Cucumber conference 2019

CGA

CUCUMBER GROWERS' ASSOCIATION

9th October 2019
Waltham Abbey Marriott

Cucumber conference 2019

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James Broekhuizen
CGA Chair

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Ali Capper

NFU Update Including Access to Labour

Ali Capper: Chairman NFU Horticulture & Potatoes Board

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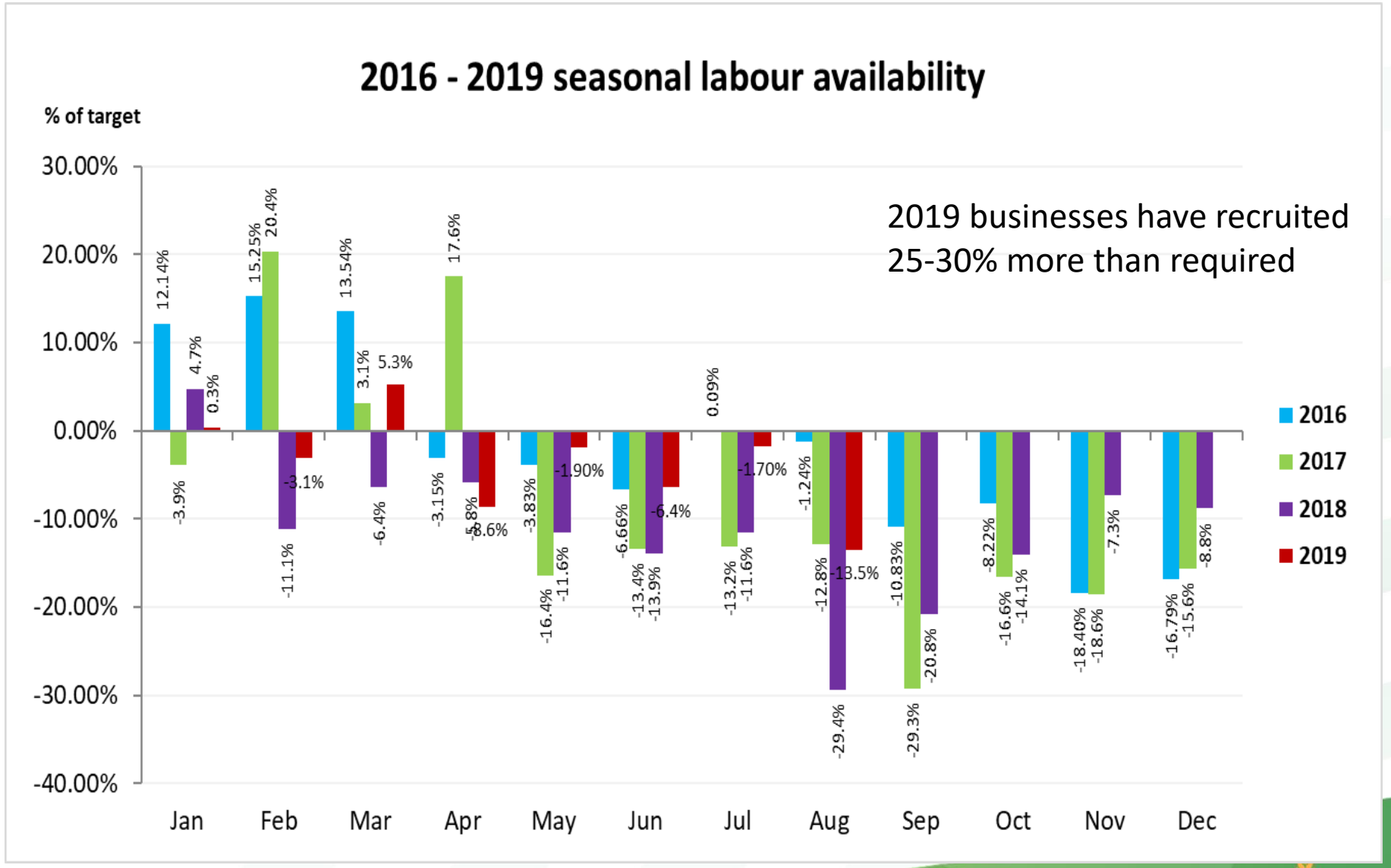

2019 businesses have recruited 25-30% more than required

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Labour Providers August 2019

August 2019		
Number of labour providers that responded	9	
Number of vacancies	7,923	
Total seasonal workers recruited	6,852	-13.5%
Returnees from the previous season	1,258	18.4%
Turnover (number of workers that did not reach the end of their contract):	**1,181**	**17.2%**
Failed to arrive	325	4.7%
Failed to meet contract length	835	12.1%
Dismissed (e.g. poor performance)	21	0.3%
Country of origin: UK	1	0.02%
EU2 nationals *(Romania and Bulgaria)*	821	12%
EU8 nationals *(Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia and Slovakia)*	4,193	61.2%
Other	1,837	26.8%

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Labour Providers Survey Jan-August 2019

Year to date	Jan-August 2019		Jan-August 2018
Number of vacancies	35,544		
Total seasonal workers recruited	33,659	-5.3%	-11.8%
Returnees from the previous season	7,027	20.9%	38.9%
Turnover (number of workers that did not reach the end of their contract):	**4,054**	**12%**	16.6%
Failed to arrive	1,717	5.1%	7.3%
Failed to meet contract length	2,181	6.5%	8.1%
Dismissed (e.g. poor performance)	156	0.5%	1.2%
Country of origin: UK	59	0.2%	0.8%
EU2 nationals *(Romania and Bulgaria)*	20,443	60.7%	61.5%
EU8 nationals *(Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia and Slovakia)*	6,966	20.7%	27.8%
Other	6,101	18.1%	10%
Unknown	110	1.6%	0%

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Labour Shortfall Including No Shows

Year	Vacancies	Total Recruited (Shortfall %)	Failed to Arrive	No Shows as % of Total Recruited	Total Actually Recruited (inc. no shows)	Actual Shortfall (inc. no shows)
2016	23,769	23,966 (+1.2%)	1,099	**4.6%**	22,867	-3.8%
2017	34,962	30,585 (-12.5%)	2,586	**8.5%**	27,999	-19.9%
2018	29,065	25,475 (-12.4%)	1,956	**7.7%**	23,519	-19.1%
Jan-Aug 2019	**35,544**	**33,659 (-5.3%)**	**1,717**	**5.1%**	**31,942**	**-10.1%**
Jan-Aug 2018	**24,118**	**21,271 (-11.8%)**	**1,562**	**7.3%**	**19,709**	**-18.3%**

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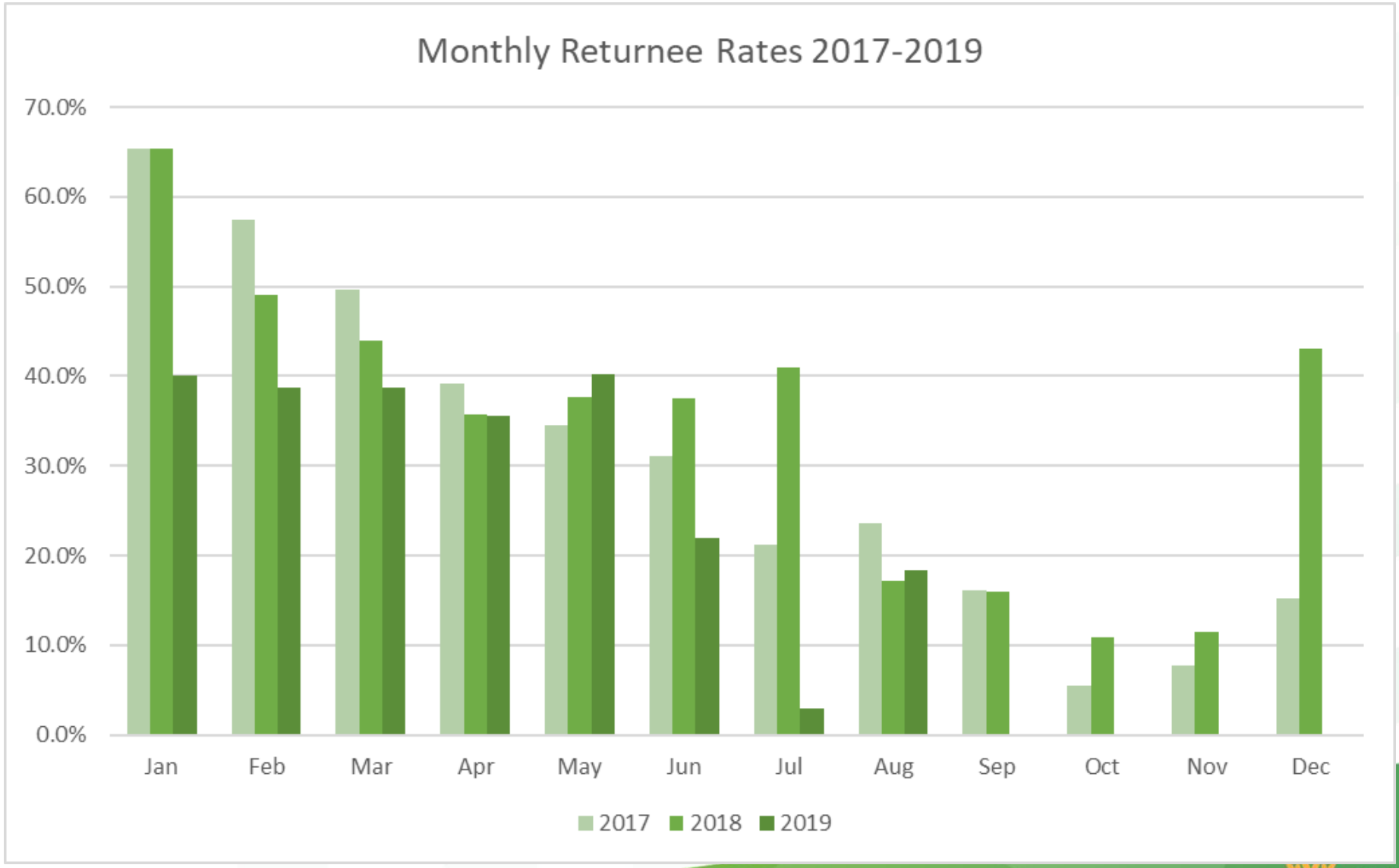

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What is the current political situation?

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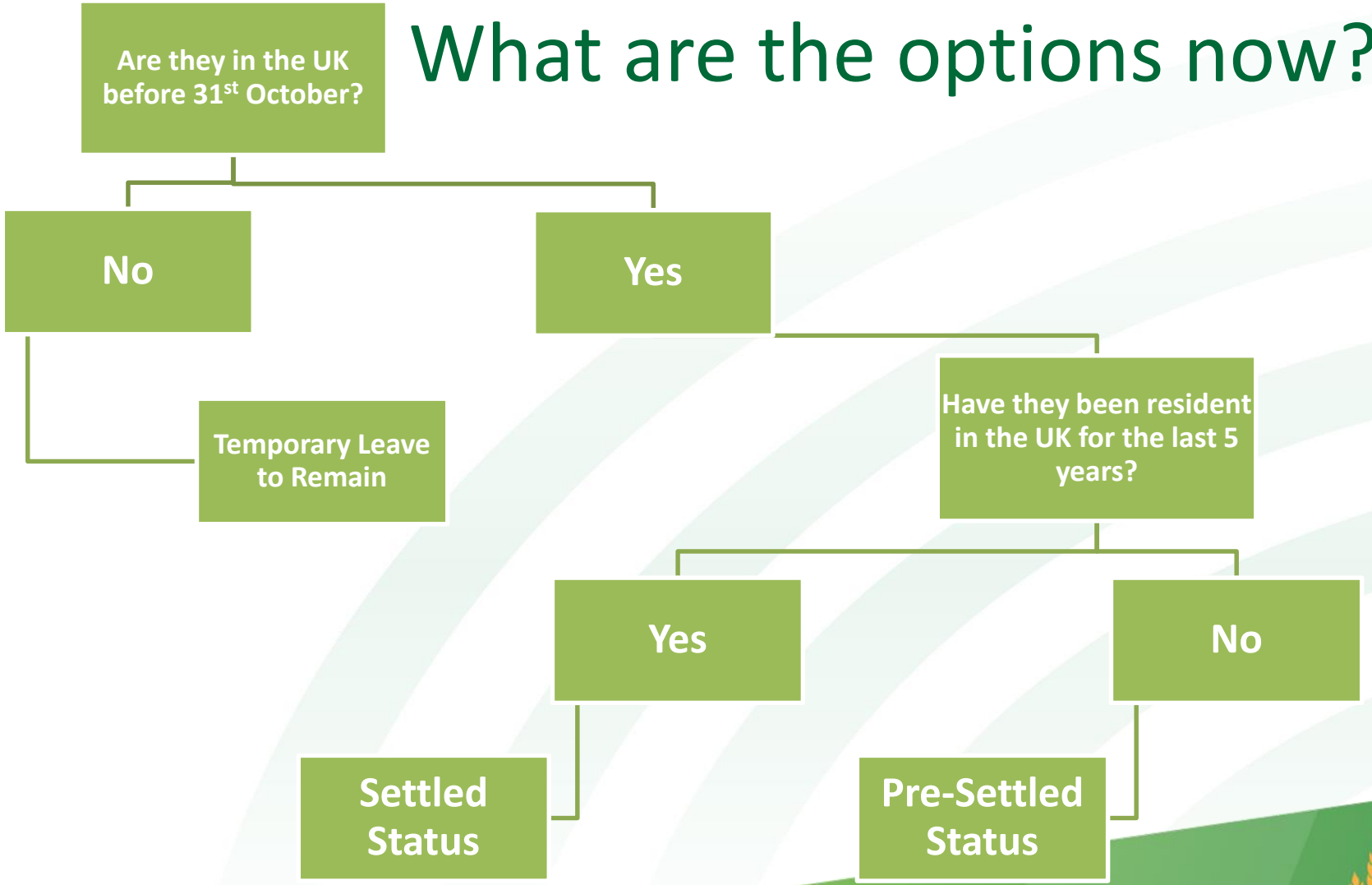
EU Nationals in the UK Pre-Brexit	**Settled Status**	**Pre-Settled Status**
	• Must have lived in the UK continuously (6 out of 12 months) for the last 5 years • Grants ability to stay in the UK permanently BUT status lost if you are out of the UK for more than 5 continuous years • Applications open until 31st Dec 2020 in No Deal or 31st June 2021 in Deal • EU nationals do not need to be in the UK when they apply • Can apply using app (Android only but Apple version expected in October) and biometric passport/ID card or by posting relevant documents and using online application system	• Lived in the UK at some point in previous 6 months (no minimum time limit but proof of residency required) • Allows ability to stay in the UK for a further 5 years and can then apply for settled status. • Pre-settled status lost if out of the country for more than 2 years • Applications open until 31st Dec 2020 in No Deal or 31st June 2021 in Deal • EU nationals do not need to be in the UK when they apply • Can apply using app (Android only but Apple version expected in October) and biometric passport/ID card or by posting relevant documents and using online application system
EU Nationals arriving Post-Brexit	**Temporary Leave to Remain**	**Future Immigration Policy?**
	• EU Nationals can still arrive as they do now using passports or ID cards (although these will be phased out in 2020) but with tougher criminality checks, customs declarations and no right to remain • Temporary Leave to Remain allows EU nationals to stay for 36 months from application date • After this 36 month period EU national would have to apply under future immigration policy. If unsuccessful they would have to leave • Applications open until 31st Dec 2020	• Immigration White Paper proposals have gone, and new proposals now being developed • The Migration Advisory Committee has been commissioned to re-examine the salary thresholds and looks at how a points based system would work in the UK. • The recent Call for Evidence includes scope to examine roles with a high public value but not necessarily high wages, other non-cash benefits which may come with a role, and willingness to work in areas with a shortage of workers.

What are the options now?



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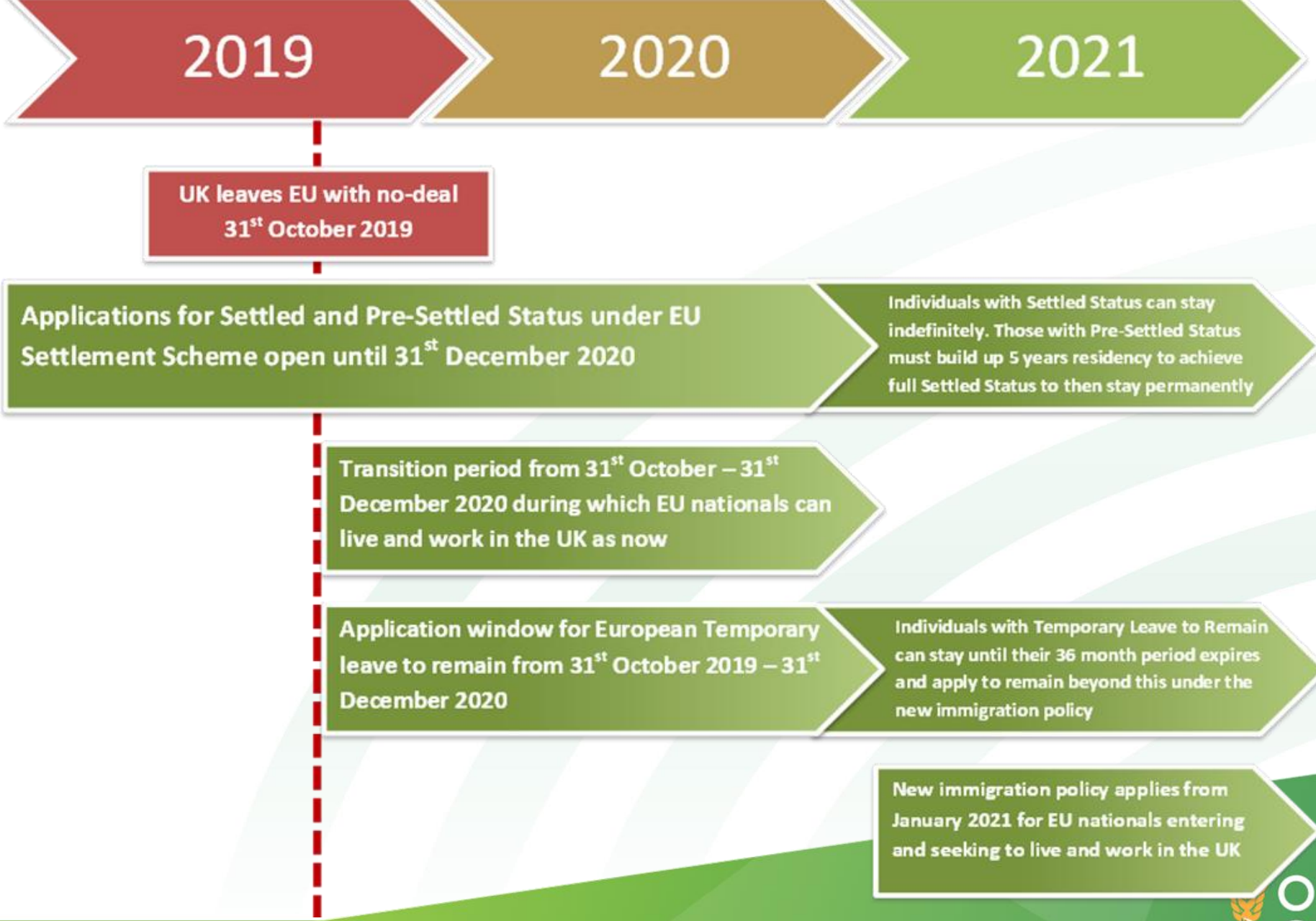

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What is the current recruitment situation?

- Crisis emerging, e.g:
  - Current shortages escalating: 50-60% workforce leaving early; before 31st October; Bulgarian unemployment benefit; currency; confusion
  - Businesses restructuring, closing, exporting production
  - Thousands of tonnes of unpicked crop; e.g. 60T, 180T, 87,000 punnets, 25-50% of crop unpicked in last month
  - Labour provider 1: 85% reduction in 2020 commitment; real fear that workers will not come

NFU Asks

NFU asks

1. Immediate expansion of the Seasonal Workers Pilot scheme to enable recruitment for the autumn/Christmas period, and reach a full scheme of 70,000 workers as soon as practically possible.

- This must be for both EU and non-EU workers.
- It must include the ornamentals sector.
- Open to Labour Providers and direct recruiters i.e. farm businesses.

2. In any new points-based immigration policy and the shortage occupation list farming must be included in order to be able to fill permanent and seasonal roles.

3. There must be clear communication from government on immigration rights, translated into multiple languages, to ensure recruitment can continue

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Joe Martin

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AMBER

Joe Martin

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Application & **M**anagement of **B**iopesticides for **E**fficacy and **R**eliability

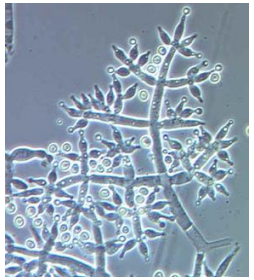
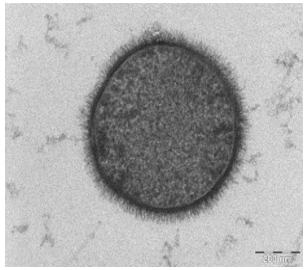
The aim of this work is to have UK growers adopting new practices that have been demonstrated to improve the performance of individual biopesticide products within commercial integrated pest and disease management (IPDM) programmes

- 5 year program conceived & funded by UK growers
- protected edible & ornamental crops.
- Develop management practices to improve biopesticide performance, grower confidence & uptake.
- Consortium (WCC, RSK-ADAS, Silsoe Spray Application Unit, Roma Gwyn, Rob Jacobson)
- Project Lead – Dave Chandler
- Industry representatives

Industry benefits

Help to get the best out of the biopesticide tool kit



Help growers to improve spray application, with recommendations on water volume, best way to deliver required dose

Improve information on timing and frequency of microbials

Develop some core principles that growers can use to optimise the use of biopesticides in IPM

Biopesticide ‘benchmarking’

- Observed how growers used microbial biopesticides as part of IPM, following product guidelines.
  - Aphids, pepper.
  - WFT, chrysanthemum.
  - Whitefly, poinsettia.
  - Powdery mildew, cucumber.
  - Botrytis, cyclamen.
  - Root rots, Choisya & Dianthus.
- Identify issues that were likely to affect biopesticide performance.

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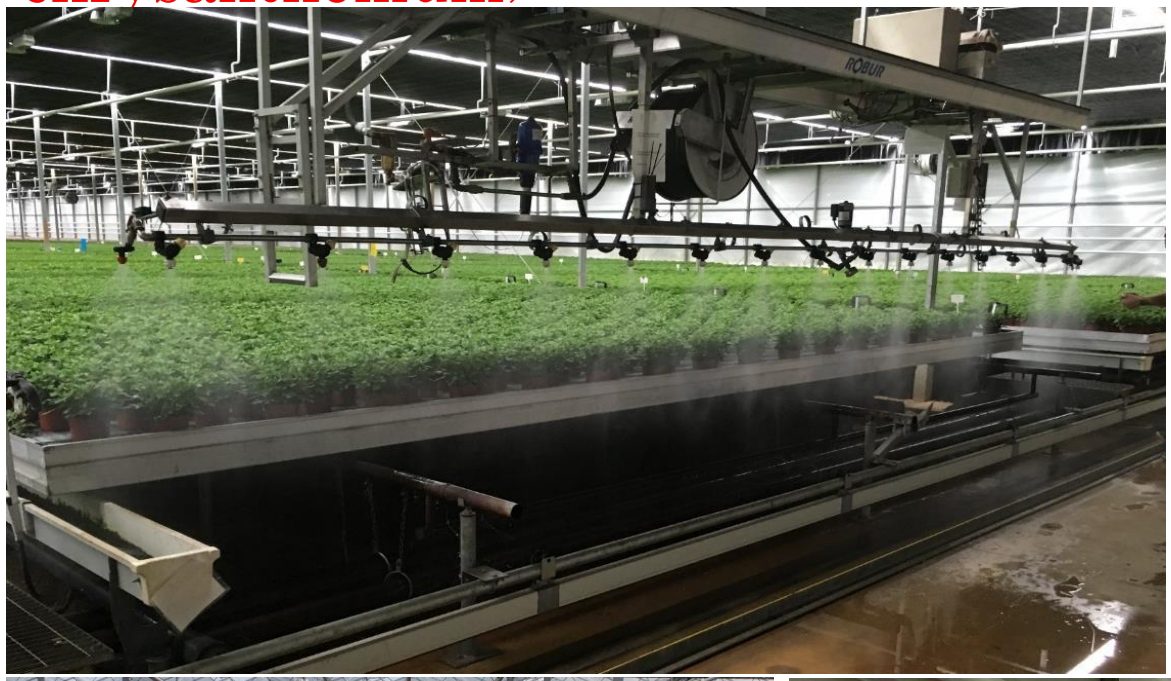
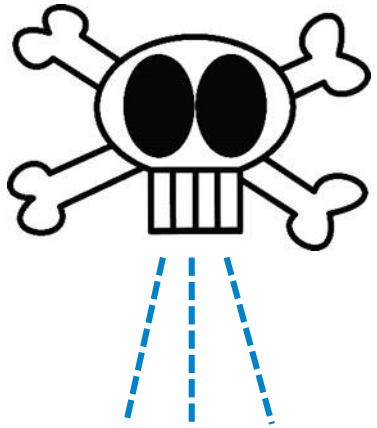
Beauveria; western flower thrips; chrysanthemum;



Effective application

(contact acting)

Right dose



Right place & time

Avoid waste

Biology of pest, disease & M.o.A. biopesticide

Environment; other IPM tools

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Working in 4 areas

Spray application: relationship between water volume and % of spray retained on crop.

Biofungicide performance: new knowledge on biofungicide persistence to improve timing of application.

Bioinsecticide performance: new knowledge on how pest population growth rates influence biopesticide application strategy.

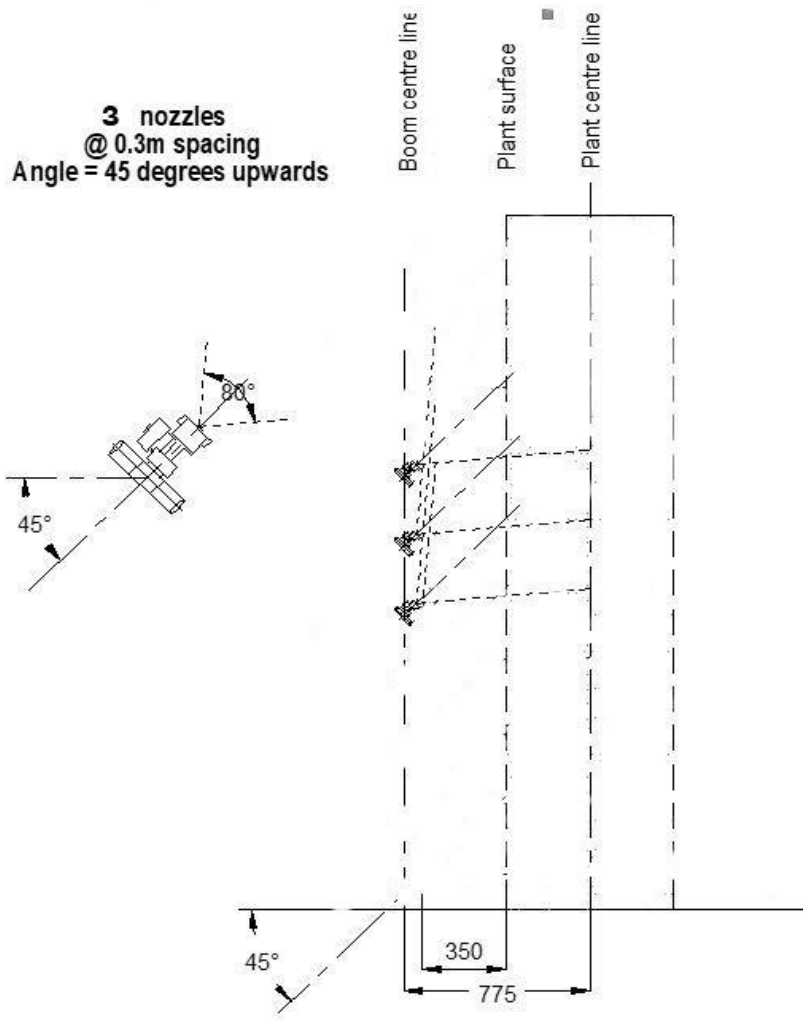
Knowledge exchange: explain the science, get core message out.

1) Improving spray application (Silsoe)

- How does water volume affect % of spray retained on leaves?
- Most efficient way to deliver required dose to target.

Application to a vertical crop

- Small area of crop available – only space for two treatments
- Some bespoke spraying kit needed – based on existing available equipment at Warwick…
- …taking account of previous HDC study

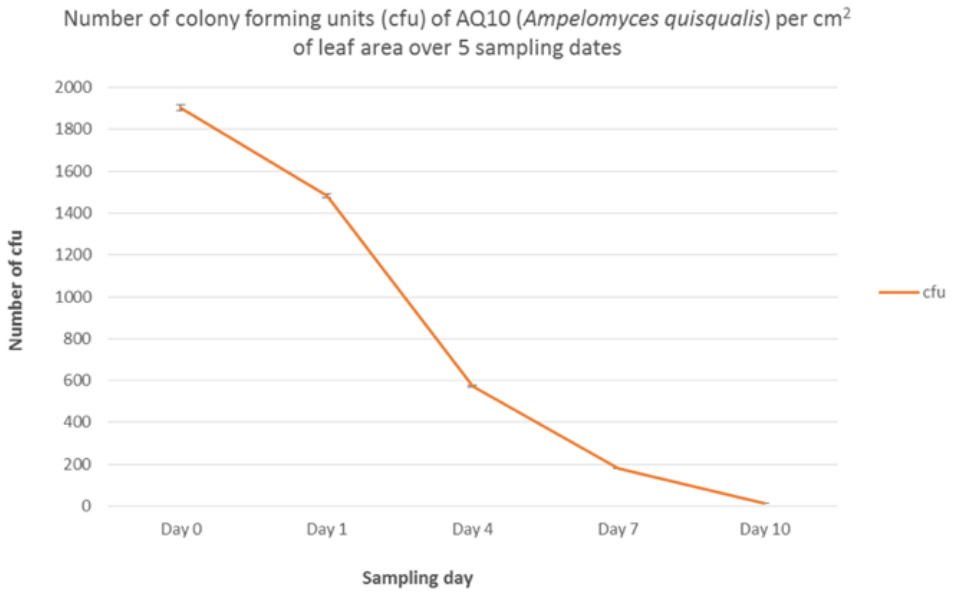


Application to a vertical crop

- Relationship between quantity deposited and volume applied appears to be less clear-cut for vertical crops than for horizontal ones
  - Is this due to much greater variability in the data?
- Very high volumes applied to the crop are likely to be less efficient
- Normalised data suggests no significant difference over a wide range of volumes – maybe up to around 1,200 L/ha (applied to the crop)

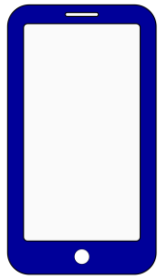
(2) Informed timing of biofungicide application (ADAS)

- Understand the mode of action of the biopesticide ...
- …as it relates to the biology of the disease.



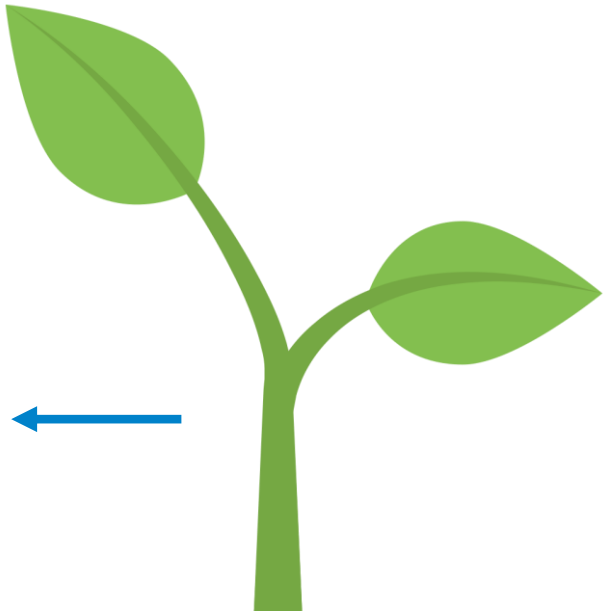
- Example: AQ10 - a parasite of powdery mildew.
- It does not persist long in the absence of its host.
- When is the best time to apply it? **The 'Goldilocks' zone**.
- How do you make this happen?

Alert on smart phone: high risk conditions for powdery mildew

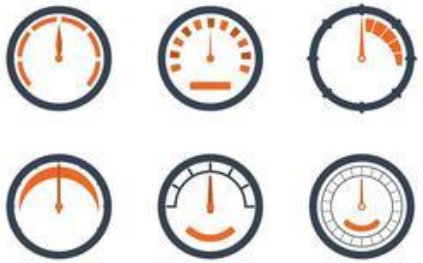


Apply AQ10

Understanding biology of AQ10 – tells you best timing for application

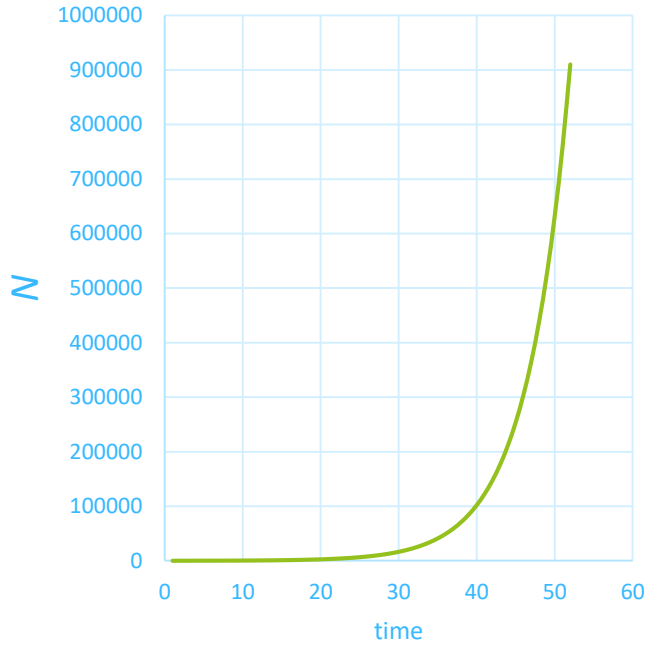


Environmental sensors: Humidity & temp.



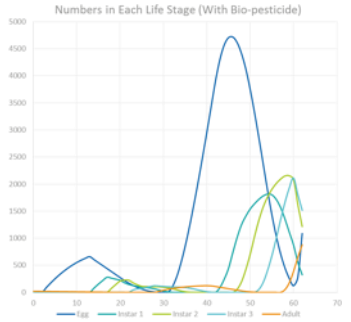
(3) Pest growth rate & biopesticide activity.

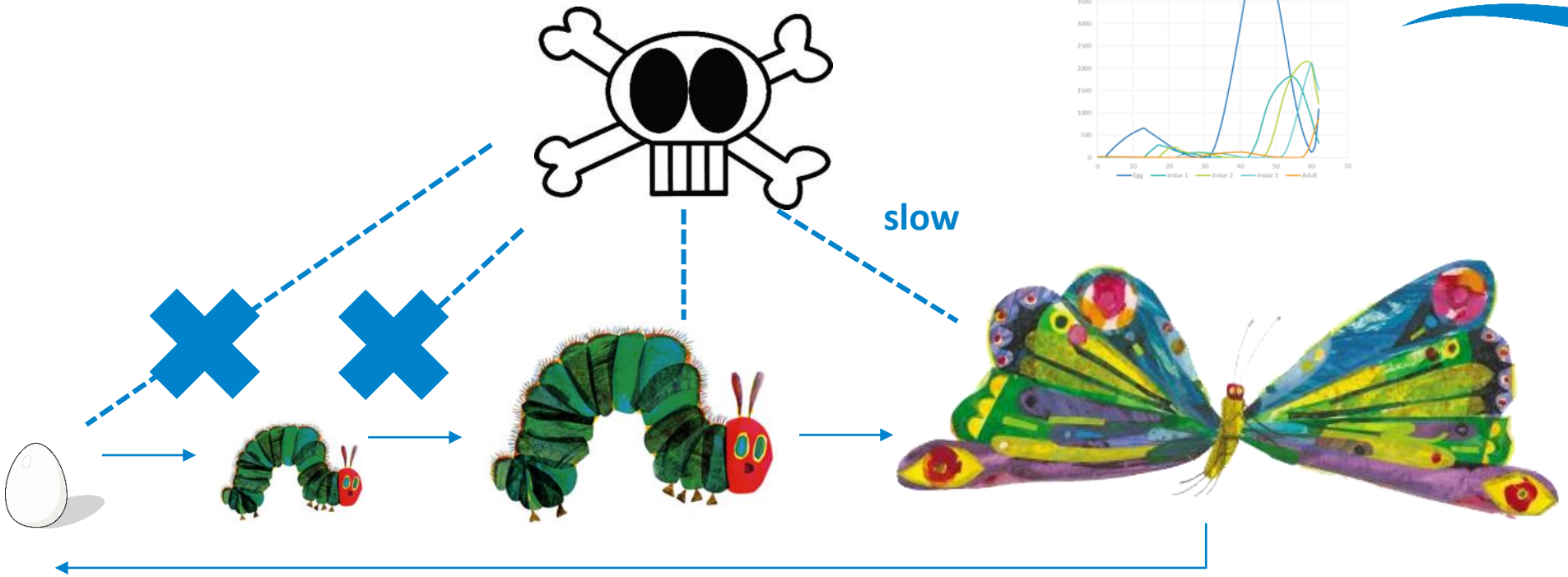
- Pests show exponential growth.
- BP efficacy affected by speed of kill, pest growth rate & population size.



- How does pest growth rate, speed of kill, crop type etc. determine the best application strategy?
- The Goldilocks zone again.

Biopesticides & pest population growth





- BP- pest ‘race’: kill pest before it reproduces.
  - Crop type, temperature, life stage susceptibility.
  - Effects of starting population size.
- Use models to inform best biopesticide strategy for particular pests & crops (when to apply, what product type.)

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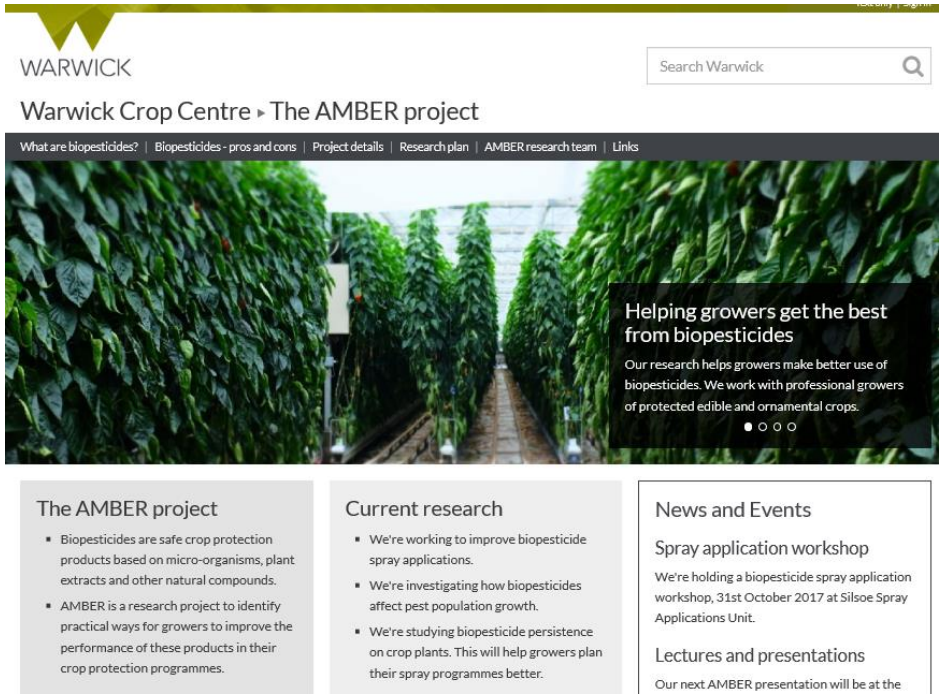
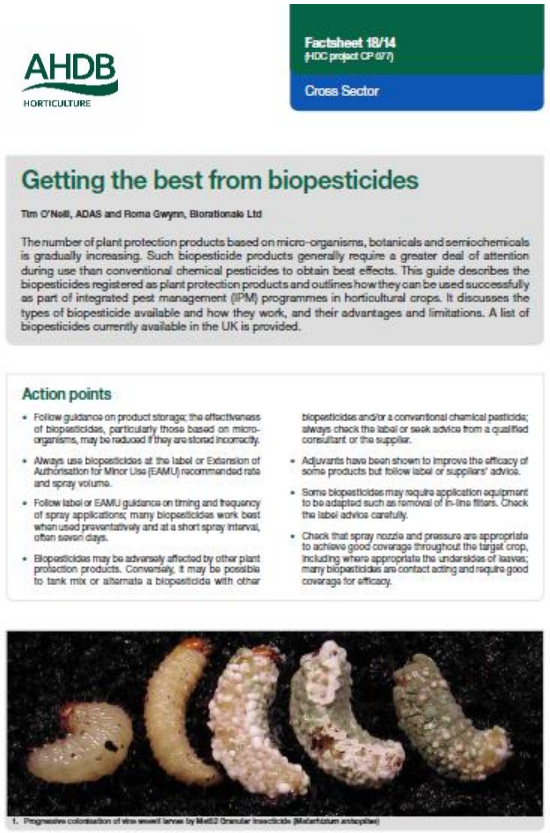
Supporting IPM
Getting better performance from Biopesticides





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- Contact us
- Joe.martin@ahdb.org.uk

Thanks

Questions?

https://warwick.ac.uk/fac/sci/lifesci/wcc/research/biopesticides/amberproject/

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Joe Martin and Kirsty Wright

Sustainable plant protection products for use in horticulture

SCEPTREplus

Joe Martin

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To deliver applied research on high priority disease, pest and weed problems in fresh produce and ornamental crops in order to support approval of products and devise and develop IPM programmes

- Consortium approach
- Financial and in kind contributions from Agchem / Product Manufacturers / Producers
- Priorities and approach in consultation with Industry Steering Groups with representatives from different sectors
- Embedded Knowledge Exchange
- Flexible approach for targets and contractors

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1.65m AHDB investment

2017 2021 4 year programme

14
new trials confirmed for 2019

4 weed trials different crop targets

4 pest trials

6 disease trials

29
Crop protection companies have contributed financially or in-kind

2
On-label APPROVAL OBTAINED

41
trials
Undertaken in years one and two

9
EAMUs secured Jan 2019
& further applications submitted to CRD

Over 165
products being evaluated so far

137 conventional products

32
Biopesticides
Botanicals
Biologicals
Basic Substances

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SCEPTREPLUS Interactive Trial Map

Diseases | Pests | Weeds

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Disease control trials

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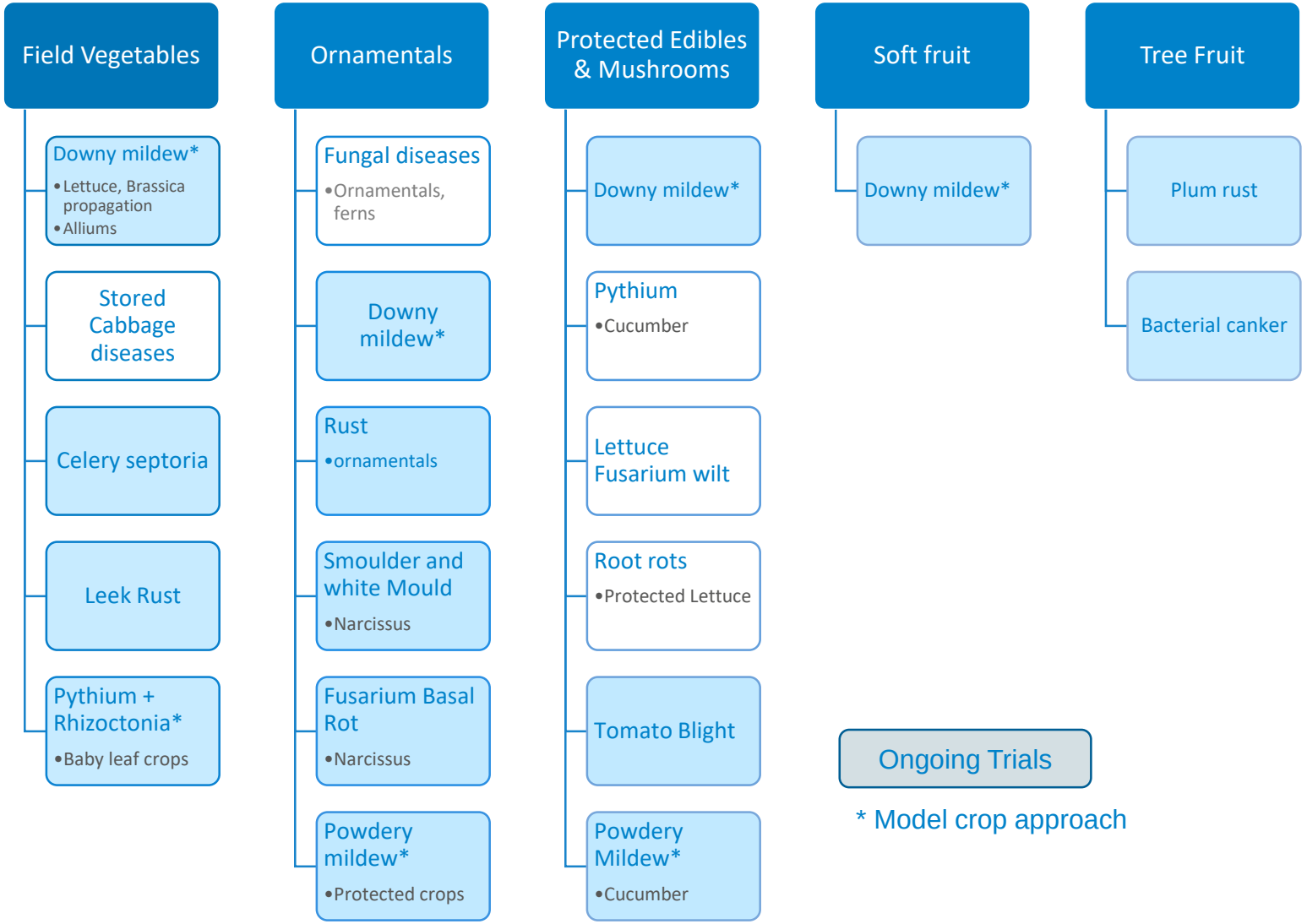

Ongoing Trials

* Model crop approach

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Pest control trials

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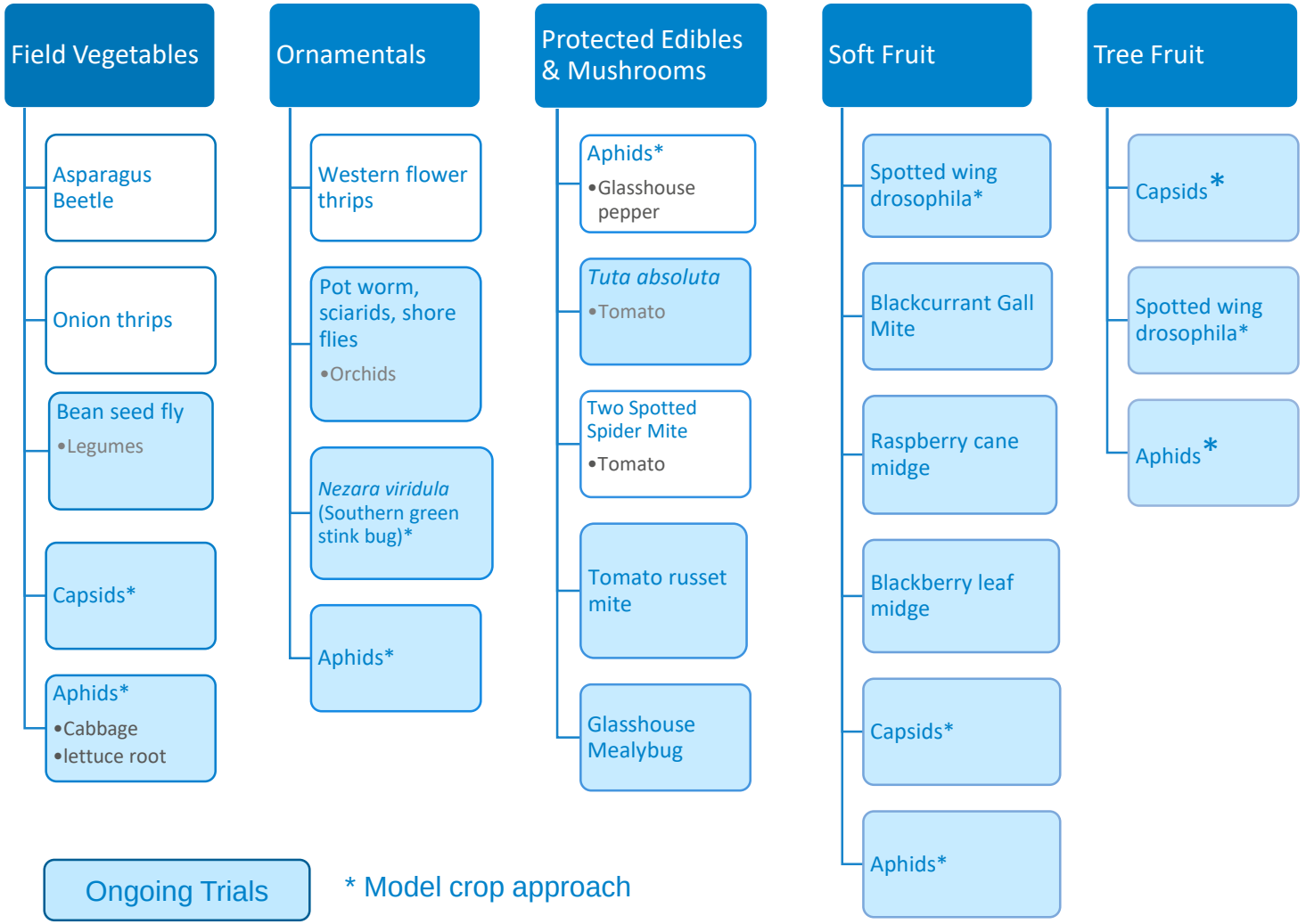

Ongoing Trials

* Model crop approach

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Weed control trials

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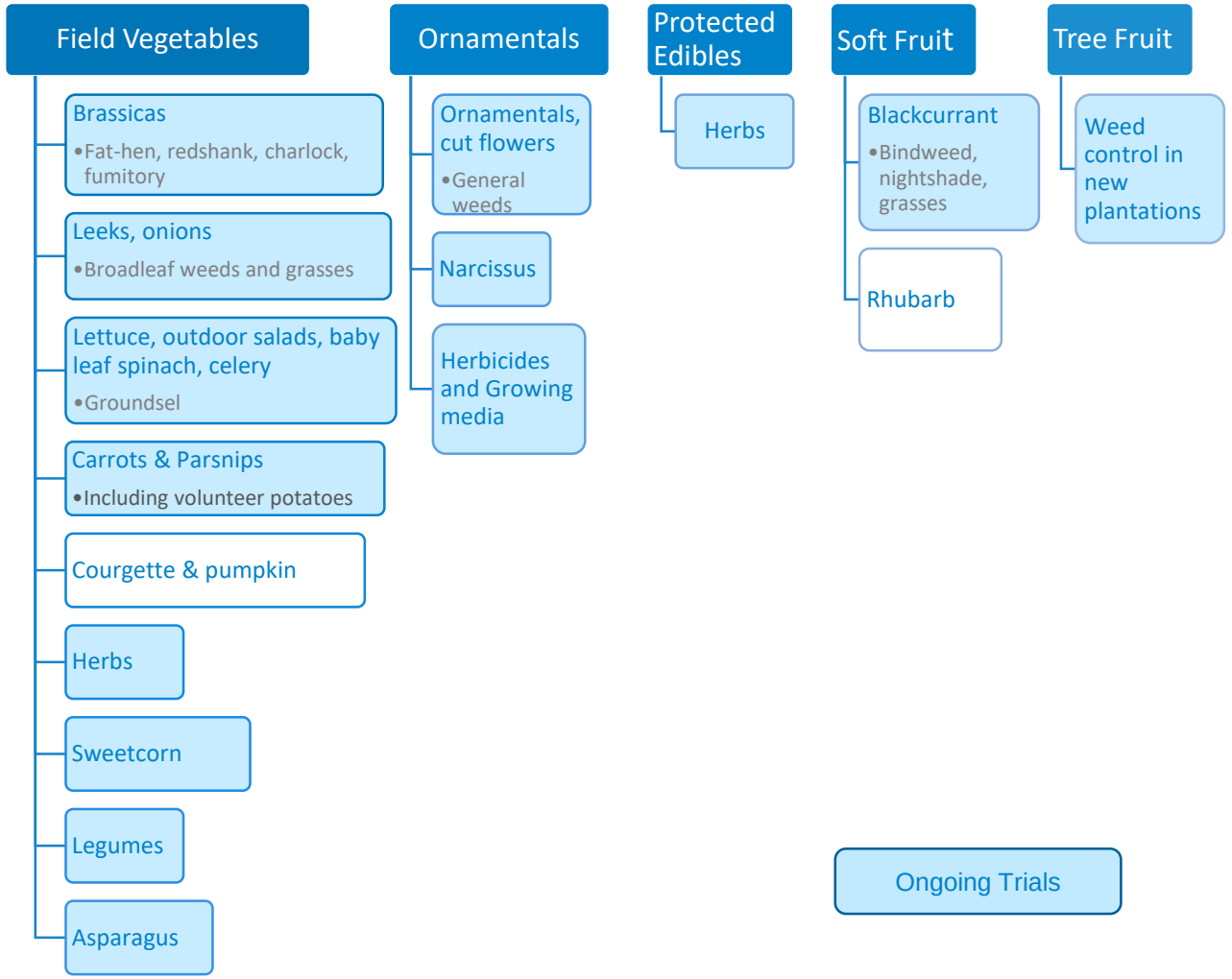

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Crop Protection – EAMUs and Other Authorisations

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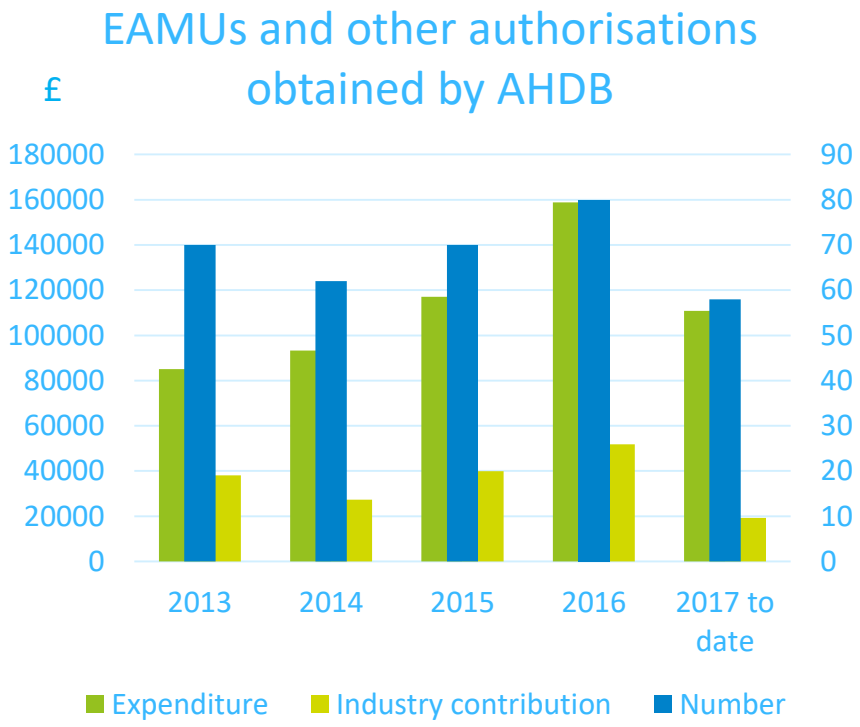

- The ‘bedrock’ of our work for the industry
- Total of 340 applications over last 4 years
- Total spend £565,080
- Joint funding from Crop Protection companies of £176,277
- Residue trials expenditure £347,400

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EAMUs linked with SCEPTREplus

Product	Crop
Devrinol	Herbs, spinach
Dual Gold	Sweetcorn
Emerger	Garlic, onion, shallot, caraway, dill, parsley
Flexidor	Carrot, horseradish, parsnip
Gamit	Carrots
Hurricane	Carrots
Metobromuron	Ornamental bulbs
Venzar 500SC	Outdoor leafy veg + fresh herbs
Wing P	Courgette, squash, pumpkin, sweetcorn

Product	Crop
Prolectus	Ornamental plant production
Serenade ASO	Cabbage
Flipper	Protected ornamentals
Mainman	Pepper and chilli
Teppeki	Cabbage

Knowledge Exchange - Trial events, Open Days

Carrots

Alliums

Sweetcorn

Weed events - 2019 delivered

- July – Carrots
- July - Alliums
- June – Sweetcorn
- May - Narcissus

Weed events - planned

- August - Celery
- September – Herbs BHTA
- October – Brassicas Elsoms
- Spring 2020 - Asparagus

Presentations to grower associations

- October – salads BLSA
- Blackcurrant grower group

Narcissus

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AHDB Communication channels

SCEPTREPLUS

The Grower

Sector Review Magazines

Email newsletters

Twitter #SCEPTREplus

Blogs and Presentations

Herbs

Press Coverage

WFT

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Follow progress

Reports Yr 1 and 2

horticulture.ahdb.org.uk/sceptreplus

- Contact us
- Joe.martin@ahdb.org.uk

Thanks

Questions?

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SCEPTREplus Project Update: SP47 Powdery Mildew Control in Protected Crops (Cucumber and Ornamentals)

Kirsty Wright, Stockbridge Technology Centre

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SP47: Control of powdery mildew in protected crops (cucumber & ornamentals)

- Aim: Identify new products for control of powdery mildew in cucumber and in ornamentals (with a focus on container-grown plants) using a model crop approach.
- Our proposal suggested that cucumber and ornamentals should be approached individually as the needs are quite different:
  - Cucumber growers have a higher tolerance for PM in their crops as the disease is not visible on the product.
  - Crop value is higher in ornamentals and so the cost of inputs is less critical.
  - Ornamental growers require a whole-season approach whereas the cucumber growers are looking for a product with good knock-down effect to use if/when PM levels get too high.
- SP47 therefore comprises two trials- one on cucumber and one on ornamentals

Cucumber trial- crop establishment

- Semi-tolerant variety (Lucania) used to enable crop establishment and prevent early infection
- Crop planted in early August to coincide with optimal conditions for disease in late summer/autumn.
- 4 plants per 1.2m slab to ensure plenty of leaf area for assessments.
- Initial application of Takumi (cyflufenamid) to aid establishment of crop before infection/inoculation.

Cucumber trial- treatment information

- Untreated control (water only)
- Standard product : Nimrod (bupirimate) – approval was due to expire but has recently been extended
- 4 novel conventional products identified but only 3 subsequently used in the trial
- 2 novel biopesticides (plant extract products in this case)
- One application of conventional products and two of biopesticides only- trying to identify a knock-down product
- Scope for some of these products to be of interest in ornamentals and other crops.

Cucumber trial- treatments

Trt	Product	Approval status	Number of Applications
1	Untreated (water only)		1
2	Nimrod (Bupirimate)	On-label until 2026	1
3	Novel conventional	On Annex 1	1
4	Untreated (no water)		
5	Novel conventional	On-label for other crops and suitable for an EAMU application	1
6	Novel conventional	Experimental, not yet on Annex 1	1
7	Novel biopesticide	On Annex 1 but no UK approvals yet	2
8	Novel biopesticide	Approvals in Europe on other crops	2

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Inoculation and Assessments

- Infected material was collected from commercial crops and from an existing STC crop and used to infest the trial.
- Two weeks after inoculation disease levels were assessed and treatments applied.
- Assessments were made on a 0-5 scale, on tagged top, middle and bottom leaves.
- Frequent assessments were carried out to track both knock-down effect and protectant activity of products.

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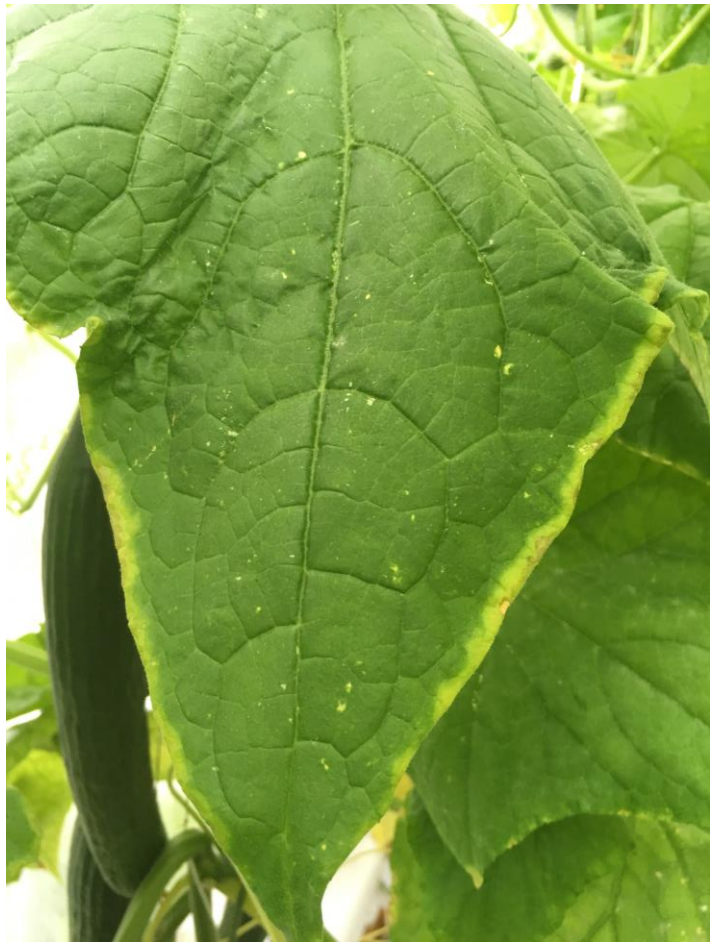
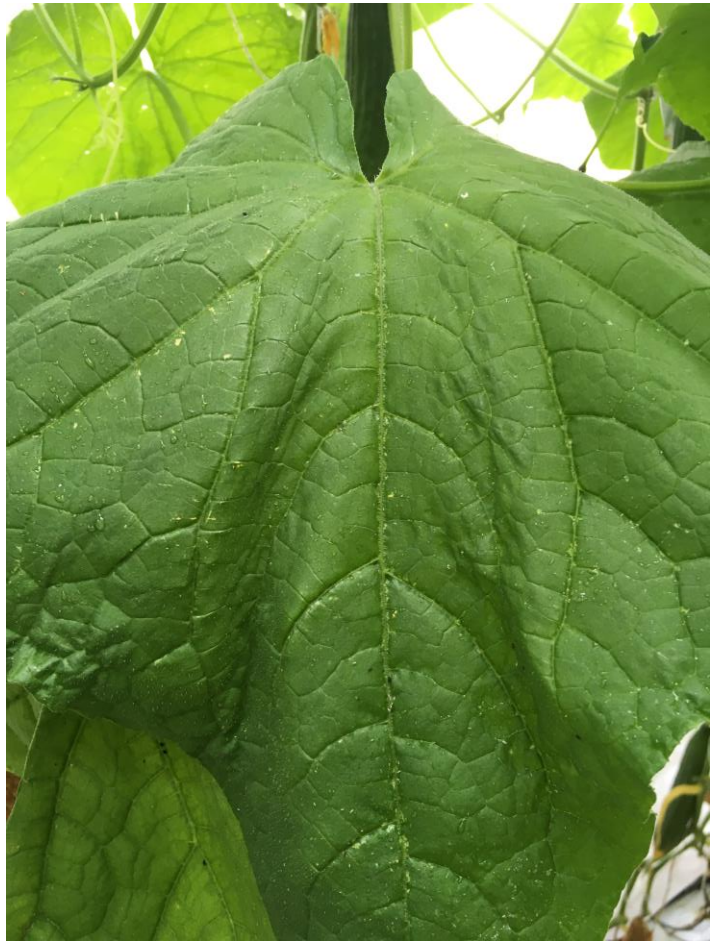


T5: Slight phytotoxicity at leaf edges

T3: Evidence of the effect of not hitting the whole leaf surface when spraying

T1: Untreated

SCEPTREPLUS



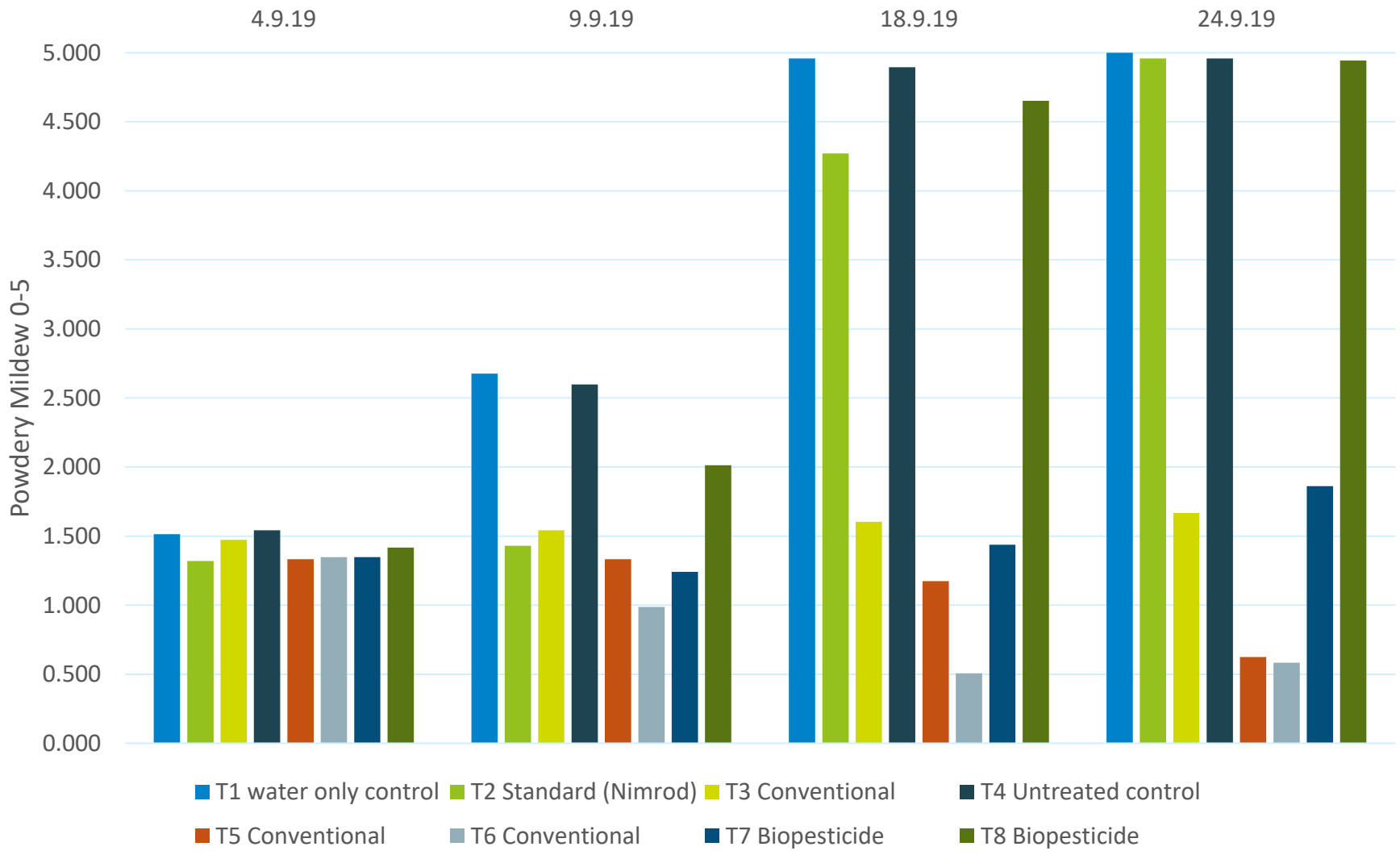
Effective treatment

HORTICULTURE

AHDB
AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

Cucumber trial- initial results

SCEPTREPLUS

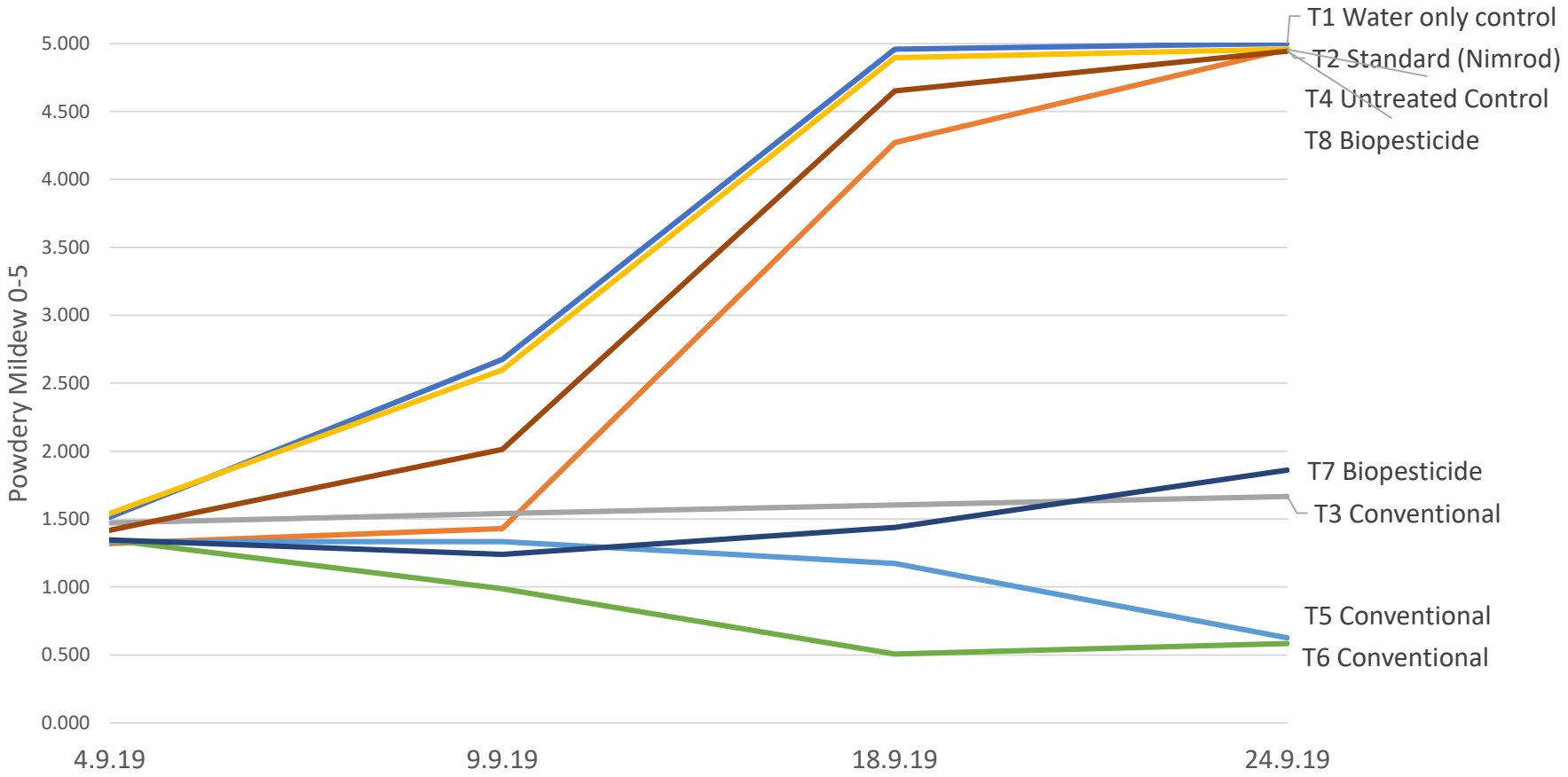


HORTICULTURE

AHDB
AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

Cucumber trial- initial results

SCEPTREPLUS



HORTICULTURE

AHDB
AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

Cucumber trial- effective treatments

Trt	Product	Approval status	Number of Applications
1	Untreated (water only)		1
2	Nimrod (Bupirimate)	On-label until 2026	1
3	Novel conventional	On Annex 1	1
4	Untreated (no water)		
5	Novel conventional	On-label for other crops and suitable for an EAMU application	1
6	Novel conventional	Experimental, not yet on Annex 1	1
7	Novel biopesticide	On Annex 1 but no UK approvals yet	2
8	Novel biopesticide	Approvals in Europe on other crops	2

Acknowledgements:

- AHDB Horticulture for funding
- Derek Hargreaves for trial design input and inoculum
- STC colleagues

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Cucumber conference 2019

CGA

CUCUMBER GROWERS' ASSOCIATION

Klaas van Egmond

Delphy

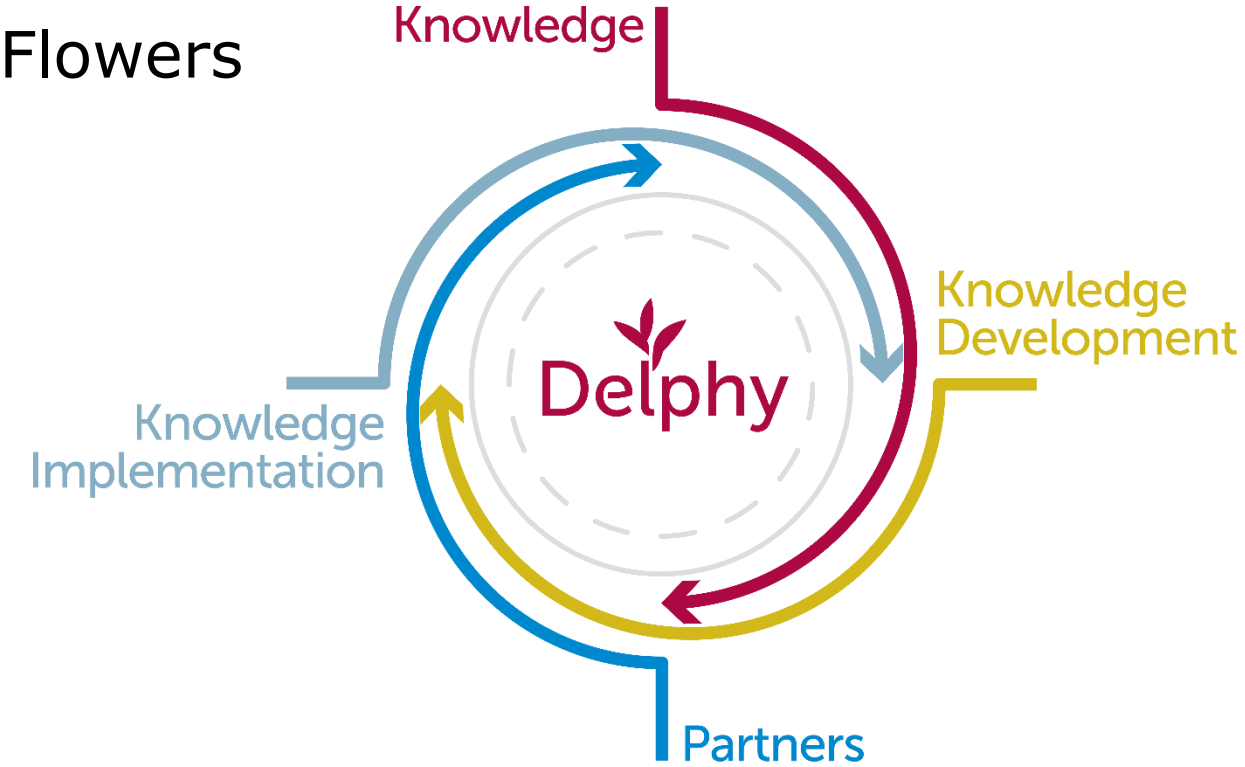
Data-driven growing

Klaas van Egmond

Worldwide Expertise for Food & Flowers

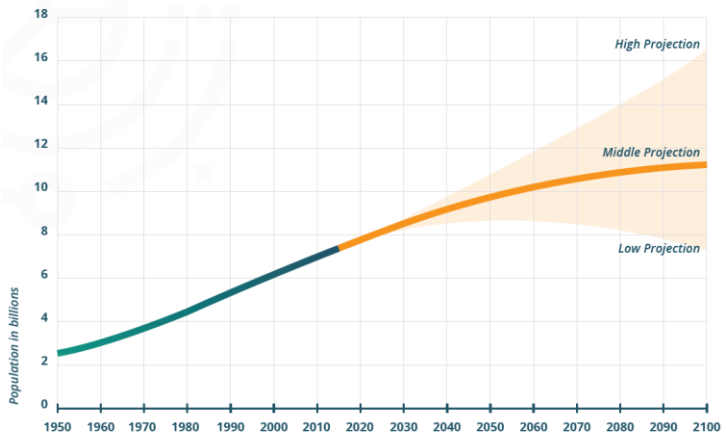
Delphy: the core

- Worldwide Expertise for Food & Flowers
- Knowledge Development
- Knowledge Implementation
- Independent Experts



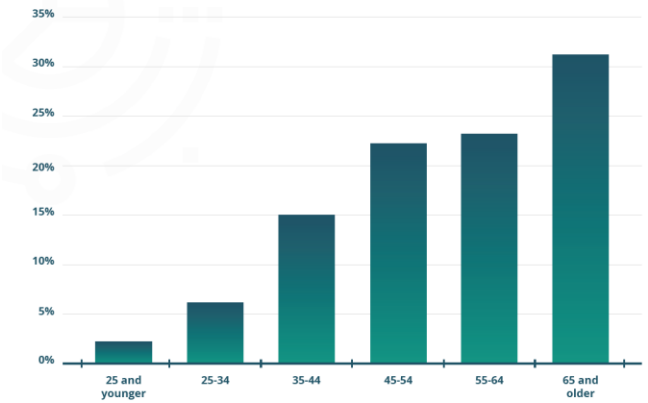
Greenhouse sector is growing

PROJECTED WORLD POPULATION



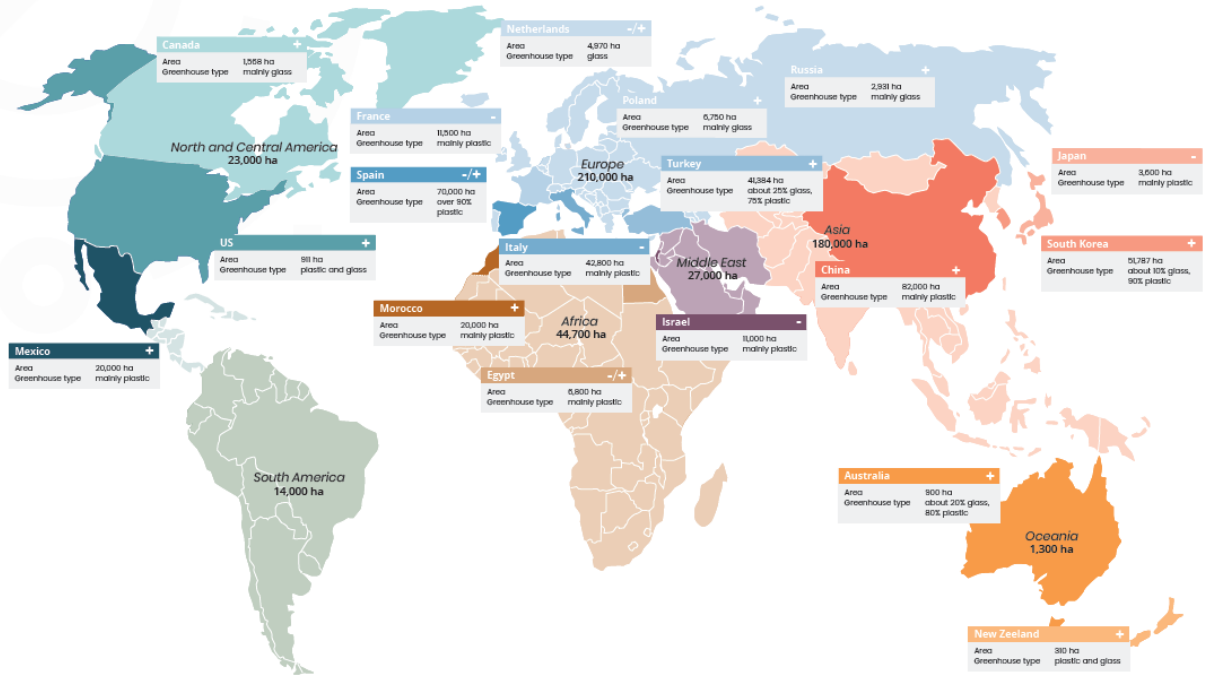
Source: United Nations, 'World Population Prospects: 2015 Revision'

AGE DISTRIBUTION EU GROWERS



Source: Eurostat, 'Agriculture statistics - family farming in the EU'

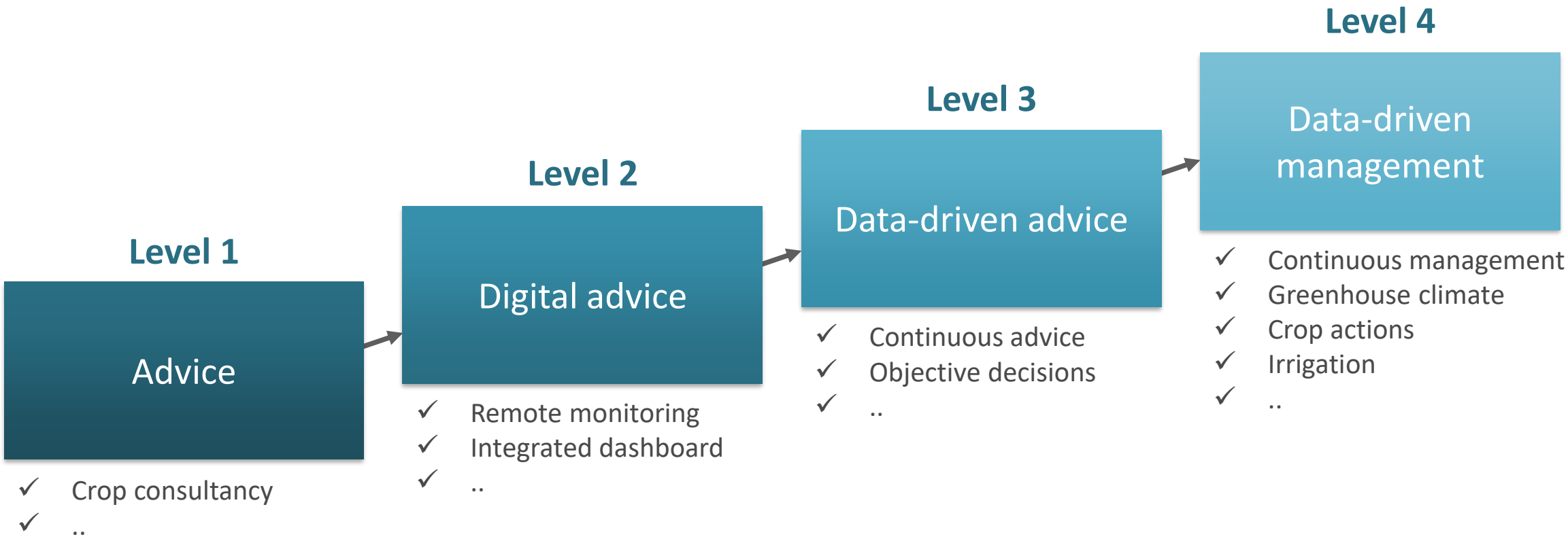
ESTIMATED GREENHOUSE VEGETABLE PRODUCTION AREA



Source: Rabobank, 'World Vegetable Map 2018'

Delphy

Data-driven consultancy



Delphy

Autonomous Greenhouse Challenge

NEWS: Delphy strong competition for international techgiants in Autonomous Greenhouse Challenge

Marijke van Rongen · Wednesday 12 December 2018

This afternoon, during the AgriFoodTech exhibition in Den Bosch, the winner of the international “Autonomous Greenhouse Challenge” was announced

The only Dutch team 'The Croperators', with experts from Delphy and AgroEnergy, achieved a nice third place. In the first place, the Microsoft Research team finished, second was the Tencent team. This international challenge involving 5 teams was organized by Wageningen University (WUR) and the Chinese Tencent, one of the largest tech companies in the world.

The jury praised the approach of The Croperators. They were convinced that the Croperators’ system is the only one that is directly applicable in practice.

Tencent 腾讯

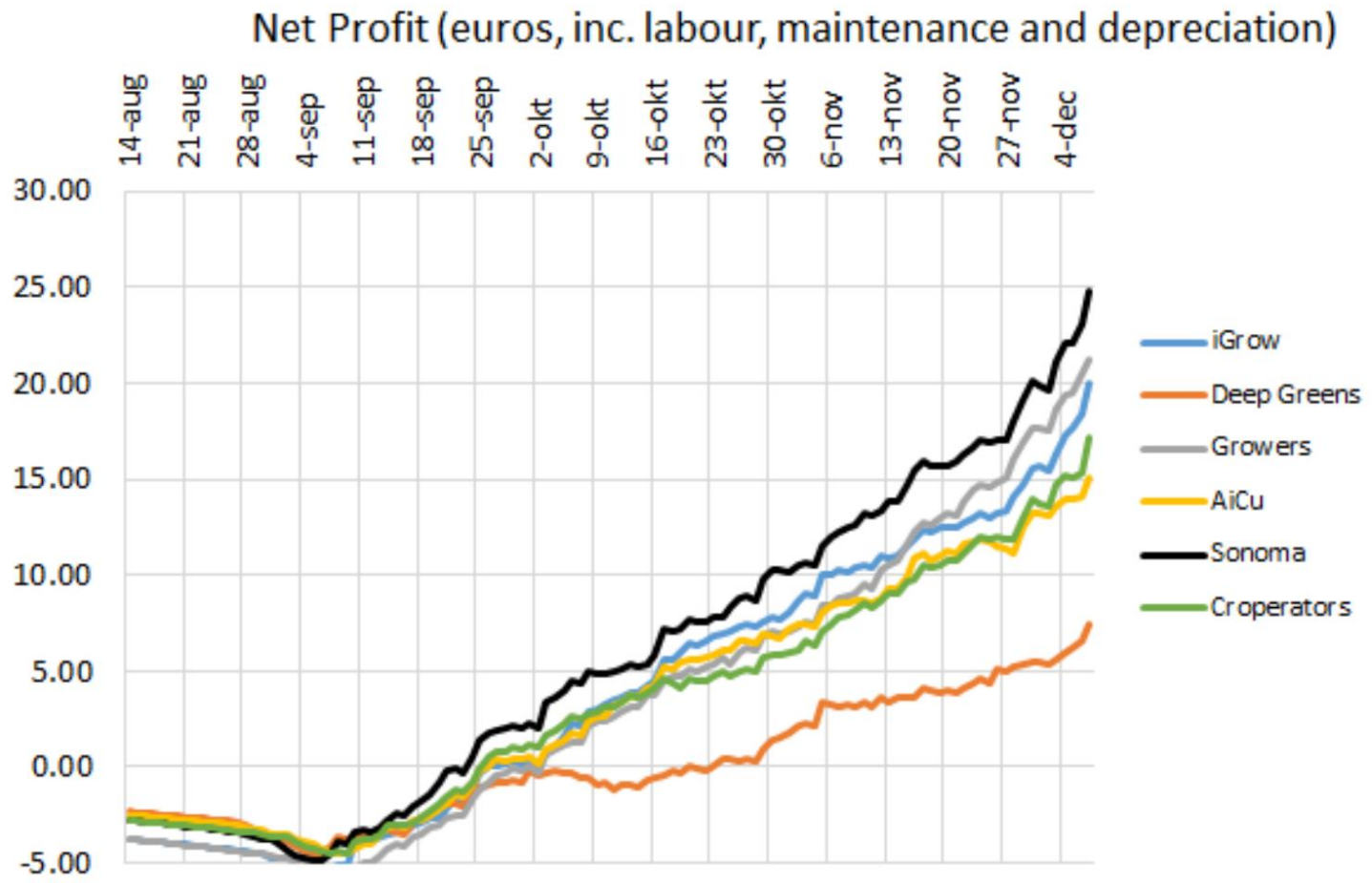
Microsoft

intel

the croperators

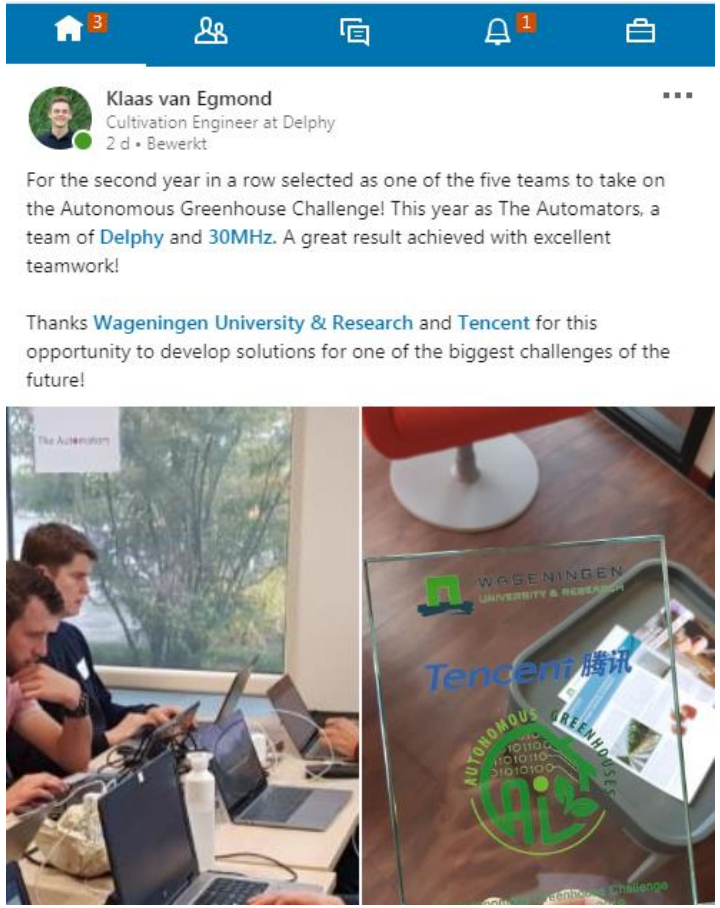
Delphy

Autonomous Greenhouse Challenge



Delphy

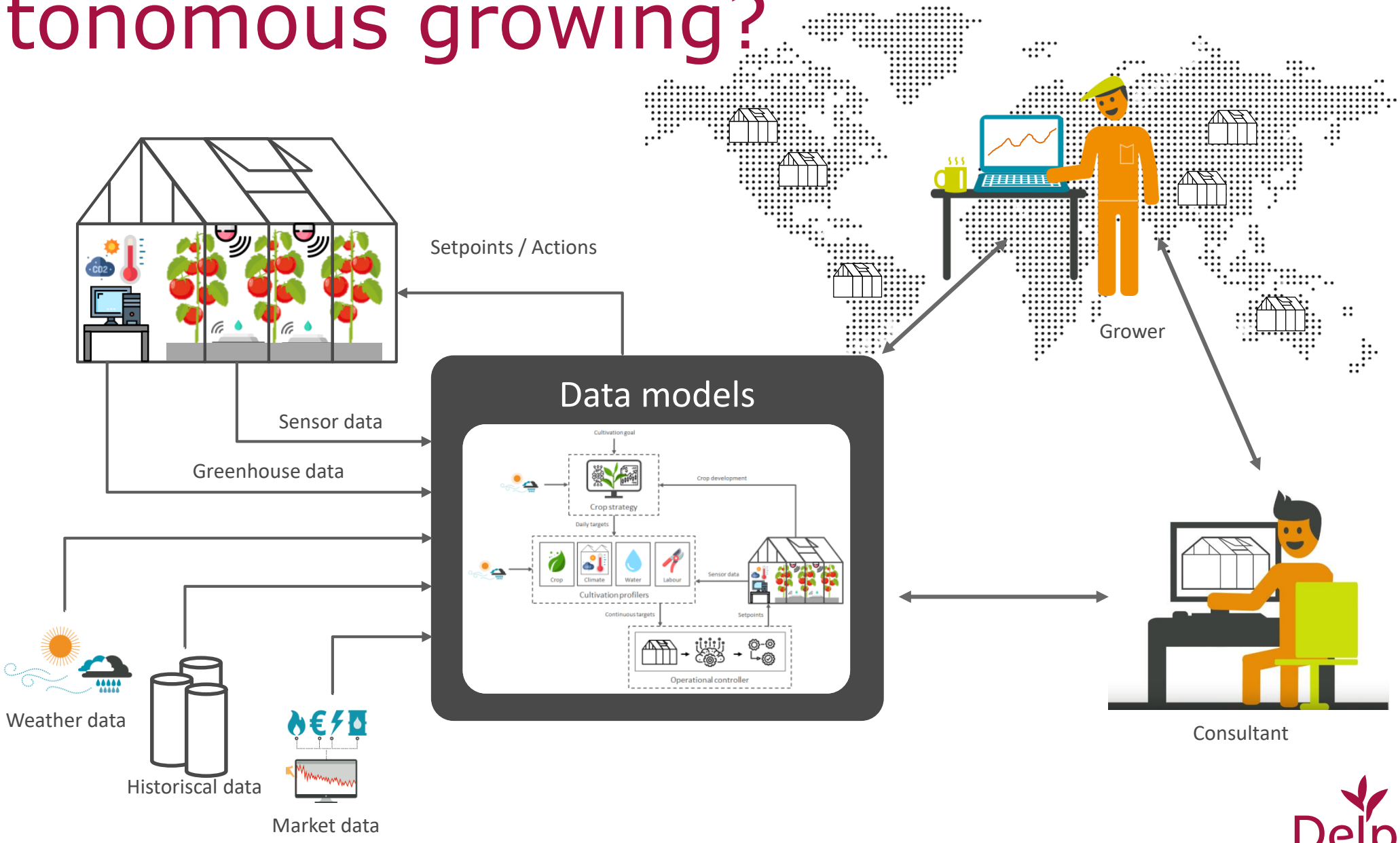
Autonomous Greenhouse Challenge 19/20



The Automators

Delphy

Autonomous growing?



Delphy

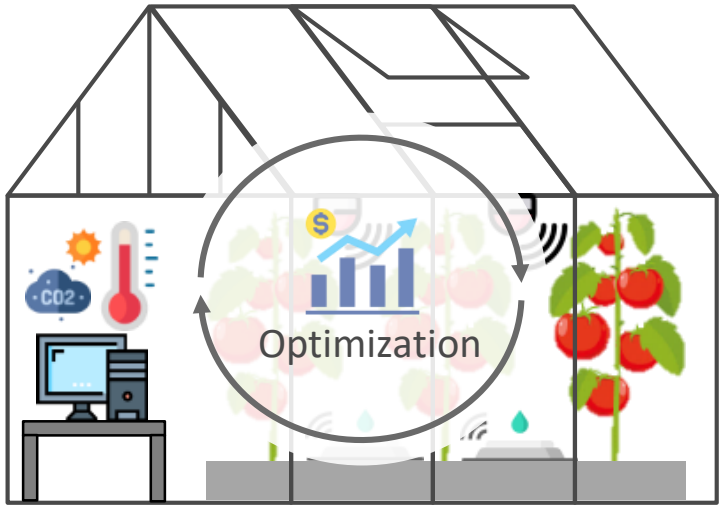
Data-driven

Greenhouse climate

Water en nutrients

Crop history

Crop actions



Crop development

Production quantity

Quality

Input vs output

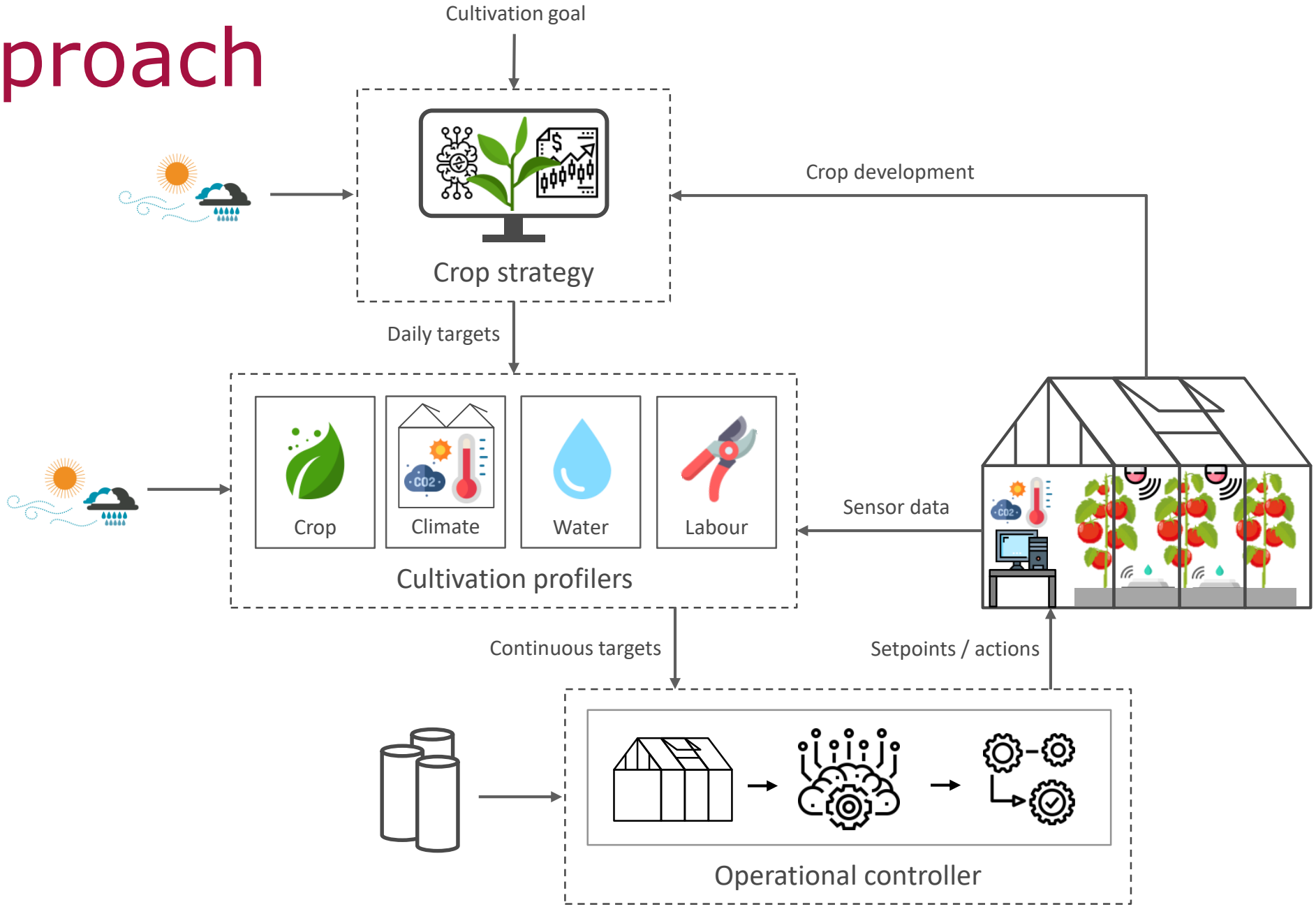
Delphy

Digitizing crop processes

- Data-driven models
- Plant fysiological models
- Expertise en experience

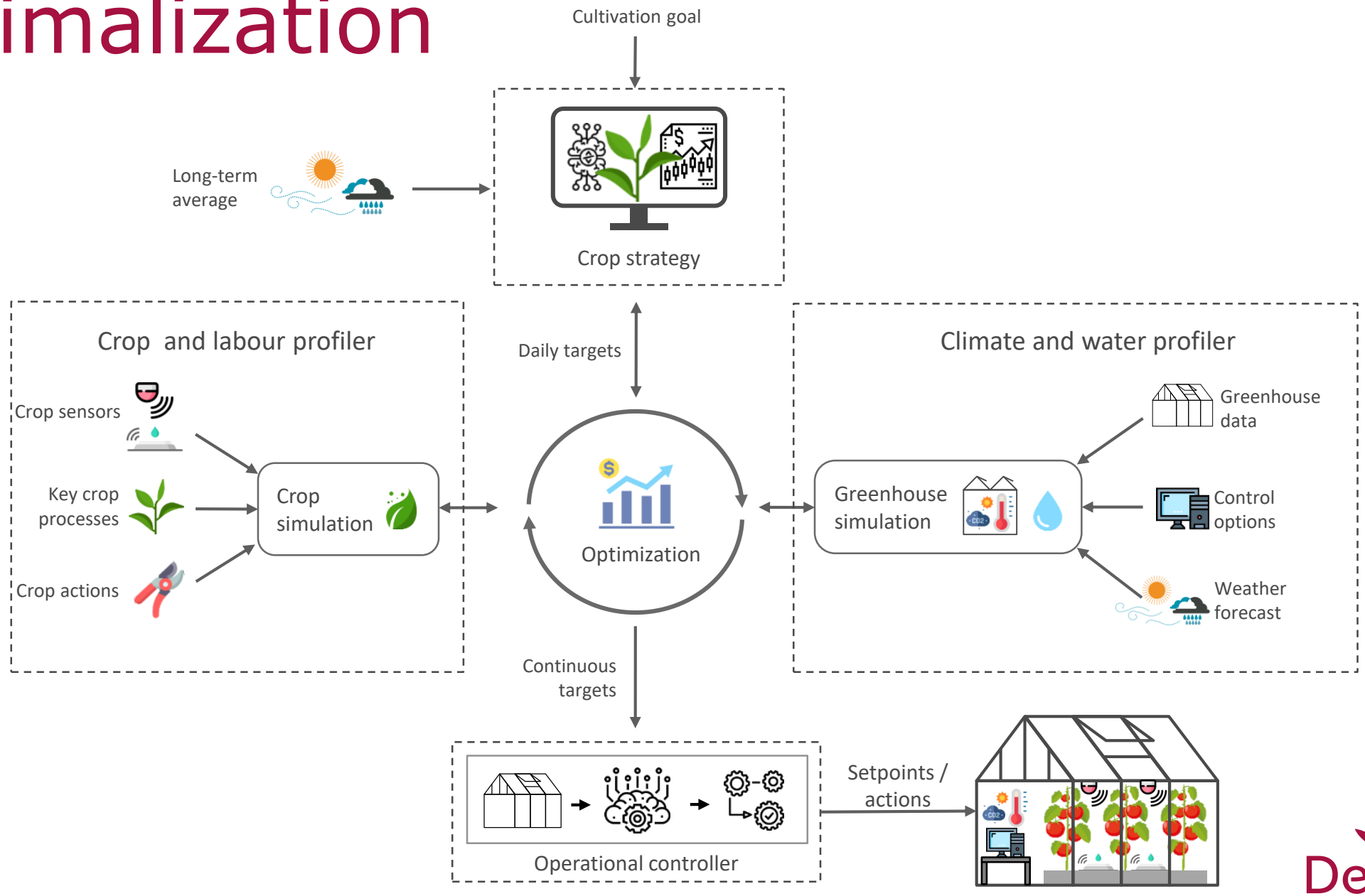
Delphy

Approach



Delphy

Optimalization



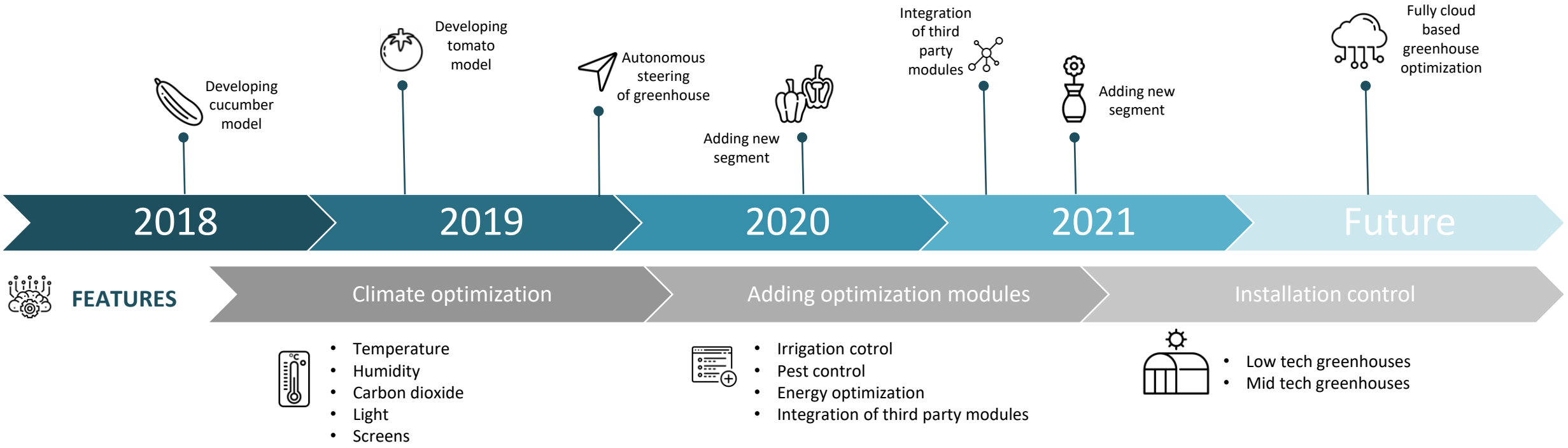
Delphy

Advantages?

- 24/7 monitoring
- Prevent mistakes
- Data-driven -> objective decisions
- 10 ha -> 100 ha
- Input : Output optimization
- Even more market-driven growing

Delphy

Roadmap data-driven growing



Delphy

Cucumber conference 2019

CGA

CUCUMBER GROWERS' ASSOCIATION

Lunch

Cucumber conference 2019

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Mark van der Werf

Next Generation Growing (NGG)
=
Growing by Plant Empowerment (GPE)

Theory & Practise

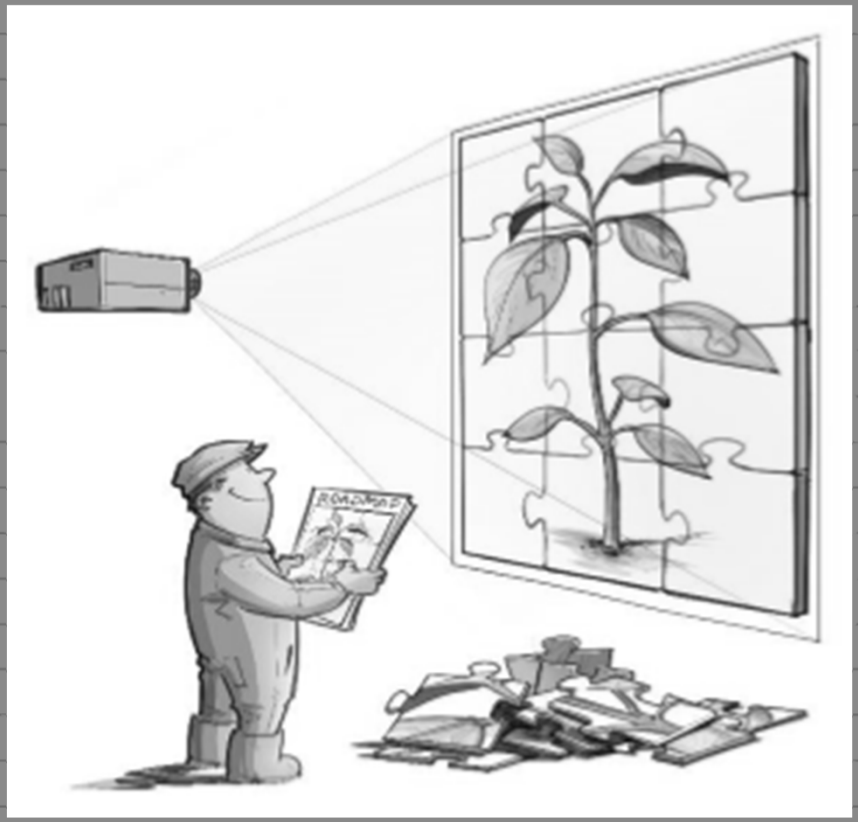
Mark van der Werf – Crop Consultant GPE
CGA Conference – 9th October ‘19

Introduction Mark

- ✓ Grower/Consultant
- ✓ Climate
- ✓ Nutrition
- ✓ Microbes and biostimulants
- ✓ Pest and disease control
- ✓ Organic fertilizers
- ✓ Salad crops
- ✓ Soft fruits

The essence of NGG is “KNOWLEDGE DEVELOPMENT”

- Plant physiology
- Physics
- Surveys
- Experience
- Learning from each other
  (technical groups – together fixing the puzzle)



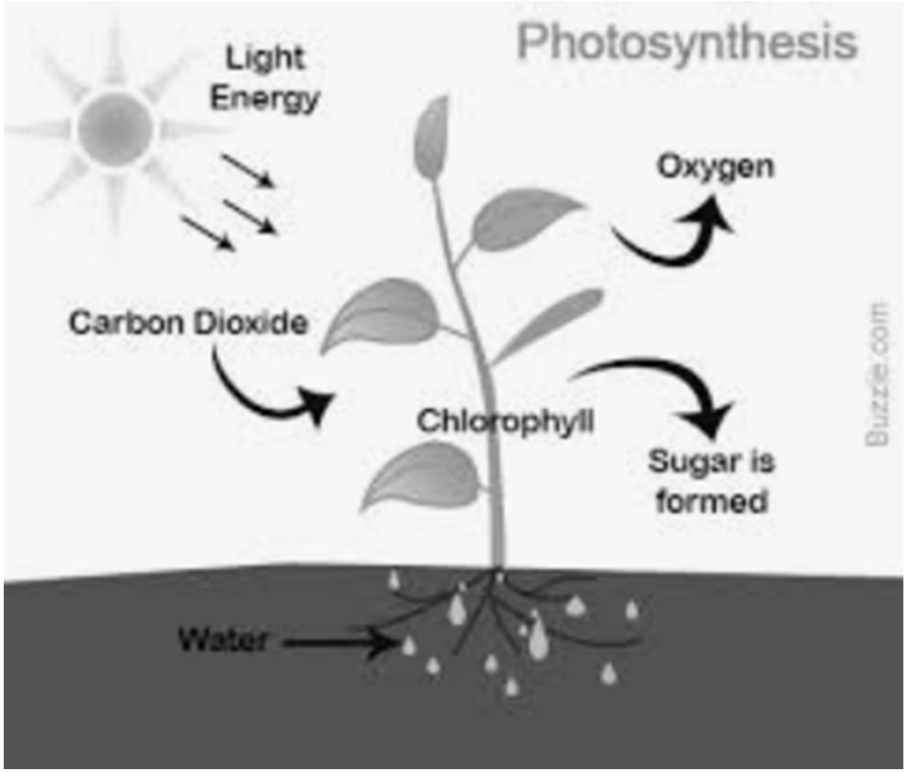
Optimal plant performance (production and quality) require all growth factors to be well balanced

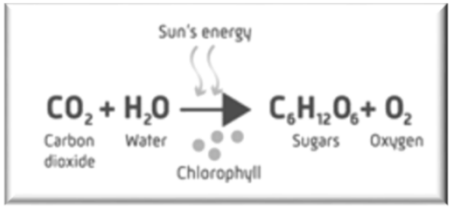
It all starts with photosynthesis

More sugars:

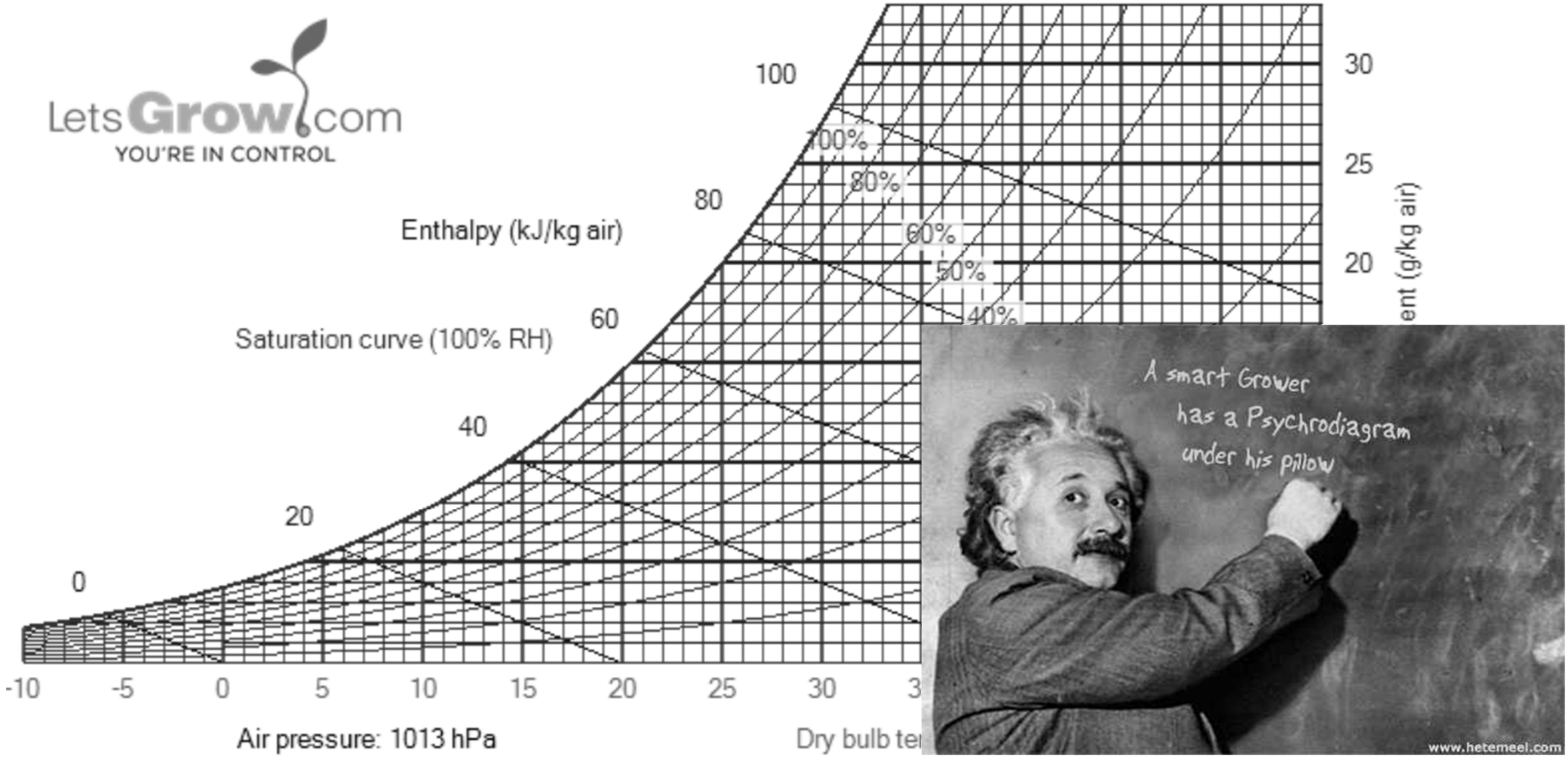
- More growth (above and below the ground)
- More production
- More plant health/plant resilience
- Etc.

Always focus on maximum photosynthesis !!





Back to the basics of physics



Plant and greenhouse balances

Plant balances:

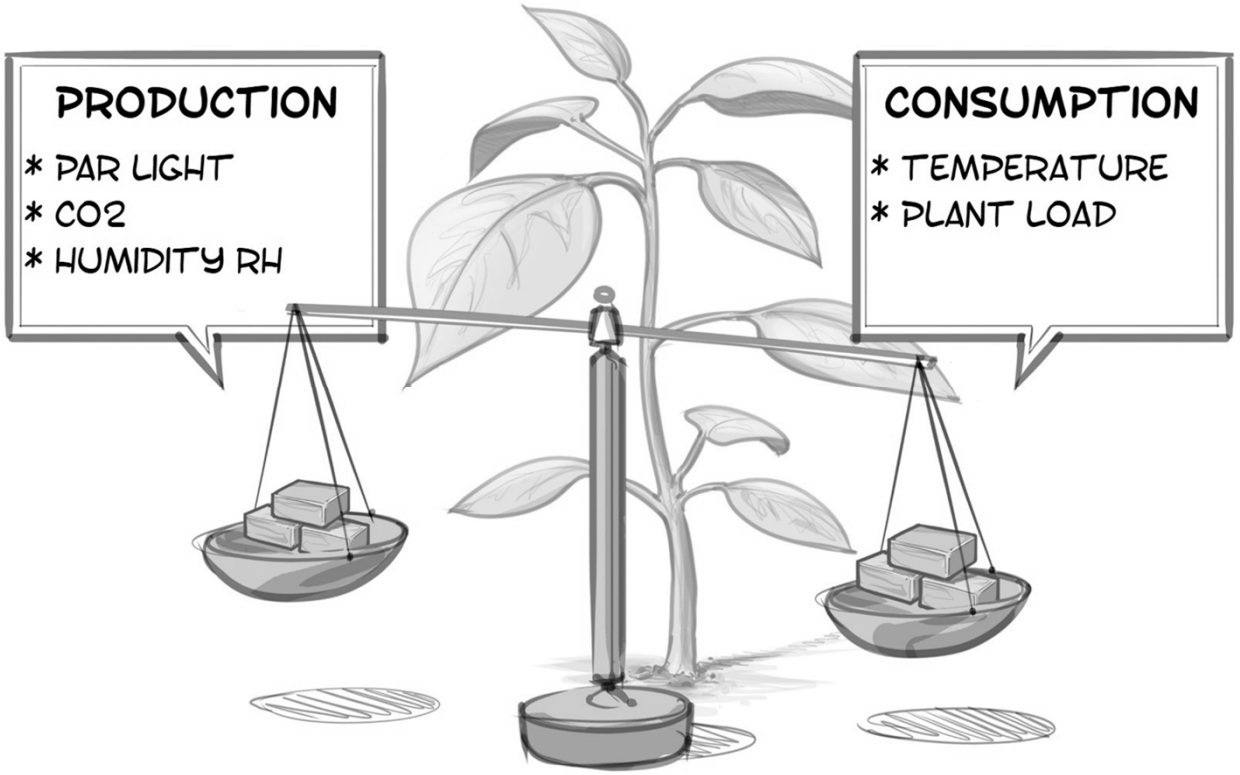
- Assimilate balance
- Water balance
- Energy balance

Greenhouse balances:

- Water balance
- Energy balance

How to listen to the plants needs?

Assimilate balance



Source size: LAI

Source activity: interaction of light, humidity and CO_2

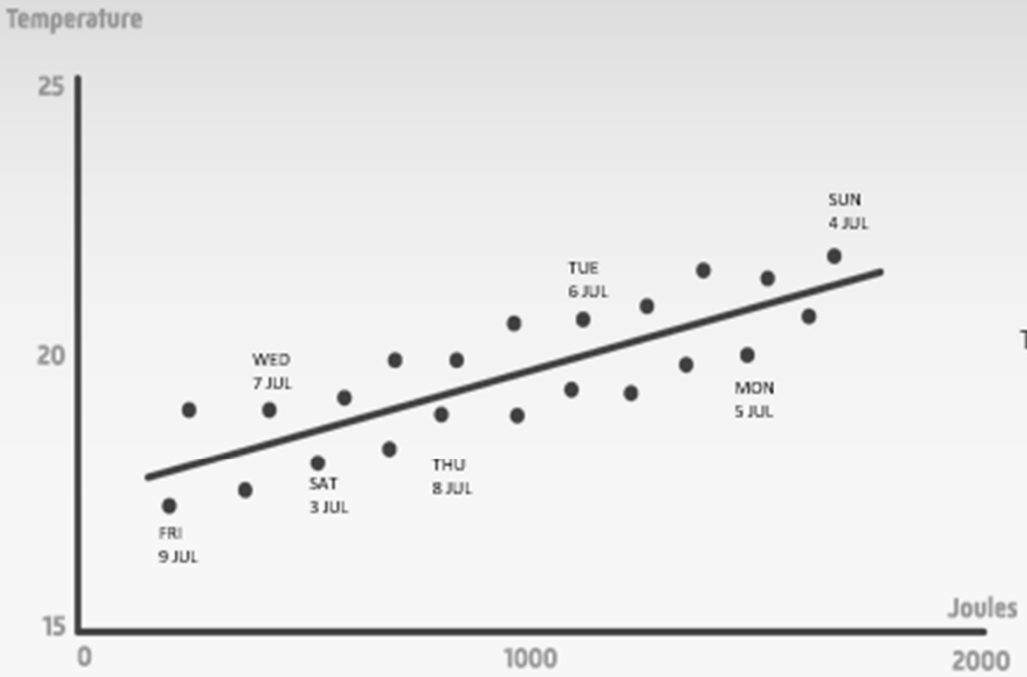
Source strength = LAI x photosynthesis

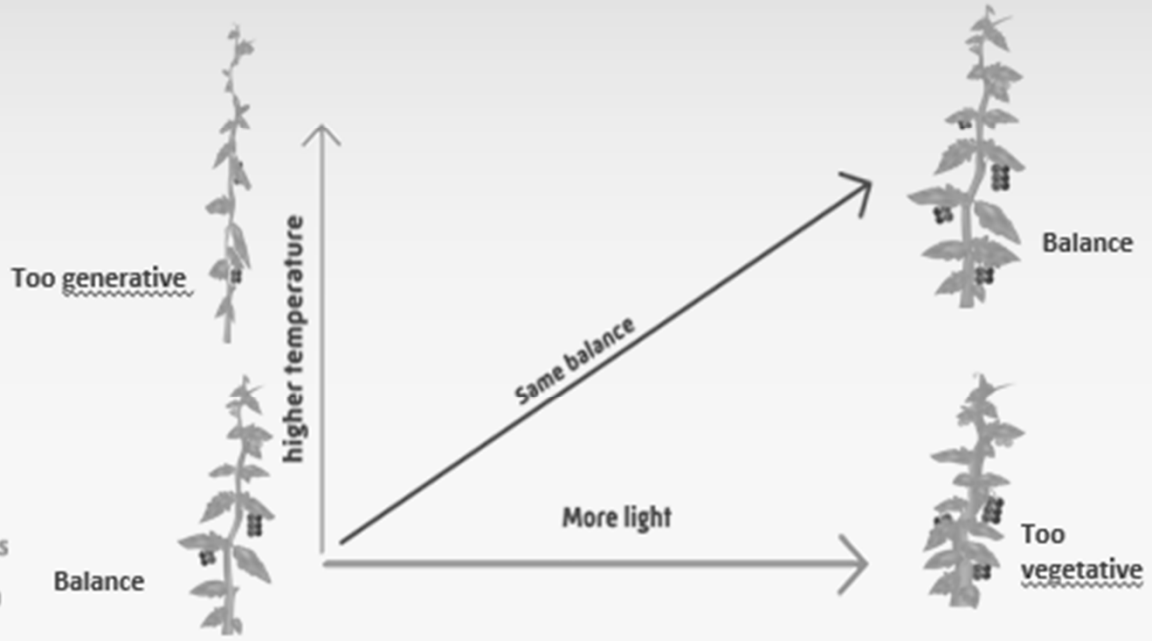
Fruitload: Sink size

Temperature: Sink activity

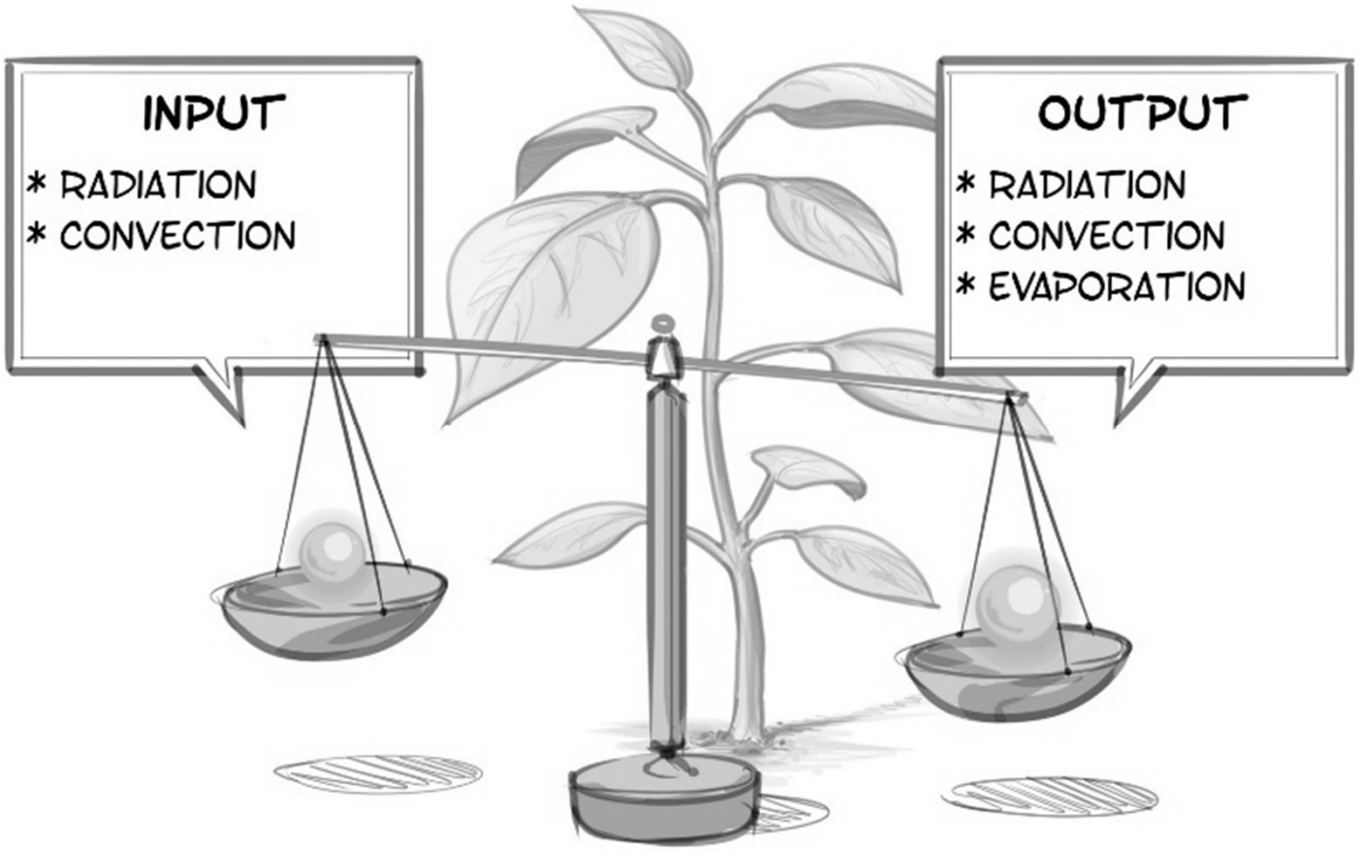
Fruitload x Temperature = Sink strength

Optimize temperature-light ratio

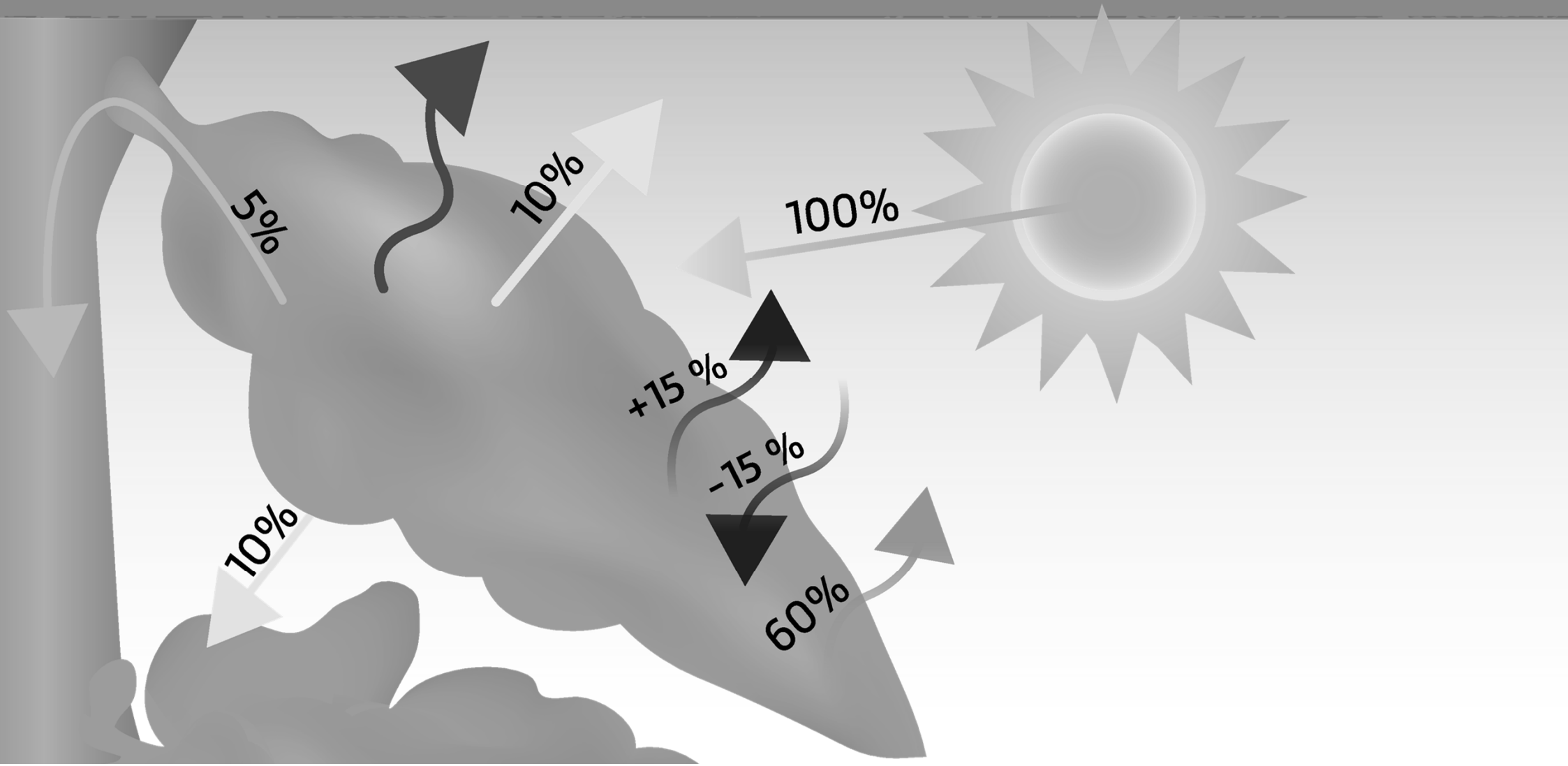




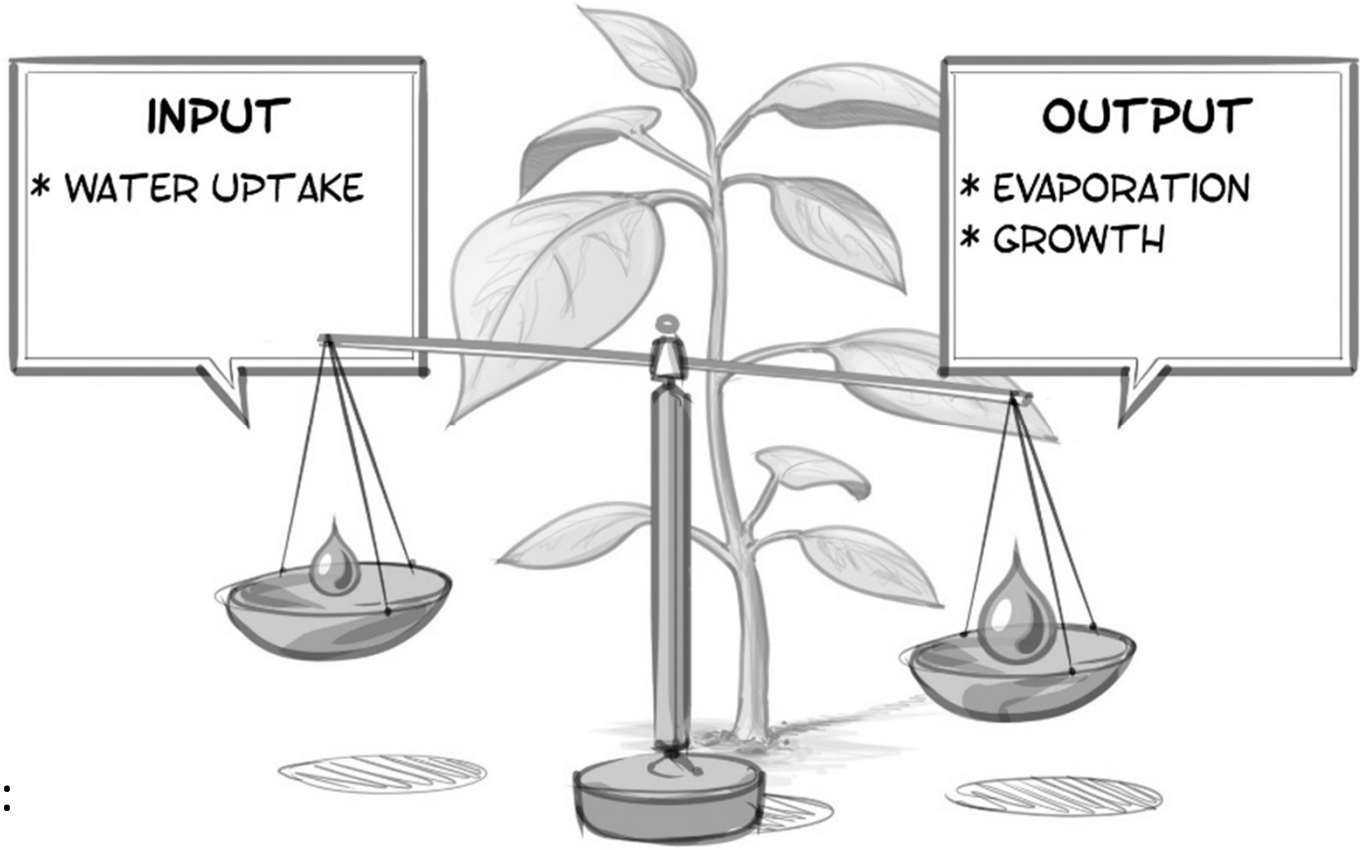
Energy balance



Energy balance



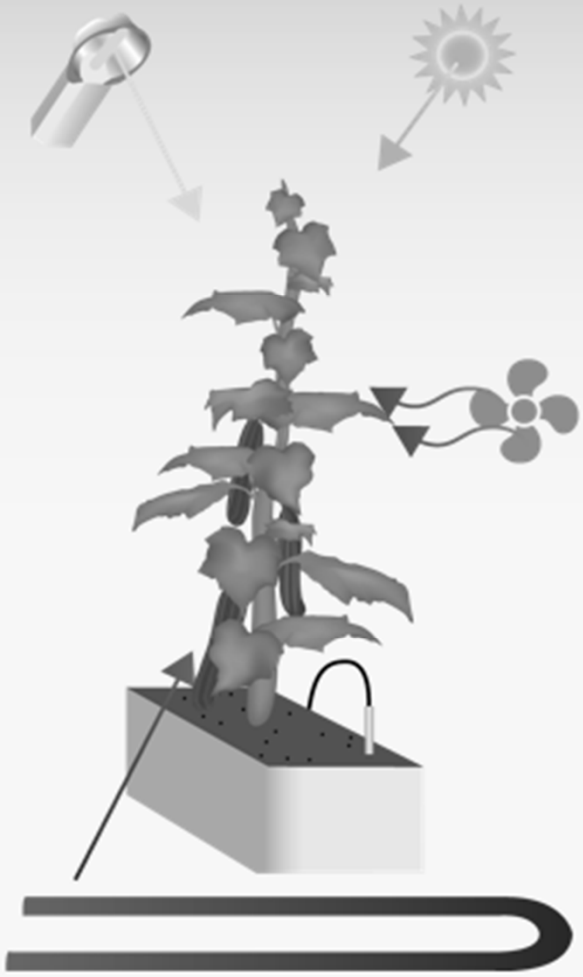
Water balance



Main objective:

- Adding fresh weight;
- Keeping the stomata open (when light available).

Water balance



Evaporation

Functions of evaporation:

1. Cooling (making the energy balance complete);
2. Transport of nutrients to and through the plant;
3. Uptake of some “difficult” nutrients (Ca en B).

NGG and evaporation:

1. Energy balance is the foundation for evaporation !
2. Circumstances have great impact on the water balance (kind of evaporation, sunny/cloudy day, etc.).

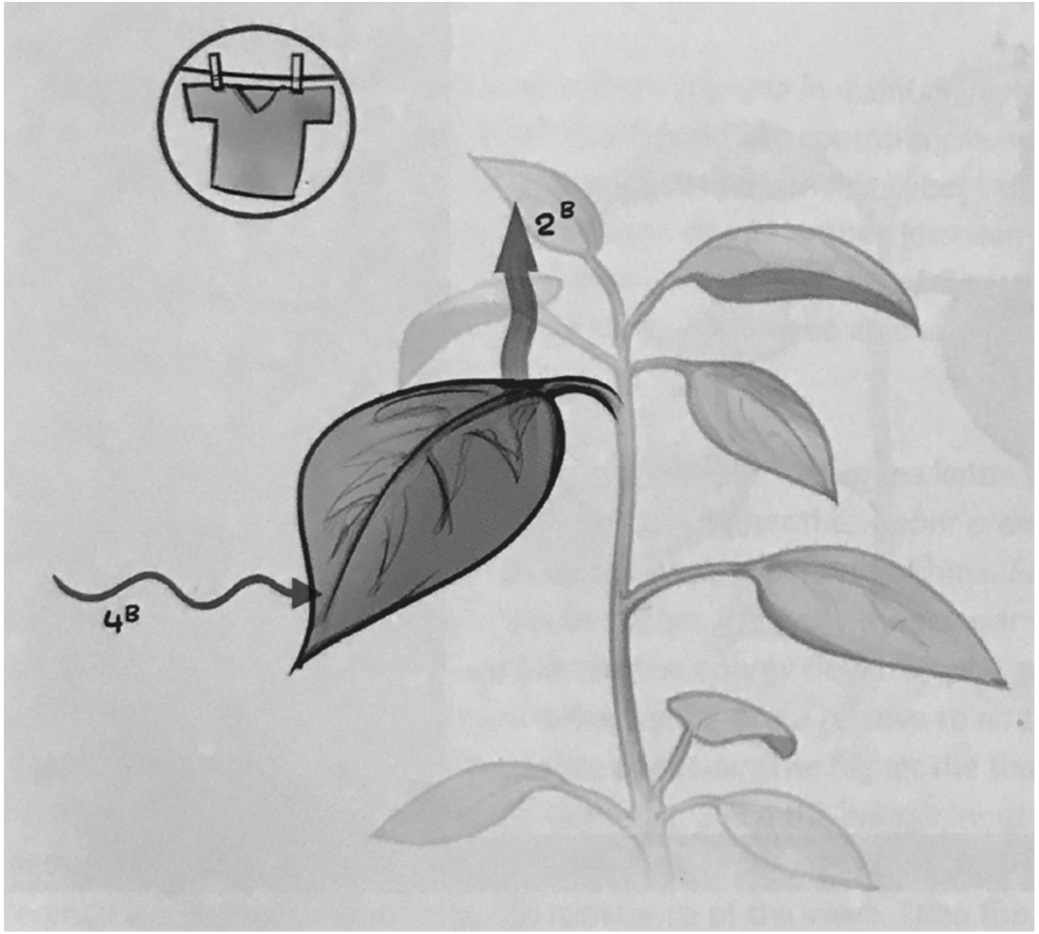
Convection - or Wet Bulb Evaporation

Convection – or Wet Bulb Evaporation (energy supply through convection):

- T-leaf < T-air
- RH< 100%
- Air movement > 0 m/s

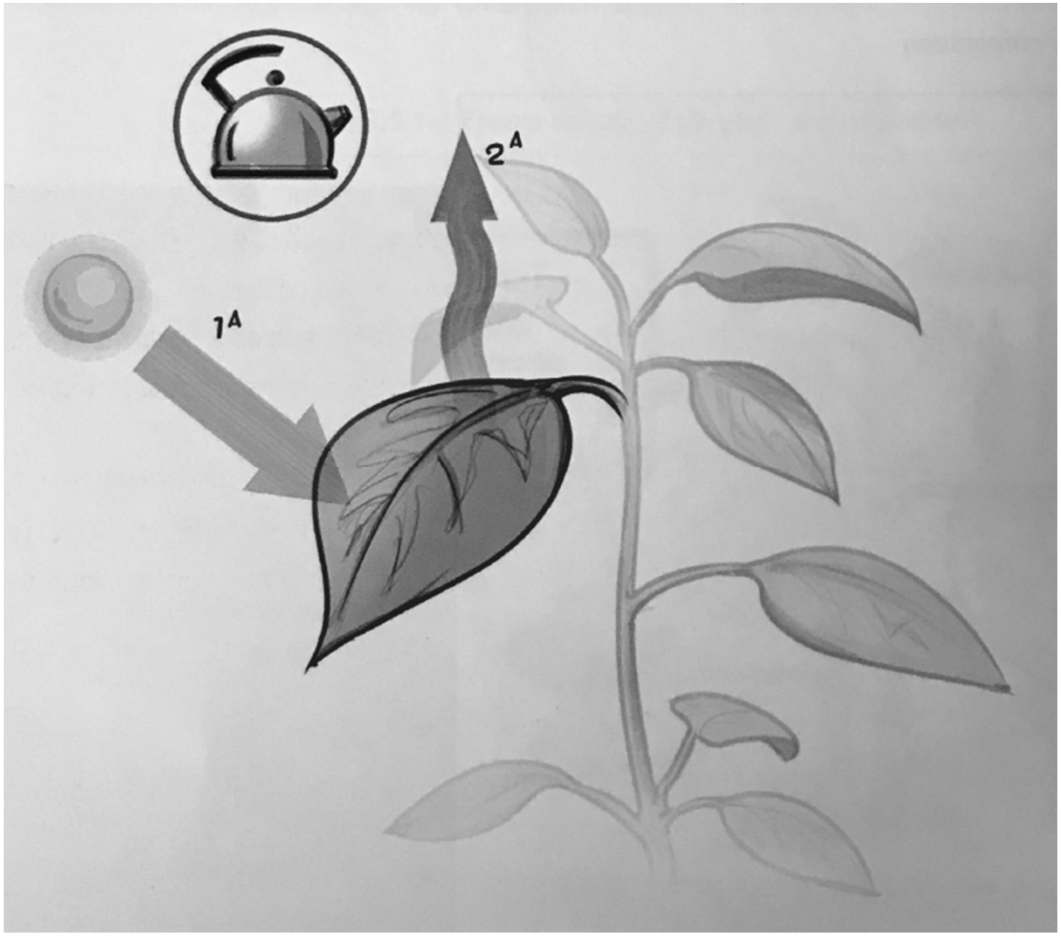
2B = Convection evaporation

4B = Convection energy



Radiation - or Tea kettle Evaporation

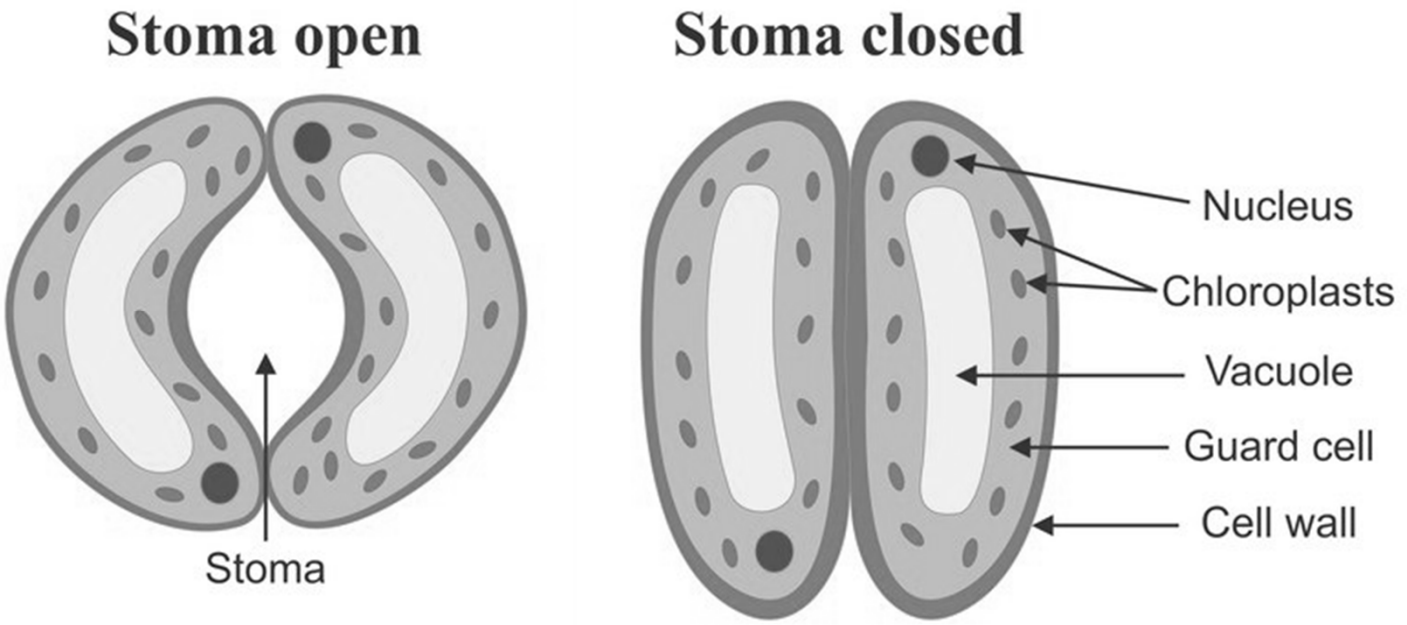
Radiation – or Tea kettle Evaporation (energy supply through radiation):



1A = Solar radiation

2A = Radiation evaporation

Role of stomata



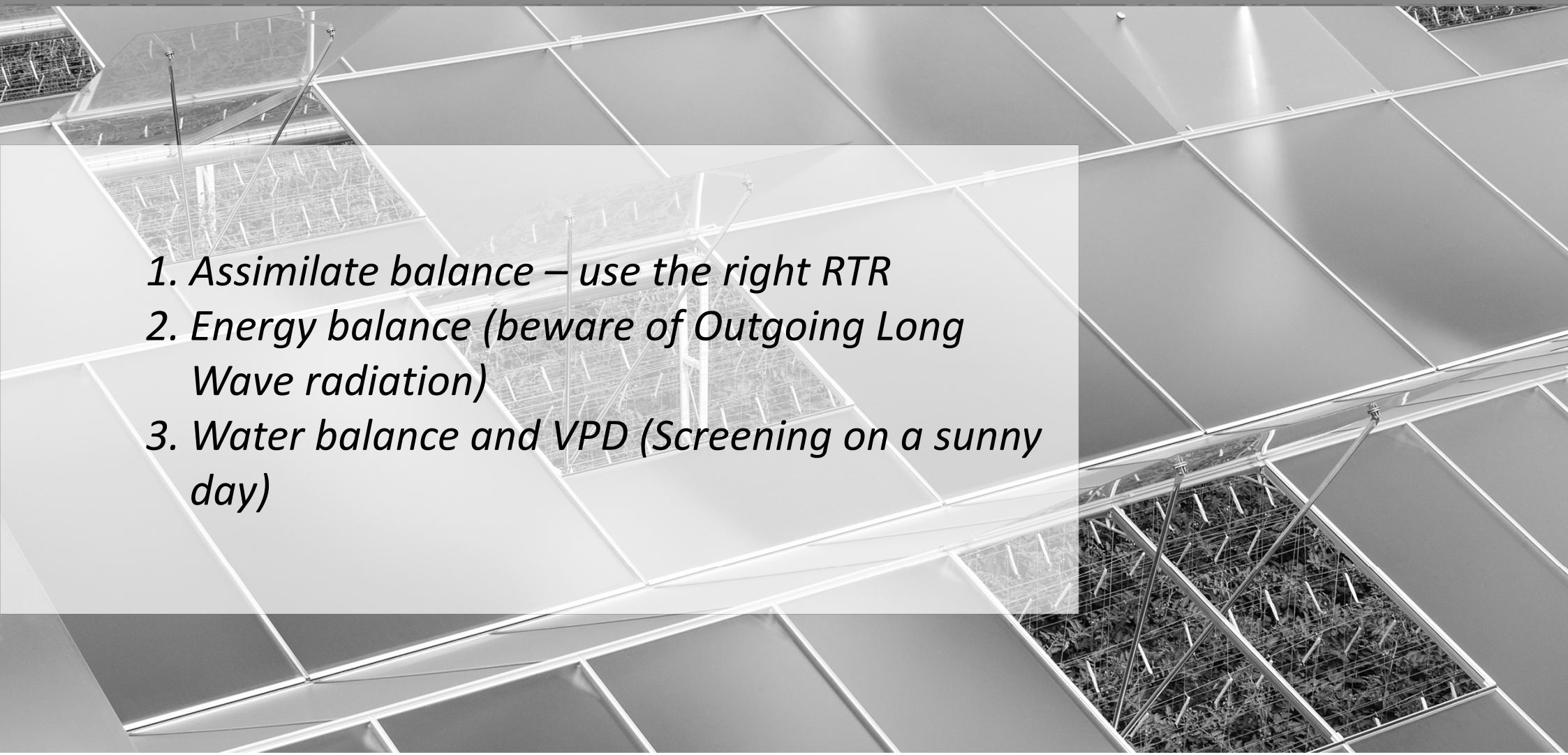
Advantage of NGG:

- Plant is starting point on each decision (3 balances);
- Every problem/issue/situation can be related back to the 3 balances;
- With every decision you have to ask yourself: “why do I do it this way and do I get the result I want?
- NGG forms a foundation for future investments (what is the added value).

Disadvantage of NGG:

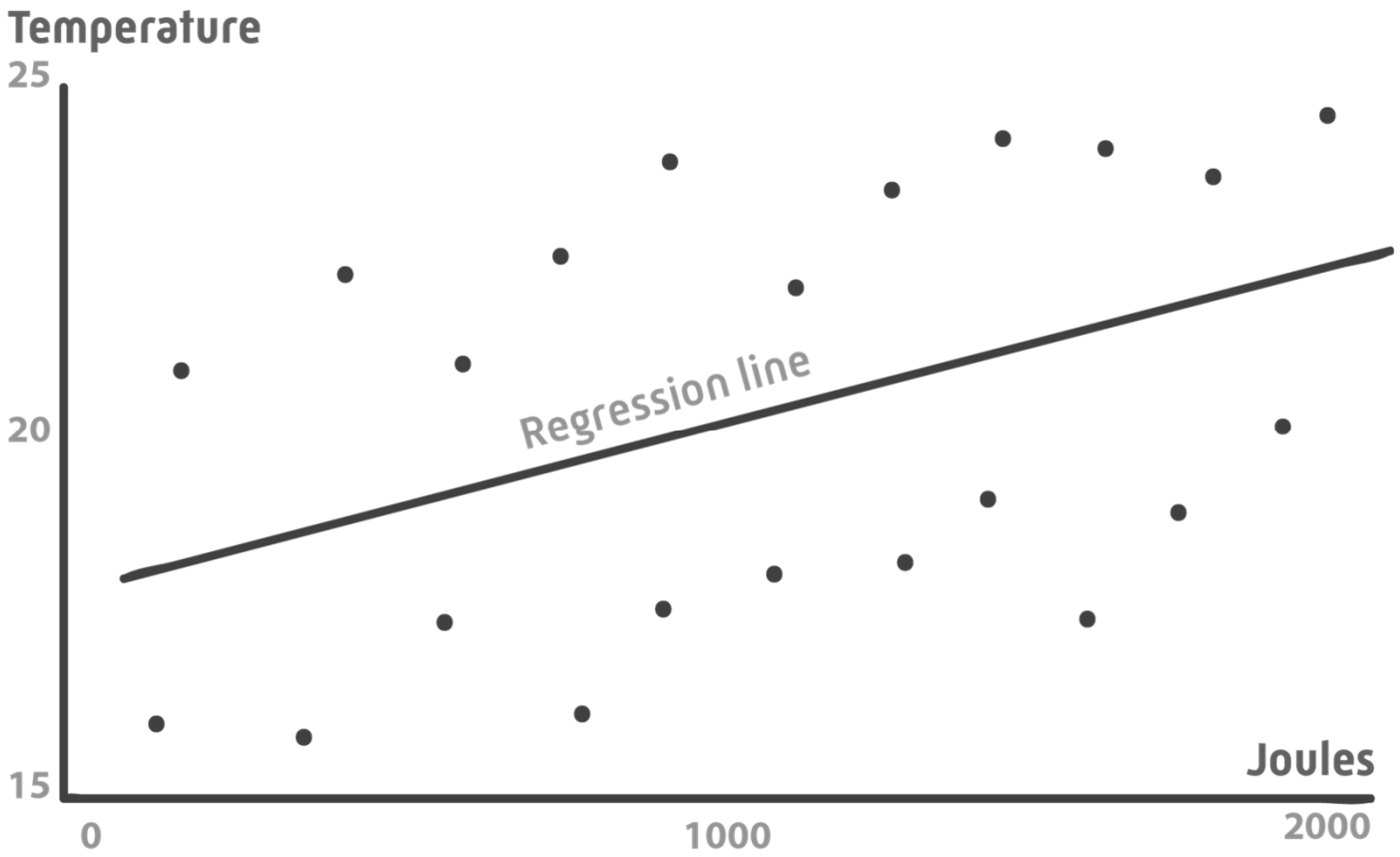
- New ways of thinking (and acting) are against our “green fingers and experience”;
- Especially in the beginning when things go wrong, people point at NGG.

NGG in practise

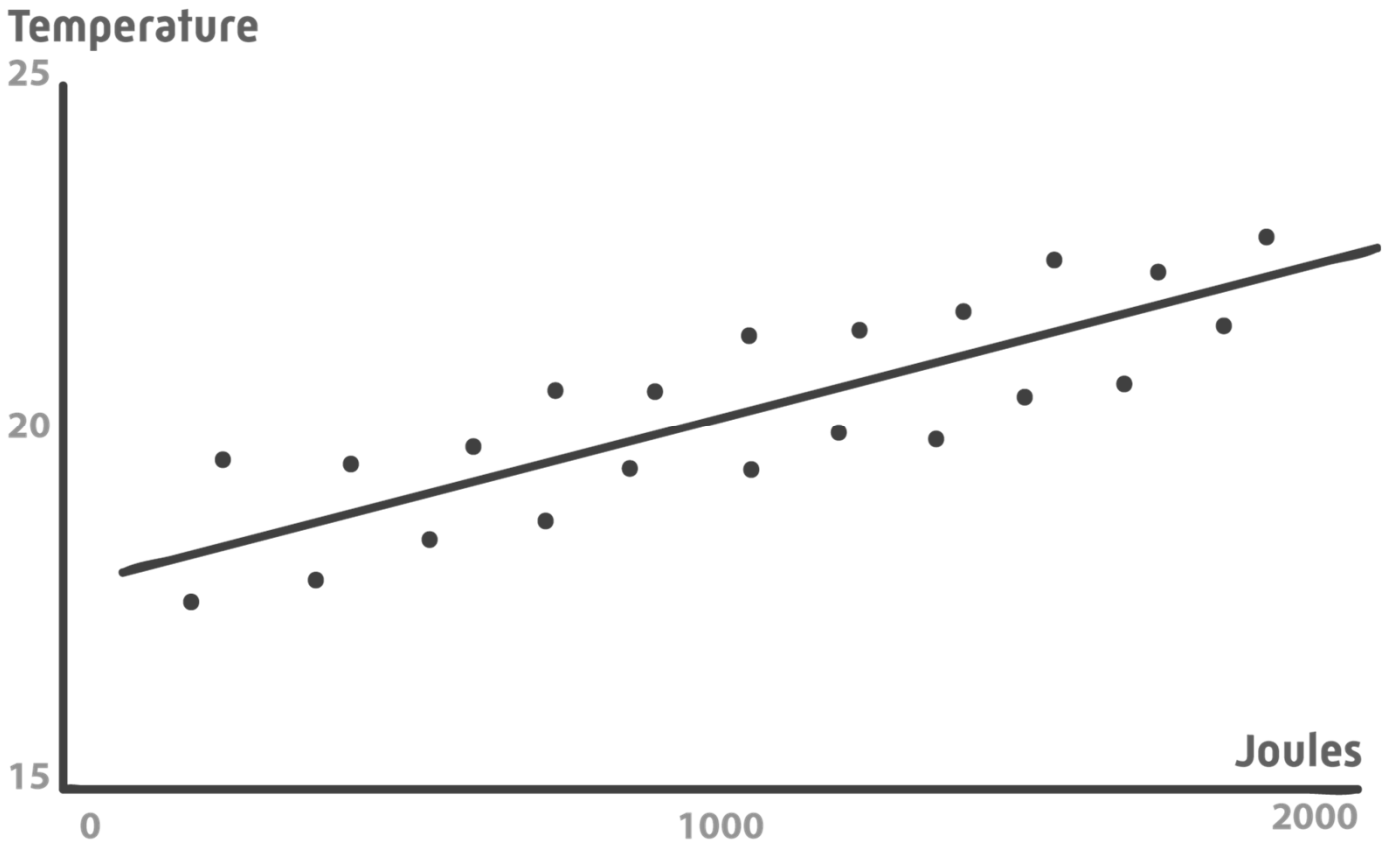


1. *Assimilate balance – use the right RTR*
2. *Energy balance (beware of Outgoing Long Wave radiation)*
3. *Water balance and VPD (Screening on a sunny day)*

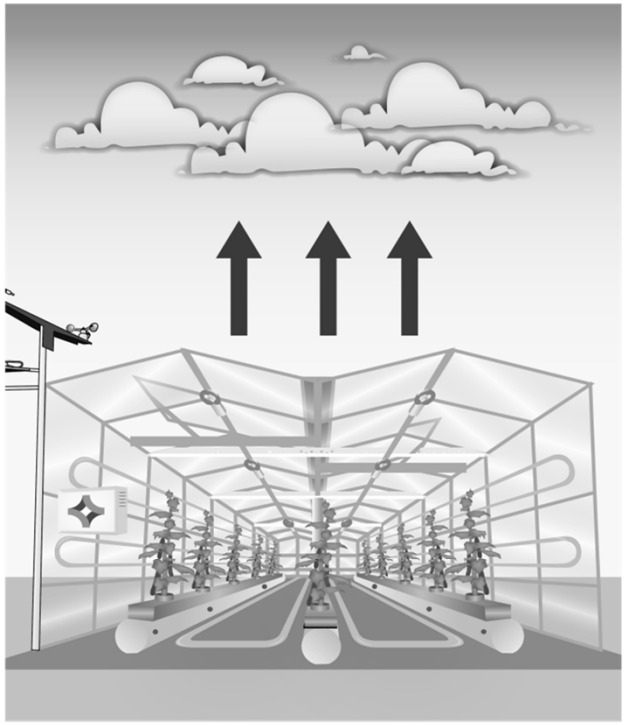
1. Step 1: Monitor ratio of temperature to radiation

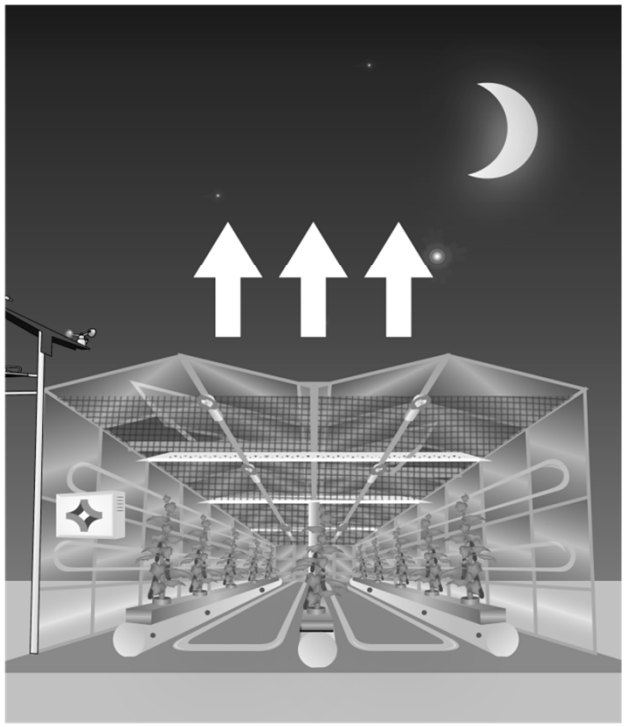


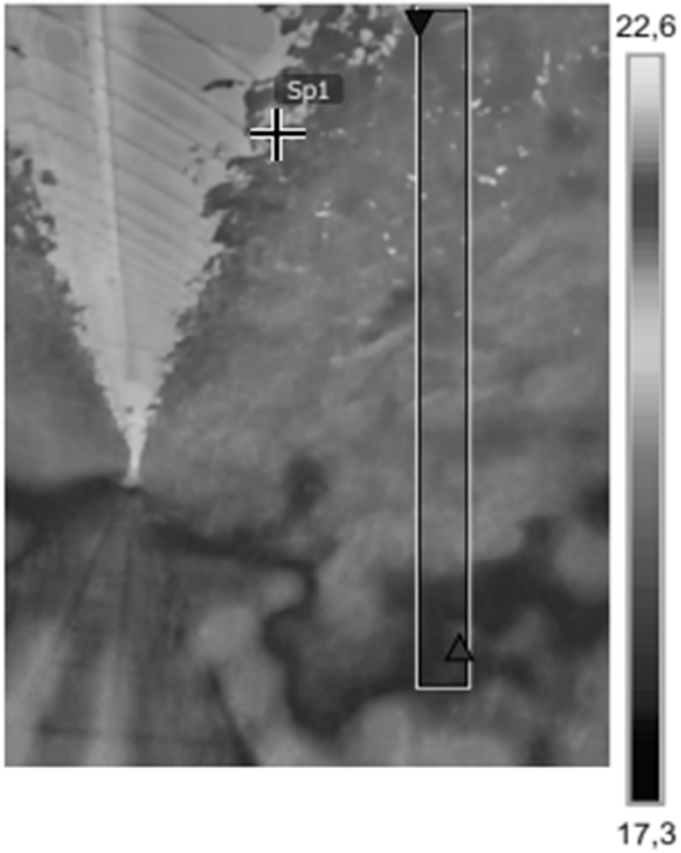
1. Step 2: Control ratio of temperature to radiation



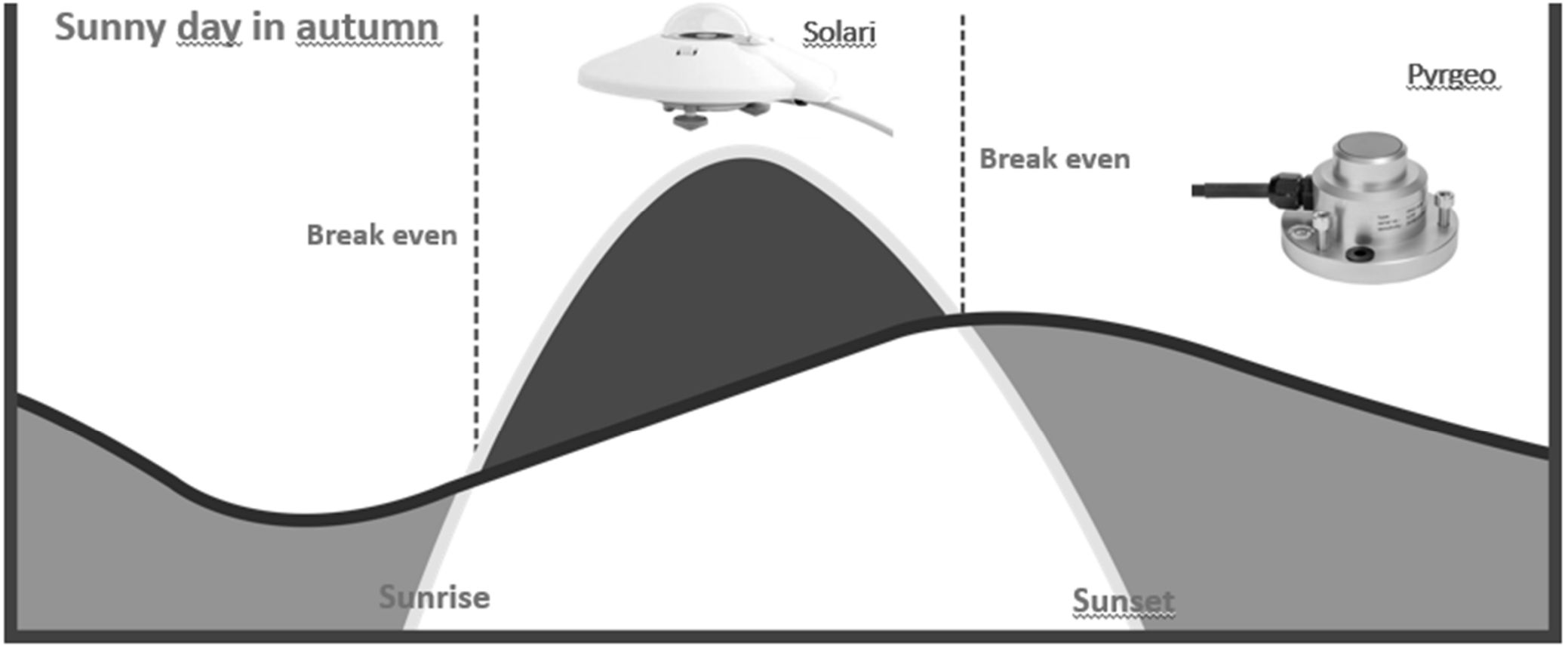
2. Beware of Outgoing Long Wave Radiation (1)







2. Beware of Outgoing Long Wave Radiation (2)

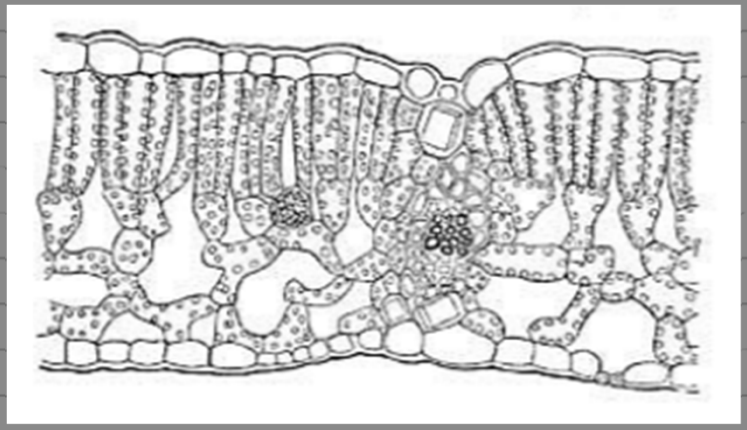


3. Monitoring VPD

VPD = Vapour Pressure Difference

- Energy supply through radiation;
- Inside the plants water starts to evaporate;
- Water pressure builds up;
- Vapor pressure leaf > vapor pressure surroundings;
- Water vapor leaves the leaf through the stomata.

De difference in vapor pressure between leaf and surrounding is VPD.
VPD > 0 otherwise no evaporation
0,2 > VPD < 1,5
VPD > 1,5/2,0 – water stress

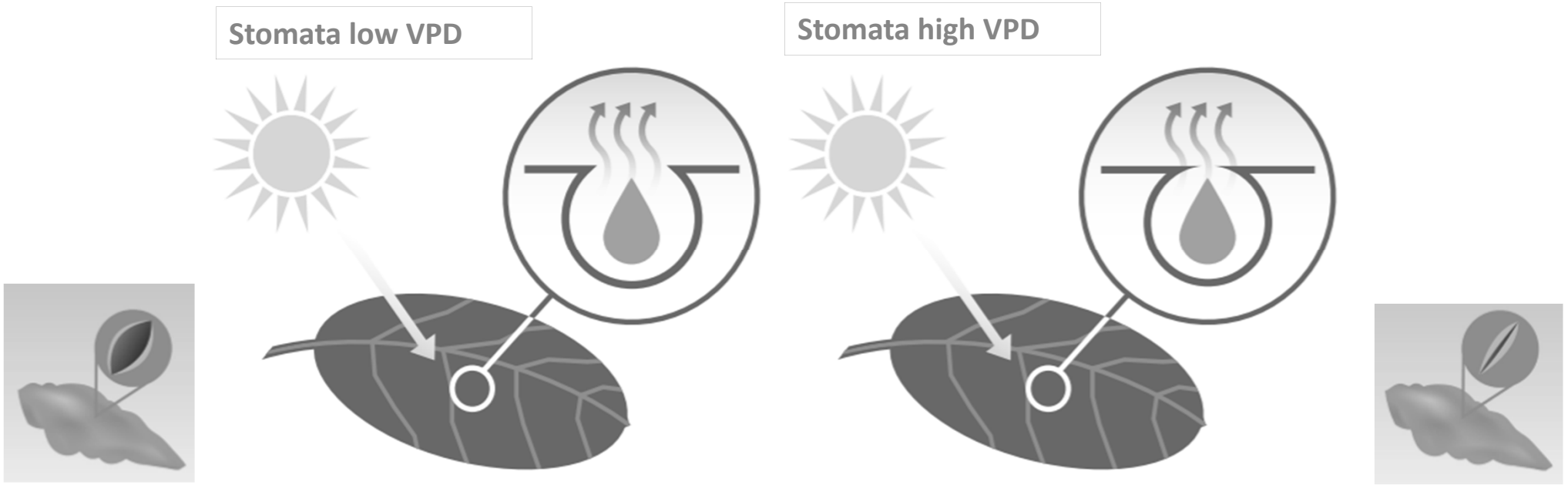


Stomata and VPD

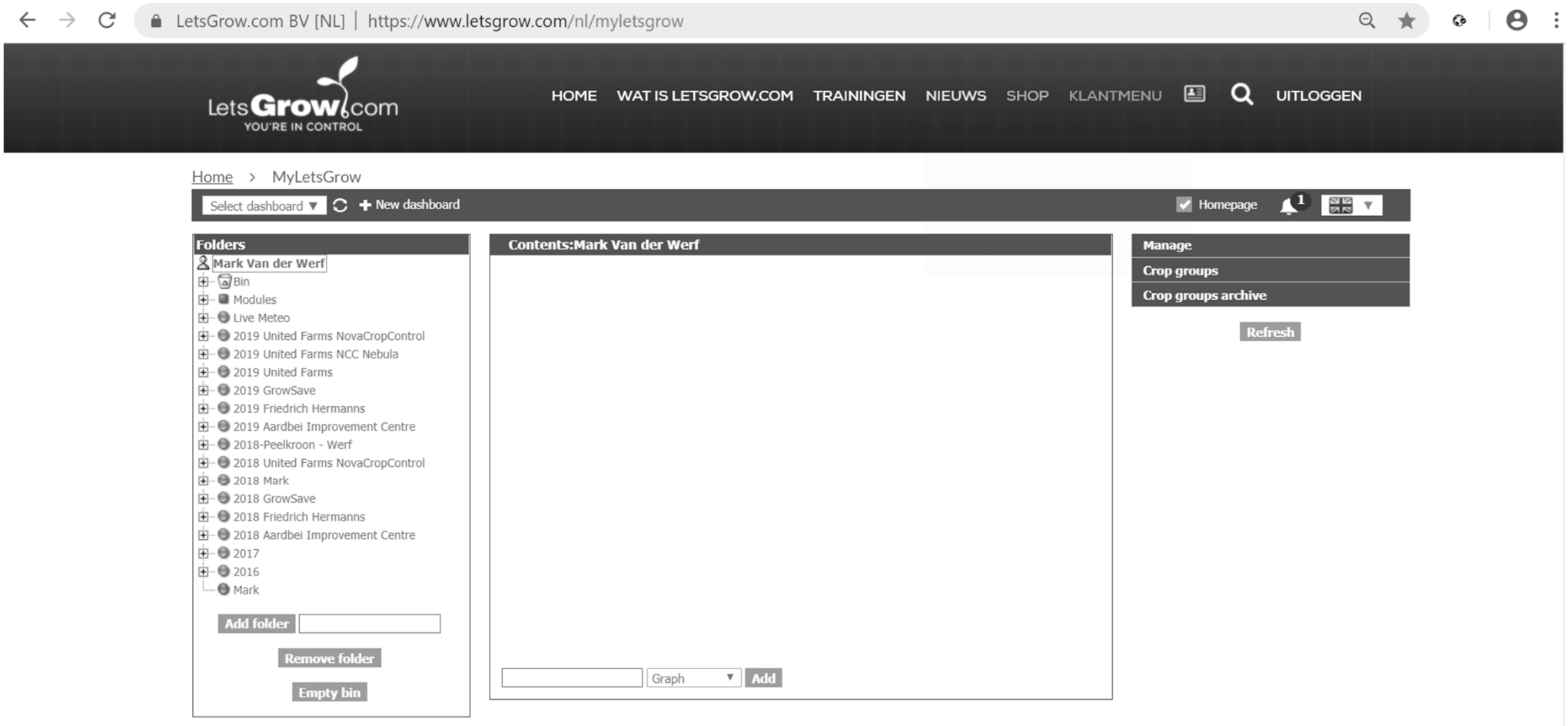
Evaporation = VPD x SC (Stomata Conduction)

12 = 2 x 6 (stomata open = low VPD) – better uptake CO2

12 = 6 x 2 (stomata closed = high VPD)

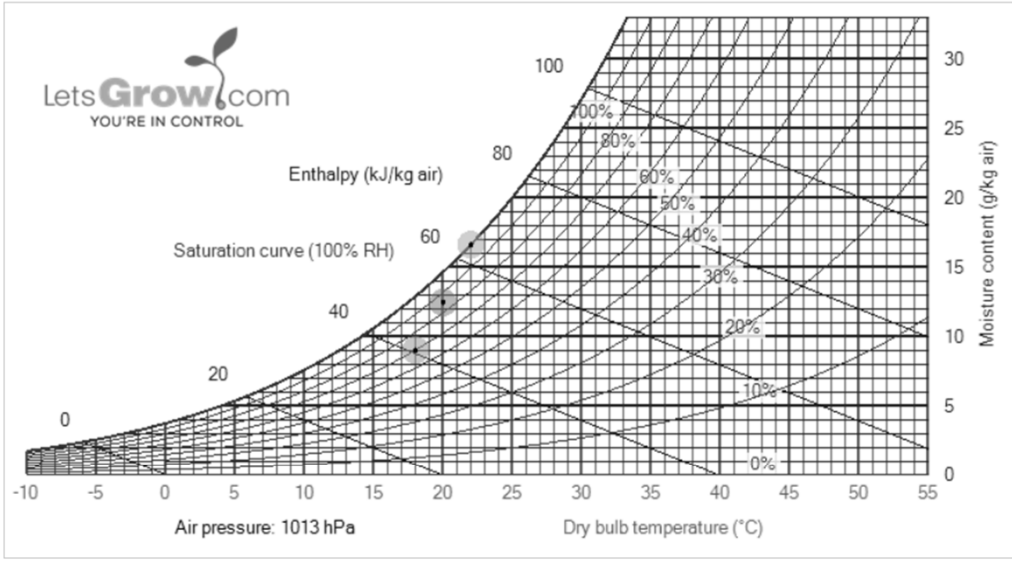


In practise: LetsGrow platform



In practise: Mollier diagram

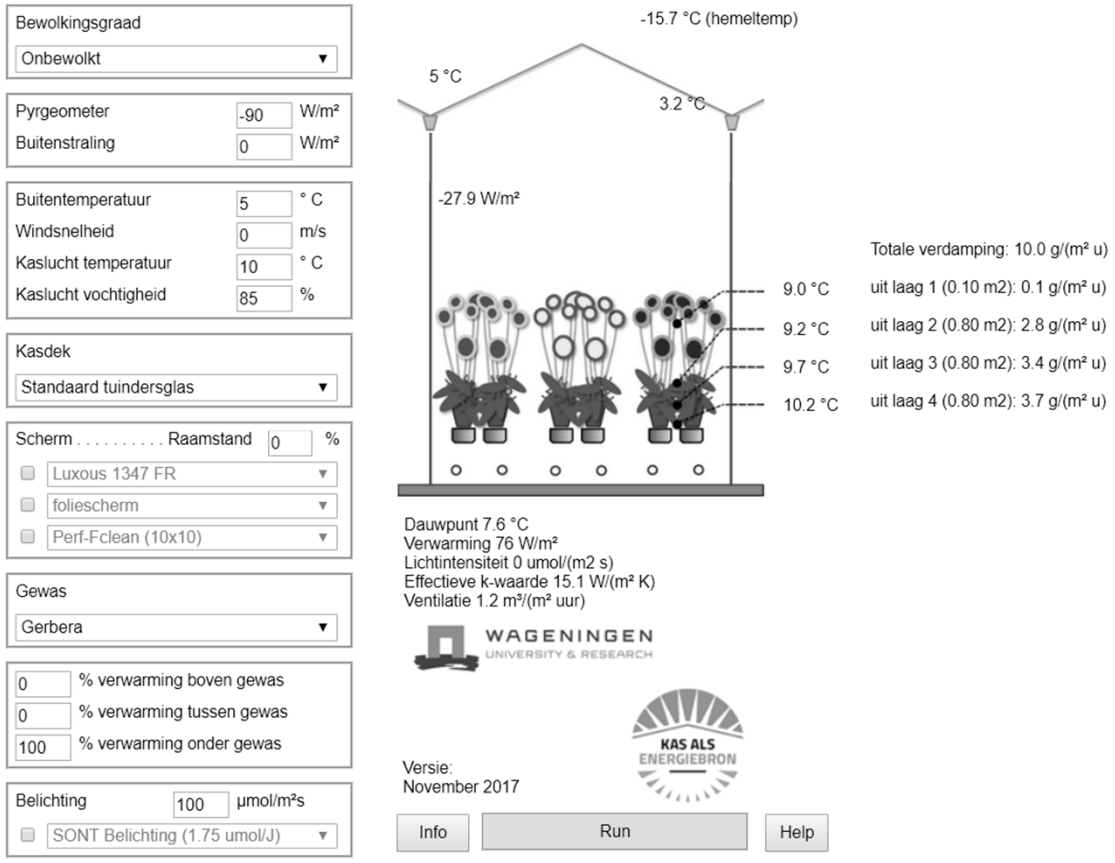
Tool Letsgrow.com:
https://gpe.letsgrow.com/psychro



Hide Psychro diagram | More info | Air pressure 1013 hPa

Outside		Difference	Inside		Difference	Plant	
Temp	18 °C	2.00	Temp	20 °C	2.00	Temp	22 °C
RH	70 %	15.00	RH	85 %	15.00	RH	100 %
Absolute Humidity AH	9.04 g/kg	3.43	Absolute Humidity AH	12.47 g/kg	4.17	Absolute Humidity AH	16.64 g/kg
Humidity Deficit HD	3.87 g/kg	-1.67	Humidity Deficit HD	2.20 g/kg	-2.20	Humidity Deficit HD	0.00 g/kg
Enthalpy	40.61 kJ/kg	10.55	Enthalpy	51.16 kJ/kg	12.38	Enthalpy	63.55 kJ/kg
VPD	0.62 kPa	-0.27	VPD	0.35 kPa	-0.35	VPD	0.00 kPa
VP	1.44 kPa	0.54	VP	1.99 kPa	0.66	VP	2.64 kPa
VPsat	2.06 kPa	0.27	VPsat	2.34 kPa	0.31	VPsat	2.64 kPa
Dewpoint	12.4 °C	5.0	Dewpoint	17.4 °C	4.6	Dewpoint	22.0 °C

In practise: Calculation tool Energy balance



http://www.glastuinbouwmodellen.wur.nl/radiationmonitor/?user=KaE_NLC_ext

Past: Best practise and common knowlegde of plant physiology combined with green thumbs and the “growers feeling”.

Current: Next Generation Growing (NGG):

- Assimilate balance;
- Water balance (plant & greenhouse);
- Energy balance (plant & greenhouse).

Future:Growing by PlantEmpowerment (GPE):

Three plantbalances (or more . . . mineral balance, hormone balance) combined with **plant health**.

Recap: How to grow productive, strong and resilient crops?

- Optimize photosynthesis
- Ensure enough activity for nutrient uptake
- Protect the plant against excessive conditions
- Support the plant in maintaining its balances

www.plantempowerment.com

Cucumber conference 2019

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Jon Swain

grow save
helping horticulture save energy

Energy Matters

From Blackouts to no more Black Stuff

Jon Swain

Senior Consultant, NFU Energy

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Some headlines

THE Sun NEWS SITE OF THE YEAR | WS | FABULOUS | MONEY | MOTORS | TRAVEL | TECH | DEAR DEIDRE

IN THE DARK National Grid had three power outage near misses before Friday's major thousands stra

Net Zero
The UK's contribution to stopping global warming

Committee on Climate Change
May 2019

Britain in two-week coal-free record

31 May 2019 Share

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Topics

- Energy prices/trends
- Renewables
- Energy compliance update
- Net Zero CO_2
- GrowSave Update

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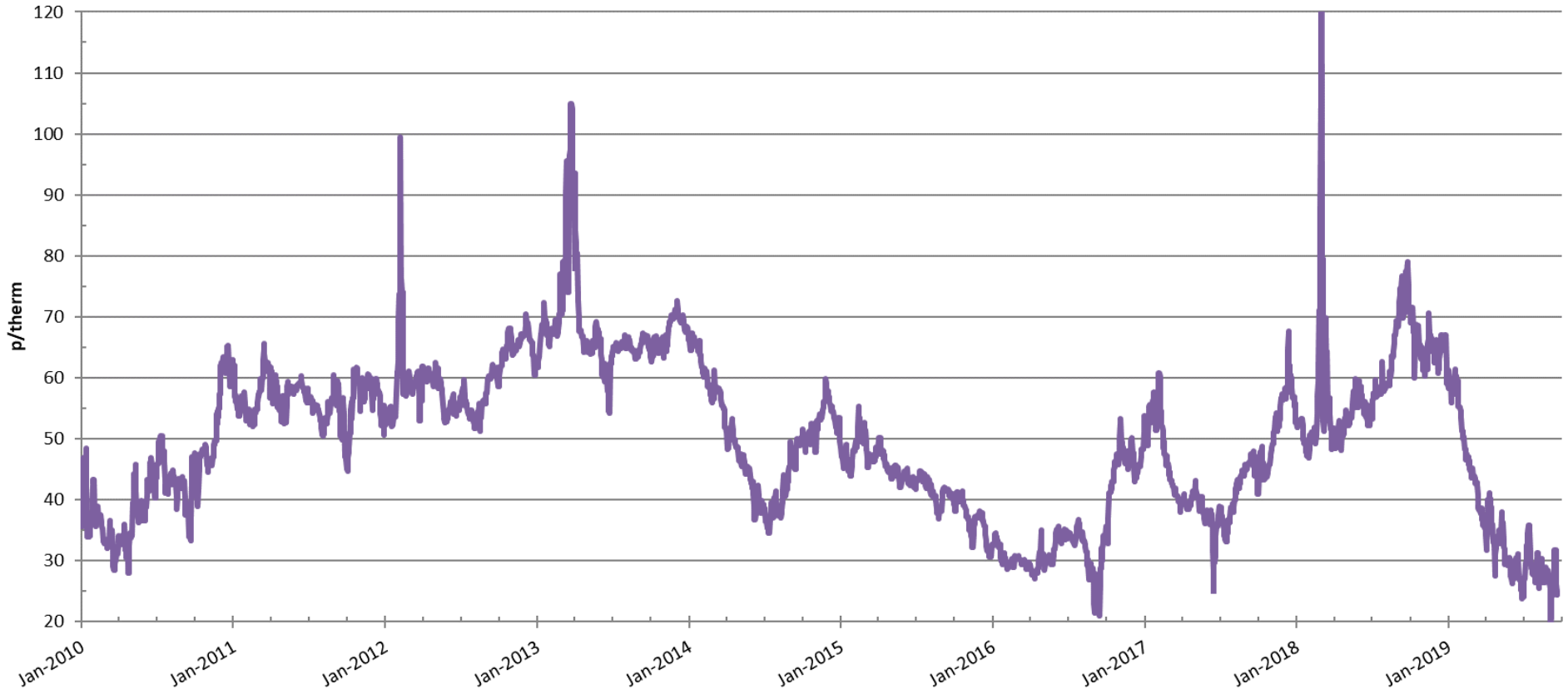
Gas

Day ahead



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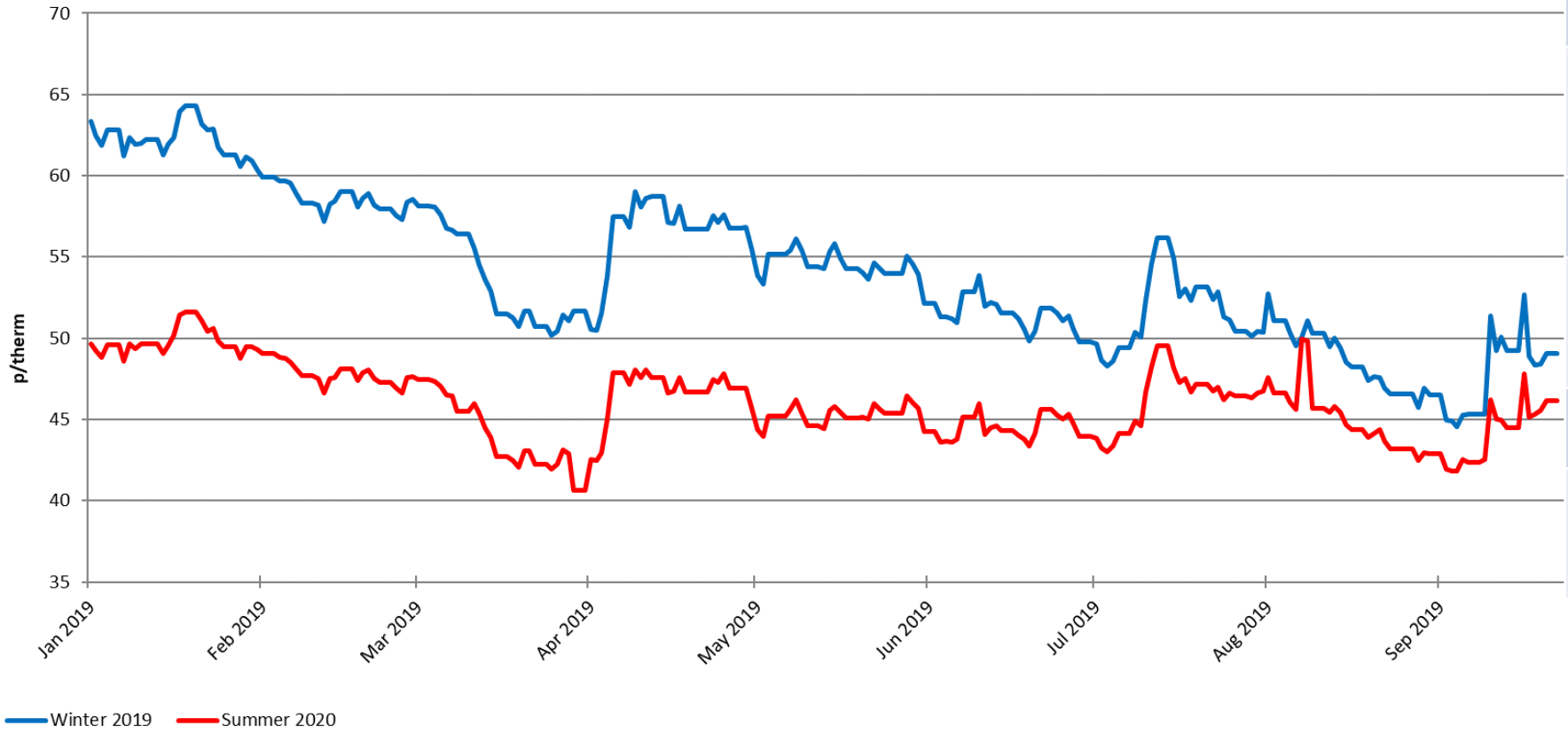
Gas

Next 12 months



Season	p/Therm
Winter 2019	48
Summer 2020	45
Winter 2020	55
Summer 2021	46
Winter 2021	54
Summer 2022	45

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Electricity

- **Commodity**
  - followed the price of gas
- **But…..**
  - Non-commodity costs (RO, FiT etc.) have gone up
  - So often a net increase overall
- **Strengthen the case for small CHP for on site electricity**

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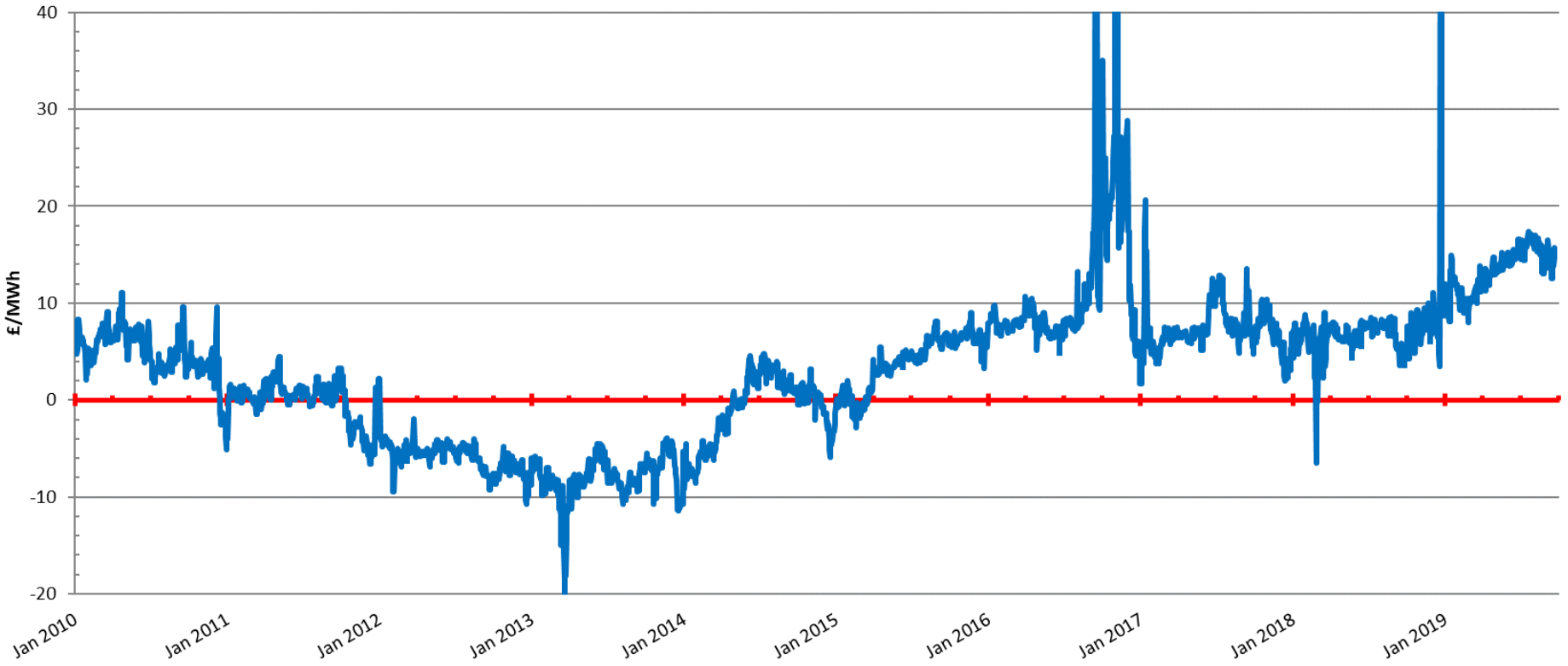
CHP economics

Spark spread



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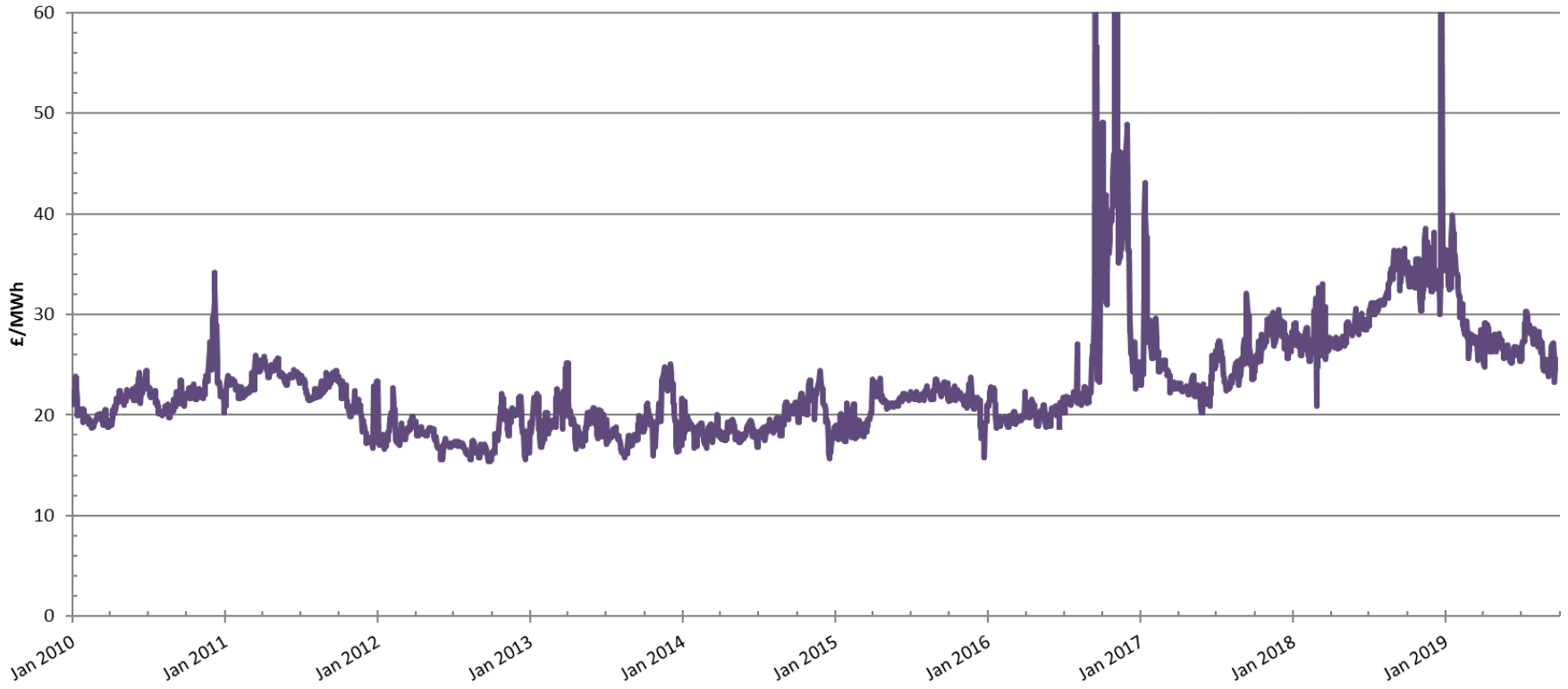
CHP economics

CHP spread



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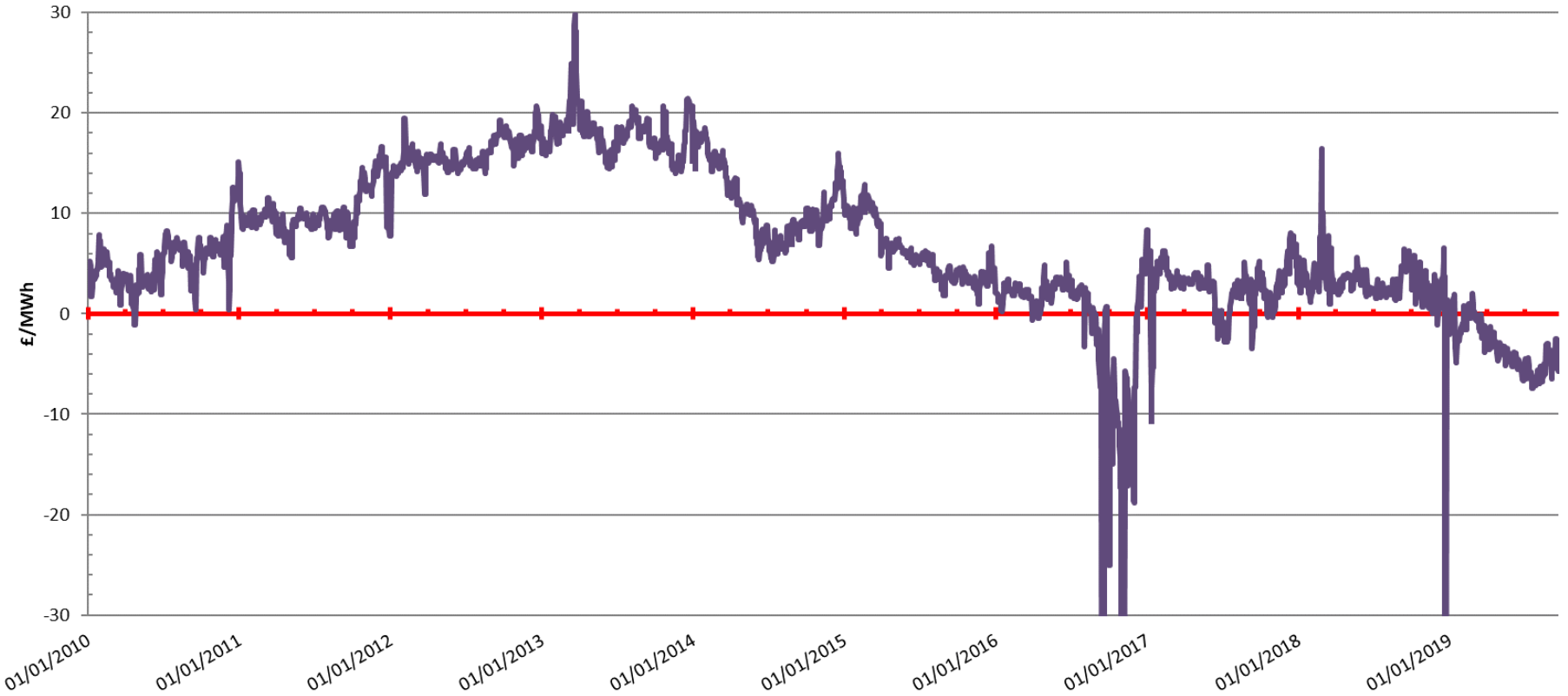
CHP economics

Bare cost of heat



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Renewables update

- **Renewable Heat Incentive**
  - Tariff Guarantee
    - Latest commissioning date 31/01/21
  - Closes to new applications 31/03/21
- **Renewable Electricity**
  - Feed in Tariff and ROCs – both closed last year
  - No realistic options currently
  - PV for own use may be viable

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Energy compliance

- **ESOS**
  - You are in if
    - >250 employees
    - Or turnover > 50m Euro AND >43m Euro balance sheet
    - Compliance deadline 05 Dec 2019
- **SECR**
  - You are in if
    - >250 employees
    - Or turnover > £36m AND balance sheet >£18m
    - First compliance deadline first complete financial year starting after 01 April 2019

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Energy compliance

- **Medium Combustion Plant Directive (MCPD)**
  - Initial permitting ‘hit’ was CHP that provide ‘grid support services’
  - ‘Hit 2’ is 01 October 2019 if
    - >5MW fuel input
    - Operating before 01 December 2016
    - NO_X > 500mg/Nm^3 (15% O_2)
  - ‘Hit 3’ if
    - Install new (to you) combustion plant >1MW
      - Note – exclusions apply to standby generators
    - Permit before it is commissioned

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Net Zero CO_2

- **The views of an engineer**
  - Not necessarily NFU policy
- **>10 years ago carbon footprints were ‘a thing’**
  - But they faded away
- **Net Zero is currently ‘hot’**
  - Will it ‘heat up’ further or ‘cool’?

Page last updated at 00:08 GMT, Wednesday, 29 October 2008

E-mail this to a friend Printable version

UK unveils CO2 footprint standard

By Mark Kinver
Science and environment reporter, BBC News

transparency.

The system, known as PAS 2050, will be managed by BSI British Standards.

The new carbon audit has been piloted by several UK businesses

Net Zero
The UK's contribution to stopping global warming

Committee on Climate Change
May 2019

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Net Zero CO_2

- **UK growers have a great story to tell**
  - Fresh, UK grown produce
  - High output from small land area
  - High water and nutrient use efficiency
- **Energy**
  - Significant improvement in kg/kWh

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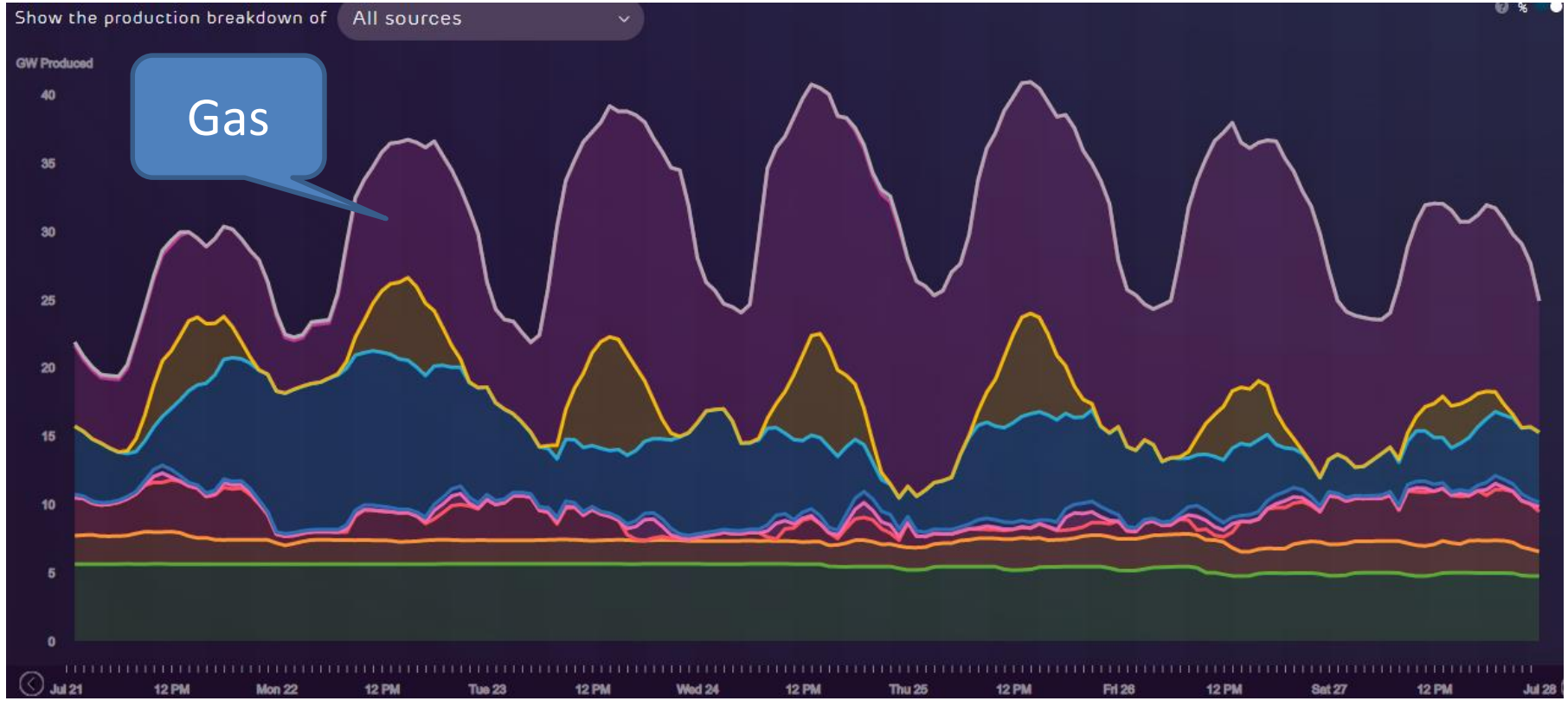
Electricity – CO_2 reduction

- **Grid elec g/kWh is c. 50% what it was 5 years ago**
  - **Technically CHP has a great story to tell**



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Net Zero CO_2

- **Heat & CO_2 are the challenge**
- **Heat is perhaps the easiest technically**
  - Biomass boiler
  - Heat pump
- **Maybe bio-methane via grid will be our saviour?**

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Net Zero CO_2

- **But what about CO_2 ?**
- **There are technical solutions with us now**
  - CO_2 from AD plants
  - CO_2 from biomass com
  - CO_2 from air!

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Net Zero CO_2

- **The future might even be**
  - No natural gas
  - All liquid CO_2 again

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Summary

- **Gas price**
  - Roller-coaster continues
- **CHP**
  - Continues to look good
- **Renewables**
  - Opportunities remain but ‘doors are closing’
  - What next?
- **Compliance**
  - Are you ‘compliant’
- **Net Zero CO_2**
  - Consider where this might take you

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GrowSave

- **New GrowSave contract 2019 - 2024**
  - PE, PO and Soft Fruit
  - Also Dairy, Pork, Cereals, Potatoes
- **Shared learning, Shared challenges**
- **Appeal**
  - How would you like your information
    - App
    - Website
    - Printed

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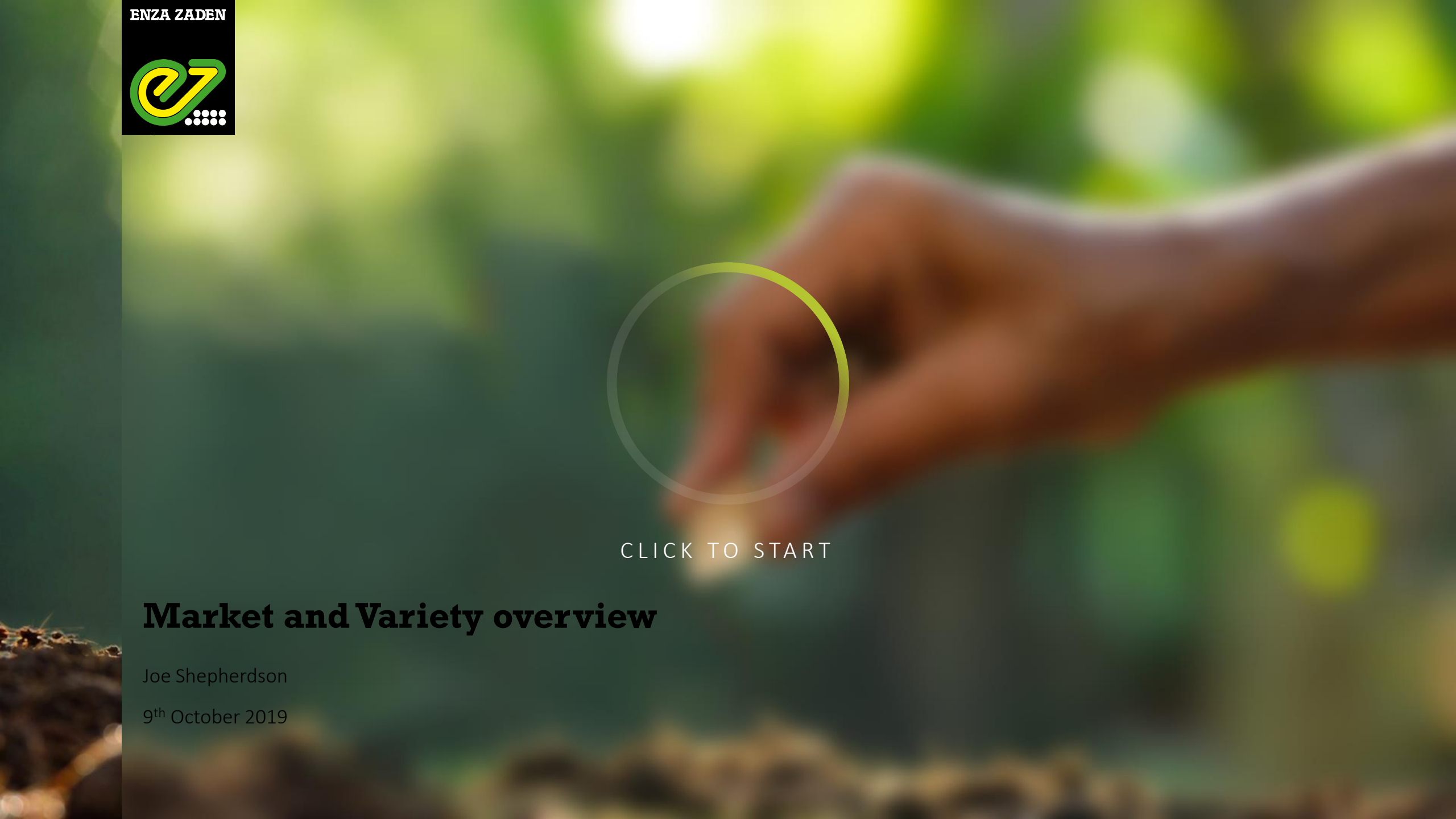
Varieties Discussion
Joe Shepherdson – Enza Zaden



Market and Variety overview

Joe Shepherdson

9th October 2019

Market overview NWE

ENZA ZADEN

Market Developments / Challenges 2019

- High wire increasing (UK and Holland)
- Plastic Free campaign gathering speed
  - As a group should we be working for or against the campaign?
- Spanish looking to long life cucumbers
  - Potentially can cause more competition in the late summer
- Snack / Mini / Midi market
  - Is it growing?
  - Does it have potential for larger areas to be grown?
- CGMMV
  - New cases this season
- Downy mildew
  - Worst year for approx. 8 years

ENZA ZADEN

Variety Overview - Traditional

ENZA ZADEN

Spring crop – Traditional

- Lucania
  - Area grew in both UK and NL 2019
  - Early producer / Even in low light conditions
  - Strong and uniform crop
  - Good production throughout
  - Strong against powdery mildew

- E23L.2352 – NEW MATERIAL
  - 2020 first season available for commercial areas
  - High production
  - Fast growing crop – always maintains colour
  - IR – powdery mildew
  - Some level of CGMMV resistance

ENZA ZADEN

Summer and Autumn Crop – Traditional

- Sumapol
  - True summer variety
  - Fast / high yielding
  - Open plant type
  - IR – powdery mildew
- Dee Zire
  - Strong versatile variety – plant March – August
  - Compact shoot development
  - IR – CGMMV / powdery mildew
- Dee Host
  - Autumn Variety / Fast plant type
  - Min Length 30cm – 36cm / 400g +
  - HR – powdery mildew / IR – CGMMV / CVYV

Variety Overview – High wire

ENZA ZADEN

Spring crop – High wire / Traditional

- Top Spin – Unlit HW
  - Standard variety in unlit HW in Holland for 5 years
  - Vegetative variety – start with 1.5 stems/m2
  - Strong high producing crop in the end
  - Uniform quality throughout the crop
  - Controlled plant length

- Trials for 2020 spring to be screened in Holland
  - Visits can be arranged with Local representative

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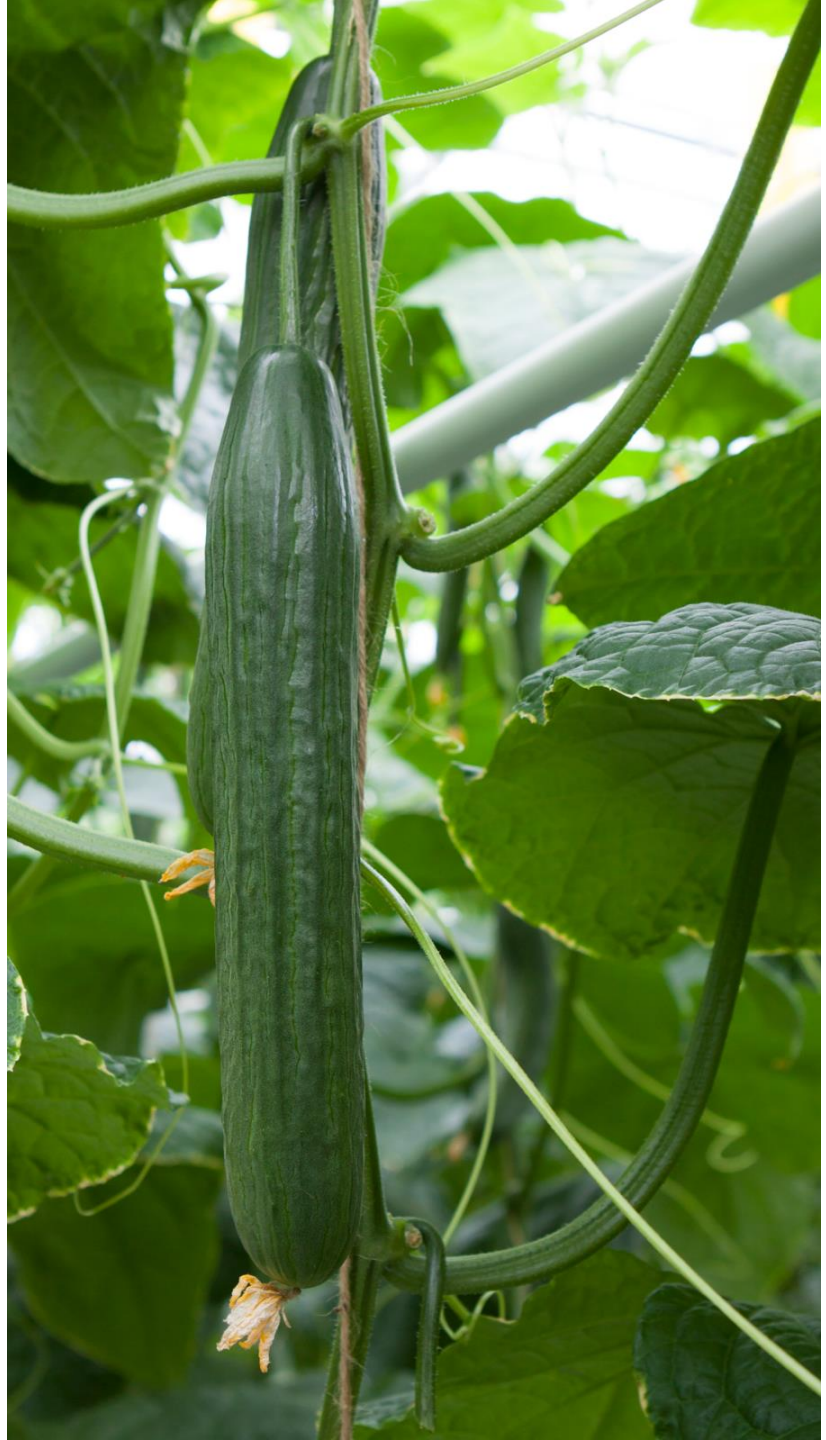
Summer Crop – High Wire

- Dee Rect
  - Follow up to Dee Lite with higher production
  - Very strong against CGMMV / powdery mildew
  - Quality long fruits
  - Single fruited



ENZA ZADEN

Questions…

Contact Details: Joe Shepherdson / **T: +44** (0)7791 592412 / **E:** j.Shepherdson@enzazaden.co.uk

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Varieties Discussion
Ronald van den Bulk – Rijk Zwaan

Introduction

- Ronald van den Bulk
- 19 years cropadvisor at RZ Netherlands Cukes and Sweetpepper

- Supporting RZ UK for Sarah Mayne during her maternity leave.

Rijk Zwaan varieties 1st crop

- Proloog RZ
- Bonprima RZ (24-243 RZ)
- Galibier RZ
- 24-279 RZ Trial umbrella
- 24-280 RZ Highwire
- 24-282 RZ Highwire
- 24-283 RZ Highwire

Proloog RZ Umbrellasystem

- Production
- Reliable
- IR Mildewresistant
- Labour
- Endurance
- Quality
- “Early and late plantings”
- Highwire Proloog also OK.
- And.. And…And

Bonprima RZ (24-243 RZ)

- Proloogtype with high CGMMV resistance.
- A bit more generative
- Allover good results

NEW for trialling: 24-279 RZ

- Trials next to Proloog.
- In potention higher productive
- Also mildew IR
- Sometimes a bit more waving production.

Highwire 24-282 RZ/24-283 RZ / 24-280 RZ

- All new commercial varieties.
- 24-282RZ in highwire lighted greenhouses >12000 lux
- 24-283 RZ in highwire lighted crops 7000-12000 lux
- 24-280 RZ in highwire unlighted crops.

Tailormade advice, please contact me.

Summercrops, new for trialing
24-285RZ

- Highres. for mildew and CGMMV.
- Open croptype
- Fruits perfect quality
- Slow starter, endurance good.

Summercrops
Tailormade advice

- Lausanna RZ, low and highwire
- Uniformico RZ, low and hiwire
- Bonsanna RZ low and high wire(cgmmv resistant Lausanna type)
- Proloog RZ (ir mildew)
- Cadance RZ (pm resistant)
- Stockeu RZ (pm resistant)
- Climont RZ (pm resistant)
- Bonbon RZ (ir mildew, cgmmv res)
- Bonifacio RZ (cgmmv res)
- Laureen
- Roxanna

Feel free to contact me:

- Ronald van den Bulk
- RZ The Netherlands
- 0031-651310630

- Website of Rijk Zwaan.

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Varieties Discussion
Rens Muusers – Nunhems

nunhems

BASF
We create chemistry

Precision breeding for the 21st century.

Together,
keeping ahead of a changing world.

Rens Muusers, October 2019

BASF Vegetable Seeds has globally oriented activities

~2,100* employees
in **42** countries

~1,200 varieties in **24**
vegetable crops

Seed production in **23** countries

16 breeding stations,
2 research centers

€401 million sales in **2018**

New built breeding facilities in 2018 for cucumber.

What is driving us

We create chemistry

Together, keeping ahead of a changing world

Why partnership is important for all of us

Today's world is rapidly developing.

- Technological innovation
- Crop security
- Changing legislation

- Travelling & mixing people
- Consumers looking for more experience, new flavours, healthiness & convenience
- Growing global population

BASF We create chemistry | nunhems

Trends in cucumber market

- Increasing risk of viruses and diseases
- Labour availability and quality → increase need automatization
- Need of consistent product quality → high wire growing
- Use of artificial light → more yearround growing

Nunhems offering

- High wire growing
  - Hi revolution varieties (Hi Power, Hi Light, Hi Force)
    - Labour friendly – horizontal leaf stand, short internodes
    - Selective fruit development
    - Uniform fruit size
    - Suited for lighted crops

- Umbrella system
  - SEcurence varieties (SEncere, SEpalin)
    - Security through resistance against CGMMV and powdery mildew
    - Combined with exxelent production potential

Future proof varieties

- Yearround production
- Stable production no matter which conditions or disease pressure.
- Ready for robotization

Together, keeping ahead of a changing world

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Derek Hargreaves

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Green Mottle Mosaic Virus

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Why is it such a problem?

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Not always easy to spot!

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It Can be in the seed

It Can be in your crop

It Can be on your visitor

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How can I sort this out?

(I hear you ask!)


Factsheet 18/11
Cucumbers
Horticulture Development Company
Stoneleigh Park
Kenilworth
Warwickshire CV8 2TL
T: 0247 669 2051
E: hdc@hdc.ahdb.org.uk
Cucumber green mottle mosaic virus (CGMMV)
Derek Hargreaves, Horticultural Consultant
Cucumber green mottle mosaic virus (CGMMV) has become a persistent problem on some cucumber nurseries in the UK. The number of affected nurseries is increasing as the disease can spread rapidly through a crop reducing yields by up to 25%. This factsheet will help growers to identify the virus, it also provides guidance on how to stop the virus entering crops; how to reduce spread once it has occurred and; how to clean-up to prevent recurrence.
Background
CGMMV is a disease that has affected many cucumber nurseries across the world (Figure 1). The virus does not appear to be present in the USA but is found in Canada, Europe, Russia, the Middle East, India, Korea and Japan. In the UK it was first recorded in the Lea Valley area and was common in that area by the early 1960s. By the mid-1980s it was widespread mainly because of the practice of using locally produced (and infected) seed of the cultivar Butchers Disease Resistor. Since then the disease has been recorded in many countries affecting a range of cucurbit species including cucumber, gourd, melon and watermelon, though not marrow.
The virus is spread by infected seed with virus particles carried on both the outside and the inside of the testa (seed coat). Virus particles are transferred to the developing cucumber seedling as it emerges which then provides a focal infection point within the crop. The virus is easily transmitted by crop workers on their hands, clothing, knives and other equipment and extensive spread occurs well before visual symptoms are seen. The virus is also spread by root contact and may occur in runoff. There are no known insect vectors.
Once the virus is transferred to a new host plant it rapidly spreads and multiplies within that plant but it does not show symptoms for up to 14 to 21 days post the initial infection.
However the virus can be spread to other plants, e.g. by leaf contact, during this period. This makes the spread of the virus so widespread throughout affected crops because infected plants are symptomless for this short but significant period.
The level of crop infection has increased with the introduction of multiple cropping because of spread during replanting. The amount of crop loss is connected to the age of the plant at the time of infection - the earlier the infection the greater the losses. When crops are replanted many are infected at that stage without showing symptoms. Second replant infection rates can be close to 100% shortly after planting.
1 Cucumber green mottle mosaic virus showing typical dark green patches and leaf blistering


506
506

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What do this AHDB - CGMMV Factsheet and a parachute have in common?

They have to be open to work for you!

This is my last presentation

Thank you for your attention
Over the years
And goodbye!

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Thank you for coming!