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Agriculture and Food Development Authority

The voice of Ireland's farming industry
IRISH FARMERS JOURNAL

CROPS & SPRAYING

2015

Teagasc & Irish Farmers Journal

Oak Park, Carlow
Wednesday 24th June 2015

www.teagasc.ie

Foreword

Teagasc Oak Park Crops and Spraying 2015

Welcome to the Teagasc Oak Park Crops Open Day, on display we have the latest technical innovations on a range of crops including; winter and spring barley, winter wheat, oats, oilseed rape and beans. The focus on these crops, presented over a number of stands, will include: optimising growth and development; disease control strategies and efficient fertiliser use. Whilst 2015 presents price and disease challenges, improved knowledge of crop growth in our climate gives us the best chance of using our high yielding potential to our advantage. Up and coming new varieties to include sugar beet will also be demonstrated on the day.

The Teagasc crops research programme will be the main focus; however, there will be many other areas of relevance to tillage farmers and the farming industry in general, including:

In the main entrance area

- Farm safety for farmers and families highlighting important issues not to be ignored.
- In addition to the focus on profitability of crops there will be information on the wider aspects of farm finances from Teagasc farm management specialists under the heading of 'Get Farm Financially Fit'.

In the machinery area

- Sprayers and spraying will be the focus of an 'event within an event' supported by the Irish Farmers Journal. Preparing your sprayer ready for the Sustainable Use Directive test, GPS and nozzle technology will feature alongside a demonstration of new sprayers in a parade ring. The DAFM will also be on hand to explain what you need to do to comply with the SUD and outline the STRIPE initiative. There will also be a wide range of other machinery on display from manufacturers and dealers, something for everyone, not just the specialised tillage farmer.
- Incorrect combine setting can threaten the ability to attain quality standards for premium markets such as malting barley, risking considerable income. The main combine manufacturers will be on hand to demonstrate how to optimise settings to ensure the crop is fully threshed whilst minimising losses and damage to grain.

On the main demonstration route

- Revision of the CAP has brought greening issues to the forefront of everyone's minds, there will be a number of stands covering topics such as; cover crop options, biodiversity and forestry.

This year's route enables you to pick out areas of interest so you can start and stop your tour wherever you wish. May I wish you an enjoyable day, one which will enhance your knowledge and will be beneficial to your business.

John Spink
Head of Crop Science
Teagasc, Oak Park

Get Farm Financially Fit

Smart Budgeting

Managing short term cash flow is the first step to improving your finances

- Plan your spending in advance
- Check actual spend v planned spend
- Monitor monthly income and expenses

€	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Income												
Expenses												
Balance												

Smart Spending

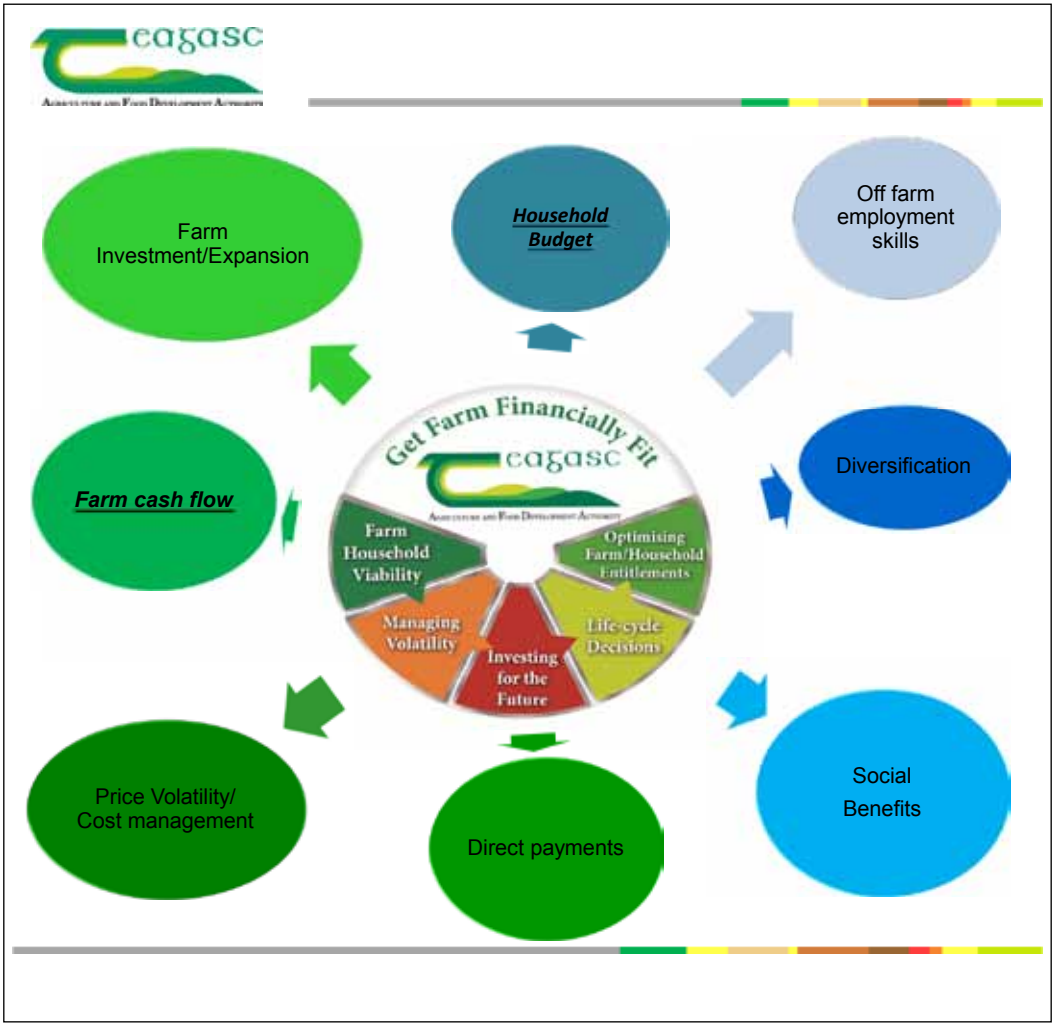
- How much do you need to run the house on a monthly basis?
- Insurance and utilities – switch or save by paying online
- Could you reduce "non productive" farm costs?

Smart Use of Resources and Skills

- Check eligibility for Farm Assist, Family Income Supplement
  - Over 1/3 of those eligible do not claim!
- Avail of free training courses - re-train and develop new skills
- Bundle your debt

"***Major increase in Grants to Households for Energy Efficiency***" **- SEAI**

Notes: _____


Farm Investment/Expansion
Household Budget
Off farm employment skills
Farm cash flow
Get Farm Financially Fit
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Farm Household Viability
Optimising Farm/Household Entitlements
Managing Volatility
Life-cycle Decisions
Investing for the Future
Diversification
Price Volatility/ Cost management
Direct payments
Social Benefits

Notes: _____

_____

_____

_____

Potato Breeding Scheme

1. Selection of parents

2. Fertilization

3. True potato seed

4. Young seedlings

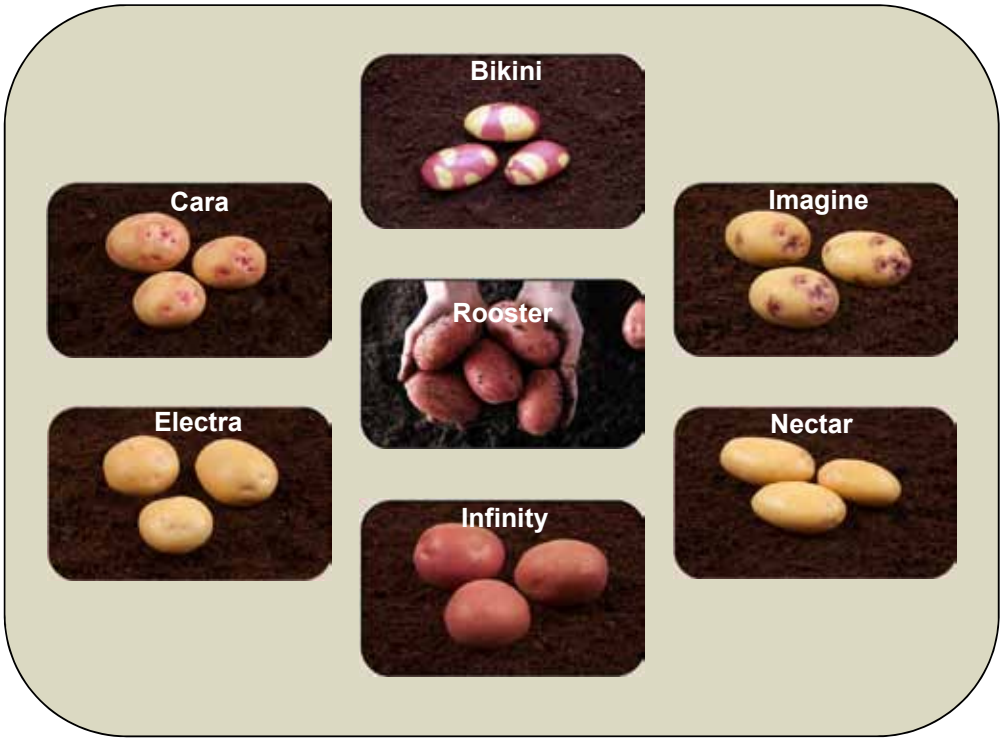
5. Evaluation trials

6. New variety

IPM POTATO GROUP

Notes:

Teagasc Bred Varieties



IPM POTATO GROUP

Notes:

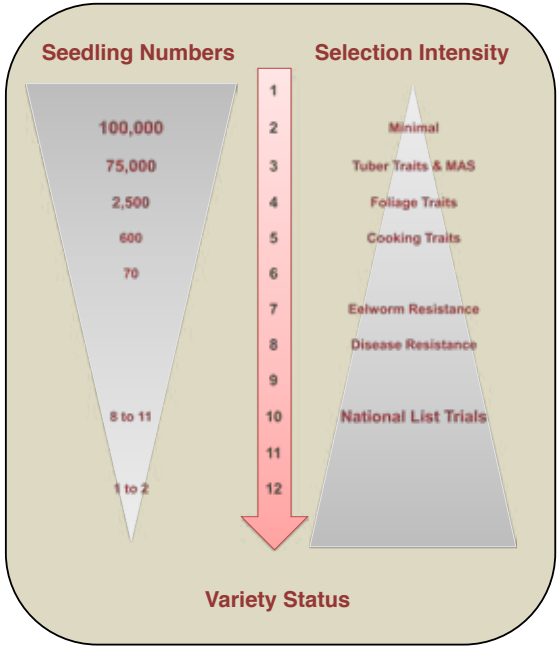
Potato Breeding Time Scale

Trial Site Locations

Years 1-11

Years 7-11

Years 7-11



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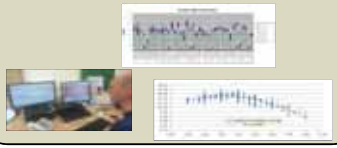
Notes:

Traits, Selection and Technology

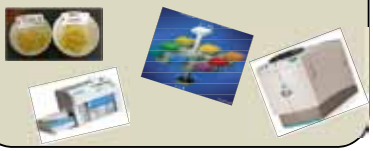
Yield

Data Analysis



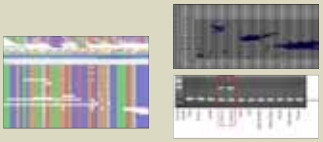
Cooking Quality

Automation



Disease/Pest Resistance

Genetic Markers



IPM POTATO GROUP

Notes:

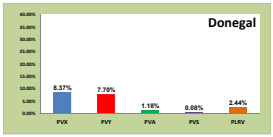
Potato Virus Symptoms & Control

Using clean seed and avoiding sources of infection is critical to reducing virus incidence

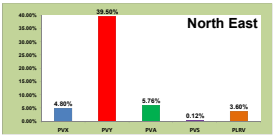
Virus	Transmission	Symptoms	Control Measures
PVX	Mechanical	Mosaic, chlorosis, decreased leaf size, rough leaves	Roguing, equipment hygiene
PVS	Aphid & Mechanical	Symptoms can be inconspicuous, can show mild mosaic	Roguing, equipment hygiene, insecticide
PVY	Aphid	Severe mosaic, chlorosis, necrosis on veins/leaves, plant stunting	Roguing, insecticide
PVA	Aphid	Mild mosaic	Roguing, insecticide
PLRV	Aphid	Rolling or curling of the leaves, leathery feel	Insecticide, roguing

Notes:

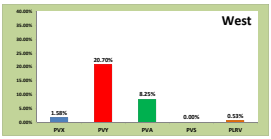
Potato Virus Incidence 2006-2012



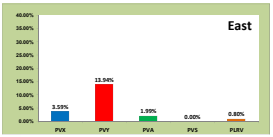
- Moderate virus
- PVX & PVY highest



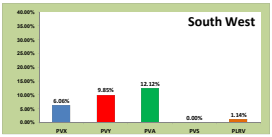
- High virus
- PVY highest
- Moderate PVA



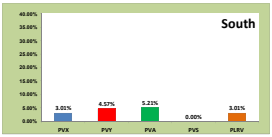
- Moderate to high virus
- PVY & PVA highest



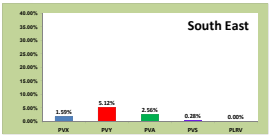
- Moderate virus
- PVY highest



- Moderate to high virus
- PVA & PVY highest
- High PVA in Golden Wonder



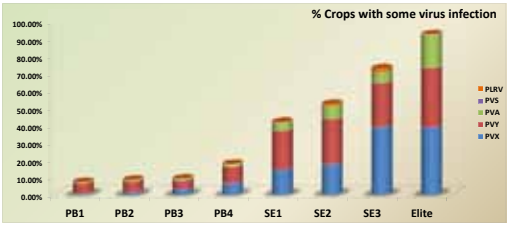
- Low to moderate virus
- PVA highest

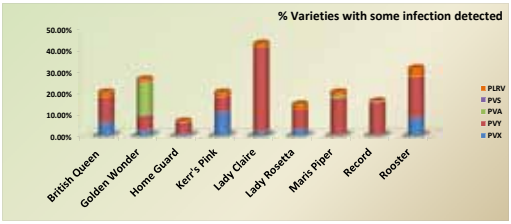


- Low virus
- PVY highest

Notes:

Virus Incidence In Seed Crops Entered For Certification





Virus present in a high % of crops but at **very low levels**

Virus levels will increase quickly in successive generations

Virus risks of key varieties

British Queen - PVY

Golden Wonder - PVA

Kerr's Pink - PVX

Lady Claire - PVY

Rooster - PVY

Key points

- Certified seed guarantees low virus levels
- Pay attention to susceptible varieties, particularly in highest risk regions e.g.

  PVX – Donegal

  PVY – North East
- PVY is the most common and economically important potato virus

Notes:

National PCN Survey 2002

Globodera pallida

Mixed Species

Globodera rostochiensis

2010 to 2013 PCN Survey

Ware Potato

Year	Area Sampled (ha)	Total Infested Area (ha)	% Infested
2010	172	31	18
2011	63	19	30
2012	114	9	8
2013	72	7	10

Seed Potato

Year	Area Sampled (ha)	Total Infested Area (ha)	% Infested
2010	1869	55	3
2011	1203	116	10
2012	682	37	5
2013	568	48	8

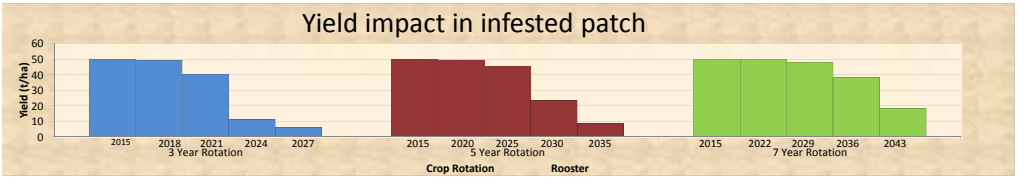
PCN breakdown

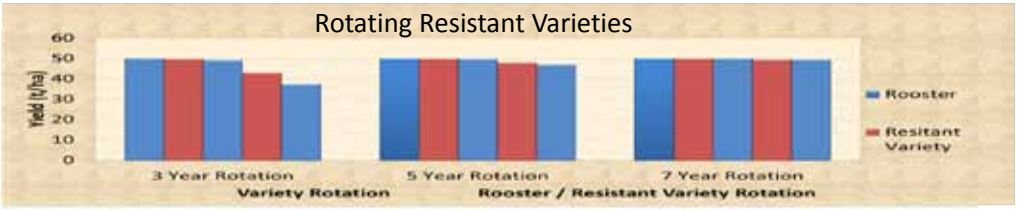
- **Up to 15% land sampled in the Republic of Ireland is positive for PCN**
- ***Globodera rostochiensis* is currently the dominant species**

Acknowledgements: The work described in the 2002 survey was conducted at AFBI in Northern Ireland with a collaboration with Teagasc

Notes:

Modelling the impact of PCN infestation





- **Crop rotation is important but not a cure**
- **Long rotations with resistant varieties protect yields**

Acknowledgements: The work described in poster was calculated using data extrapolated from British Potato Council

Notes:

Best Management Practices for PCN

Minimise soil movement
- Avoid sharing farm equipment
- Only return tare soil to field of origin
- Never re-use boxes unless soil free
- Be sure commercial vehicles are soil free

Best practice for potatoes
- Plant certified seed material
- Practice long crop rotations (7+ years)
- Care should be taken with discard soil, wash water, and tubers
- Segregate potatoes in storage by field
- Rotate with a resistant variety

Keep farm equipment clean
- Clean and disinfect farm machinery before going between fields
- Collect waste water, to minimise spread of PCN to clean land

Best Practice when PCN present
- Grass over land positive for PCN
- Test after 6 years
- Maintain good rotation records

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Notes:

Developing new varieties with natural resistance to PCN

Globodera rostochiensis

Resistance conferred by a single gene (*H1*)

H1 gene present in majority of new varieties

T5233/7

Globodera pallida

No single gene confers complete resistance

Only partially resistant varieties available

T5343/5

Marker assisted breeding (MAB)

No. genotypes	YEARS
100,000	1
75,000	2
2,500	3
600	4
70	5
15	6
8	7
	8
	9
	10
	11
	12

Marker assisted selection

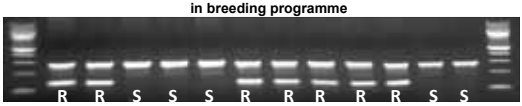
Traditional PCN Resistance Testing

1-2 genotypes forwarded to

National List Trials

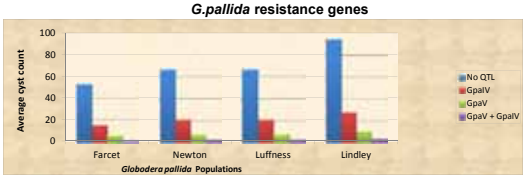
Cultivar Status Year 14-15

MAB allows earlier and more efficient selection for PCN in breeding programme



Outcome: More PCN resistant varieties

MAB allows us to develop varieties with multiple partially effective *G.pallida* resistance genes

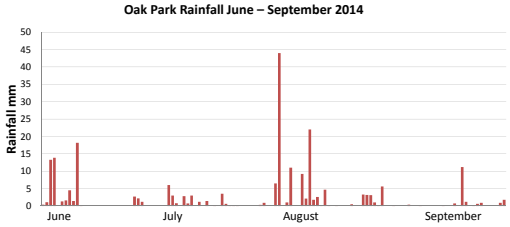


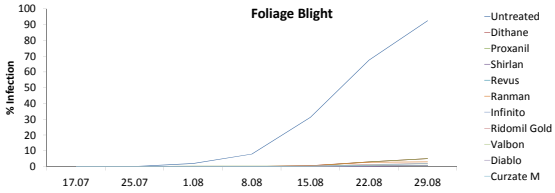
Outcome: Highly G. pallida resistant varieties

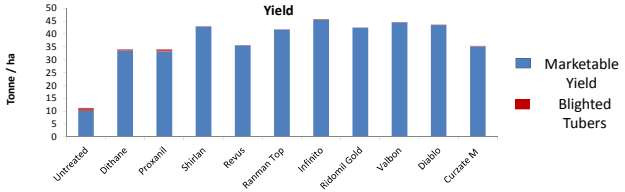
Notes:

Comparisons of late blight fungicides in 2014

During 2014 the efficacy of the main late blight fungicides were compared at Teagasc Oak Park as part of a season long programme







- Disease detected in early July
- Disease development slow due to warm and dry July
- All fungicide products provided excellent foliar control of late blight
- Differences observed in marketable yield and levels of tuber blight
- Season long application allows comparisons between fungicides
- **All late blight fungicide programmes should include a range of actives and always adhere to label recommendations**

Notes:

Give Safety Top Priority

Irish farm accident record

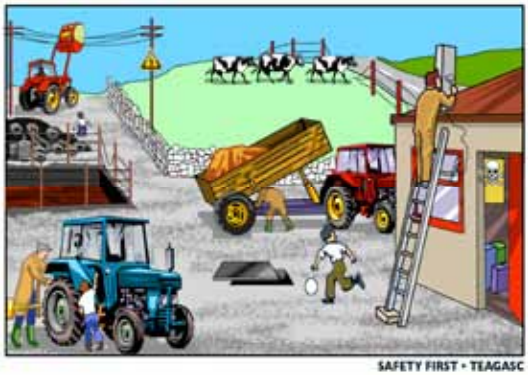
- 30 Deaths in 2014
- 2,500 accidents per year

Accidents cause the following:

- Tragedy, pain and suffering
- Disability
- Farm income loss

Complete a Risk Assessment for your Farm

Safety Management is Missing on this Farm

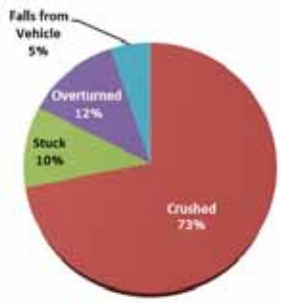


Notes:

Tractor and Vehicle Safety

Vehicles are associated with 27% of farm deaths

- Being struck or crushed is the major cause
- Pedestrians and passengers are most at risk
- Stop any dangerous activity immediately



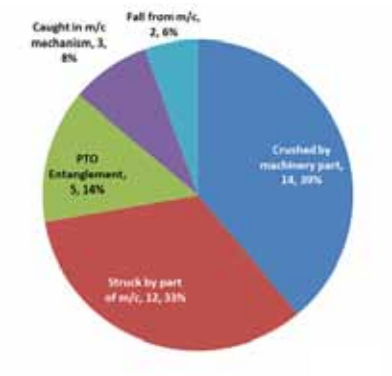
ENSURE OPERATORS ARE COMPETENT

Notes:

Machinery Safety

Machinery accidents are associated with 17% of deaths

- Main causes include:
- Being crushed or struck by machine part
- Being entangled in PTO or machine part
- Being struck by machinery



MAINTAIN MACHINE GUARDING

Notes:

Maintain your Health

Farmers overall have poor health

- Farmers have a 5 times higher death level (to 65 years)
- Principal causes include: cardiovascular, cancer & respiratory issues

Key Prevention approaches

- Be informed about health issues
- Obtain a regular 'health check'
- Exercise and diet are crucial for health
- Avoid Lung disease (e.g. smoking and dust)

OBTAIN A HEALTH CHECK

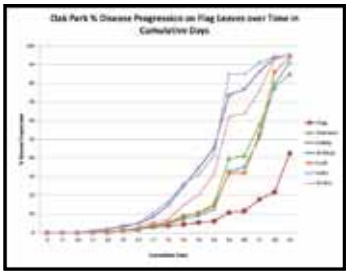
Notes:

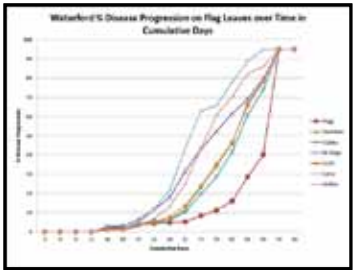
Winter Wheat Varieties and Septoria Resistance

Disease Resistance

- Varieties differ in Septoria resistance but mechanisms not fully understood
- Latent period one mechanism
- The latent period is the time between initial infection and visible disease symptoms
- Extended latent period delays the progression of disease epidemics

Septoria on Croft





Conclusion:

- Stigg has a substantially longer latent period (~ 15 days) compared to, for example Gator (~7 days)
- Further work focussed on studying the molecular interaction between Stigg and Septoria

Research completed as part of the DAFM-RSF funded 'CIVYL' project

Notes:

Integrated Pest Management

Cultural

Rotation
- Reduce build up of insect pests
- Reduce build up of disease

Physical

Manage residues
- Reduce reinfection from trash and stubble
- Control weeds

IPM

Biological

Natural predators
- Beneficial insects control insect pests
- Predatory birds deter crows and rabbits

Chemical

Product choice
- Precise timing and effective rates
- Anti-resistance strategy

Notes:

IPM Questions

Q1 **How familiar are you with IPM techniques?**
Please circle (1 = not at all familiar → 5 = very familiar)

Q2 **Do you use a break crop?**

Q3 **What influences your choice of variety?**
Please rank from 1 - 3 (1 = greatest → 3 = least)

Q4 **Do you alter pesticide inputs?**
eg. by variety, sowing date, weather

Q5 **Do you monitor pesticide performance?**

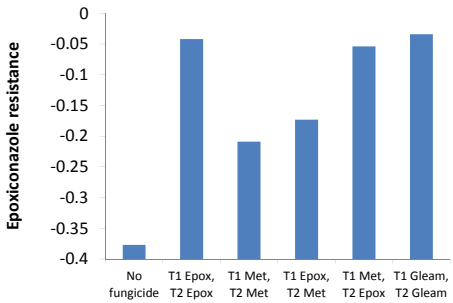
Please provide your name and contact details if you are willing to be involved in future IPM surveys. Your assistance is of vital importance to the success of this project.

Notes: _____

Fungicide Resistance

What is fungicide resistance?

A fungal strain adapts to survive and reproduce in the presence of a fungicide



Impacts of resistance

- Increased cost of production
- Poor disease control
- Loss of active ingredient

You don't need perfect disease control to maximise profit

Notes:

Fungicide Resistance

Disease management

- Adopt good agronomic practices
- Monitor disease and resistance development
- Proper choice of application timing and fungicides

The 1, 2, 3 of Fungicide Resistance Management

1. Limit **N**umber of **A**pplications

2. Use **E**ffective **R**ates

3. Mix **M**odes of **A**ction

Notes:

Wheat Disease Control

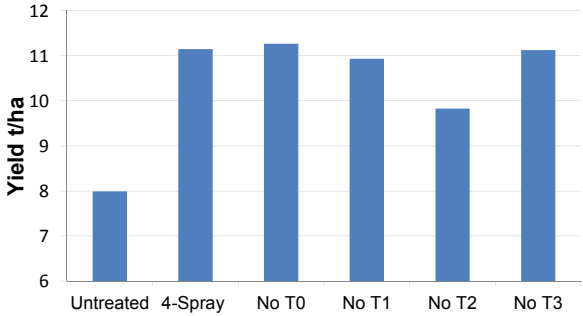
The Why, When and What of winter wheat fungicide programmes

Why: Diseases can reduce potential yields

When: To protect the upper leaves and ear from infection

What: Mixes of multi-sites + azoles +/- SDHIs

T0 End of tillering	T1 3rd leaf fully emerged	T2 Flag leaf fully emerged	T3 Start of flowering



Yield response to fungicide programmes

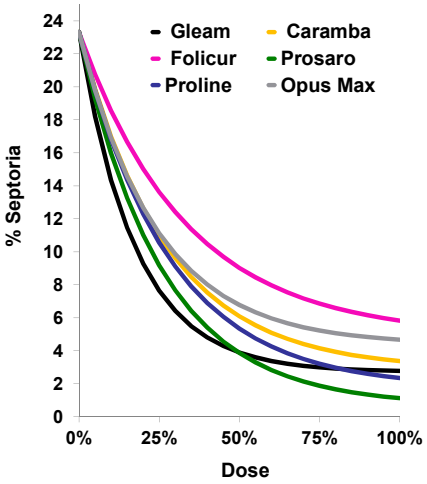
Aim: To protect yield

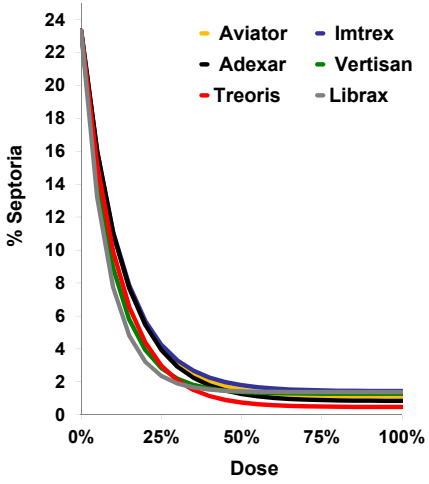
- Upper leaves critical to yield
- Build programme to provide protection
- Fungicide timing **critical** to effectiveness of programme

Notes:

Wheat Disease Control

Know the target - Know the timing - Know the fungicide





Put Together	T0	T1	T2	T3
Low Disease Pressure	------	Azole (Mix) & Multi-site	SDHI / Azole & Multi-site	Azole (mix) +/- Multi-site
High Disease Pressure	Multisite & (Strob)	SDHI / Azole & Multisite	SDHI / Azole & Multisite	Azole (mix) +/- Multisite

Notes:

Ecological Focus Areas

Potential Benefits of EFAs

For the Farmer



- Enhanced crop pest control (natural predators)
- Increased pollination
- Decreased soil erosion
- Prevention of soil nutrient leaching

For Biodiversity



- Increased species diversity
- Increased habitat and landscape diversity
- Maintenance of 'wildlife corridors'

Social & Tourism



- Public goods (Ecosystem Products and Services)
- Maintenance of historical features and heritage
- Clean, green image

Some Current and Potential EFAs

Fig 1: Hedgerows are currently eligible as EFAs in Ireland

Fig 2: Drains are currently eligible as EFAs in Ireland

Fig 3: Buffer strips are currently eligible as EFAs in Ireland

Fig 4: Fallow land is currently eligible as EFAs in Ireland

Fig 5: Field Margins are eligible as EFAs under EU prescriptions but are currently not eligible under Irish regulations

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Notes:

GLAS for Tillage Farmers

Catch Crops €155/ha/yr

- **Min:** 10ha Priority, 4ha General
- **Max:** 32ha
- **Sow by 15 September**
- **Can graze after 1 Dec**
- **Can be rotated**

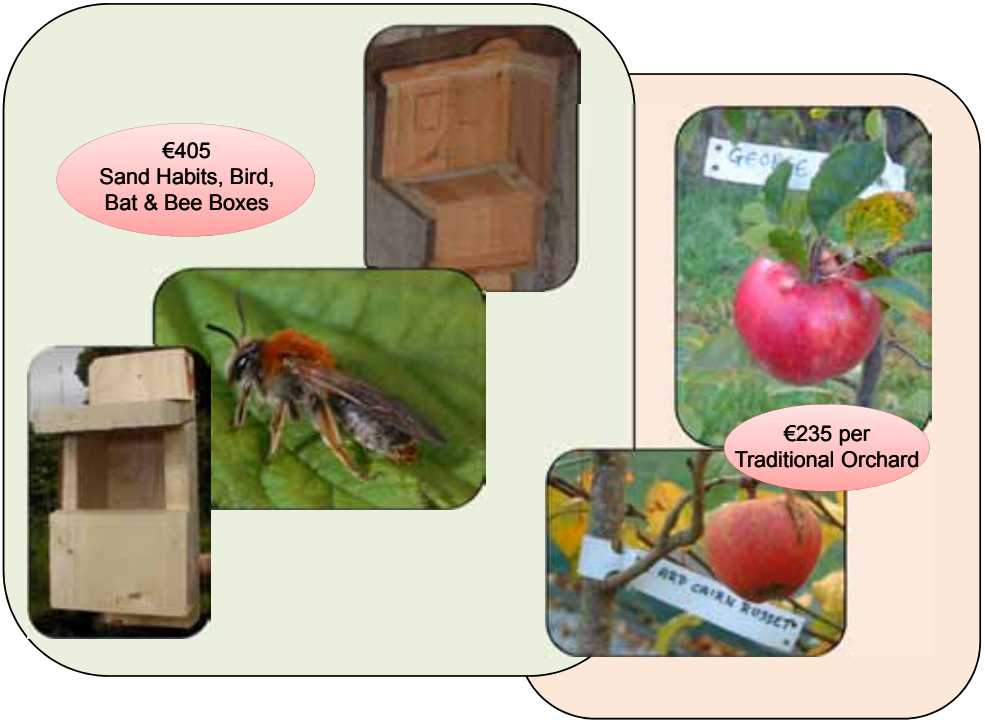
And…

- Buckwheat
- Forage Rape
- Rye
- Leafy Turnip
- Berseem Clover
- Peas
- Beans

Priority Action for Tillage

Notes:

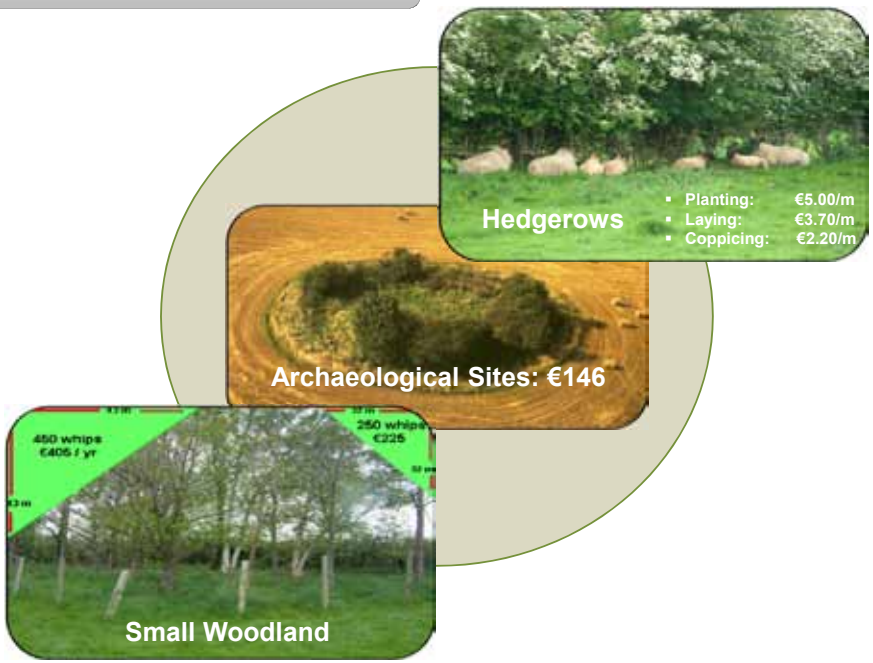
GLAS for Tillage Farmers



Notes:

GLAS for Tillage Farmers

GLAS - up to €5,000/yr



Notes:

GLAS for Tillage Farmers

Arable Margins

- Sow 2 tusocky grasses:
  - Cocksfoot
  - Timothy
- Cut once a year
  - Before 1 March
  - After 15 August
- Min: Full side of a field

€1200/ha/yr

Min Till

- Min:
  - 10 ha Priority
  - 4 ha General
- No Max
- Can't be rotated

€40/ha/yr

GLAS:
Up to €5,000/yr

Wild Bird Cover

- Min: 0.25 ha
- Max: 3 ha
- Sow each year by 31 May
- Can't be rotated

€900/ha/yr

Environmental Management of Fallow Land

- Min: 0.25 ha
- Max: 3 ha
- Sow 2 tusocky grasses:
  - Cocksfoot
  - Timothy
- Cut once a year
  - Before 1 March
  - After 15 August
- Cannot be grazed
- Cannot be moved

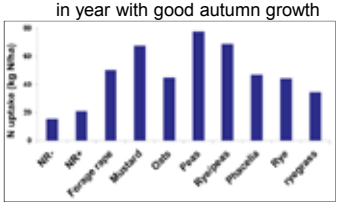
€750/ha/yr

Notes: _____

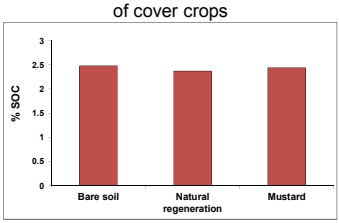
Cover / Catch Crops

- Many potential benefits (reduced leaching, improved yields improved organic matter, reduced fertiliser requirement)
- Benefits are variable and can be small
- Choose species carefully
  - Rotation, seed cost, benefits required, sowing method
  - Must use mixture for GLAS and EFA
- Include a legume for nitrogen
- Early sowing important – before mid September
  - Late sowing = poor growth = small benefits
- Destroy/incorporate stemmy material early – slow breakdown
  - Early incorporation of leafy material less critical

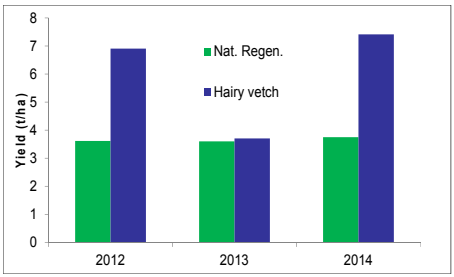
Cover crop N accumulation in year with good autumn growth



Soil organic carbon levels after 7 years of cover crops



Benefits of legumes as cover crops to yield of following spring barley



Key Points

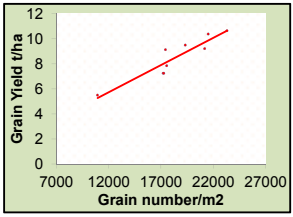
- **Can have positive effects - often limited**
- **Economic benefits can be small or negative**
- **Choose species carefully**
- **Sow early (by early September)**
- **Incorporate early particular if stemmy**

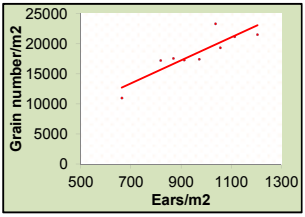
Notes:

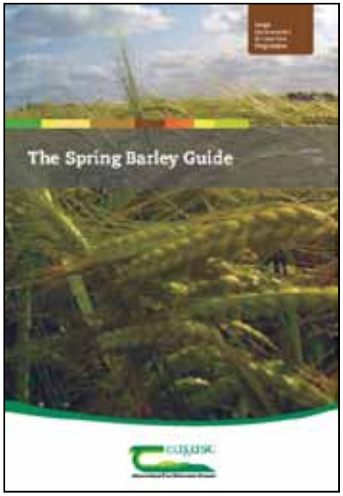
The Spring Barley Guide

Crop growth and yield formation

- Certain periods of crop growth are more important for yield formation
- Inputs should be targeted at the most critical growth periods to maximise return on investment
- Inputs should be adjusted if a crop is significantly ahead of or behind average







Key Points

- Barley yield is strongly related to grain number
- Grain number is mainly influenced by ear number
- Getting the crop off to as good start is critical
- Maximise crop growth during tillering and stem extension
- Late season input less important for barley

Notes:

CIVYL

Cereal Improvement through Variety choice and understanding Yield Limitations

Aim: Improve economic return from winter wheat and spring barley crops

- Investigate what limits yield in Ireland
- Estimate maximum yield potential

- Detailed crop monitoring
- Yield potential modelling

- Reduce crop inputs to economic optimum rates

- Use variety characteristics to target corresponding crop inputs

Variety x crop input trials 2015

Crop	Variety characteristic	Crop input
Spring barley	Lodging	Nitrogen + PGR
Spring barley	Rhynchosporium	Fungicide
Winter wheat	Septoria	Fungicide
Winter wheat	Lodging	Nitrogen + PGR
Winter wheat	Eyespot	Eyespot fungicide

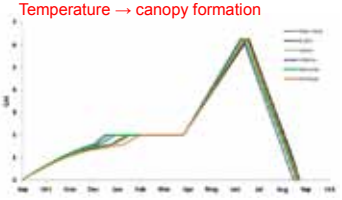
Notes:

Winter Wheat Yield Potential

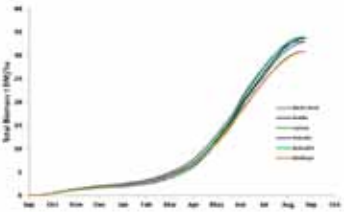
Yield potential: maximum possible yield of a crop at a site when nutrients are non-limiting and stresses are controlled

Yield potential model:

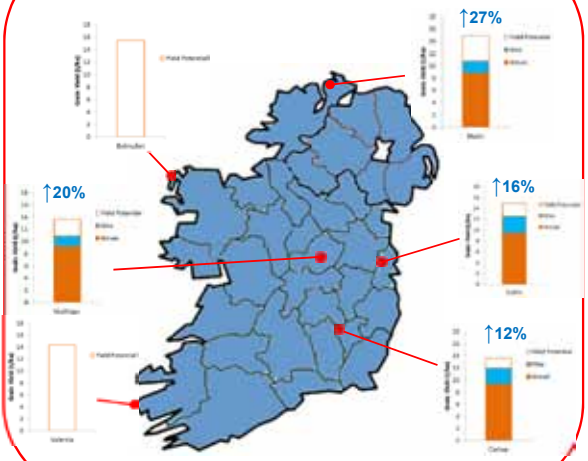
Temperature → canopy formation



Radiation and available water → biomass production



10 year average estimates



Take home points:

- Potential for increases in yield of winter wheat in Ireland
- Maximum yield doesn't mean maximum return
- Studies are ongoing to determine whether variety characteristics can be reliably used to target agronomic input rates

Notes:

STAND LIST

1 **Marquee – First Aid and Defibillator**
Potatoes, Farm Finances,
Pig on Spit and Refreshments

Outside Marquee
Farm Safety
Met Eireann

2. **Winter Wheat**
Varieties
Disease Control

3. **Cover Crops**
EFAs
GLAS

4. **Spring Barley**
Varieties
Disease Control
Nitrogen

5. **Oats**
Varieties
Agronomy

6. **Beans**
Varieties
Agronomy

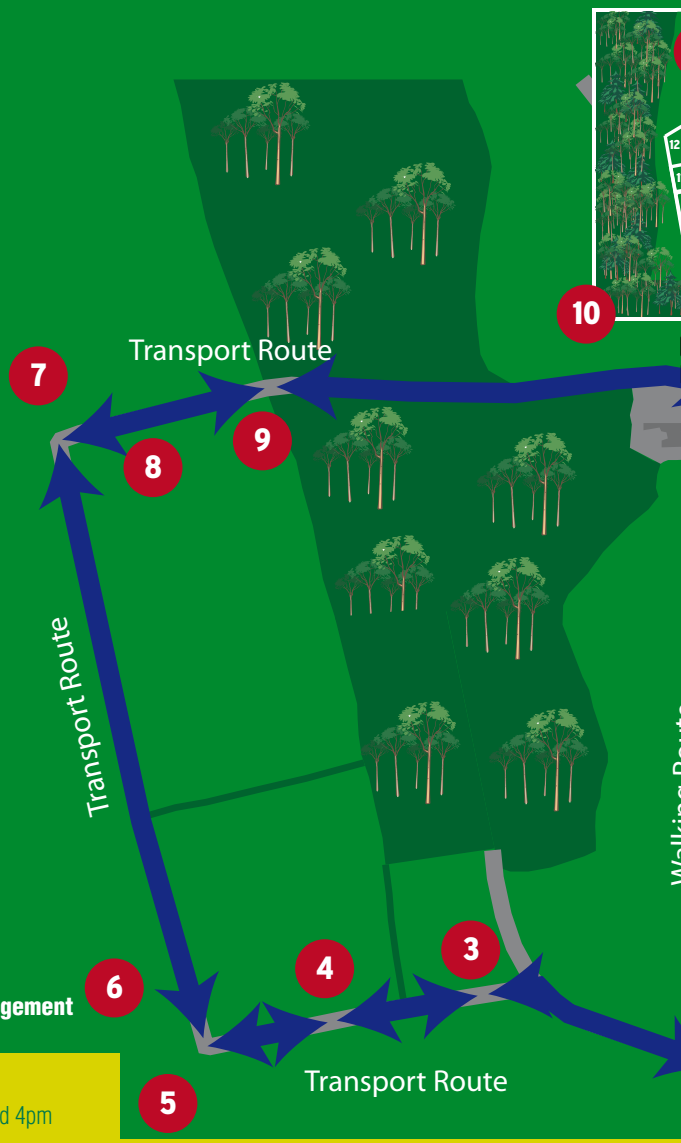
7. **Winter Barley**
Disease Control and Management
Aphid Control

8. **Crop Nutrition and Manures**

9. **Forestry**

10. **Machinery and Spraying**

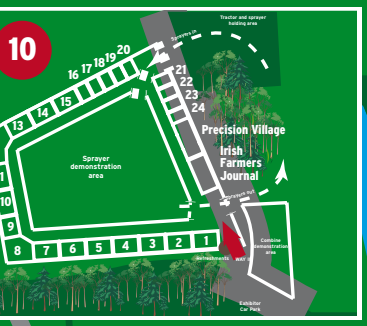
11. **GM Potatoes, Beet Varieties, Soils, Oilseed Rape Cultivations and Management**



Stand 10 – Machinery & Spraying
Spraying Demos in this area at 12 noon, 2pm and 4pm

Exhibitors:
IAM Agricultural Machinery Ltd.
Farmec Ireland Ltd.
Farmhand Ltd.
Kelly's of Borris
Agrigear Tyre and Wheel Specialists
Kverneland
WR Shaw
John Deere
Lemkin
Farmtech Solutions
Precision Ag Ireland
Agco/Massey Ferguson
F. Jenkinson Ltd.
Murphy Machinery
Suir Sprayers
John Atkins & Co. Ltd.
Kuhn Centre Ireland
Gordon Hegarty & Sons
Spraytek Agri Ltd.
Samco Agriculture Manufacturing
Moore Unidrill
Chafer Machinery Ltd./Agricare
Cross Agricultural Engineering Ltd.
Cooney Furlong Machinery Co.
Case IH Dealers

Precision Village / Marquee
McHugh Components
Progressive Agriculture Solutions
Farm Navigator
Wextech
Farmflo
AIB
Quinns of Baltinglass
Fossland Services Ltd.
Topcon Ireland
Department of Agriculture
Irish Farmers Journal
IFJ Admin Office / First Aid & Defibillator



CROPS & SPRAYING

Oakpark, 24th June from 11.00am to 6.00pm 2015

11

2

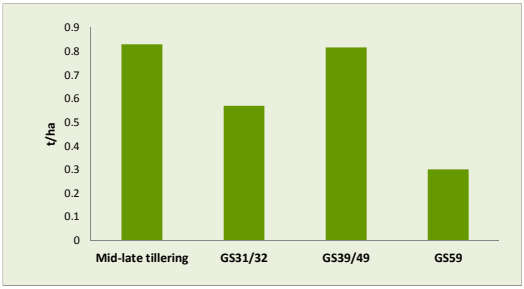
1

Walking Route

Spring Barley Disease Control

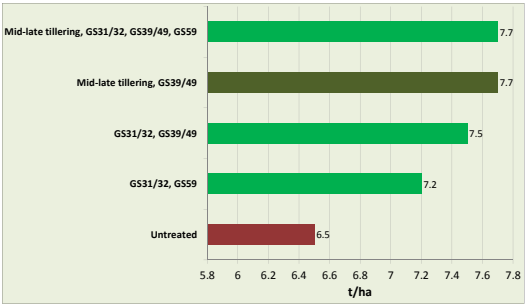
Disease progress is influenced by:
- Time of sowing
- Variety
- Fungicide rate/ timing
- Weather

Why use fungicides?
1. To protect yield potential
2. To control disease to achieve yield potential



- Timing trial carried out from 2012-2014 over 6 sites
- Early disease control essential to protect tillers
- Delaying the final application until GS59 can reduce yield potential

Rhynchosporium



- 1st application: mid-late tillering
- 2nd application: GS39/49
- No benefit from additional applications

Notes:

Fungicide Choice

	T1	T2
	Mid-Late tillering	Booting
	GS 25-30	GS 39-49
Target diseases	Rhynchosporium Net blotch Rust	Rhynchosporium Net blotch Rust Ramularia Fusarium
Fungicide choice	Minimum of two active fungicides (Azoles, Strobilurins, SDHI's, multisite)	Minimum of two active fungicides (Azoles, Strobilurins, SDHI's, multisite)
	Mildewicide where required	Mildewicide where required

Take home messages

- All available control methods should be used as part of an IPM strategy
- Always use a minimum of 2 actives at each application to achieve optimum disease control and to reduce the risk of resistance development
- The choice actives should be based on, yield potential, variety sown (disease susceptibility), disease present and weather pattern

Notes:

Oat Crop Management

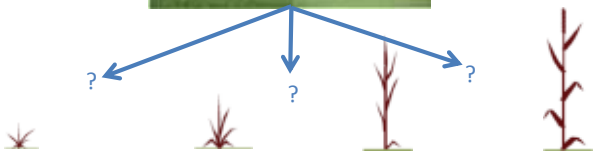
At what growth stages should inputs be focussed in order to achieve high yield and quality?

Components of Grain Yield

- **Grain numbers** - determined earlier in the growing season
- **Grain size** - determined later in the growing season

Which component is most important?

Strategy: Focus inputs when the most critical yield component is determined



Some Examples

Wheat: Critical component = grain size; late season management
Barley: Critical component = grain number; early season management
Oats: ??? Subject of ongoing Teagasc research

Notes:

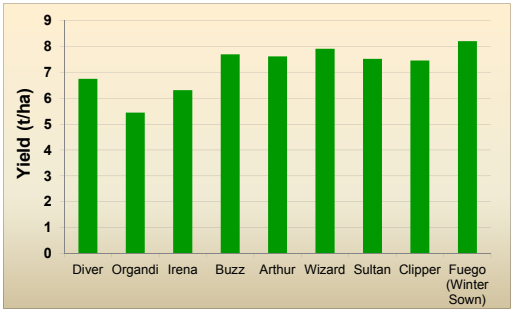
Beans: Current Research

Current Trials

2014 results

1. Winter and spring varieties

- 7 winter and 3 winter sown spring vars.
- Crow damage widespread
- Investigating yields from very low plant stands
- 8 new early maturing spring varieties



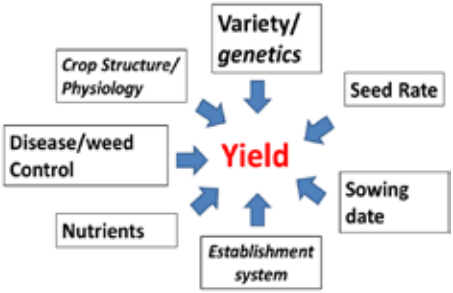
2. Disease control

- Signum @ 0.75 kg/ha
- 3 timing wave trial
- Pre flowering, + 3 weeks, + 6 weeks

3. Weed control

- Combinations of Nirvana, Lingo, Defy, Stomp Aqua and Basagran with and without oil

Research Areas



Notes:

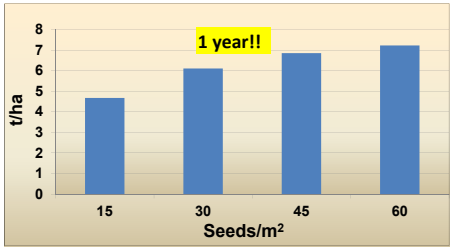
Beans: Current Research

Current Trials

4. Time of sowing X seed rate X early N

- 28th Nov., 27th Jan., 6th March, 9th April
- 15, 30, 30 + N, 45, 60 seeds/m^2
- 40 kg N/ha applied to N plots

2014 results



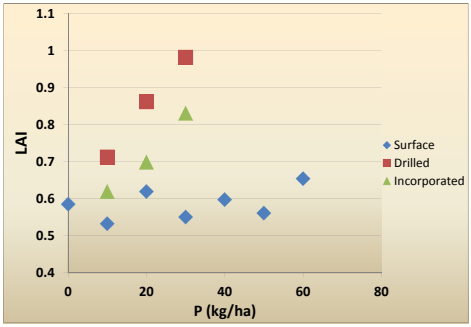
5. Flowering control

- Terpal @ 1l/ha
- 3 timing wave trial
- Reports of shortening and early ripening effects

6. Phosphorous rate and application method

- Index 1, 2 and 3 soils
- Surface: 0 – 60 kg/ha P
- Incorporated: 10, 20, 30 kg/ha P
- Drilled: 10, 20, 30 kg/ha P

Index 1 LAIs
20/05/2015



Notes:

Beans: Agronomy

Sowing Date → Early Feb. to Mid March, as soon as soil conditions allow

Seed Rate → Sow 35 – 40 seeds/m^2 to achieve optimum plant density of 30 – 35/m^2

T.G.W. → Can vary by up to 30%: adjust seed rates (150-250 kg/ha) based on TGW and germination %

Nutrition → Apply P, K as per soil index. Watch Mg, Zn, Mn

Weed control → Pre-emerge Nirvana or Lingo. Basgran only post emergence BLW option. Graminicides suitable for grass weed control

Notes:

Beans: Agronomy

Disease ➡ Chocolate spot biggest threat. Spray at early flowering and repeat 2 – 3 weeks later. Signum or Rover 500 + Amistar.
Ascochyta and Downy Mildew also of concern

Pests ➡ Bean weevil cause U shaped notches on leaves. Larvae feed on roots and can cause substantial damage to young crops. Apply insecticide if notching seen across field.
Black bean aphid: only spray if greater than 5% of plants infested

Harvest ➡ Late August – Mid September
Aim for 18% moisture content

Notes:

CROPQUEST

Aims

- Review broad acre break-crop options
- Identify Market / Crop options including high-value possibilities
- Determine economics value of break crops
- Disseminate to growers, industry

How

- Desk Study:
  - Rotation crops (OSR, Beans, etc.)
  - High Value crop options
- Economic analysis
- Dissemination
  - Crop Reports, research paper etc.
  - Website
  - Workshop

Website

Launching soon:

http://www.teagasc.ie/CROPQUEST

Notes:

Sample Crop: Oilseed Rape

Quick Facts:

- Good break crop in cereal rotation
- Generally suited to Irish climate
- Produces oil and protein
- Mostly exported currently – low value
- Potential for higher value markets

Potential outputs

- **Vegetable oil**
- **Biodiesel**
- **Protein for animal and human use**
- **Industrial: Lubrication, surface coating, slip agent, biodegradable plastics**
- **Other: Medicinal, Cosmetic, Polymers etc.**

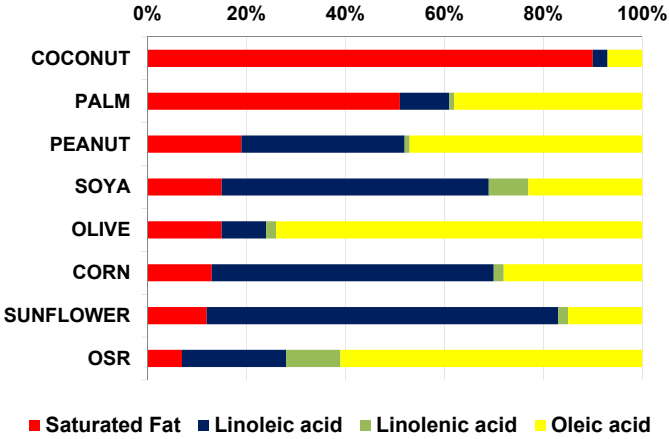
Food Grade OSR:

Cold pressed, Healthy options
Greatest potential?

Notes:

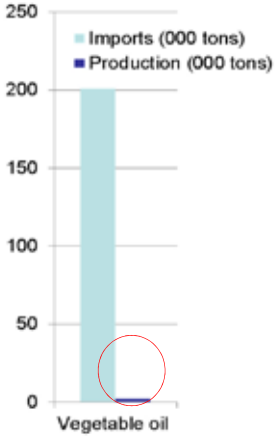
OSR Food Grade Potential – Why?

Healthy oil profile



Source: HGCA

Imports



Palm oil:	**89,000 t**
Soya:	**44,000 t**
Rape oil:	**41,000 t**
Sunflower:	**13,000 t**
Others:	**13,000 t**

Cold pressed rape

- Good marketing potential
- Scope for specific fatty acid profile varieties

Notes:

Aphid Identification

Aphid Identification is essential for monitoring spray efficacy and resistance – IPM TOOL

Quick guide to recognising Aphids of concern regarding BYDV & Resistance

Step 1:

- Does the Aphid have long black Siphunculi?
- Yes → Grain Aphid (*Sitobion avenae*) or Blackberry-Cereal Aphid (*S. fragariae*)
- No (Go to Step 2)

Step 2:

Is the Aphid green with pale or clear coloured Siphunculi?

- Yes → Rose-Grain Aphid (*M. dirhodum*) or Wheat Aphid / Greenbug (*S. graminum*)
- No (Go to Step 3)

Step 3:

Is the Aphid brownish to olive green and round in shape (ovate) with short Siphunculi?

- Yes → Bird Cherry-Oat Aphid *(Rhopalosiphum padi)*
- No → *If concerned, Contact Advisor*

Notes: _____

BYDV Control

Barley yellow Dwarfing Virus is spread by Aphids

Risk Factors:

- Early sown autumn crops / late sown spring crops
- Mild winters (Aphids overwintering)
- Mild Autumns (Aphid migration period lengthened)

Control Guidelines:

(1) Autumn crops

- Early sown:

Insecticide seed treatment and 1 aphicide in November
Or 1 aphicide mid-October & 1 aphicide early November

- Late sown:

Insecticide seed treatment **Or** 1 aphicide in early November

If poor aphid control or BYDV have been an issue it may indicate resistance – use a seed treatment

(2) Spring crops

- Early sown: Usually do not require aphicide
- Late sown (After mid-April): 1 aphicide at 4 leaf stage

(3) Direct Feeding by Aphids

- Wheat – Between GS 65 -85 aphicide may be beneficial at 5 aphids/ear +
- Barley – For aphicide to be beneficial, ears need to be '*infested*'

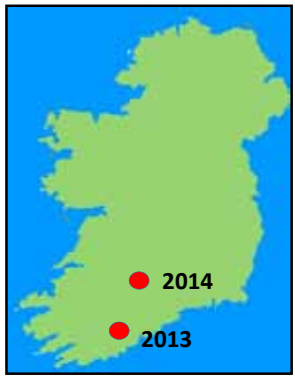
Crops should suffer little yield loss from new BYDV infection after GS31

Notes:

‘Knock Down Resistance’

‘Knock Down Resistance’ or ‘KDR’ was first identified in the UK in 2012 and in Ireland 2013

- Aphids with ‘KDR’ gene less susceptible to pyrethroids
- To date, ‘KDR’ has only been discovered in Grain Aphid, an important BYDV vector
- Two instances of ‘KDR’ discovered in Ireland, Cork (2013) & Tipperary (2014) - however likely to be more widespread
- If high numbers of aphids are left in a crop after pyrethroid use, identify aphid species present to inform choice of aphicide
- If you need to apply another aphicide, choose an insecticide with a different mode of action
- If you suspect that pyrethroids haven’t been effective, consider using a seed treatment on following autumn sown crops
- Teagasc, UCD and Rothamsted Research have commenced a project, funded by DAFM, to ascertain how widespread the ‘KDR’ resistance gene is in Irish Grain Aphid populations



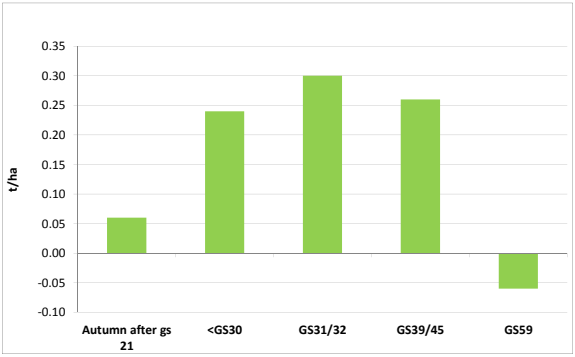
Notes:

Winter Barley Disease Control

Use fungicides to:

1. **Increase yield potential**
2. **Control disease to achieve yield potential**

Winter barley average yield responses to different timings



- Timing trial carried out on cv. Saffron in Oak Park and Cork in 2010-2013
- Tillering, stem extension and awn emergence applications all gave significant increases in yield
- Yield responses not as large as expected

Take home messages

1. **Don't delay disease control**
2. **Little justification for delaying last spray until ear emergence**

Notes:

Fungicide Choice?

Main Diseases

Net blotch

Ramularia

Rhynchosporium

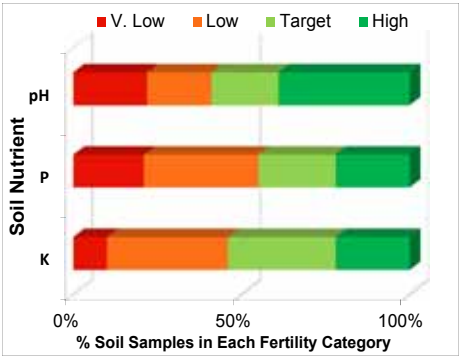
	T1	T2	T3
	Mid-Late tillering	Stem extension	Booting
	GS 25-30	GS 31-32	GS 39-49
Fungicide choice	Minimum of two active fungicides (Azoles, Strobilurins, SDHI's, multisite)	Minimum of two active fungicides (Azoles, Strobilurins, SDHI's, multisite)	Minimum of two active fungicides (Azoles, Strobilurins, SDHI's, multisite)
	Mildewcide where required	Mildewcide where required	Mildewcide where required

Notes:

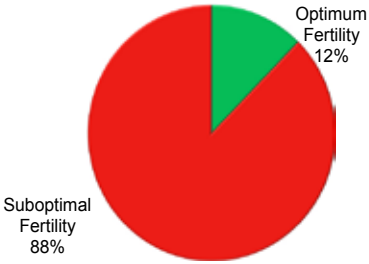
Soil Fertility Management

National Tillage Soil Fertility Status

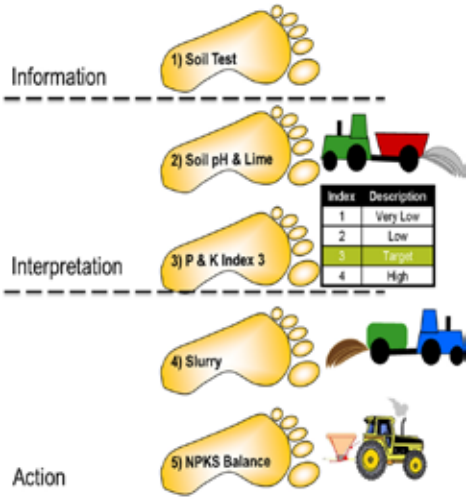
Results of Soil Samples from Tillage Farms in 2014



% Tillage Soils with Good Overall Fertility:
Soil pH > 6.5; Soil P and K Index ≥ 3



5 Steps to soil Fertility Management



Take Home Messages

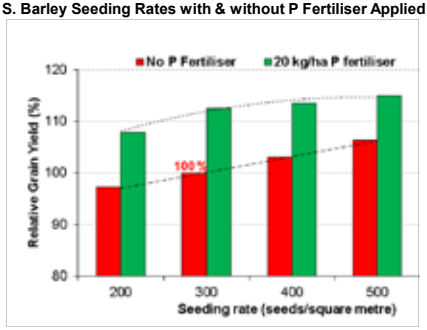
- Crop yields limited on 90% of tillage soils by pH, P or K
- Sample fields for soil fertility every 3-5 years
- Aim for target soil pH 6.5 by applying lime
- Build soil P & K to Index 3 over time
- Utilise organic manures where available as cost effective sources of P and K

Notes:

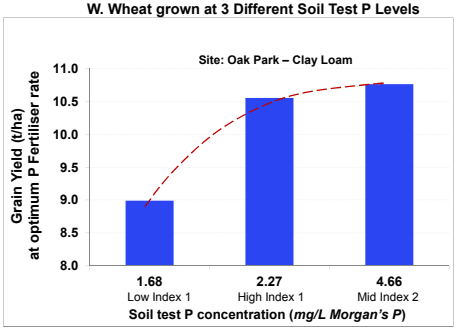
Phosphorus Fertiliser Studies

Importance of Adequate P Availability for Crop Establishment and Soil P Fertility for yield

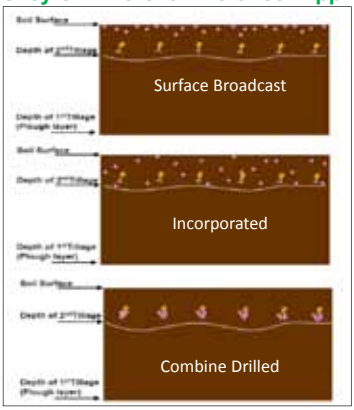
S. Barley Seeding Rates with & without P Fertiliser Applied



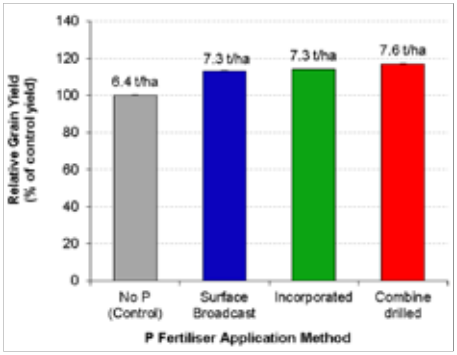
W. Wheat grown at 3 Different Soil Test P Levels



Efficiency of Different P Fertiliser Application Methods on Low P Soils



Relative Yield Response to P Fertiliser Application Method
Mean results across 8 sites between 2010 & 2014



Notes:

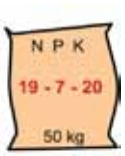
The Value of Pig Manure

Key Points

- Fertilizer value of pig manure, at 4.3% solids, is currently valued at €5.87 per m^3
- This translates into €26.65 per 1000 gallons

Using pig manure on tillage soils

- improves the soil organic content
- improves the soil structure
- means a cheaper alternative to chemical fertilizer
- reduces the vulnerability of farmers to fluctuations in the cost of imported fertilizers



	Nitrogen	Phosphorus	Potassium
Nutrient content (kg/m^3)	4.2	0.8	**2.2**
Nutrient availability (%)	50	100	**100**
Fertilizer cost per kg (€)*	1.04	2.32	**0.83**
Value (€)	**2.18**	**1.86**	**1.83**

Note: 1 m^3 equals 220 gallons. *Based upon Chemical Fertiliser prices in Feb 2015

Notes:

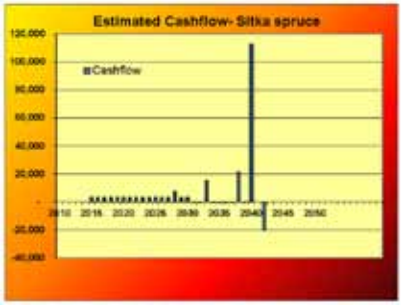
Forestry

Main Points

- Afforestation Grant Covers Costs to establish a woodland
- Can receive both **Forestry premium and BPS payment** on eligible land
- Annual premium **€510-€635/ha** for **15 yrs**
- Both BPS eligible forestry and Short Rotation coppice **are reckonable as Ecological Focus Areas (EFA's)**
- Forestry is a permanent change of land use

EXAMPLE

- 8 ha Sitka spruce
- Planted 2010
- Rotation 30 year
- YC 24
- Net profit: €182,000
- AEV/ ha: €696



Forest Service

Notes:

Forestry

Teagasc Forestry Online: www.teagasc.ie/forestry

Teagasc Forestry e-News: Have you signed up?

Contact your local forestry adviser:

- Forestry on your land
  - new opportunity
  - a whole farm approach
- Site suitability
  - right tree in the right place
- Technical advice
  - on your new crop
  - managing your young crop
- The forestry investment
  - what can you expect from your trees

@teagascforestry

TeagascMedia

forestry.teagasc

Agriculture, Food and the Marine

Forest Service

Notes:

Precision Spraying - 1

Weed mapping/spot treatment

- Has not developed practically
- Has potential for Invasive weeds e.g. Sterile Brome
- Weed ID and mapping capacity needed – Will develop

Auto-steer and Tramlines

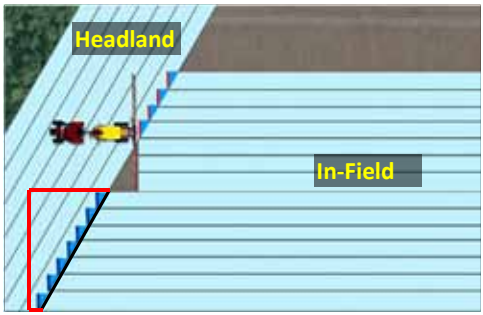
- Scribe tramlines:
  - 5% overlap (150mm in 3m)
  - 21m sprayer – 2 nozzles wasted
  - Set the scribe correctly!
- Auto-steer:
  - Can reduce overlap
  - But accurate GPS needed
  - Cost carefully

Notes:

Precision Spraying - 2

Sprayer auto-section control

- For headland
- For short triangular runs
- Most beneficial for:
  - Trailed sprayers
  - Wide booms
- Careful set-up required



Savings depend on

- Size and shape of field
- Boom size and if trailed sprayer
- Skill of operator with manual system
- Technology accuracy and if correctly set up
- Scale impact on purchase cost
- Research on overspray savings: 20 fields: 2% to 20%

Notes:

Nozzle Developments

Nozzle impacts on

- Correct application rate
- Even distribution on crop
- Deposition on plant/soil
- Loss to drift and environment

Drift reduction

- Greater spraying window
- Larger nozzles, lower pressures
- Low drift pre-orifice type
- Air induction nozzles
- Air blast sprayers

Efficacy – air induction

- Mostly good + better timeliness
- Avoid low volumes (<120 l/ha) with contacts and grass herbicides

Nozzle	Size	Output (l/ha)	Droplet size	LERAP Drift	JKI Drift
Flat Fan	03	144	Fine	-	-
Flat Fan	05	240	Med	-	-
Low drift	03	144	Med	-	-
Air Induction	03	144	Very coarse	***	75%

Notes:

Sprayer test – key points

Pump and PTO

- PTO guard and stand
- Pump output
- No pulsations or leaks

Tank, hoses, boom

- No leaks
- Basket filter, level indicator emptying valve: fitted
- No kinks or hose damage
- Induction hopper working
- Boom straight: suspension, height adjustment working

Pressure gauge + controls

- Accurate, readable gauge
- All spray controls functioning and accessible

Nozzles: Pressure drops

- Suction and pressure filters
- All nozzles identical
- Anti-drips working
- **All nozzle flow rates: <10% error**
- Pressure drop to boom <10%
- Pressure change when sections closed <10%

Notes:

Sustainable Use of Pesticides Directive (SUD)

Professional Pesticide Users - who needs to register?

Training and Registration:

- Anybody who applies 'Professional Use' products
  - any amount
  - any method of application
- Teagasc (QQI/FETAC) or City & Guilds certification
- List of providers available at http://www.pcs.agriculture.gov.ie/sud/
- All Professional Users must be registered by: 26th November 2015
- www.agfood.ie for DAFM clients
- Otherwise http://www.pcs.agriculture.gov.ie/sud/sudreg/

Responsibilities of Professional Users

- Maintain usage records
- Practice general principles of IPM
- Retain proof of qualification

Notes: _____

_____

_____

_____

Testing of Pesticide Application Equipment

Testing of Pesticide Application Equipment

- Boom sprayers > 3m and blast and orchard sprayers by:
  26th November 2016
- Farmer's responsibility to ensure sprayer is tested
- Test cert remains with sprayer if sold
- Tested every 5 years up to 2020
- Tested every 3 years after 2020
- Must be tested by a DAFM-registered Inspector of Pesticide Application equipment
- Knapsack sprayers are exempt

Notes:

Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

Surface water Tool for Reducing the Impact of Pesticides on the Environment

KEEPING PESTICIDES OUT OF WATER

Notes: _____

USE STRIPE KEEP PESTICIDES OUT OF WATER

Know the buffer zones required by the products you are using.

Use drift reducing technology

Optimise boom height

Do not fill sprayer from water course or near surface drains

Notes: _____

_____

_____

_____

Combine Setting

Grain problems

- Broken or skinned grains
- Excess awns or screenings
- Challenges for malting

Combine setting

- Start with instruction manual/default settings
- Combines differ: drum diameter, threshing elements etc.
- Start with gentle threshing; check threshing, losses, damage
- Change one setting at a time and record

Check List

- Check threshing elements for excessive wear
- Check basic settings; level concave etc.
- Start with low cylinder speed and open concave; adjust as needed
- Keep threshing elements properly loaded with crop
- Avoid excess grain going through returns
- Check elevators and augers
- Consider 'extras' such as de-awner plates as appropriate

Notes:

'AMIGA' GM Potato Study

What is AMIGA?

- EU wide project of 22 partners across 15 countries
- AMIGA = 'Assessing and monitoring the agri-environment impact of GM 'blight resistant' potato'
- No industry involvement in Teagasc GM research

Blight infected leaves

Project goals?

- Improve knowledge on specific GM crops relevant to EU
- Model response of blight to novel resistance gene i.e. GM potato is in effect a research tool
- Estimate the compatibility of specific GM crops with Integrated Pest Management (IPM) principles
- Impact of GM management on soil biodiversity (fungi, bacteria, etc.)

Blight infected tubers

Wild potato (*S. venturii*)

GM potato in use

- Developed at the Univ. Wageningen, the Netherlands
- Blight resistance gene (vnt1) taken from wild potato *Solanum venturii*
- Inserted into var. Desiree via biotechnology to deliver cisgenic potato
- Wild potato to commercial potato = cisgenics
- In contrast with for example, carrot to salmon = transgenics

Notes:

Progress to date?

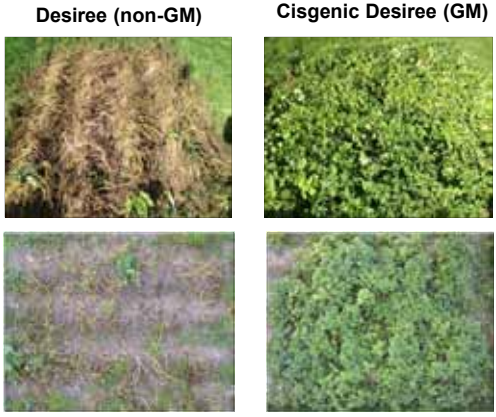
2013, 2014 & 2015

- Large scale comparative assessment of:

1. Cisgenic Desiree	GM	Single wild potato R gene present
2. Conventional Desiree	Non-GM	No R gene present
3. Conventional Sarpo Mira	Non-GM	Up to 5 wild potato R genes present

Output?

- Blight resistance gene (vnt1) has displayed strong performance in 2013, 2014 and will be tested again in 2015
- Identification of fungal, bacterial and nematode populations extracted from GM v. non-GM soil samples near completion
- Potential of integrating R genes into IPM strategies for potato disease control quantified
- Over 80 media events/workshop/public debates completed to date

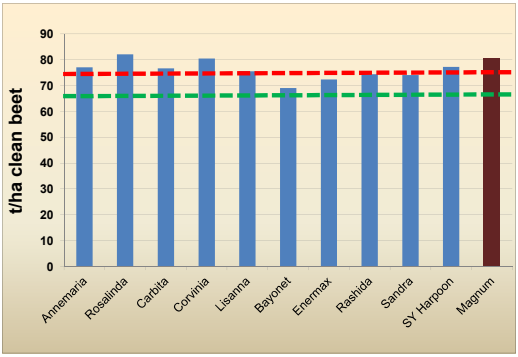


Notes:

Sugar Beet

Background

- Abolition of sugar quotas
- Farmer desire for profitable break crop
- Expressions of interest in forming new industry
- Reports of significant yield increases over past 10 years
- World sugar prices low
- Input prices increased greatly since sugar beet last grown



Current Research

- 2014: Replicated variety trials in OP and on farms strips
  - ➢ 10 sugar and 1 fodder beet variety
- Some sugar beet varieties surpassed 'Magnum' fodder beet dry matter yields
- Average plot yields at Oak Park 2002 (dashed green line) approx. 7 t/ha lower than 2014 (dashed red line)
- Trial continued into 2015 to verify these trends
  - ➢ 17 sugar and 1 fodder beet variety

Notes:

Winter Oilseed Rape

Light Leaf Spot (LLS)

- Major disease with losses of 30%
- Prevent LLS infection on buds essential
- Varietal resistance essential for good control
- Reduced rate triazole sufficient for control

Phoma

- Potential yield losses >0.5t/ha
- Treat when 10-20% plants infected

Sclerotinia

- High risk situations
  - ➢ close rotations
  - ➢ susceptible crops (potatoes, beans)
- Control at early petal fall

Disease Control: Fungicide strategy

- November (for Phoma and LLS. Use 1/2 rate triazole)
- February (for LLS. Use 1/2 rate triazole)
- +/- March PGR fungicide (@green bud stage)
- +/- April (for Sclerotinia @ early petal fall)

Notes:

Winter Oilseed Rape

Costs of production

- Break even yields 3.9t/ha (1.6t/ac)
- Establishment costs €170/ha (Plough)
  - ➢ Savings of 50% possible?

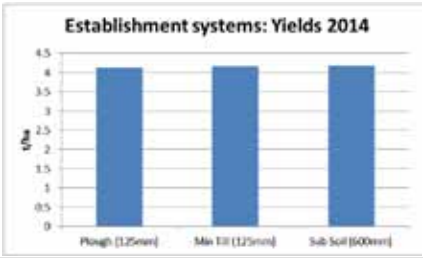
Shallow Sub-soil (600mm rows)

- Increased speed of planting ↑~50%
- More suited to good soil conditions
- Weed/slug control issues may arise but potential for herbicide savings

Preliminary Results 2014

Seed establishment rates

- Plough based 75%
- Subsoil (600mm) 64%



Notes:

SQUARE

Soil Quality Assessment Research Project

Soil Quality impacts on crop productivity and other soil functions

Objectives

- Evaluate the status of soil structural quality in Ireland
- Assess impact of soil structural degradation on functional capacity of soil
- Develop a toolbox for farmers to assess structural quality

SQUARE How?

- **Field campaign – 160 grassland and tillage sites over three years**
- **Farmer surveys to assess ranges in soil management practices**

Outputs

- Visual Soil Assessment for Irish soils and in-field toolkit for farmers
- Knowledge and scientific understanding to facilitate improved management practices

SQUARE supports the co-existence of environmental sustainability with increased food outputs

This project has been funded by the Irish Government under the National Development Plan 2007 -2013

Notes: