# Open Day

## Oak Park Crops Research Carlow

## Wednesday 26 June 2013

Teagasc
Agriculture and Food Development Authority

https://twitter.com/TeagascCrops

NDP
National Development Plan 2007 - 2013

# Welcome to the 2013 Teagasc Oak Park Crops Open Day

The tillage industry in common with all other agricultural sectors has been through a difficult time in the last year due to poor weather conditions. Crops in 2012 suffered from high disease pressure and yields were suppressed by poor weather during the key grain filling period. This was followed by a difficult harvest, however, the difficult year was at least compensated for by good grain prices as other key production areas in the world also suffered from reduced production. The poor conditions for last year's crops were followed by more difficult conditions for establishing crops in the Autumn, and a long Winter delaying Spring growth. Despite this, most crops that were established in reasonable conditions have recovered well and largely compensated for very delayed development earlier in the year, so that at present prospects for harvest look reasonable. This rapid crop development in relatively dry conditions mean that in many crops disease has remained at the bottom of the canopy. However, conditions in early June were ideal for disease development and applying the right products at the right time is as usual going to be vital to maximise yields. Grain prices have come back somewhat from last Autumns highs, but are still at historically good levels.

Prices have recently dropped as global production estimates are currently good, which is a demonstration of the volatility in prices that can be expected in a world market, and emphasis the need to manage price risk. However, ever increasing global demand gives the tillage industry good prospects in the medium to long term. Ireland, as a net importer of arable products and with high yield potential, is well placed to exploit this opportunity.

The Teagasc Tillage Crops Stakeholder Group recognised this opportunity and took it upon themselves to produce the Tillage Sector Development Plan on behalf of the tillage industry as a whole. This plan was presented to, and accepted by, the Minister for Agriculture, Food and the Marine and the Food Harvest 2020 High Level Implementation Committee. This provides the industry with a great opportunity for expansion and increased profitability, but it requires input from the whole sector if we are to fully exploit the opportunities. The Teagasc crops research programme, in conjunction with our advisory colleagues, is focussed on providing the highest quality technical information that will be required by the industry to make the most of the opportunities that lie ahead.

I hope that you will take the opportunity today to gather as much technical information as you can, and use it to make your own businesses prosper.

The research programme would not be possible without the support of the Department of Agriculture, Fisheries and the Marine, who have provided additional support through the Stimulus fund to expand the programme. However, in these times of limited resources the programme would not be possible without the support of the industry as a whole, and in particular the IFA, ISTA and the crop protection industry for which we are very grateful.

**John Spink**

*Head of Crop Science*
Teagasc Oak Park

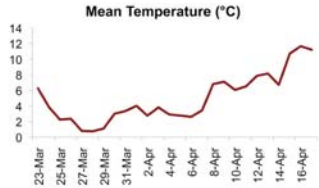
# Spring Barley Growth and Development Monitoring

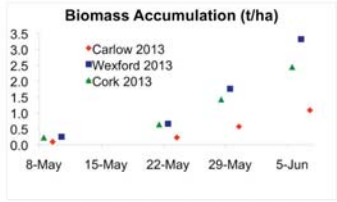
CELUP Oak Park

- 3 sites (Carlow, Wexford, Cork) 3 seasons (2011-2013)
- Variety: Quench
- Seedrate: 350 seeds/m$^2$
- N ≈ 135 kg/ha split @ tramlines visible & during tillering
- Fungicides: pre-stem extension & ear emergence

## 2013 – A Difficult Start

| | Sowing Date | Plants/m$^{-2}$ |
|---|---|---|
| Carlow 2013 | 20th March | 200 |
| Wexford 2013 | 3rd April | 284 |
| Cork 2013 | 4th April | 247 |




Carlow 447 shoots/m2

Wexford 1090 shoots/m2

Cork 1300 shoots/m2

Crops @ GS 31

Stand 1

Notes: _____

_____

_____

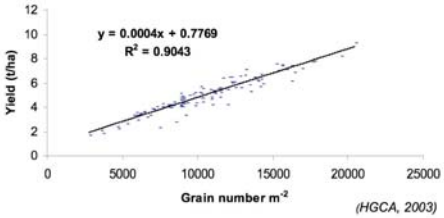
_____

_____

CELUP Oak Park

# Spring Barley Yield Components

- Yield = Grain Number x Grain Weight
- Grain number is the most influential component




(HGCA, 2003)

| | Carlow 2011 | Wexford 2011 | Cork 2011 |
|---|---|---|---|
| Grain yield (t/ha) | 9.3 | 10.7 | 10.8 |
| Grain number/m2 | 18039 | 20682 | 23149 |
| Grain weight (mg) | 50.7 | 50.8 | 46.5 |

- How far can we push grain number? What is controlling grain weight?
- Seedrate trials to generate plots of differing grain number and grain weight
- 6 seedrates, 4 replications, 2 sites (Oak Park and Kildalton)

40 seeds/m² 80 seeds/m² 160 seeds/m² 320 seeds/m² 640 seeds/m² 1280 seeds/m²

Stand 1

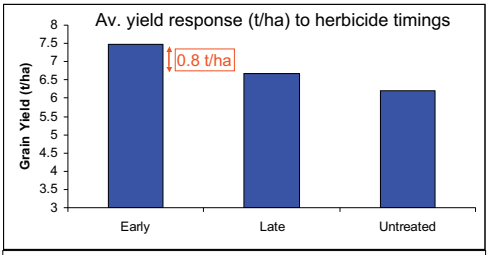
Notes: _____

CELUP Oak Park

# Spring Barley: Weed Control

**Good Spring Weed Control depends on:**

- Weed size
- Growing conditions
- Herbicide rate used
- Even application




**Herbicides used**
Ally Max + Galaxy @ different rates at each timing

Results (5 trials)

- Spray early in weedy ground
- Reduced rates gave similar results
- Avoid high rates on stressed crops
- **Late application can lose up to 0.8t/ha but will clear weeds**

Early herbicide application pays!

**Key Messages**

- Apply products early
- Especially in 'dirty' fields or lose tillers
- Reduce rates when conditions allow

Stand 1

Notes: _____

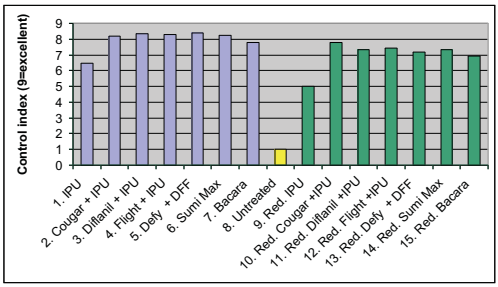
CELUP Oak Park

# Winter Wheat: Weed Control

**Autumn Weed Control**
- Best control pre/early post emerge
- Control AMG before tillering
- Clean up may be needed where
- Wild oats, Cleavers, Groundsel

Yield losses not always evident

Winter Wheat Herbicide Trials (Autumn)




Spring Herbicides for winter wheat
- Alister, Pacifica, Broadway Star, etc.

**Advantages**
- Can be useful to clean up (BLW,AMG)
- Cost effective if W Oats

**Disadvantages**
- Heavy reliance on ALS herbicides
- Need correct growing conditions
- Tank mix restrictions

Treat 1-7 @commercial rate
Treat 9-15 @ 30% of commercial rate

Results
- All products preformed well
- Red. rates-lower control but acceptable
- Spring clean up not always necessary

**Key Messages**
- Autumn application still effective
- Reducing rates will reduce persistency

Stand 1

Notes: _____

_____

_____

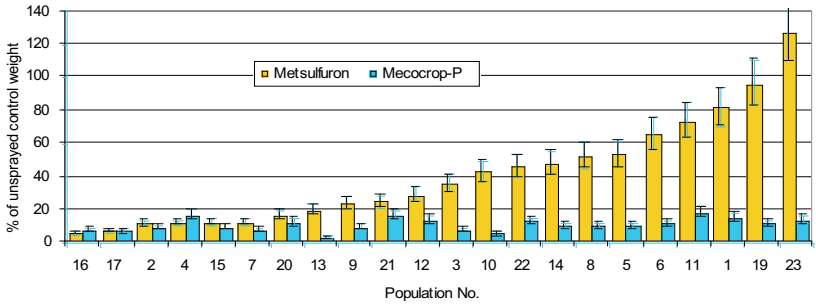
_____

_____

Teagasc
CELUP Oak Park

# ALS Resistance

- Well known since 2000
  - Chickweed, Marigold, Poppy
- Problem increasing each year
- Dominates strategy in some fields
- Can lead to complete failures
- Control options
- Rotation, Non-als herbicides
- Follow-up visits, field notes




Stand 1

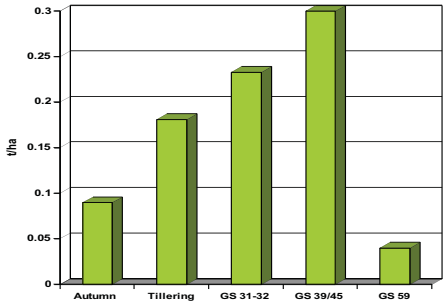
Notes: _____

CELUP Oak Park

# Winter Barley - Disease Control

**Use fungicides to:**

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




- Timing trial carried out on cv. Saffron in Oak Park and Cork in 2010-2012
- 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**

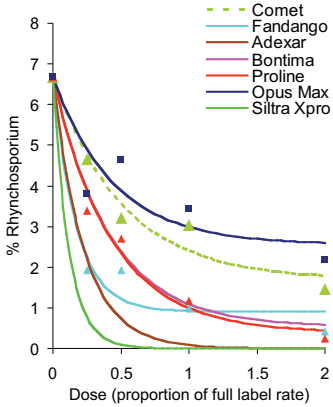
Stand 2

Notes: _____

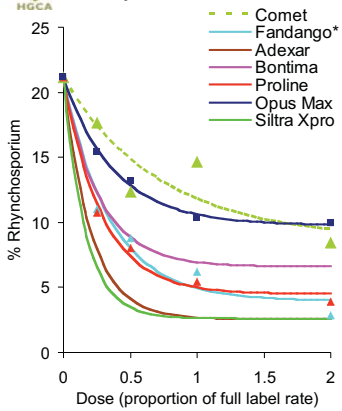
CELUP Oak Park

# Fungicide Choice?

Rhyncho Protectant*




Rhyncho Eradicant*




*Based on 2009-2011 data, 7 sites, including Teagasc data

## Fungicide Programmes

| Timing | GS | Targets | Fungicide |
|---|---|---|---|
| T1 | <30 | Foliar & Stem Diseases | Triazole + Strob or multi-site |
| T2 | 31-32 | Foliar Diseases | Triazole + SDHI or Strob |
| T3 | 39-49 | Foliar & Ear Diseases | Triazole + CTL and/or SDHI |

Add Mildewicide where required

Stand 2

Notes: _____

_____

_____

_____

_____

CELUP Oak Park

# GM Potato Study – Why?

**Challenges to potato sector?**

- ~15 sprays per crop
- Novel, more aggressive blight strains now exist
- EU legislation curbing use of fungicides

**Can we breed resistant varieties?**

- Yes, but requires minimum of 13 years
- Up to 40 years when breeding from wild potato species
- GM = process to 'accelerate breeding'

**Is GM the answer?**

- We don't know
- Must assess and monitor environmental impact
- Will not rely on research by proponents/opponents
- **Not advocates of GM, advocates of public research**

Stand 3

Notes:

CELUP Oak Park

# What are we doing?

**Collaborating with:**

- 22 partners (15 EU countries) in 'AMIGA' project (www.amigaproject.eu)
- NO industry involvement in Teagasc GM research

Wild potato (*S. venturii*)

**GM Potato**

- Developed at Univ. Wageningen, the NL
- Resistance ('R') gene taken from wild potato *Solanum venturii* and put in var. Desiree
- These are 'cisgenic' GM potatoes

**Project goals ?**

- Quantify impact of GM potato on soil microbes
- Determine how blight will respond
- Evaluate Integrated Pest Management Strategy

Microscopic nematodes

SEVENTH FRAMEWORK PROGRAMME

Stand 3

Notes: _____

CELUP Oak Park

# Progress to date?

**Phase I 2012:**

- Small scale field evaluation
- 24 non-GM v. 24 GM plants
- Resist Irish blight strains ?

GM non-GM

**Phase II 2013 - 2015:**

- For statistical validity, research must be completed for 3 years
- 5274 plants to be grown each year
  - 1758 GM Desiree
  - 1758 non-GM Desiree
  - 1758 Conventional resistant variety (Sarpo Mira)

**Check out www.gmoInfo.ie for regular updates**

SEVENTH FRAMEWORK PROGRAMME

Stand 3

Notes: _____

CELUP Oak Park

# Oilseed Rape Management

## Establishment

- Roots sensitive to compaction – deep cultivations may be needed
- Drill early – Pigeons, weed competition, N scavenging
- Establish 30 plants/$m^2$ in spring

## N management

- Moderately sized crops yield best ~ 7000 pods/$m^2$
- Target canopy size 3.5 GAI at start of flowering
- Need 50 kgN/ha from soil or fertiliser to make 1 GAI
- Fertiliser ~ 60% efficient
- Need an additional 60kg fertiliser N per tonne of yield over 3.5t/ha applied late
- Average benefit 0.36 t/ha and -9% $CO_2$ cost

Stand 4

Notes:

CELUP Oak Park

# Oilseed Rape Management

## Fungicide use

- Phoma (10-20% plants infected) and LLS (>25% plants infected) treat in autumn
- Follow up in spring if re-infection
- Sclerotinia spray at early petal fall if history in area

## PGR use

- Tebuconazole and metconazole effective growth regulators
- Spring PGR needed on crops greater than 1 GAI in mid-March. Do not use on smaller crops
- Optimum timing ~green bud

Stand 4

Notes: _____

CELUP Oak Park

# Oilseed Rape: Establishment

## Needs

- **Good establishment: Even plant distribution**
- **Soil structure for root growth**
- **Weed competition: Slug control**
- **Moisture retention: Drainage**
- **Low cost: Reliable, Convenient**

## 2012

| | Plants (Aut) | LAI (Feb) | Yield (9% mc) |
|---|---|---|---|
| Plough | 66 | 1.13 | 3.7 |
| Min Till | 64 | 0.81 | 3.8 |
| Subsoiler | 66 | 1.11 | 3.6 |

Plough 125mm spacing

Subsoiler 600mm

Stand 4

Notes: _____

CELUP Oak Park

# OSR Establishment Trials

## Systems:

- **Standard Plough-based:** 125mm, 600mm row spacing
- **Minimum tillage:** 125mm, 600mm row spacing
- **Subsoiler establishment:** 600mm row spacing

### Combined with:

- **Nitrogen: 5 rates** (+/- Autumn N )
- **Management strategies** (Canopy management+ Growth regs)
- **Weed control strategies**

### Assessments:

- **Crop performance:** Establishment, Canopy, Structure, Yield
- **Greenhouse gases:** $CO_2$, $NO_2$, LCA etc
- **Soil Microbiome:** Beneficial soil/root microbiota

Stand 4

Notes: _____

CELUP Oak Park

# Breeding for Septoria Resistance

## Why?

- Hugely important disease to Irish wheat farmers
- High fungicide costs : € 14 million p.a.
- *But* fungicides becoming less effective!

## What have we done?

Riband

Stigg

Untreated

- Selected lines with good Septoria resistance under Irish conditions
- Identified genes linked to pathways underlying Septoria resistance
- These genes will be used to assist future breeding of better varieties

Stand 5

Notes: _____

CELUP Oak Park

# Breeding for Septoria Resistance

## How did we do it?

- Field trials for 3 consecutive years; up to 34 lines screened for Septoria resistance
- Next generation sequencing (NGS) technologies to identify candidate genes for resistance

## What's the benefit to you?

- Better varietal resistance means less fungicide
- Reduce fungicide usage, potentially by up to half
- Saving € 7 million p.a.!
- Improve the profitability, competitiveness and sustainability of your farm

Stand 5

Notes: _____

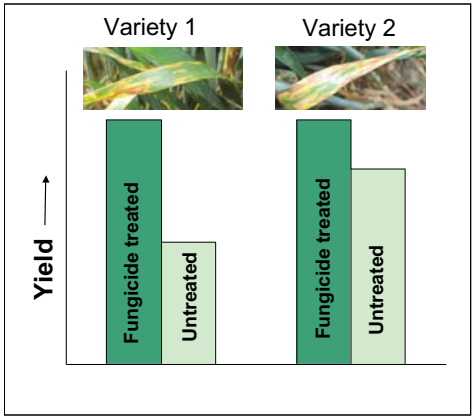
CELUP Oak Park

# Disease Tolerance

## What is disease tolerance?

"The ability to maintain yield performance in the presence of disease symptoms"

Some varieties are able to maintain a higher yield when infected with disease –
This is called **disease tolerance**




## What determines disease tolerance?

Not known, but thought to be a combination of traits such as:

- Increased photosynthesis in non-infected areas
- Increased radiation use efficiency
- Increased stem storage of carbohydrates

Stand 5

Notes: _____

CELUP Oak Park

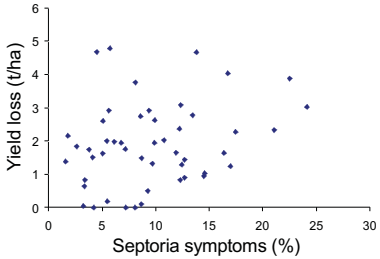
# Disease Tolerance

## What are we doing?

We are testing a wide range of wheat lines for disease tolerance to Septoria, including:

- Mexican spring wheat x UK winter wheat
- UK spring wheat x UK winter wheat
- UK winter wheat varieties

The lines in the field trial 2012 displayed big differences in yield loss caused by Septoria.




## And why?

Disease tolerance - an opportunity to decrease fungicide applications without losing yield.

- **Economical** benefit
- **Environmental** benefit
- More **sustainable defence** against pathogens than resistance genes

Stand 5

Notes: _____

CELUP Oak Park

# Winter Wheat Disease Control

**Aim of fungicide programmes are to protect potential yields**

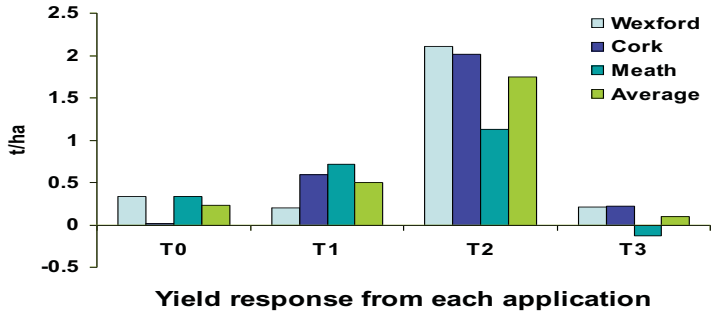

**Timing is critical!**

T1: 3rd leaf fully emerged

T2: Flag leaf fully emerged

T3: Mid way through flowering

Controlling disease on flag leaf is essential




**Yield response from each application**

Stand 5

Notes: _____

_____

_____

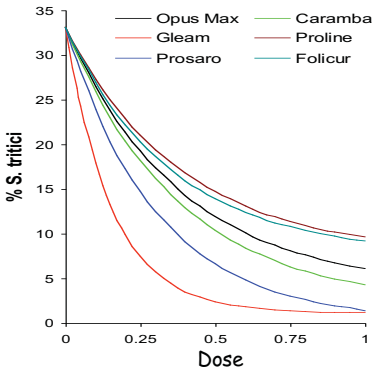
_____

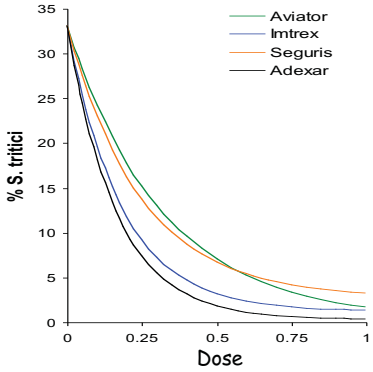
_____

CELUP Oak Park

# Fungicide Choice?

## Teagasc Fungicide Dose Response 2012




## Fungicide Programmes

| Timing | Targets | Fungicides |
|---|---|---|
| T0 | Foliar (& Stem) Diseases | Ctl (± strob for rust control) |
| T1 | Foliar & Stem Diseases | Triazole + Ctl (± SDHI) |
| T2 | Foliar Diseases | Triazole + SDHI + Ctl |
| T3 | Ear & Foliar Diseases | Triazole (± Ctl) |

Stand 5

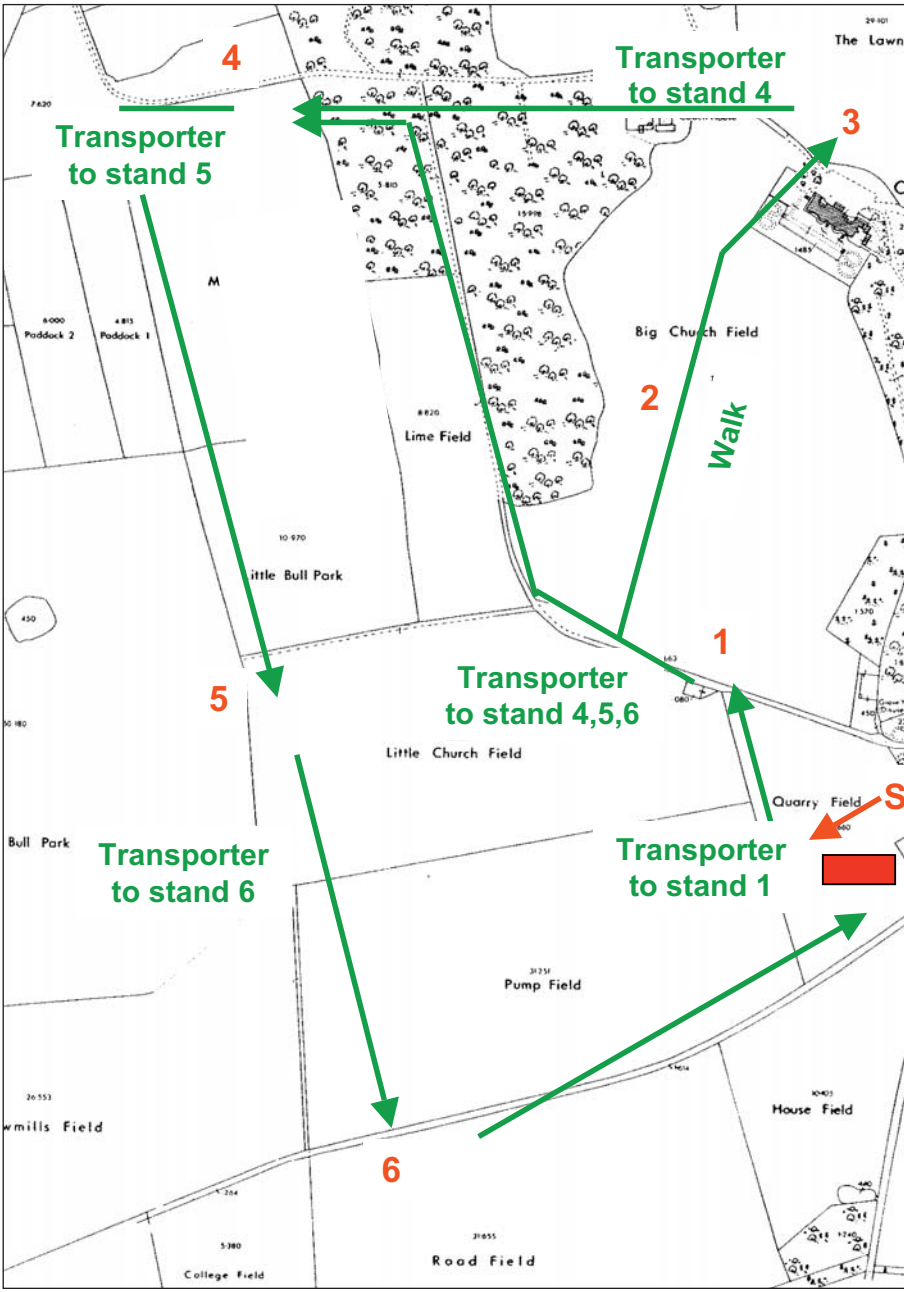
Notes: _____

_____

_____

_____

_____


4
Transporter to stand 4
Transporter to stand 5
3
2
Walk
1
5
Transporter to stand 4,5,6
Transporter to stand 6
Transporter to stand 1
6
Paddock 2
Paddock 1
Lime Field
Big Church Field
Little Church Field
Quarry Field
Pump Field
House Field
Road Field
College Field
Bull Park
The Lawn


**Stand list**

1. Spring Barley
   - Varieties
   - Crop Growth
   - Weed Control & Herbicide Resistance
2. Winter Barley
   - Varieties
   - Disease Control
3. GM Potatoes
4. Oil Seed Rape
   - Cultivations
   - Agronomy
5. Winter Wheat
   - Septoria Resistance
   - Disease Tolerance
   - Varieties
   - Disease Control
   - Septoria Resistance Management
   - Soil N supply
6. Spring Barley
   - Camelia
   - Nitrogen
   - P,K & Micronutrients for cereals
   - Fungicide Timings/Products

**Marquee**

- Whole Crop Forages
- Catchments
- Biodiversity
- Farm Safety
- Molecular Biology & Potato Breeding
- Potato Viruses
- PCS
- IASIS Registration
- Pig on Spit & Refreshments

CELUP Oak Park

# Septoria Resistance

## Resistance: why should you be concerned?

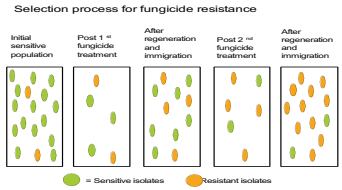
Protection of existing fungicides is important because

1. Once a population is resistant to a fungicide, that fungicide is of limited use
2. Removal of established products due to EU legislation
3. Limited new chemistries in the pipeline

## The problem - Septoria

- Spreads via rain and wind
- Many reproduction cycles per year
- Reproduces sexually and asexually
- Sexual spores travel up to 250 km
- Spores overwinter in crop debris

## The problem - Selection for fungicide resistance and eventual loss of efficacy

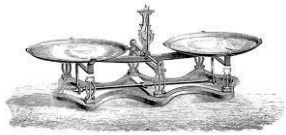



Stand 5

Notes: _____

CELUP Oak Park

# Septoria Resistance Management



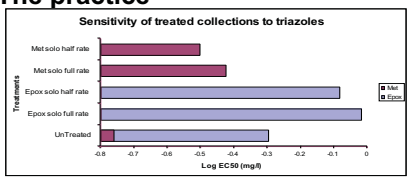
**Resistance management aims to slow the selection of resistant populations without compromising disease control. How?**

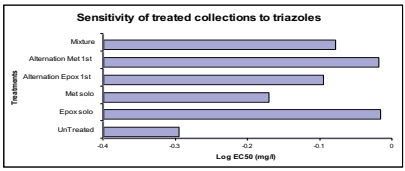
## The theory

- Using less fungicide (reduced rates) = less selection pressure = less selection

- Using two fungicides in mixtures or alternation = less selection

## The practice




- Using fungicides with different modes of action = less selection

**Take home message**

Use fungicides with different modes of action; to protect each other

**Remember: the more you use it, the faster you loose it**

Stand 5

Notes: _____

_____

_____

_____

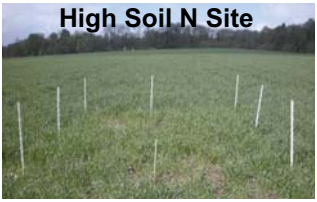
_____

CELUP Oak Park

# Investigating Soil Nitrogen Supply from Arable Soils

## Background

- Large quantities of N can be supplied from the
- soil to arable crops
- Large variation in soil N supply
- Crop N fertiliser requirement is dependent on soil N supply
- Soil N index system does not account for the affect of soil type or weather on soil N supply


## Research Objectives

- Investigate alternatives to the soil N index system?
- Do N tests used in other countries work in Ireland?

## Methodology

- 5m X 5m plots in commercial winter wheat
- 49 field sites in 10 different counties
- Range of soil types and previous crops
- Farmer covers the plot with plastic when spreading fertiliser to create a “No N” plot
- Measurements taken to assess soil and crop N status during the season

For more information or to participate in this project next year please contact Siobhán Walsh on 085-7424147 or siobhan.walsh@teagasc.ie

Stand 5

Notes: _____

CELUP Oak Park

# Camelina – A Potential Alternative?

Camelina sativa – a member of the brassica family, also known as false flax or golden pleasure

**Potential uses:**

- Oil for human consumption
- Biofuel

**Advantages over oilseed rape**

- Reduced inputs required
  - good resistance to pests and diseases
  - lower N requirement than OSR?
- Reduced pre-harvest seed loss
- Less susceptible to pigeon damage
- Healthier oil

**Disadvantages**

- Limited market opportunity
- Lower oil content than OSR

Oilseed rape Camelina

Past research indicated yields of 2.5 t/ha from spring camelina – has yield potential increased?

*Research Funded by Dept. Agriculture, Food and Marine Research Stimulus Fund*

Stand 6

Notes: _____

_____

_____

_____

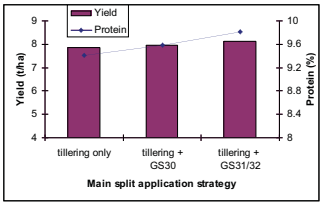
_____

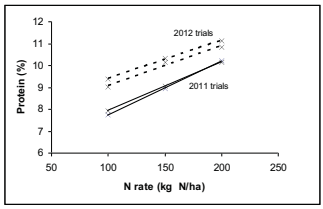
CELUP Oak Park

# N for Spring Barley

## N for Yield

- Small benefit to N in seedbed vs tramlines visible for 1st N
- Little advantage of splitting main dose (dry April/early May)
- Indications that permitted amounts satisfactory for yield
- Sulphur is important on light soils




## N for Protein

- Soil N influences protein content
- Some at sowing ~30-60 kg N/ha
- Main split at early-mid tillering
- Retain some of main split for 10-20 days (until GS 30-31)
- Amounts currently permitted adequate in most situations
- Late applications (flag leaf to heading) can give green tillers

Stand 6

Notes:

CELUP Johnstown

# Soil Fertility – 'P & K'

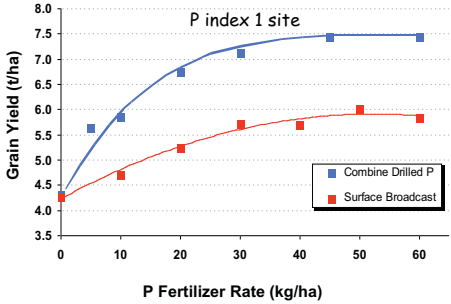
## Phosphorus & Potassium

- Early root & tiller development
- Maintaining productivity
- Increased N use efficiency

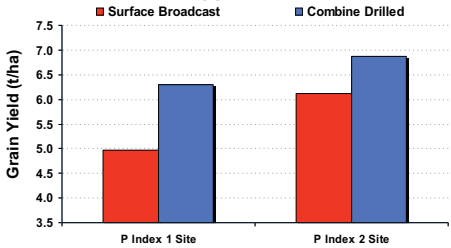
## P Research Spring Barley

- Large response on low fertility soils in 2012
- No response on P index 4 soils
- Higher grain yield potential at optimum soil P fertility levels
- P required by crop early in the growing season
- Yield benefits from combine drilling P fertiliser at sowing time on low P fertility soils

### P Fertiliser Response in Spring Barley




### P Fertiliser Application Method




## Take Home Messages

- Soil test regularly to monitor soil P and K fertility
- Calculate P & K fertiliser rates based on soil fertility levels
- Maximise profits with efficient P and K fertiliser use

Stand 6

Notes: _____

CELUP Johnstown

# Trace Elements

- Low application rates (grams/ha) – But essential!
- Essential to maxmise utilisation of N, P, K, & S
- Availability depends on soil type / soil reserves / soil conditions / weather
- Common deficiencies – Magnesium, Manganese, Zinc & Copper
- Apply trace elements early in the growing season

**Identifying deficiency**

- Soil / plant analysis
- Symptoms
  - Transient
  - Confused with other nutrients
  - Soil / weather factors

**Treatment**

- Soil applications
- Seed dressings
- Fertiliser dressing
- Foliar applications

**Most Common Deficiencies**

| Mg | Mn | Zn |
|---|---|---|


**Take Home Messages**

- Test soils to identify fields with low trace element levels
- Maintain soil pH to maximize availability ~ pH 6.5 cereals
- Apply appropriate trace element treatment early

Stand 6

Notes: _____

CELUP Oak Park

# Spring Barley: Disease Control

**Disease Progress**
- Time of sowing
- Variety susceptibility
- Fungicide timing/rate
- Weather

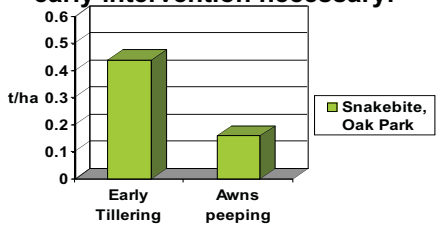
**Why Use Fungicides**
- Maintain yield potential (tiller numbers)
- Disease Control (maintain potential yield)

**Traditional Fungicide Programmes**
- Two(2) applications (GS 30-31 + GS 59-ear out)
- Are crops losing potential from early disease?

Rhynchosporium

**Disease Levels Dictate Fungicide Timing**

Early disease will reduce yield (tillering to stem extension)
- by reducing tiller numbers
- **early intervention necessary!**




## Action

1st application @ tillering - GS30 (at the onset of disease)

2nd application @ awns emerging

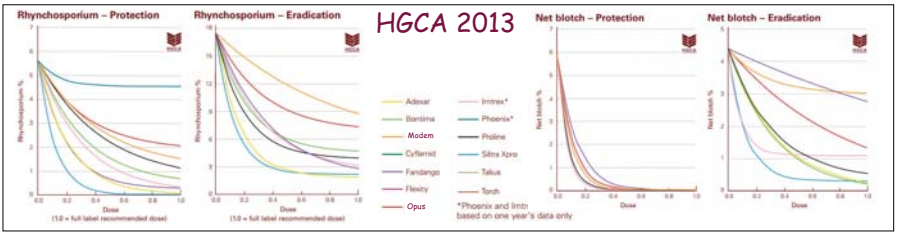
***Adjust spend at each timing to reflect disease level***

Stand 6

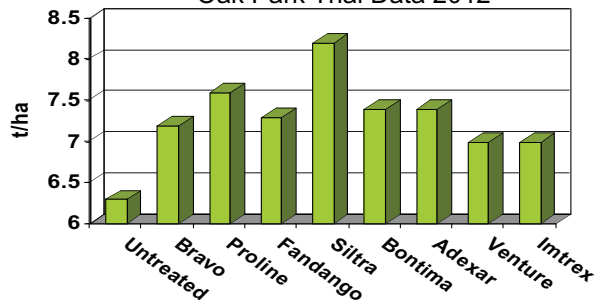
Notes: _____

CELUP Oak Park

# Spring Barley: Products




Oak Park Trial Data 2012




**Fusarium Control**
- More difficult to control than in wheat
- Flowering can start before head emergence
- Proline offers best control

***Other diseases are more important***
- Early fungicides necessary (Ramularia, etc)
- GS 49 awns emerged (latest)

**Key Messages**
- Prothioconazole excellent barley product
- SDHI will add to the triazole partner
- Bravo is essential at final timing
- Need to protect Prothioconazole

Stand 6

Notes: _____

# Buying & Treating Grain

**Farm-To-Farm Trading**

1. Weigh all trailers
2. Collect grain samples and do moisture content
3. Calculate value, relative to green grain
4. Consider other potentials costs e.g. straw value

| Treatment | Moisture |
|---|---|
| Drying | 15%+ |
| Organic acid & Rolling | 18-22 |
| Crimping | 30-35 |
| Urea based | 20-22 |
| Alkali | 18-22 |

**Factors To Be Considered**

| | |
|---|---|
| Storage & treatment costs | Risk analysis |
| Existing facilities | Storage losses |
| Handling equipment | Management skills |
| Flexibility | Legislation |
| Harvesting | Alternative uses for store |

Marquee

Notes: _____

# Whole Crop Cereals

1. Use high grain yielding crops
2. Crop yield is consistent from the soft- cheddar stage to ripening
3. Harvest crops at the soft cheddar consistency
4. Direct precision chop harvester is preferable. Mowing & picking up will lose grains
5. Cracker only needed if grain is dry
6. Preservation does not need an additive

If it's not quality in the field, it won't be quality in the pit
Use high grain crops

**Valuing The Crop**

**Method 1** Grain & Straw Valued e.g.

| | |
|---|---|
| 4 tonnes grain @ €160/t | €640 |
| Straw | €60 |
| Harvesting | -€55 |
| TOTAL Value / acre | €645* |

* For the livestock farmer to calculate total cost must include harvesting & transport

**Method 2**

Measured Yield (weigh trailers)

Forage analysed for DM & starch

Calculate DM yield, starch yield

Grain yield calculated from starch yield

Value relative to barley

**e.g. 4 tonne grain crop**

| Rolled Barley Price | Value €/t DM | Value € / t fresh @ 40% DM |
|---|---|---|
| €225 | 152 | 61 |
| €265 | 180 | 72 |

Marquee

Notes: _____

_____

_____

_____

_____

CELUP Johnstown

# Agricultural Catchments Programme

- Nitrates/Water Framework Directives set down targets for water quality
- WFD target dates 2015, 2021, 2027 – all waters at 'Good' quality
- Ecological standard – not just chemistry like ND
- GAP measures introduced for farming

- Progress is reviewed by EU Commission
- Agricultural Catchments Programme evaluating effectiveness of the GAP measures
- Basis for modifications to measures (if necessary)
- Economics and attitudes included in the study

Department of Agriculture, Fisheries and Food
An Roinn Talmhaíochta, Iascaigh agus Bia

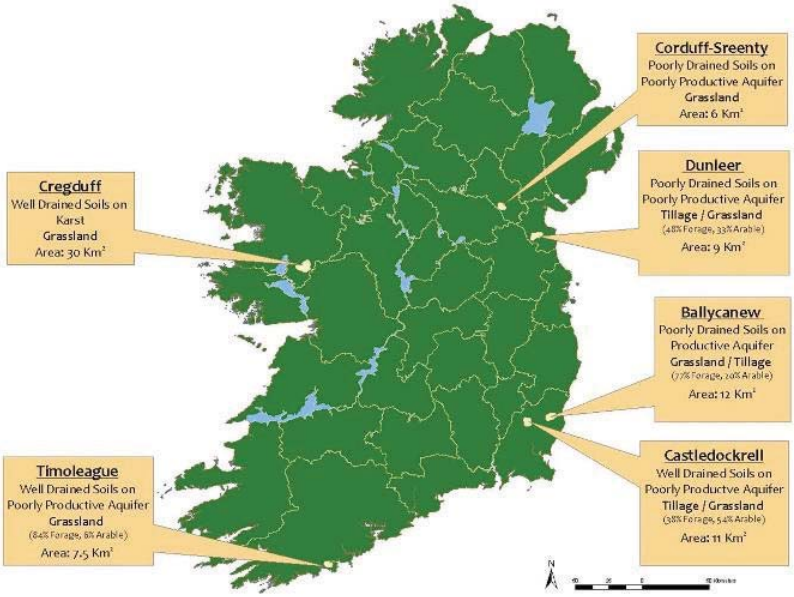
AGRICULTURAL CATCHMENTS PROGRAMME

Marquee

Notes: _____

CELUP Johnstown

# Six Catchments




Marquee

Notes: _____

_____

_____

_____

_____

CELUP Johnstown

# Some Results

## Nitrogen

- Streams - N all six catchments below MAC (11.3 mg $l^{-1}$)
- Groundwater - N rarely over the MAC
- Very high denitrification potential in near-stream zone

## Phosphorus

- Loads - low to moderate - 0.18kg and 0.79kg/ha/yr
- Concentrations - in 3 streams exceeded ecological standard
- Application rate very variable (also for N)

## Lag Times

- N - enriched groundwaters to reach acceptable $NO^3$ between 2019 and 2033 (full measure starting 2012)
- P - c. 5-20 years expected between changing management and changed soil P status

## Loss Pathways – overland /underground

- Soils/geology – big impact - measures vary in effectiveness

## Ecology

- Summer background P ecologically significant due to lower dilution – point sources need targeting

## Closed Period

- N & P lost during closed slurry spreading period was disproportionately high

Marquee

Notes: _____

## What is Biodiversity?





**Flora, Fauna and Habitats**









**Flora & Fauna need *specific* Habitats**




Marquee

Notes: _____

_____

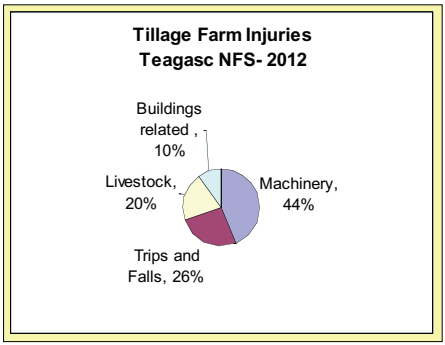
_____

_____

_____

# Injuries on Tillage Farms

- Machinery (44%) and Trips and Falls (26%) are the major associated factors
- Injuries on Tillage Farms result in **47 Days** off Work on Average
- Safety Behaviour the major preventative measure e.g. getting up/ down off tractor
- Irish farmers have a very poor Health Profile – Do a Health MOT
- Prevent contact with Pesticides – use low pressures and wear **PPE**




**Take Home Message**

**Health is Wealth – ' Think Safety and Take Action'**

Marquee

Notes: _____

_____

_____

_____

_____

# Manage Health and Safety

- Your Health and Safety is your most important resource
- Applying active management to Health and Safety greatly reduces risk
- Under the Safety, Health and Welfare at Work Act (2005) it is a legal requirement to complete and implement a Risk Assessment
- Teagasc provide short training on completing the Risk Assessment document
- Implement controls and practices on an on-going basis


**Take Home Messages**

- **Complete or Revise Risk Assessment**
- **Attend H&S Training**
- **Implement Control Measures on on-going basis**

Marquee

Notes: _____

_____

_____

_____

_____

Teagasc
CELUP Oak Park

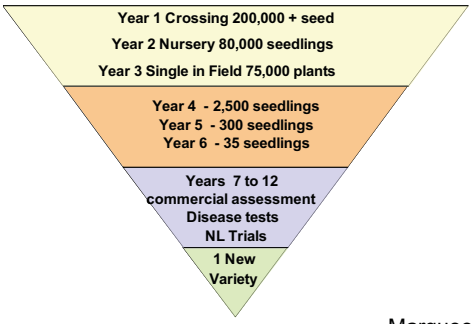
# Potato Breeding

Combining 50 years of potato breeding experience with cutting edge research in areas such as plant pathology, physiology and biotechnology, we produce potato varieties with high yield, disease resistance and excellent quality traits.

**Rooster**

**Electra**

**Potato Breeding Timescale**




Marquee

Notes: _____

_____

_____

_____

_____

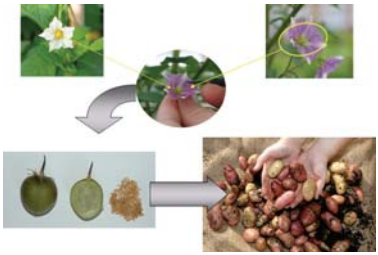
CELUP Oak Park

# Marker Assisted Selection (MAS)

**We use MAS to increase the speed and efficiency of potato breeding**

- Same genetic fingerprinting technology as used in medicine and forensics – allows us to track genes from parents to progeny

- MAS allows us to pinpoint which progeny from a cross have inherited beneficial gene variants from parents up to five years earlier than previously




**Benefits of MAS**

- Increases the precision of breeding – more of our cultivars will be resistant to multiple potato diseases because of MAS

- Can reduce the period required to move genes from wild species into cultivars from 40 years to as few as 15 years

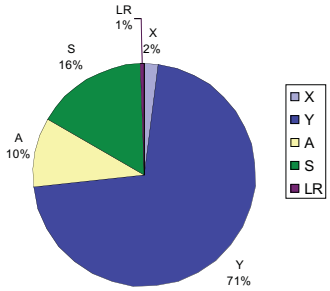
Marquee

Notes: _____

CELUP Oak Park

# Common Potato Viruses

## 2011 Virus Frequency



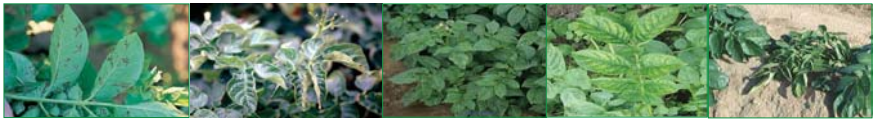

## Virus Transmission

**Mechanical** - machinery, animals, humans

**Aphid - non persistent** – virus taken up rapidly but does not remain in aphid. Very difficult to control with aphicides

**Aphid - persistent** – virus is taken up slowly and remains in aphid for lifetime

| Virus | Transmission | Description |
|---|---|---|
| Potato Virus Y | Aphid (non persistent) | Mottling, wrinkling, brown spots or streaks |
| Potato Virus S | Mechanically and Aphid (non persistent) | Slight deepening of veins, or symptomless |
| Potato Virus A | Aphid (non persistent) | Alternating light and dark green patches |
| Potato Virus X | Mechanically | Mild to severe mottling with rough leaves |
| Potato Virus LR | Aphid (persistent) | Leaves curl, stiff, dry & leathery |



Marquee

Notes: _____

_____

_____

_____

_____

CELUP Oak Park

# Potato Virus Y Strains Found In Ireland

| Strain | Symptom | Yield |
|---|---|---|
| PVYo | Mild to severe mottling, chlorosis, leaf drop death, no tuber symptoms | 10 - 80% loss |
| PVYc | Stipple-streak, stunting, death, no tuber symptoms | 10 – 80% loss |
| PVYn | Mild mottling, no tuber symptoms | Up to 50% loss |
| PVYntn | Mild mottling, tuber necrosis | >50 % + tuber loss |

**PVYntn – British Queen**

## PVYntn

- This is a recombinant strain of PVYn + PVYo or PVYc
- Necrotic ringspot on tubers (PTNRD)
- Can result in up to 50% + tuber loss

**PVYntn not found in Ireland before 2011**

Marquee

Notes: _____

_____

_____

_____

_____

Notes: