

SmartHort 2019

What to Consider When Investing in New Technology?

Jacob Kirwan - G's Growers

G's Fast Facts

- Established 1952
- £500m turnover
- 1 billion products
- 7,000 employees
- 17 farmers and growers in the UK
- c. 13,000 hectares
- c. £20m invested p.a.
- Supplying all major UK retailers
- Supplying major supermarkets across the EU and USA



The G's Group

- A group of marketing led family farming businesses
- Growing across 12,982 hectares in Europe and Africa



UK
5,742 ha



Spain
6,027 ha



Czech
420 ha



Senegal
425 ha



Poland
368 ha

- Dedicated to quality and service; underpinned by strong values

Full Vertical Integration

Crop Establishment & Plant Raising



Farming



Further Process & Packing



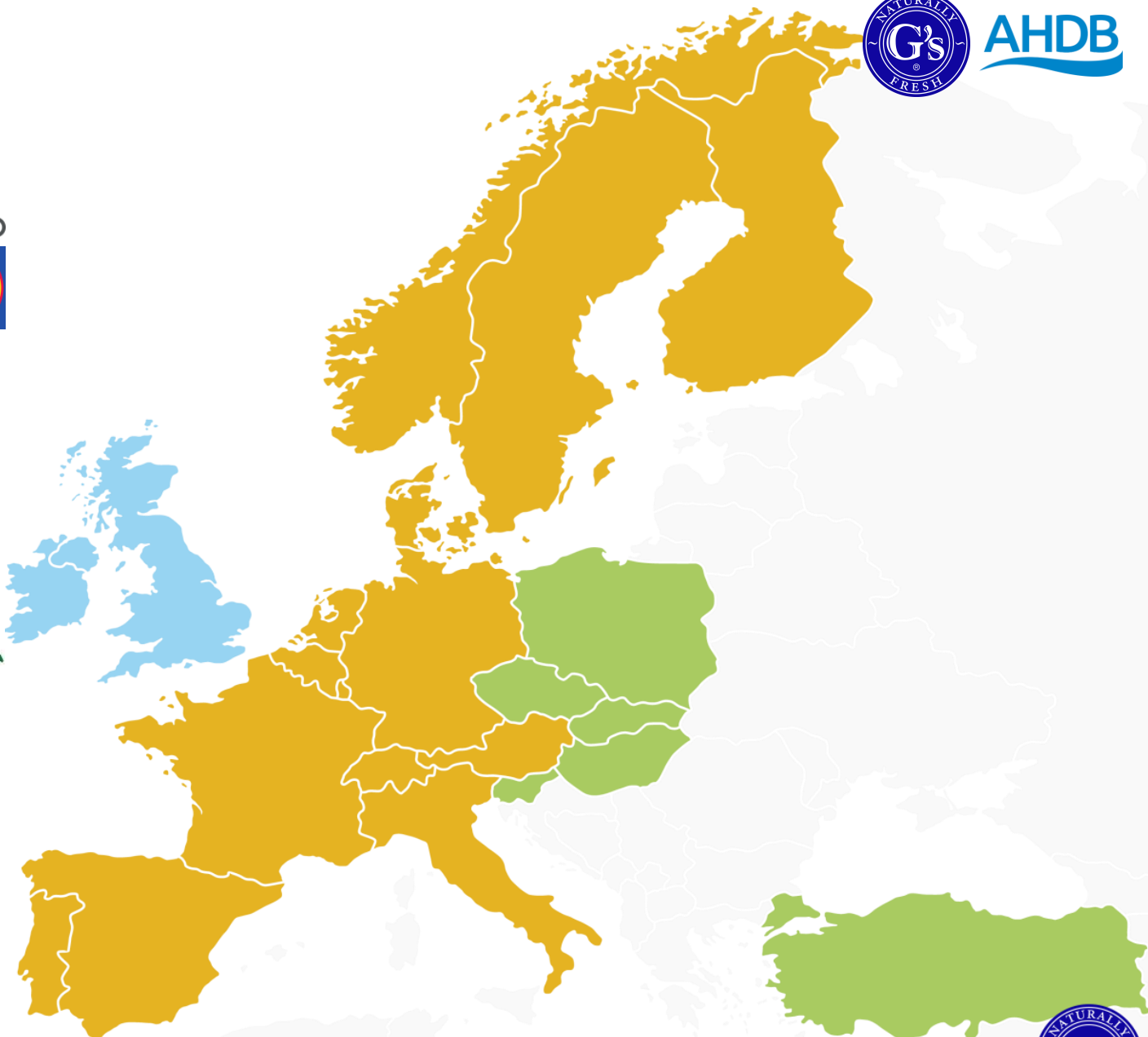
Sales & Marketing



Crop Portfolio



Customer Base - Europe



Research and Development



- 50 current R&D projects (including 15 PhDs)
- 5 core G's products covered
- 5 strategic themes (quality, nutrition, precision growing, packaging, sustainability)
- 5 sources of research funding (G's farms, EU, AHDB, InnovateUK & PhD sources; total of £1.5M external research funding accessed)

Innovation Strategy



Aim:

To drive quality, efficiency and sustainability inspiring trust with our customers through the application of leading edge science and technology, expertise and knowledge

Strategic Themes:

**Quality &
Food Safety**

**Nutrition
& Health**

Precision Growing

Packaging

Sustainability

**Improve taste and
flavour**

**Differentiate
products**

**Develop
nutritional
content**

**Promote benefits
of products**

**Optimisation of
yield through
automation and
variability
management**

**Enhance shelf life
and convenience**

**Reduce impact on
Environment**

**Reduce waste and
carbon emissions
of products**

Challenges and Opportunities



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Key Challenges and Opportunities:

Labour Availability

Food Waste

AI assisted farming

Environmental
Stewardship

Brexit

Automation

Carbon Footprint

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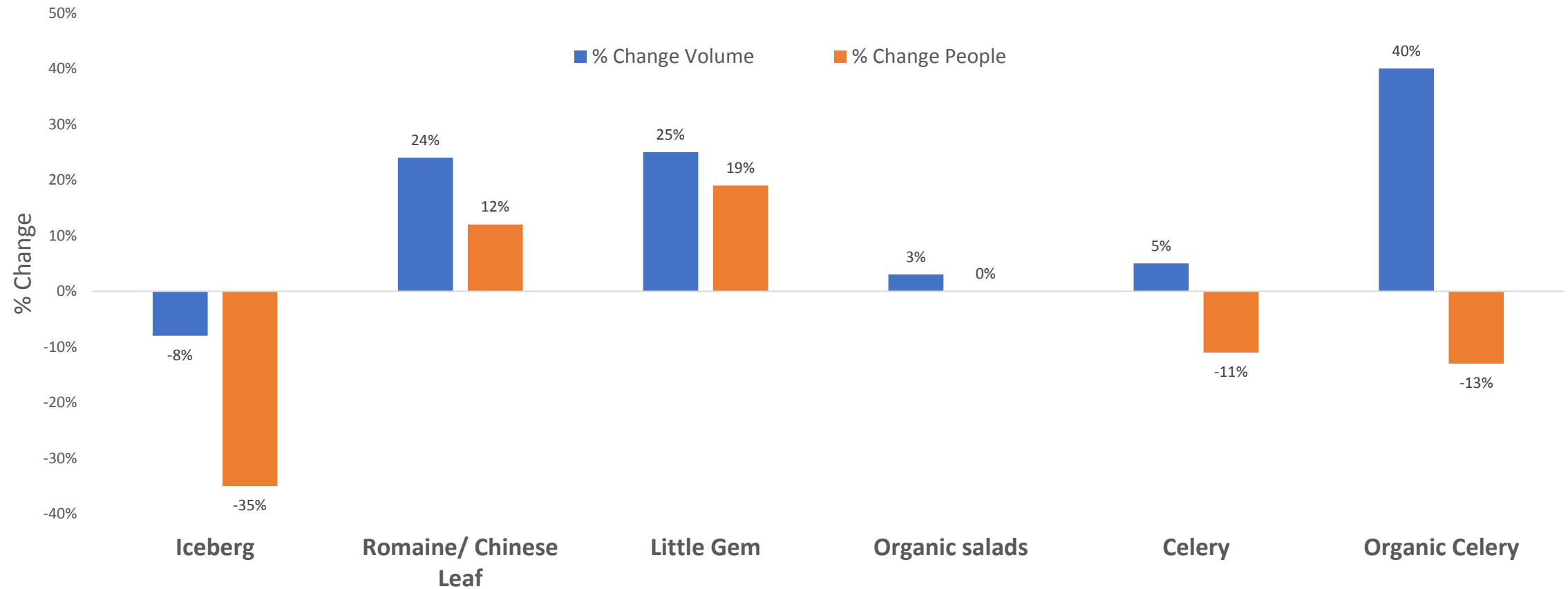
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Labour Challenges

Progress from 2012 to 2017 on harvest rigs through increased automation



Harvest Automation

Investments of £7.9m since 2012

- Automated speed wrapping machines
- Automation of processes- product transfers and packing, labelling
- Automated crop cutting and lifting
- Dedicated design - innovation team – 3D design

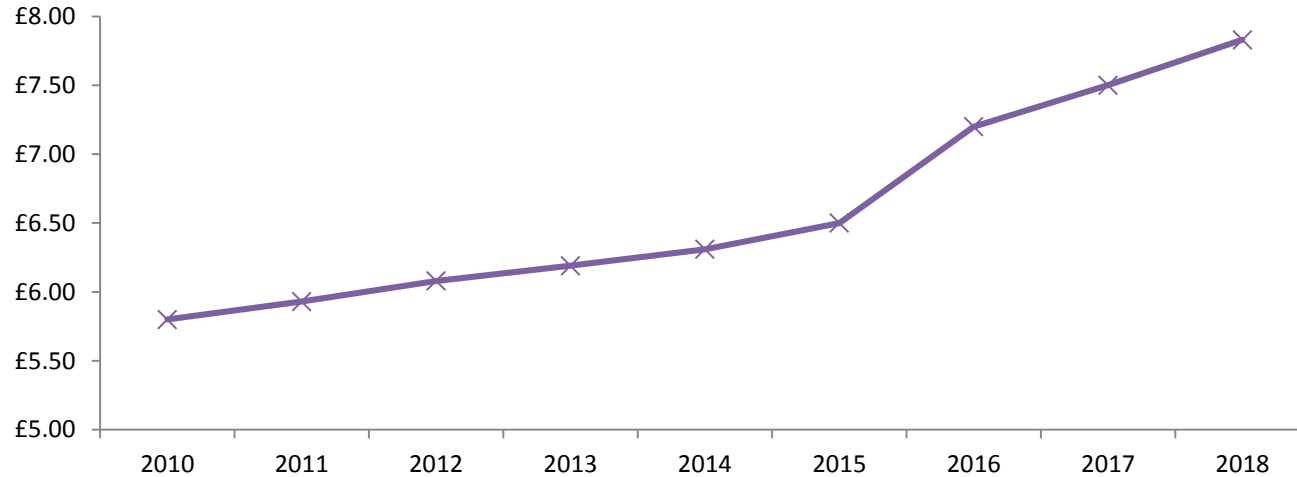


Celery auto lifting harvester – 50% productivity increase

Auto wrapping lettuce harvester – 60% productivity increase

Future Challenges

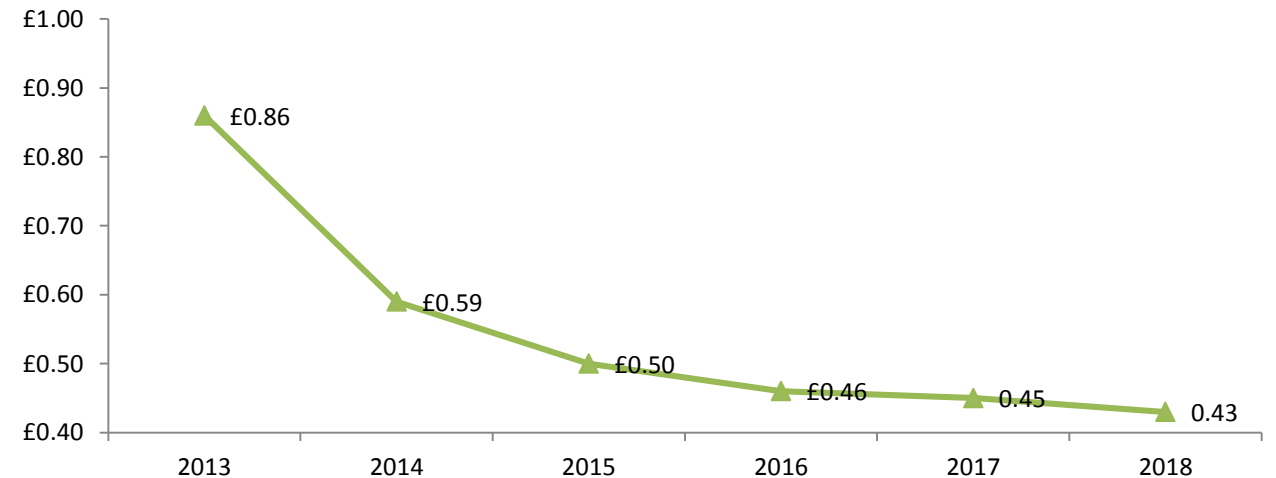
National Minimum/ Living Wage



- Expected further 15% increase up to £9.00 in 2020
- Uncertainty over labour and exchange rates

- Retail price deflation in the last 4-5 years
- Increased customers quality and ethical standards, leading to higher waste in growing and packing processes

Iceberg Retail Price



2017 Season Statistics



A rapid increase in recruited employees not arriving to start their contracts and far fewer have returned.

	2015	2016	2017
% "No-Shows"	9.8	12.6	19
% Returners	65.7	65.8	43

Far more employees have also been leaving their contracts early.

	2016	2017
Early Leavers (% Workforce)	18.6	46.1
Staff Working < 4 Weeks (#)	96	187

Employees completing more than 12 weeks work.

2000	2016	2017
71%	74%	40%

Future Opportunities

Turning this...



Salad Harvest



Salad Planting

Future Opportunities

Into this...



Cambridge University Robotic Lettuce Harvest Prototype



Plant Tape Automated Planting Machine

Future Opportunities



Centre for Doctoral Training in Agri Food Robotics:

- World first and largest ever cohort of Robotics and Autonomous Systems specialists, funding for 50 doctoral students



- Supported by industrial partners
- Improved collaboration, application and uptake – tackling skills shortages in robotics and AI in agriculture

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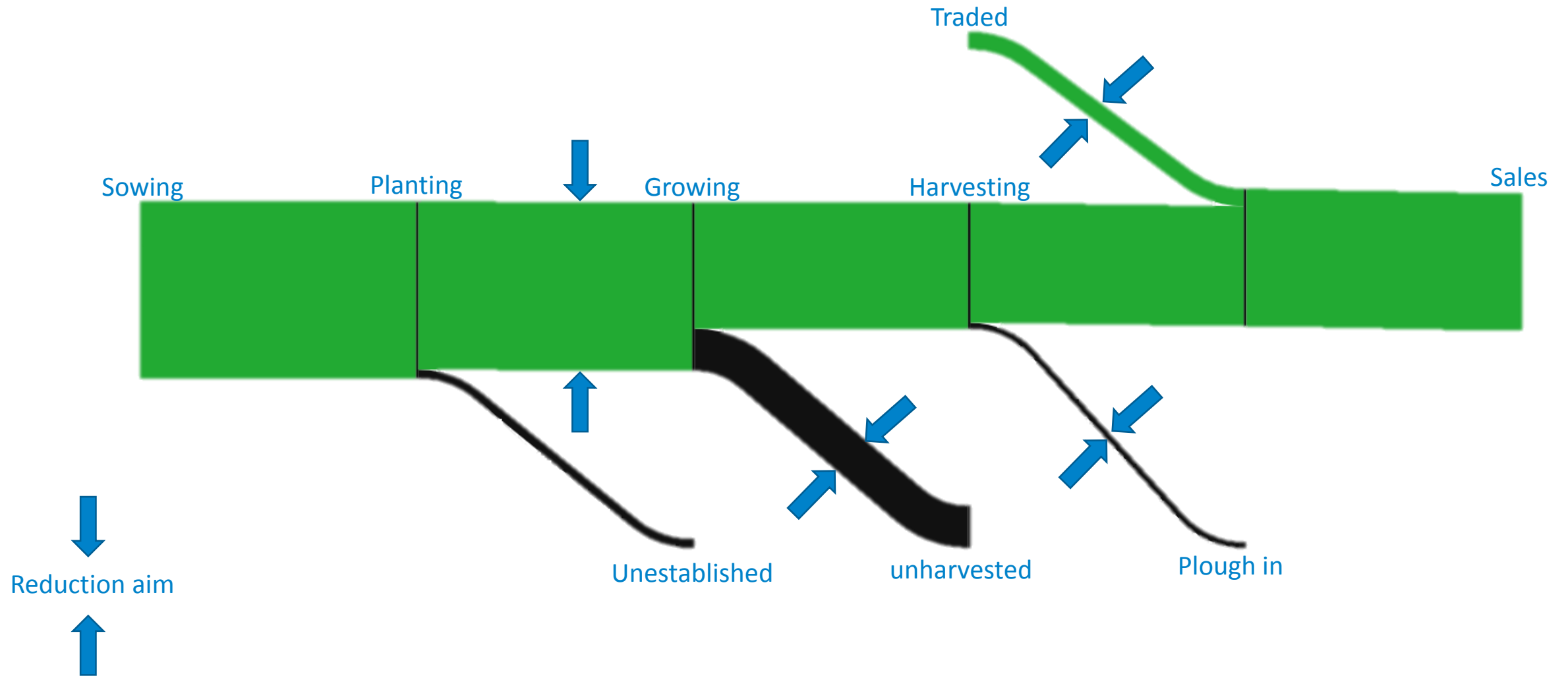
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Salad Growing Supply Chain



Crop intelligence using aerial platforms

Manned aircraft - UK

Spectrum Aviation

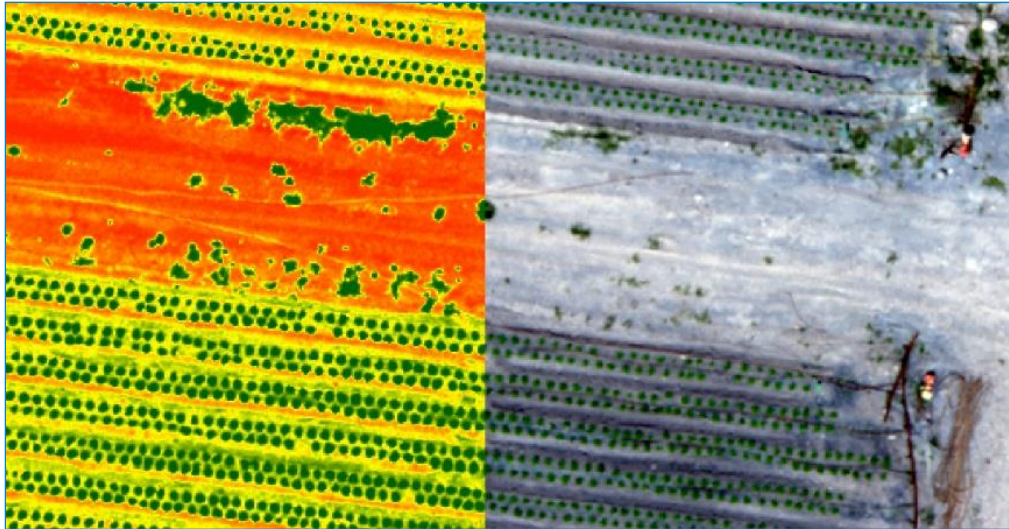


Unmanned Aerial Vehicles (UAVs) - Spain

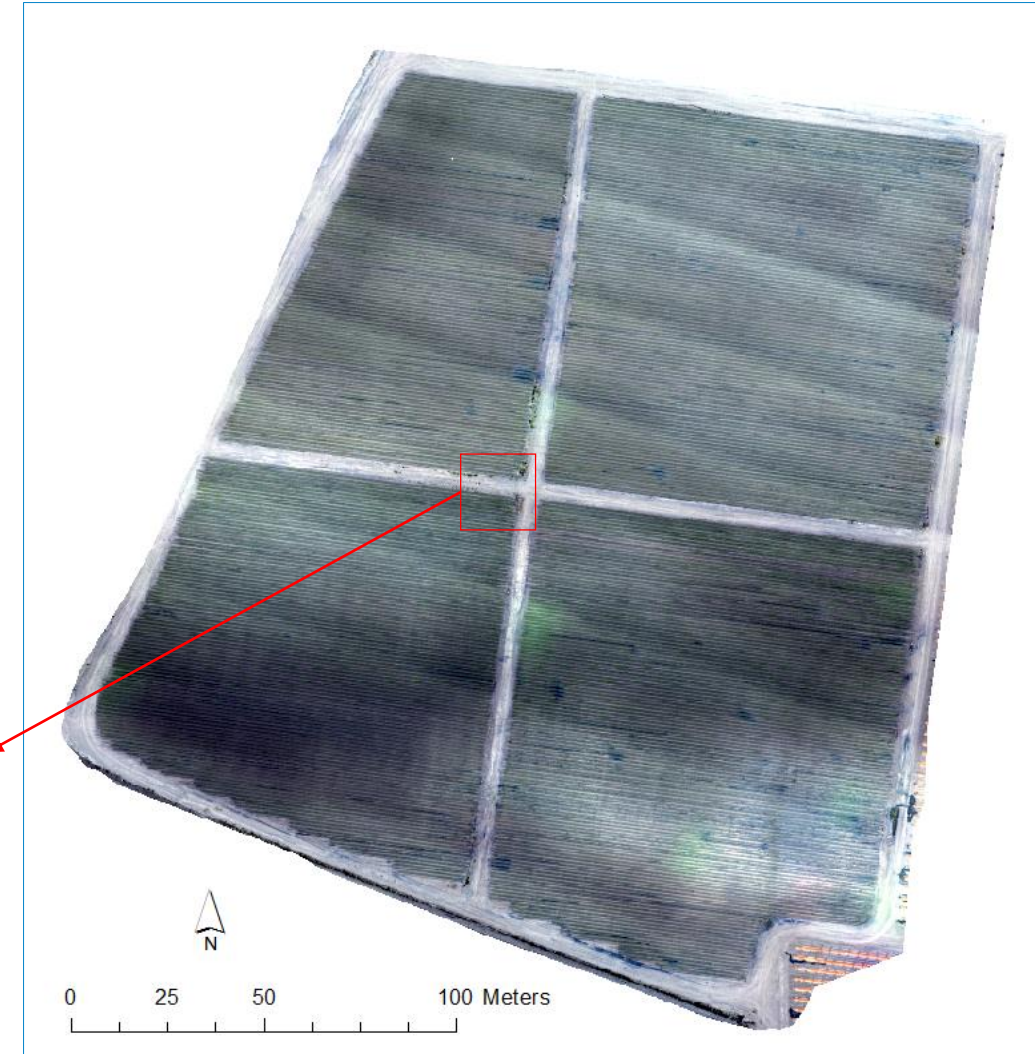
Hemav



Georeferenced multispectral imagery (3cm/pixel), being able to locate individual plants.



Real colour orthomosaic image and NDVI (red/green) of an iceberg crop at La Raposa 01 (Cullar- G's Growers Spain – 2017).



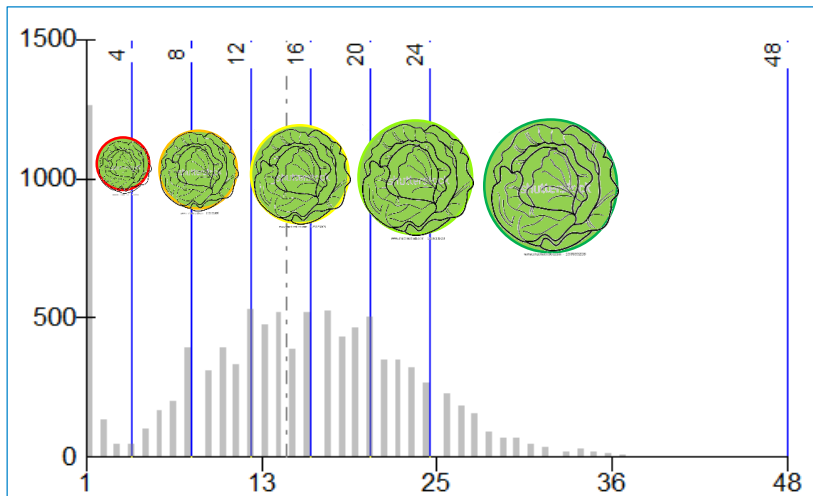
Yield Forecasting - Plant Count/Sizing App

In-house algorithm to identify each of the plants determining **No. of surviving plants** (>98% accuracy) 2-3 weeks after planting.

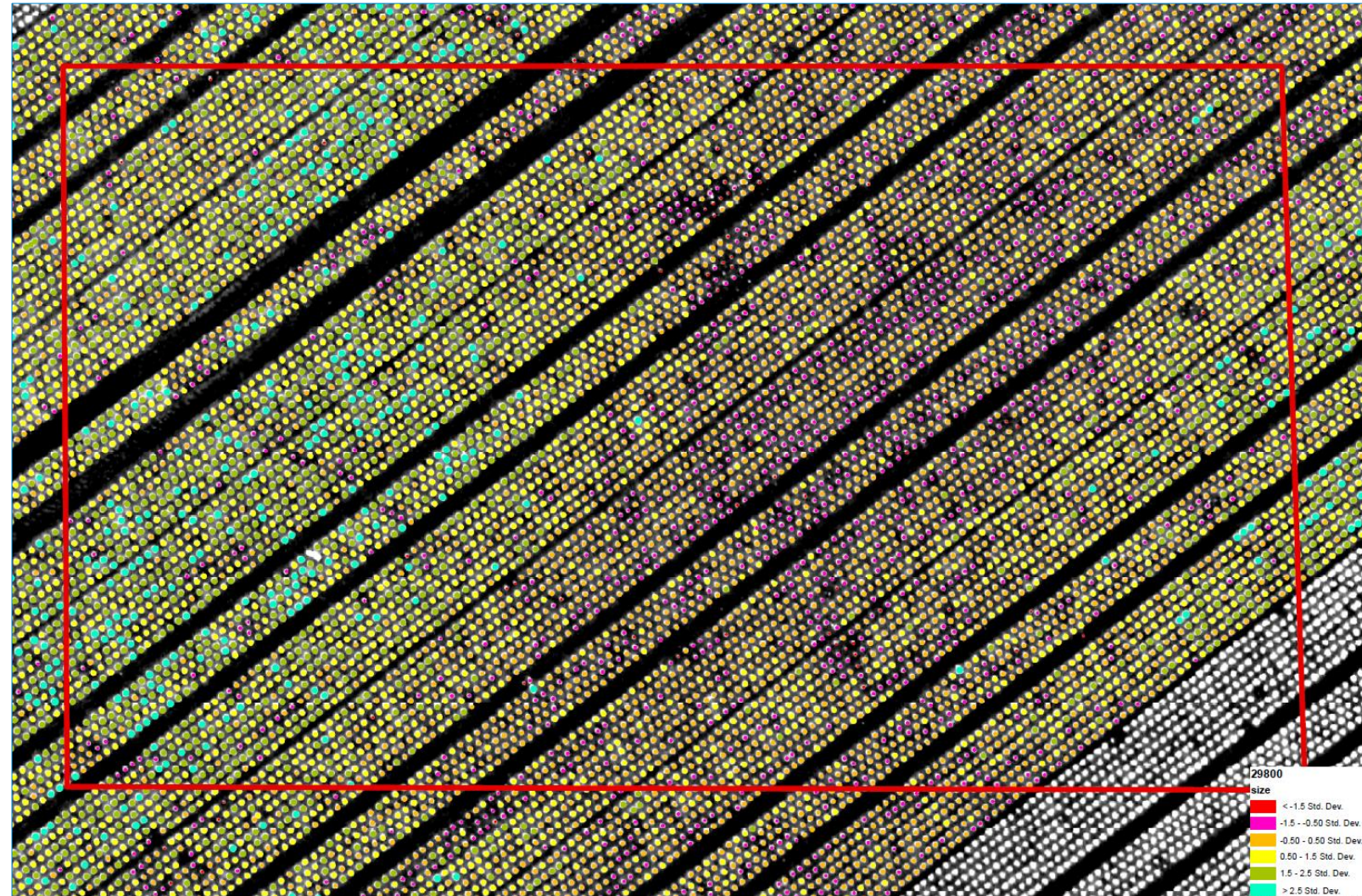
From localized surviving plants, extract **Ground Area Covered (GAC)** and assess **greenness index range**.

Correlating GAC with product specifications

- Head weights
- Head frame sizes



Iceberg population histogram with classes based on pixel sizes.



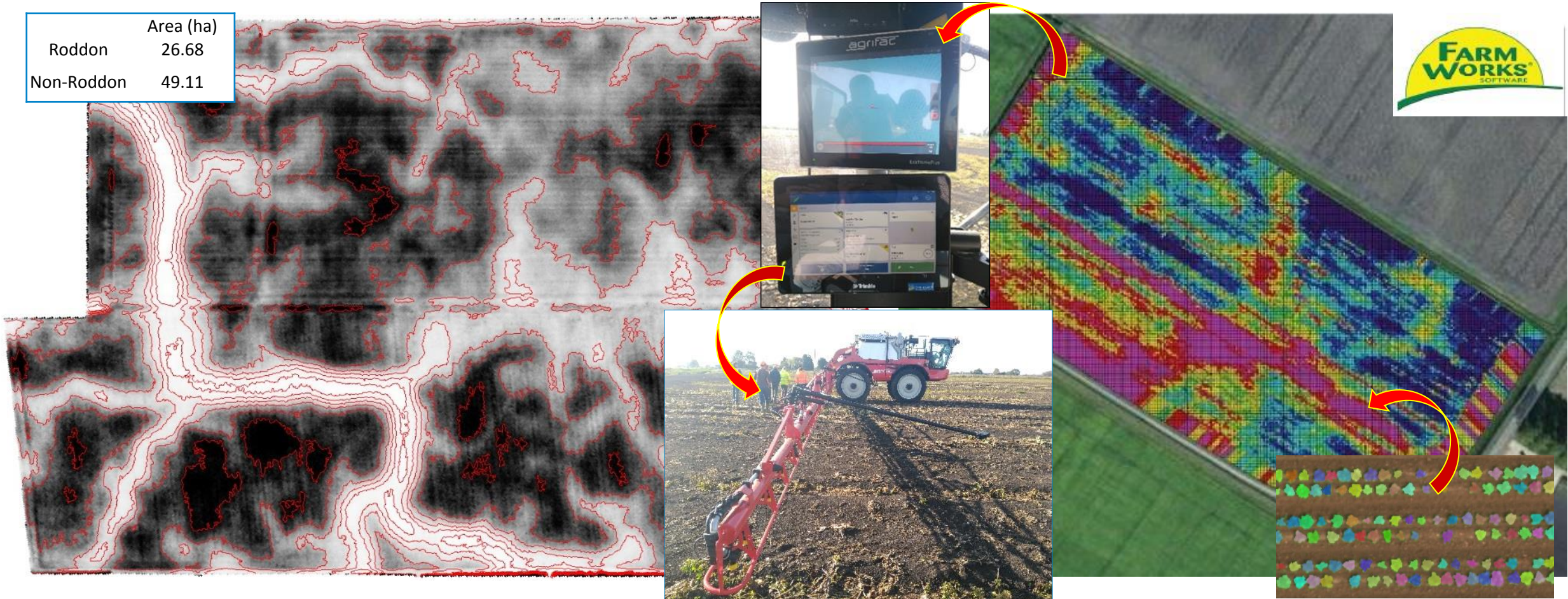
Iceberg batch classified in intervals using Standard Deviation (SD) based on pixel sizes (3cm/pixel). AOI in red.

Variable Rate Application (VRA)

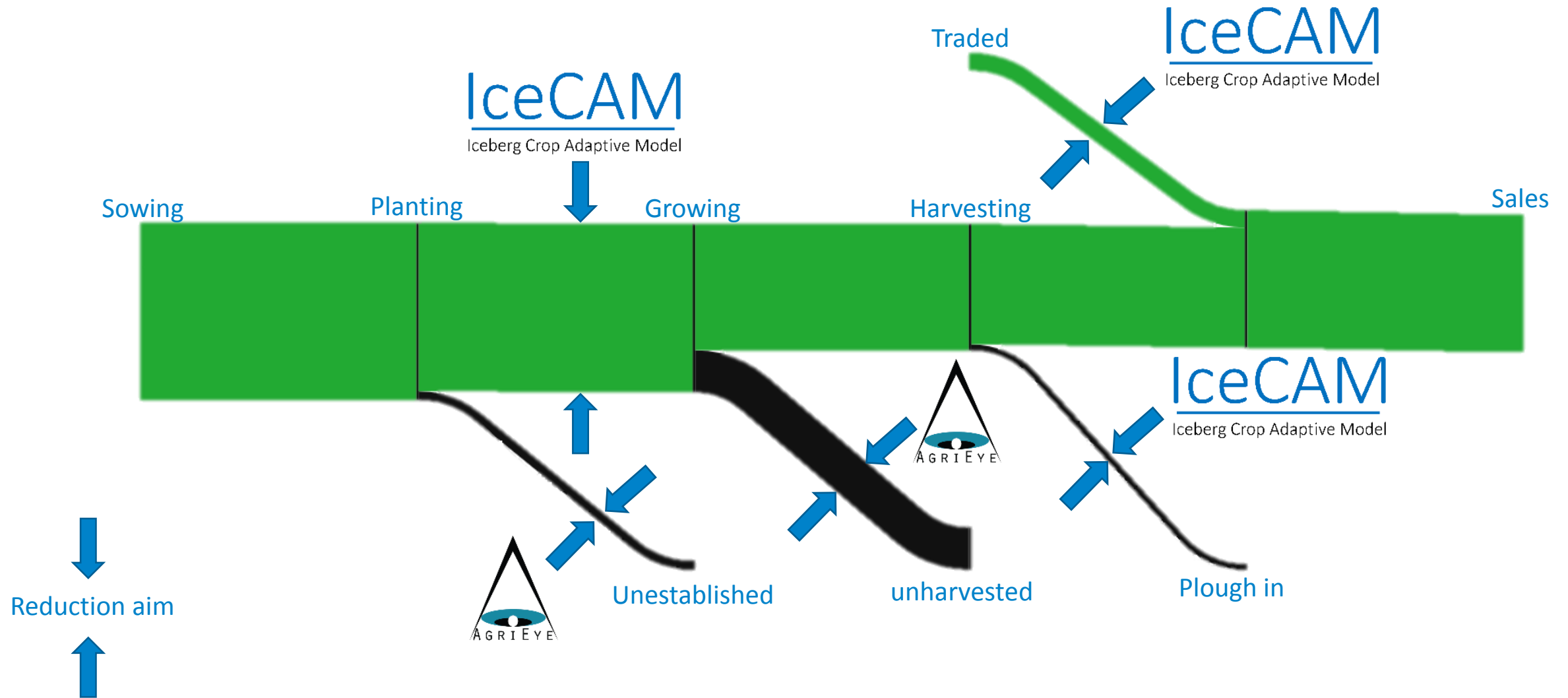
The Science of Where is the science of digital transformation

- **Treat individual plants** with fertilizer to increase yields by recovering the small plants into commercial spec
- Split fields into **Management Zones based on elevation** (roddon Vs Non-roddon)

	Area (ha)
Roddon	26.68
Non-Roddon	49.11



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