Interreg 2 Seas Mers Zeeën INNO-VEG

BRITISH GROWERS inagro Delphy ARVALIS ADAS west-vlaanderen

Framework conditions for innovation

Leek discussion group

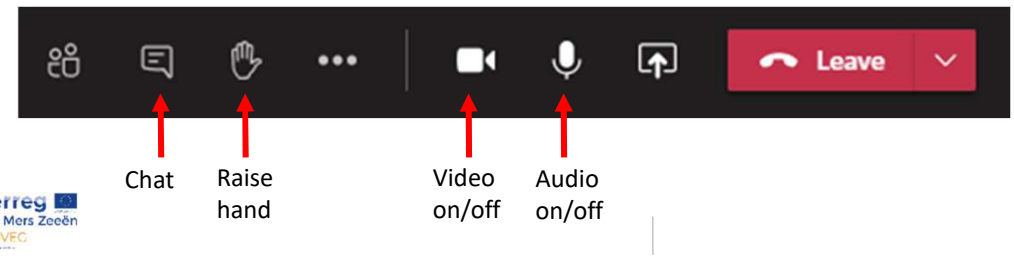
Tuesday 20th October 2020

@InnoVeg
#INNOVEG

1

Some 'housekeeping' rules

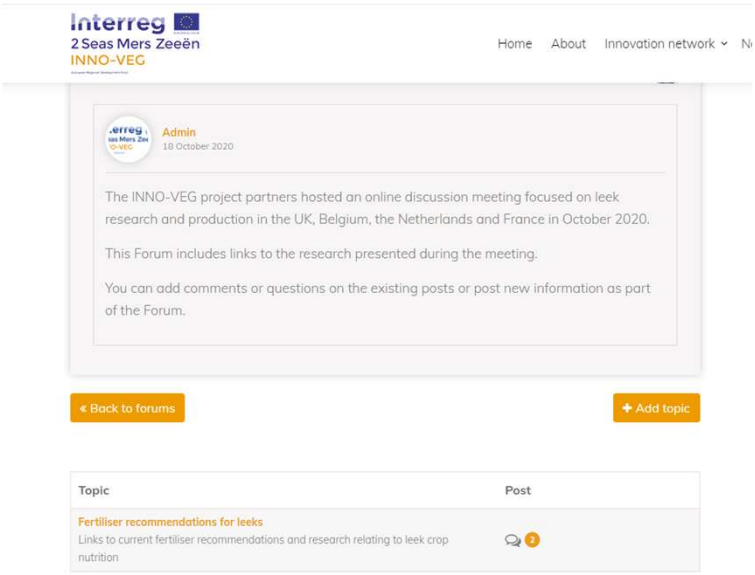
- Please turn your audio and video off unless you are speaking
- Raise your hand to ask a question
- Use the meeting chat to ask questions and for discussion during the meeting
- Please introduce yourself in the chat
- The meeting will be recorded – let us know now if you object to this



Interreg 2 Seas Mers Zeeën INNO-VEG

2

Forum for the meeting on the INNO-VEG website



- Links to information presented
- Links to slides next week
- Register to add comments/ask questions
- www.inno-veg.org/eg/forum
- In English, Dutch & French

3

Agenda

- Technical presentations
  - Leek nitrogen response studies (Lizzie Sagoo, ADAS)
  - WikiLeeks project (Eva Ampe, Inagro)
  - Update from UK leek SCEPTREplus crop protection project (Dave Kaye, ADAS)
- Grower/industry presentations
  - Patrick Allpress, Allpress Farms, Chatteris, UK
  - Pieter Vandooren, Hooglede, Roeselare, Belgium
  - Alternative weed control for Leeks & Onions, Philip Garford, Garford Farm Machinery, UK
- Questions and discussion

4

Interreg 2 Seas Mers Zeeën INNO-VEG

Framework conditions for innovation

Leek nitrogen response experiments

Lizzie Sagoo, ADAS

@InnoVeg
#INNOVEG

5

Fertiliser recommendations for leeks in UK - nitrogen

SNS Index	0	1	2	3	4	5	6
SMN to 90 cm kg/ha	<60	61-80	81-100	101-120	121-160	161-240	>240
	N rate (kg N/ha)						
Nitrogen	200	190	170	160	130	80	40

- Autumn N – an additional 50-100 kg N/ha may be applied in the autumn to support growth and colour
- N regulations (Nmax) - must not apply more than 370 kg N/ha

6

Fertiliser recommendations for leeks in UK – P, K & S

P Index	0	1	2	3	4	5	>6
mg/L P[1] 0-15 cm	0-9	10-15	16-25	26-45	46-70	71-100	>101
	Phosphate (kg P_2O_5/ha)						
Phosphate	200	150	100	50	0[2]	0[2]	0

1. Olsen's extractable P
2. At P Index 4 and 5 up to 60 kg P_2O_5/ha as starter fertiliser may be beneficial

K Index	0	1	2-	2+	3	>4
mg/L K[1] 0-15cm	0-60	61-129	121-180	181-240	241-400	>401
	Potash (kg K_2O/ha)					
Potash	275	225	175	125	35	0

1. Ammonium nitrate extractable K

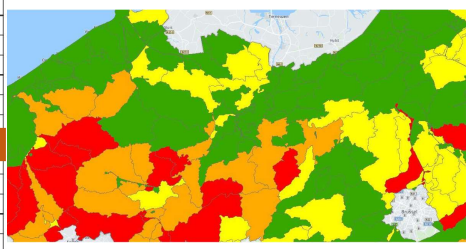
- Sulphur – 25 kg SO_3/ha

7

Fertiliser regulations for leeks in Belgium (Flanders region) - nitrogen

- Different areas with different maximum fertilizer application in each area

Teelt		Werkzame N (kg/ha, jaar)						Dierlijke N (kg/ha, jaar)
		Gebiedstypes 0 en 1		Gebiedstype 2 (-5%)		Gebiedstype 3 (-10%)		
		Zand	Niet-zand	Zand	Niet-zand	Zand	Niet-zand	
Grasland	Maaien	375	385	356	366	338	347	170
	Maaien + grazen	235	245	223	233	212	221	170
Wintertarwe of triticale		160	175	152	166	144	158	100
Wintergerst of andere graangewassen		110	125	105	119	99	113	100
Suikerbieten		135	150	128	143	122	135	170
Voederbieten		235	260	223	247	212	234	170
Aardappelen		190	210	181	200	171	189	170
Maïs		135	150	128	143	122	135	170
Groenten groep I		225	250	214	238	203	225	170
Groenten groep II		160	180	152	171	144	162	170
Groenten groep III		115	125	109	119	104	113	170
Sierteelt en boomkweek		160	180	152	171	144	162	170
Aardbeien		160	160	152	152	144	144	170
Spruitkool		225	250	214	238	203	225	170
Teelten met een lage stikstofbehoefte[1]		115	125	109	119	104	113	125
Andere leguminosen dan erwten en bonen		70	75	67	71	63	68	120 (Z) / 125 (NZ)[2]
Andere teelten incl. voederkool en bladrammenas		130	145	124	138	117	131	170



8

Nitrogen requirements of leeks

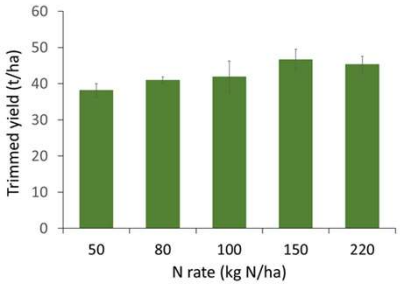
- AHDB Horticulture project 'Nitrogen requirements of leeks'
- Two nitrogen response experiment (in 2009 & 2010)
  - Low soil nitrogen supply sites (SNS Index 0 and 1)
  - Over-wintered leeks (Belton)
- 2009 N response experiment (SNS Index 0)
  - N rates: 0, 180, 240, 360 & 480 kg N/ha
  - Large yield increase up to 180 kg N/ha
  - No increase at higher N rates
- 2010 N response experiment (SNS Index 1)
  - N rates 0, 75, 150, 200, 300 & 500 kg N/ha
  - Yields increased up to 200 kg N/ha, but declined at higher N rates

Interreg 2 Seas Mers Zeeën INNO-VEG

9

INNO-VEG N response experiments (2019 in UK)

- Three N response experiments in 2019 across 2 fields
- Field one
  - Peaty soil (45% organic matter)
  - Two varieties – Chieftain and Spheros
  - Drilled 20th March; harvested 2nd December
  - SNS Index 6 – no significant response to N
- Field two
  - Loamy sand, SNS Index 2
  - N rates: 50, 80, 100, 150 & 220 kg N/ha
  - Krypton
  - Transplanted 9th May; harvested 8th October
  - Yield response to N up to 150 kg N/ha
  - *Fertiliser recommendation at SNS Index 2 170 kg N/ha*



10

Crop N uptake and fertiliser N recovery

- Fertiliser N recovery within 1 month of establishment was <3% of fertiliser N applied

Date (2009/10 trial)	% Fert. recovery	Date (2010/11 trial)	% Fert. recovery
25 Jun 2009	2		
22 Jul 2009	12		
19 Aug 2009	22	17 Aug 2010	3
22 Sep 2009	34	15 Sep 2010	13
2 Nov 2009	47	18 Oct 2010	26
14 Dec 2009	46	13 Dec 2010	41

Source:
AHDB Horticulture project *'Nitrogen requirements of leeks'*

- Recommendations:
  - Fertiliser N should be split to match the growth of the crop
  - No more than 50 kg N/ha should be applied in the seedbed for drilled crops and no more than 100 kg N/ha for transplants.
  - The remainder should be applied as one or two top-dressings when the crop is fully established

11

Autumn nitrogen

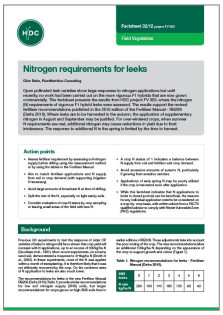
- 'Supplementary' N in autumn/winter can increase yields & improve colour
- BUT, it also increases the risk of frost damage, so results are mixed
- AHDB Horticulture project *'Quantifying over-winter nitrogen requirements of the leek crop'*
- 50-100 kg N/ha applied October/November increased yields (mild winter)
- Later applications of N reduced yields
- Guidance: *An additional top-dressing of 50-100 kg N/ha in the autumn may be beneficial where the risk of frost damage is low*

Interreg 2 Seas Mers Zeeën INNO-VEG

12

Further information/links

- AHDB Nutrient Management Guide
- AHDB Factsheet – Nitrogen requirements for leeks
- AHDB project reports:
  - Nitrogen requirements of leeks
  - Quantifying over-winter nitrogen requirements of the leek crop'
- Links to these documents are on the website
  - www.inno-veg.org/en/forum



Interreg 2 Seas Mers Zeeën INNO-VEG

13

Interreg 2 Seas Mers Zeeën INNO-VEG

inagro Delphy ARVALIS ADAS west-vlaanderen

Framework conditions for innovation

WikiLeeks

AGENTSCHAP INNOVEREN & ONDERNEMEN

Vlaanderen is ondernemen

inagro ONDERZOEK & ADVIES IN LAND- & TUINBOUW

ILVO Instituut voor Landbouw-, Visserij- en Voedingsonderzoek

KU LEUVEN

vito

PROEFSTATION VOOR DE GROENTETEELT

pcg

WikiLeeks project

Eva Ampe, Inagro

@InnoVeg
#INNOVEG

14

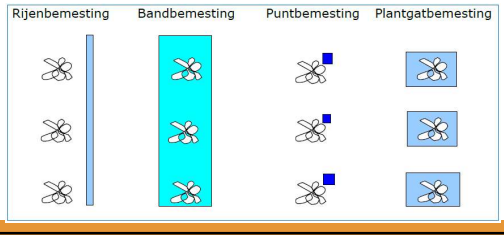
Site-specific fertilization

➢ ***Variable fertilizer dosing based on task maps or real-time sensor data***

Variable dosing types:
- Variation in the driving direction
- Variation in the driving direction & in the working width

Variation = on/off
Variation = ≠ steps or continuous

➢ ***Local application of fertilizers (with or without variable dose)***

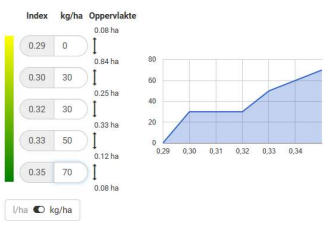


15

Site-specific fertilization

⑩ Create task maps based on decision rules is complex

Fertilization
=
Complex



Take into account variation soil, weather, crop development

16

Stepping up to site-specific fertilization

- Step 1: Trials at research station (calibrate the model)
- Step 2: Follow-up on farm (calibrate the model)
- Step 3: Apply site-specific fertilization on farm

Today

Interreg 2 Seas Mers Zeeën INNO-VEG

17

Measuring is knowing

Soilscan

Drone images

Soilsamples

Intermediate yield measurements

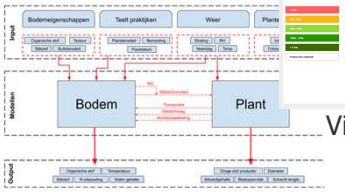
18

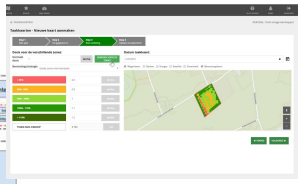
Precision leek growing with precision farming

Data collection

Growth model

+weather data

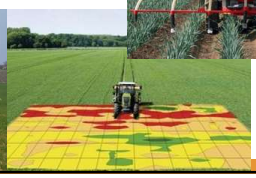




Visualisation and interpretation

WikiLeeks

Apply



Evaluate

19

Soil scan maps are converted into advice

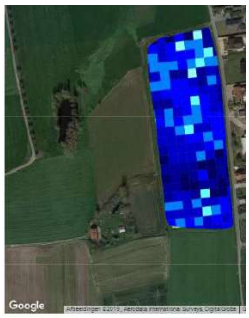
pH

pH categories

OC %

Lime

Compost



20

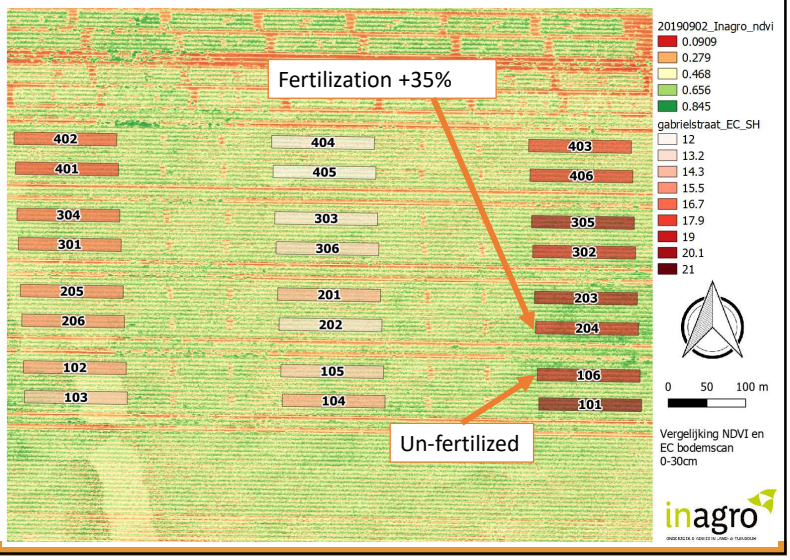
Qualitative drone data is crucial

- Acquisition standards fine-tune:
- Winter-time drone flights are difficult
- Standardized and automatic data processing
- Fast visualization and sharing of results

21

Mapping the soil
= explaining differences

- Highest yield has highest EC, despite big difference in fertilization
- Higher yield also colors greener on NDVI card

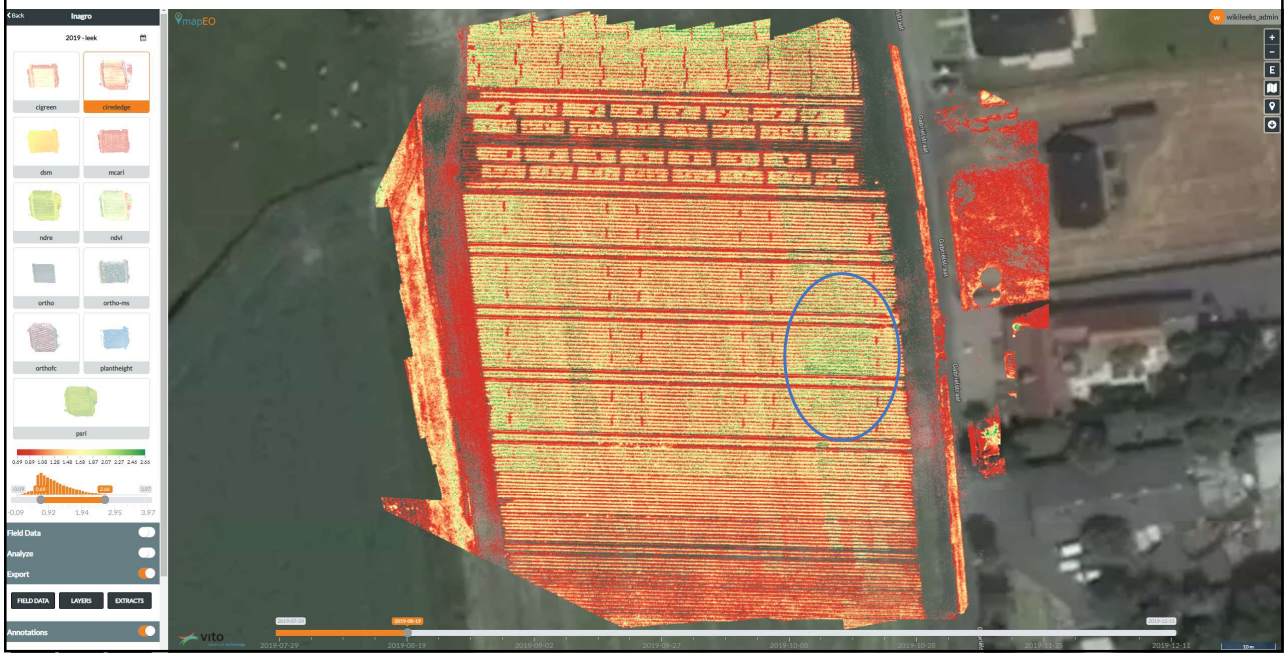


Interreg 2 Seas Mers Zeeën INNO-VEG

22

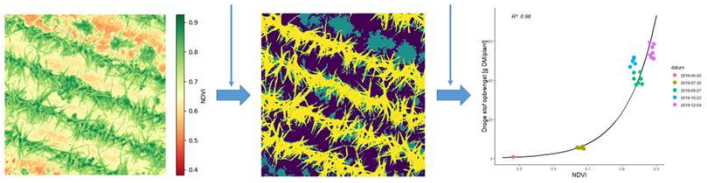
Easy visualisation via online tool Mapeo

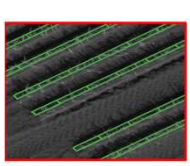
EA

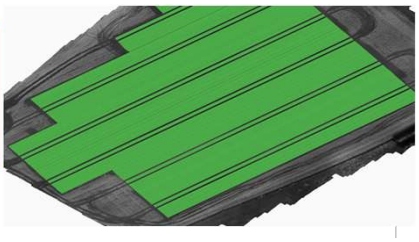


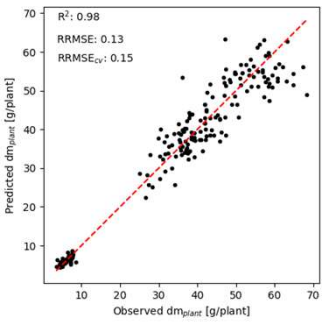
23

Goal drone images is to replace destructive sampling









Interreg 2 Seas Mers Zeeën INNO-VEG

24

Stepping up to site-specific fertilization

- Step 1: Trials at research station (calibrate the model)
- Step 2: Follow-up on farm (calibrate the model)
- Step 3: Apply site-specific fertilization on farm

Today

Interreg 2 Seas Mers Zeeën INNO-VEG

25

SCEPTREPLUS

ADAS HORTICULTURE

AHDB AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

UK SCEPTREplus : leek crop protection projects

Dave Kaye, ADAS Horticulture

HORTICULTURE

26

Overview

SCEPTREPLUS

- Introduction to the SCEPTREplus programme.
- SCEPTREplus leek trials:
  1. Leek rust
  2. Seed treatments
     A. Fusarium
     B. Pythium

HORTICULTURE

AHDB

27

ADAS HORTICULTURE

Introducing

AHDB HORTICULTURE

SCEPTREPLUS

+ Develop solutions to emerging crop protection issues

+ Reduce adverse environmental impacts of crop protection products

+ Reduce supply chain vulnerability

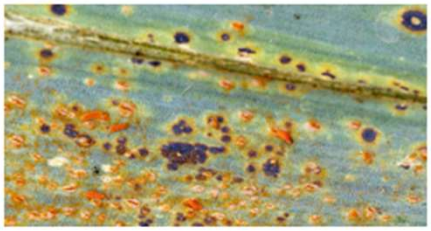
+ Accelerate the testing process and bring new products to market

28

Leek rust

SCEPTREPLUS

- Leek rust caused by *Puccinia allii*
- Current control: azoles and strobilurins, no SDHIs*
- Long season crop: limited number of applications.
- Rust is active for most of the year: a challenge for overwintered crops.
- (exception, Signum for white tip)



HORTICULTURE

29

Trial summary

SCEPTREPLUS

- Based at ADAS Boxworth (Cambridgeshire).
- Artificially inoculated using infected spreader plants.
- Cv. Jolant
- 8 treatments including a double untreated control and commercial standard.
- Four applications, every 2-3 weeks.
- Hand watered twice daily to encourage infection.
- Rust developed within 17 days of inoculation.

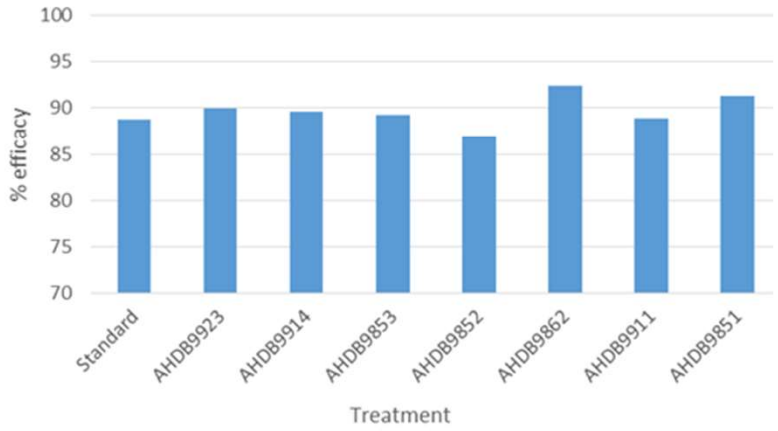
HORTICULTURE

30

Results

SCEPTREPLUS

Efficacy of products, shown as percentage reduction in rust severity at the final assessment timing.



HORTICULTURE

AHDB

31

Conclusions

SCEPTREPLUS

- The standard reduced disease incidence by approx. 89%.
- By the final assessment, all of the products tested gave over 87% control and AHDB9862 and AHDB9851 provided excellent control (>90%).
- AHDB9852 (suitable for organics) also gave good efficacy against rust giving 87% control.
- Several options to take forwards for EAMU to support the industry.

HORTICULTURE

AHDB

32

Seed treatment trials

SCEPTREPLUS

- The withdrawal of thiram and metalaxyl-M has left limited options for seed treatments in a variety of horticulture crops.
- Seed treatments will be trialled against leek seedlings grown in soil artificially inoculated with fusarium or pythium to establish efficacy.
- Germination tests will establish crop safety at the date of treatment and after 4 months replicating 'long-term storage'.
- Preliminary work identifying inoculation load is currently underway.

HORTICULTURE

AHDB

33

Additional information

SCEPTREPLUS

- SCEPTREplus leek rust report available online - https://ahdb.org.uk/cp-165-sceptreplus-research-for-sustainable-plant-protection-products-for-use-in-horticulture.
- AHDB leek rust factsheet - https://ahdb.org.uk/knowledge-library/leek-rust


Factsheet 14/11
Field vegetables

Horticulture Development Company

Leek rust

Background

HORTICULTURE

34

Allpress Farms Ltd

Patrick & Nick Allpress
Allpress Farms Ltd

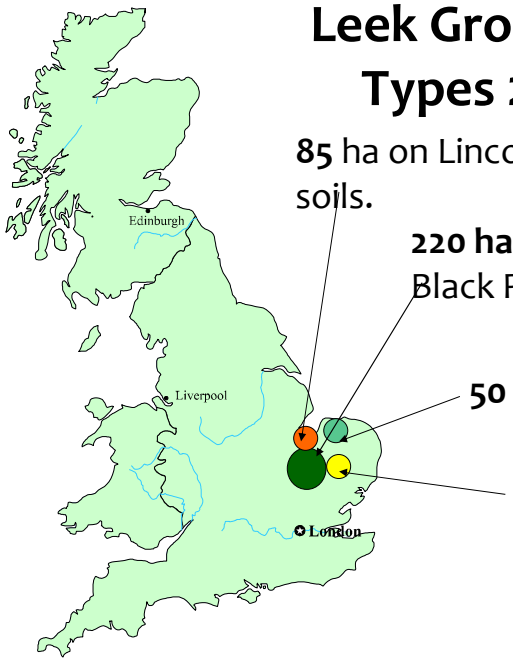
35

Overview of Allpress Farms

* Allpress are 3rd generation farmers, family owned and family managed since the 1930's. I have worked on the farm for 30 years alongside my brother Nick.
* Allpress farm 1400 ha in the UK and 48ha in Spain as a joint venture.
* Crops include leeks, onions, sugar beet, wheat & maize.
* We're based in Chatteris, Cambridgeshire with 89 full time employees and 120 regular agency workers.
* Leek Production started in 1974 with 8ha expanding to 400ha in 2020.
* In 2014 Allpress started producing energy via a 500kw Anaerobic Digester, which is fed by 9000 tons of whole crop Maize, and 2000 tons of leek/onion waste. The energy produced helps power the leek packing facility and stores.
* More information on www.allpressfarms.co.uk

36

Leek Growing Soil Types 2020-21



85 ha on Lincolnshire silt soils.

220 ha on Cambridgeshire Black Peat soils.

50 ha on Norfolk sands.

45 ha Organic Norfolk sand.

37

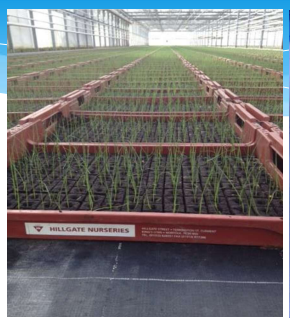
UK Supermarket Supply Calendar by soil type

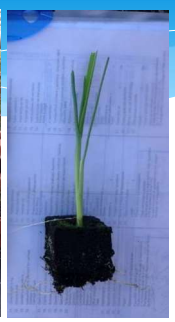
	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
UK Plants Black Peat		■	■	■								
UK Drill Black Peat				■	■	■	■	■			■	■
UK Drill Sand							■	■	■	■		
NL Bare Roots Sand								■	■	■		
UK Drill Silt									■	■	■	
UK Plant Tape Sand										■	■	
Spain Plants Sand	■											■

38

Leek Plant Types - Conventional

- Block Plants (62ha) are from UK heated glass houses for early production July & August.
- Bare Root plants (21ha) from Holland are use for Winter production January to March.
- Plant Tape (12ha) is also used for winter production. An automated planting system to increase output and planted area.





39

Leek Plant Types - Organic

* Organic leeks are all grown from plants to reduce the pressure of weed competition. Super Seedlings & modules (32 ha) from Morocco, Holland and the UK are used, production starting in July through to the following April.
* Fleece covers help to warm up soils in March to encourage root development for July production. Also helps to protect plants from early spring frosts.
* **Total Planted area for both organic and conventional is 31% of our leek production.**

40

Seed Drilling

- Precision air drill - Seed is distributed via a stainless steal disc where the seed is sucked onto a hole and then released when over the soil at a depth of 2cm.
- Higher capacity than planting – 30-40 acres per day.
- Slower growing than plants. Germination to emergence in the field takes time depending on field conditions and soil temperatures.
- Baby leeks are drilled at a high density so the plant stays between 12 & 20mm diameter.
- **Total seed drilling area is 69% of leek production.**

41

Dust Storm

- Drilled crops are at risk from dust storms or "Fen Blows" that often occur during late spring when the leeks are emerging.
- The blowing soil behaves like a sand blaster and cuts away all visible leek plants that are vulnerable. It can devastate a crop.
- By establishing a Barley Cover crop before drilling the soil is stabilised and protects the soil from blowing.

42

Harvest with Field Leek Rig

- Allpress have a high production capacity with 6 field rigs & 1 top lifter to harvest the UK crop.
- Field sampling is regularly done to prioritise size quality and maturity of crop.
- Our Labour Agencies provide workers to hand pick the leeks in front of the machine, place leeks on a set of conveyors that go through a washing system before being selected into trays for different specifications.
- 1 rig with 25 people can harvest up to 12,000kg per day.
- Overall Capacity is up to 250ton/week.

43

Packing & Storage

- Allpress use Blast chillers to remove field heat down to 2 degrees C.
- Our Cool chain through the factory to dispatch helps improve product quality and shelf life.
- Recent expenditure has improved product flow and processing efficiency. There are 4 prepack lines that can pack up to 250t/week.
- 6 stores can hold up to 300t for 42 days to extend the leek season throughout May.

44

Sales Plan

- Total Annual Supermarket Sales **10495** tons from UK & Spain.
- Prepack is 63% of sales.

Tons	Loose	Prepack	Baby	Organic
Block Plants from Glass House	500	700		
Super Seedlings from Glass House				400
Pre Christmas Seed Drilled	1000	2400	80	
Post Christmas Seed Drilled	800	3000		
Post Christmas Bare Roots	700			
Spanish Planted Leek	200	470	65	180
	3200	6570	145	580

45

Recent Developments

- Covid-19 has increased home cooking and buying of staple foods. Supermarkets have remained open and Leeks have benefited from increased sales.
- Allpress are currently doing trial work into extending leek storage into June to reduce imports from Spain.
- There have been big improvements in camera guided systems for inter-row hoeing and inter-row spraying which has become more important with reduced pesticide choices.

46

Challenges for the future

* **Pesticide De-Registration**
* There is a general requirement from The European Commission to reduce the amount of pesticides used within farming. Furthermore under the UK's Chemicals Regulation Division (CRD) many "minor use" pesticides have also been withdrawn from use. The combination of these two bodies has brought about a huge reduction in pesticide usage in the UK.
* Most Pesticides currently used on Leeks are approved under an EAMU (An Extension of Authorisations for Minor Use Crops). This means none of these pesticides are certain to be used in the future as they come up for renewal.
* Consequently, Weed, Disease & Pest Control have become more difficult. Recent de-registered products include Aramo (tepraloxydim); Linuron (linuron); Totril (ioxynil); Thiram (thiuram disulphide) ; CIPC (chlorpropham); Buctril (bromoxynil); & diquat;

47

Challenges for the future

* **Pesticide De-Registration**
* Force ST (tefluthrin) seed treatment has been withdrawn for use after December 31st 2021. This is generally only used in the UK against Bean Seed Fly, a soil borne pest.
* The risks of growing crops from seed without Force are higher and could make planting leeks more common for UK Leek production.
* Bean Seed Fly doesn't affect all of the UK but is worst in regions of East Anglia where UK leek production is high.

48

Challenges for the future

* **Plastic Reduction** – 63% of our sales are packed in plastic bags. No suitable 100% bio-degradable alternative has been commercially found yet!
* **Brexit** and the reduced reliability on labour from Europe. This is certainly going to be one of our biggest challenges. Let's hope for a **DEAL**!

49

Interreg
2 Seas Mers Zeeën
INNO-VEG

inagro Delphy ARVALIS ADAS west-vlaanderen

Framework conditions for innovation

Pieter Vandooren

Hooglede, Roeselare, Belgium

@InnoVeg
#INNOVEG

50

Pieter Vandooren

- Organic (bio) leeks: 9 ha (22,3 ac)
- Past: 14 ha (34,6 ac) conventional leeks
- Why organic?
  - Increasing restrictions on the use of pesticides and fertilisation
  - Volatile price
  - Limited social recognition

Interreg 2 Seas Mers Zeeën INNO-VEG

51

Pieter Vandooren

- 4 year rotation
  - cauliflower (nl: bloemkool)
  - Leeks (nl: prei)
    - fresh market (80%)
    - fourth gamma (10%) (Sliced leeks, fresh)
    - frozen (10%)
  - fennel (nl: venkel) / celeriac (nl: knolselder)
  - grass clover (nl: grasklaver)

Interreg 2 Seas Mers Zeeën INNO-VEG

52

Controlled traffic farming

- Paths at 3 m 20 (10,5 ft)
- Adapted tractor
  - wheelbase centre to centre 3 m 20
- 3 m of ground to cultivate and 20 cm loss

Interreg 2 Seas Mers Zeeën INNO-VEG

53

Steketee mechanical weeding

inagro Delphy ARVALIS Institut du végétal ADAS

- Everything planted at a distance of 60 cm (2 ft)
- Planted with RTK GPS
- IC camera
  - Recognizes the plants
  - Deep learning
  - Changing sunlight can be a problem
    - Recent update

Interreg 2 Seas Mers Zeeën INNO-VEG

54

Treffler weeder

- Most important weapon against weeds
- 9 m 60 (31,5 ft) working width → 3 beds at once.
- 2,5 ha per hour (6,2 ac/hour)
- Every 10 days

55

Deep drip irrigation

- Depth 40 - 45 cm (1,3 – 1,5 ft)
- Every 75 cm a hose
- 8 ha divided into 6 sections
  - Smaller pump
  - Possible to irrigate only part of the field

56

Future

- Different directions: Growth fourth gamma and industry.
- Selling more leeks per piece, it seems cheaper for the consumer.
- Further growth of the organic market
  - Stricter requirements for conventional market
  - Increasing quality of organic leeks
- Thrips in particular is a problem where a lot of progress can still be made. Rust and paper is not really a problem with the current varieties.

57

58

garford

providing advanced technology for progressive farming

Alternative Weed Control
Leeks and Onions

1

Garford Products for the Onion Grower

- Robocrop Precision Guided Hoes
- Hooded Sprayers
- Robocrop Spot Sprayer
- Weedfoil Wiper
- Robocrop InRow Weeder

2

robocrop

Vision guided, computer controlled, field scale implements delivering a fast and effective means of mechanical, or targeted chemical, weed control.

3

Robocrop Precision Guided High Speed Hoes

garford

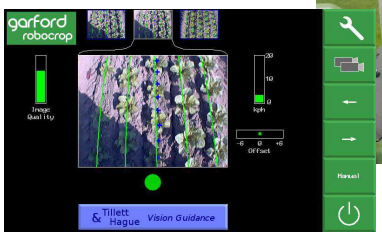
Robocrop uses video cameras and bespoke image analysis software to accurately locate crop rows ahead of the implement so facilitating accurate a fast inter-row guidance.

4

The video camera views the crop just ahead of the row crop equipment.

The computer analyses the images searching for higher densities of green pixels which should match the pre determined grid to determine exact plant row position.

The computer continually adjusts the position of the hoe via a hydraulic sideshift or disc steer system.



5

Robocrop Precision Guided High Speed Hoes

So long as the crop row is a clear dominant feature and weeds are reasonably evenly distributed crop row following is generally +-10mm and accuracy can be maintained at up to 12kph or beyond.

6

garford

[redacted]

7

garford

Garford can combine additional equipment into the hoes such as

- Granular fertiliser applicators
- Liquid fertiliser applicators
- Bandsprayers

8

The granular fertiliser applications can be either spread on the surface, overall or in bands, or through a coulter for sub surface applications adjacent to the crop row.

9

Hooded Sprayers offer an alternative to hoeing which may be advantageous as soil disturbance is minimal. Garford employ spray hoods and crop protection shields for maximum crop safety. Glyphosate is authorised (EAMU) for use inter row in onions, carrots, parsnips and other veg crops.

10

garford

"Robocrop Guided" Hooded Sprayers are, of course, available and offer greater work rate and accuracy. The greater speeds also assist in providing sensible nozzle choice options for the narrow bands between carrot rows.

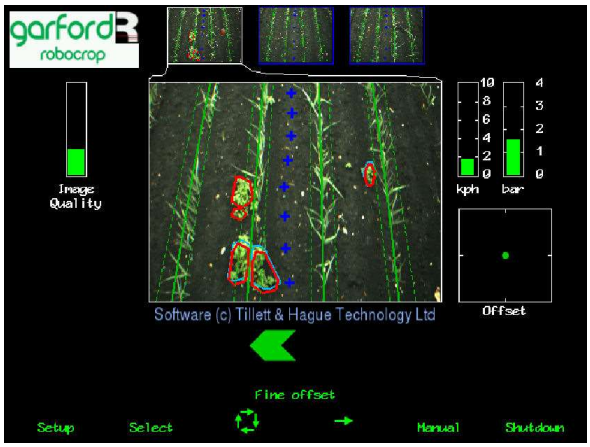
11

garford

Robocrop Spot Sprayer.

12

The Robocrop Spot Sprayer Imaging system takes a slightly different approach. Firstly the crop row position is determines and locked on to, then Robocrop searches for clumps of vegetation which do not conform to the crop row characteristic. These objects are then tracked as they pass down through the camera field of view.



13

As the clumps of weeds pass below the specially developed nozzles, Robocrop fires the required nozzle at precisely the right moment to hit the weed with a measured quantity of herbicide in order to hit the weed clumps but minimise crop damage.

The user interface allows for selection of the minimum weed clump size threshold.

The percentage of the plant area to be targeted can also be selected.

The minimum nozzle on/off period of 30ms results in a minimum target area of 40mm at 5kph .

14

15

garford

The Robocrop Spot Sprayer targets the weeds and avoids the plants therefore keeping the possibility of crop contamination to a minimum.

The actual quantity of herbicide usage can be as low as 1-2% of the overall rate.

16

The Garford Precision Weedfoil Wiper has been developed to provide height dependant weed control via felt pads which are saturated with glyphosate via an electronic controlled delivery system.

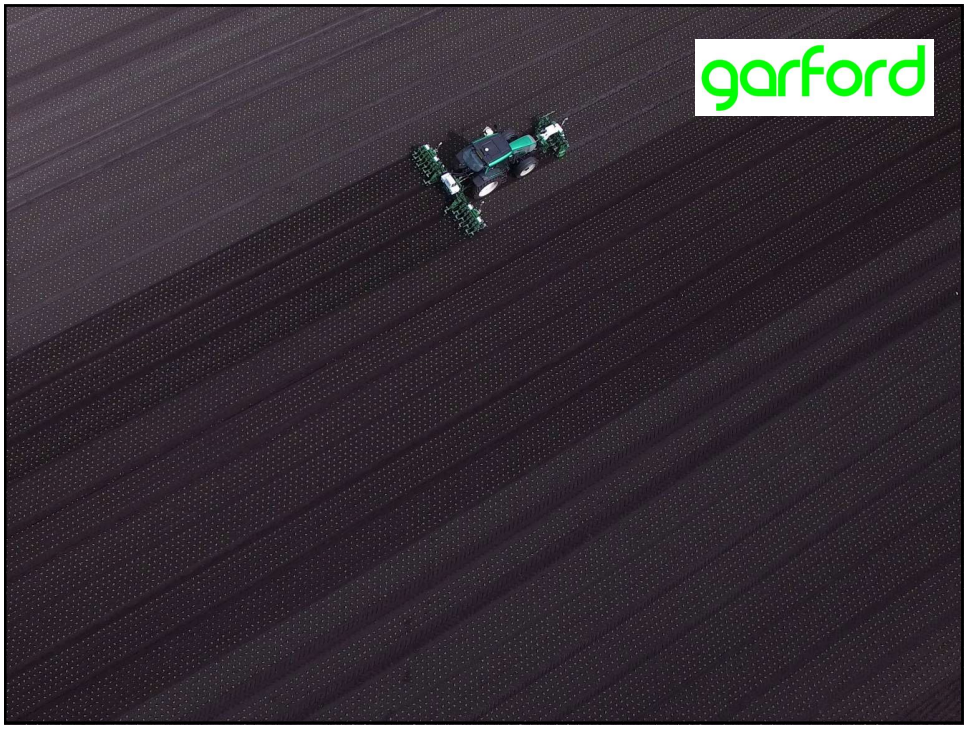
17

The Garford Precision Weedfoil Wiper pads are mounted on a contour following wheel unit which accurately follows the contours of the soil to keep the pad at a constant height.

The operator can adjust the height remotely and if required monitor the ground clearance closely via a CCTV system.

The inter-bed area is sprayed via a number of hooded spray units if required.

18



19

garford

Even the Robocrop InRow Weeder can have a place in weed control in onions

20

21

garford

providing advanced technology for progressive farming

Weed control solutions in a challenging environment

- Robocrop Precision Guided High Speed Hoes
- Hooded Sprayers
- Robocrop Spot Sprayer
- Weedfoil Wiper
- Robocrop InRow Weeder

22