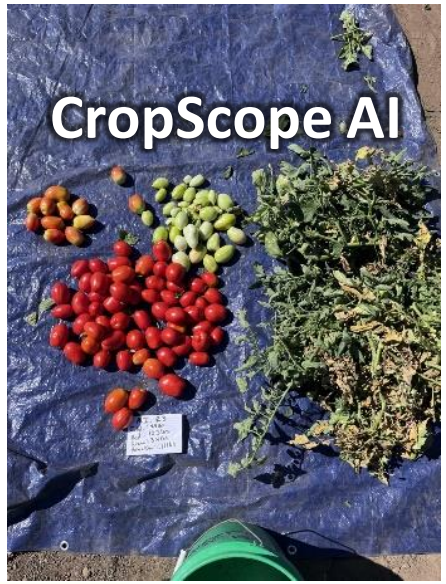
Shake Test Results as of Aug-25 (111 days)

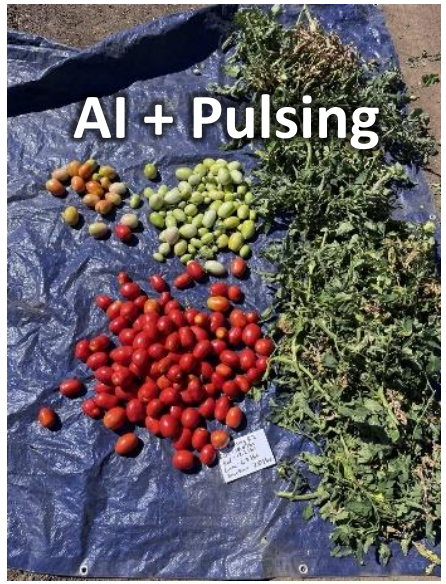
We took 3 plants from each block for preliminary analysis

Sampling average Weight (lbs.)/Plant

	Red	Breaker	Green	Total
Control	11.9	2.3	3.2	17.3
CropScope AI	14.5	2.4	4.0	21.0
AI+Pulsing	**17.1**	2.2	3.9	**23.2**







Summary of Trial Results in California

	Harvest date	Total irrigation	Total N fertilizer	Yield
Grower Control	Early Sep	30.1 inches	231.3 lb N/ac	160.3 t/ha
NEC AI	Sep 24(141days)	29.9 inches (-0.8%)	213.5 lb N/ac (-8.7%)	145.2 t/ha (-9.4%)
NEC Pulse	Sep 24(141days)	27.5 inches (**-8.7%**)	239.0 lb N/ac (+3.3%)	138.4 t/ha (**-14.7%**)

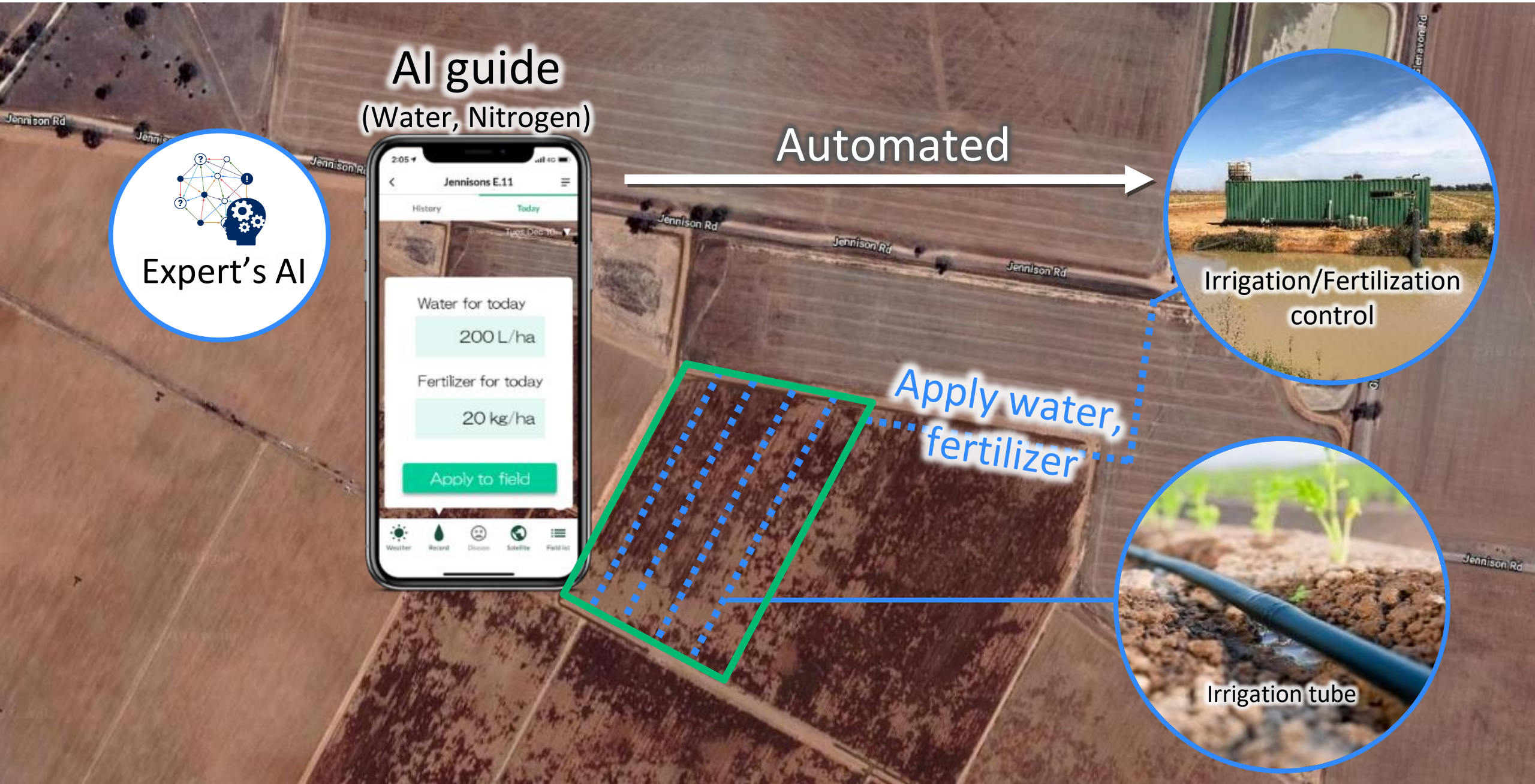
Ref.

Variety	Days to maturity	Company	Disease Tolerance	Plant Size	Brix	Viscosity
N6434	128	Nunhems	VFFFNTsw	Large	Medium	Medium

Other data from Plant petiole sample nitrate-N on August 19 (105days)

Plant petiole sample nitrate-N, August 19	NO3-NPPM	NO3-PPM
Grower Control	263.3	1165.7
NEC AI	283.3	1254.2
NEC Pulse	160.0	708.3

New function will be available from April 2023



Thank you.