NATIONAL TILLAGE CONFERENCE 2012

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Teagasc
Crops Environment and Land Use
Oak Park Crops Research
Carlow

Wednesday, 25th January 2012

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Programme

09.30	Registration/Tea/Coffee
10.30	Conference Opening

Morning Session:

10.45	Challenges and opportunities for North European Agriculture ***Professor Ian Crute, Chief Scientist of the UK Agricultural & Horticultural Development Board***
11.30	Explaining cereal yields in 2011 ***John Spink, Shane Kennedy, Teagasc, Oak Park***
12.00	Future prospects and issues for tillage farming in Ireland ***Andy Doyle, Irish Farmers Journal***
12.30	Share farming – a new farm business model ***Michael Hennessy, Teagasc, Oak Park, Ollie Whyte, Whyte Bros, Tillage farmer, Co. Dublin***
13.00	Lunch

Afternoon Session:

14.30	Nitrogen use in barley ***Richie Hackett, Teagasc, Oak Park***
15.00	Fertiliser spreading – getting the mechanics right ***Dermot Forristal, Teagasc, Oak Park***
15.30	Cereal fungicide sensitivity and performance ***Steven Kildea, Liz Glynn, Teagasc, Oak Park***
16.00	Close of Conference
16.15	Tea/Coffee

Contents

Challenges and opportunities for Northern European Agriculture

Professor Ian Crute
Chief Scientist, Agriculture and Horticulture Development Board (AHDB)
Stoneleigh, Warwickshire, CV8 2TL, UK
ian.crute@ahdb.org.uk

SUMMARY

Although those with knowledge of agriculture and food production have known for decades that the legacy of the “green revolution” would not be sufficient to support the demands of a global population projected to be approximately 9 billion by mid-century. Nevertheless, since the mid-1980s most countries (with some important exceptions such as China and Brazil) have disinvested in agricultural science. Thankfully, the message that there is a need to re-prioritise agriculture has started to be heard and the UK Government’s Chief Scientific Adviser, Professor Sir John Beddington has done much to make this case. In 2008 he characterised the growing global demand for food, water and energy as an impending “perfect storm” when set against the backdrop of climate change, population growth and urbanisation. This was the impetus for the commissioning of a “Foresight” report which examined the global future of food and farming looking forward to 2050. The Foresight report was published early in 2011 and has begun to have policy impacts in the UK and beyond. (see: *http://www.bis.gov.uk/foresight/our-work/projects/published-projects/global-food-and-farming-futures/reports-and-publications*.

The Foresight report identified five primary challenges:

- Balancing future demand and supply sustainably
- Addressing the threat of future food price volatility
- Ending hunger
- Food production in a low emissions world
- Maintaining biodiversity and ecosystem services while feeding the world

And the report’s three high level messages were:

- Action is urgent and no action is not an option
- The global food system needs radical redesign
- Policies and decisions outside the food system are also critical

One of the concepts that were threaded throughout the report was that of “Sustainable Intensification”; simultaneously raising productivity, increasing resource use efficiency and

reducing environmental impacts. This has relevance to agriculture in developed and developing countries alike and recognises that producing as efficiently as possible on the smallest footprint of land capable of delivering market requirements can spare land for conservation of biodiversity; for carbon capture and storage (in grasslands and forests); and to sustain other ecosystem services.

Adopting an ecosystem approach to land use and management in Northern Europe will enable the trade-offs between different outcomes required from land to be identified and quantified. These outcomes include, as a priority, the need to increase the productivity of food production systems. Such things as ensuring that the genetic potential of improved crop varieties is realised by efficient disease control as well as optimised crop nutrition, are central to the concept of sustainable intensification.

Northern Europe, with its resilient, fertile soils and sufficiency of water will become an increasingly important region for global food production particularly given the expected climatic changes that are being predicted over coming decades. It will be necessary to start considering production efficiency not just in terms of yield per area (which will still be very important) but also in terms of nutrients produced (e.g. protein or joules of energy) and other resource use apart from land (such as water). In addition, the environmental impact will need to be taken account of in metrics (such as greenhouse gas emission per unit of production).

Alongside the new combination of metrics that describe system sustainability, the introduction and uptake of new technologies founded on advances in science will be essential if countries in Northern Europe are to take advantage of the opportunity that growing global demand represents. A drive for increasing competitiveness will be necessary to secure national food supply chains and contribute to global security.

I highlight six points in conclusion:

- N. European challenges and global challenges are closely connected
- R&D is essential (but not sufficient)
- Efficient land use and its management provide the key to meeting the challenge (= “Sustainable Intensification”)
- A focus is needed on increasing and realising genetic potential as well as reducing waste and environmental impact – *new metrics will be required to drive this*
- Innovation which adopts an “ecosystems approach” coupled with new technologies is necessary
- Climate change presents opportunities as well as risks and adaptation will require investment (and more information)

Challenges and opportunities for North European agriculture

Ian Crute
AHDB Chief Scientist

National Tillage Conference
Kilkenny
25 January 2012

Route map for the talk

USomething about :

•AHDB and me

•Foresight - challenges and opportunities

•“Sustainable Intensification”

USome conclusions

Six main points:

•N. European challenges and global challenges are closely connected

•R&D is essential (but not sufficient)

•Efficient land use and its management provide the key to meeting many challenges (= “Sustainable Intensification”)

•A focus is needed on increasing and realising genetic potential as well as reducing waste and environmental impact – *new metrics will be required to drive this*

•Innovation which adopts an “ecosystems approach” coupled with new technologies is necessary

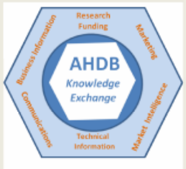
•Climate change presents opportunities as well as risks and adaptation will require investment (and more information)

What is AHDB ?

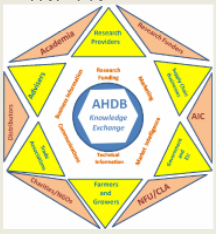
AHDB Knowledge Exchange

AHDB is a "hub" to broker and orchestrate industry-led Knowledge Exchange

Funded by and serving the needs of 300,000 UK farming businesses



- Partnerships
- Integration
- Co-ordination
- Added-value



EBLEX beef & lamb:	£15.6 m (England)
HGCA cereals & oilseeds:	£10.5 m (UK)
BPEX pigs:	£ 8.2 m (England)
DairyCo milk:	£ 7.3 m (GB)
PCL potatoes:	£ 6.4 m (GB)
HDC horticulture:	£ 5.8 m (GB)

£53.8 m

What about me ?

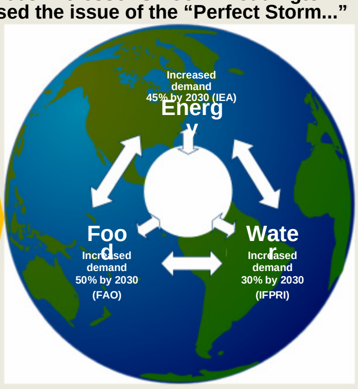
U Crop scientist (pathology/genetics) (40+ years)
U Horticultural and arable crops
U Former Director of HRI (Wellesbourne) (1995-98)
and Roth amsted Research (1999-2009)
U Foresight Lead Expert Group
UChief Scientist AHDB (ca 75% of UK agricultural production crops and livestock)
U Particular interest in agricultural sustainability

Government Office for Science

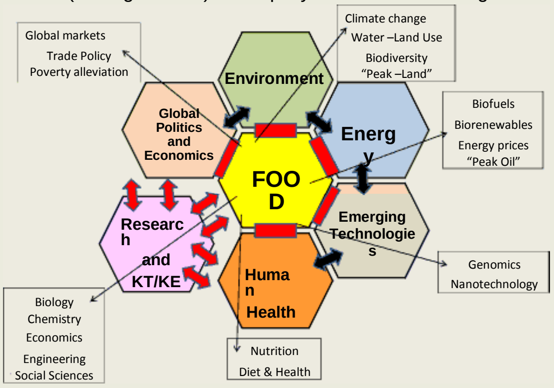
In 2008 Professor Sir John Beddington raised the issue of the "Perfect Storm..."

1. Increasing population
2. Increasing levels of urbanisation
1. The goal to alleviate poverty
1. Climate Change

Putting food security into context



Food (and agriculture) has rapidly become centre-stage



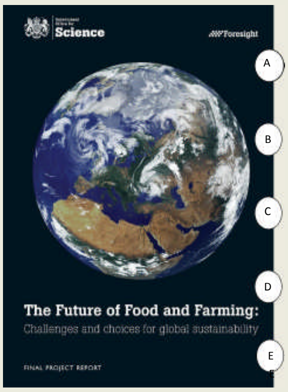
Why a Foresight report?

The case for urgent action in the global food system is now compelling:

- **Convergence of threats**
- **The food system is failing**

Work conducted 2008-2010

http://www.bis.gov.uk/foresight/our-work/projects/published-projects/global-food-and-farming-futures/reports-and-publications



Five Challenges

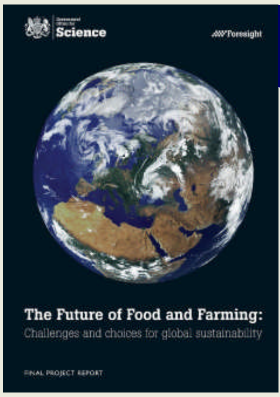
Balancing future demand and supply sustainably

Addressing the threat of future volatility in the food system

Ending Hunger

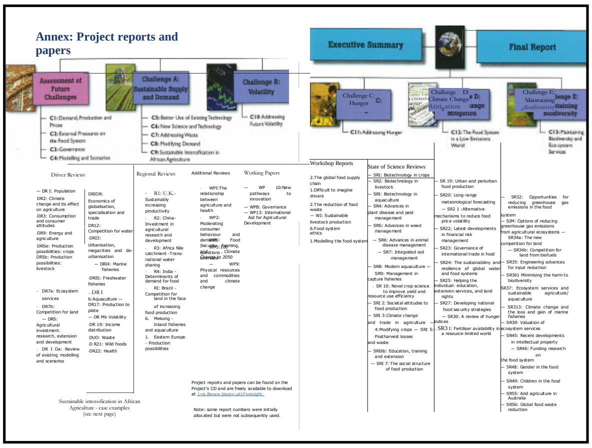
Production in a low emissions world

Maintaining biodiversity and ecosystem services while feeding the world



Key messages

- Urgency
- Radical redesign of the global food system
- "No action/change" is not an option
- Policies and decisions <u>outside</u> of the food system also critical



Three informative graphs from Foresight: 1

The failure to end hunger

Undernourishment data versus the MDG target

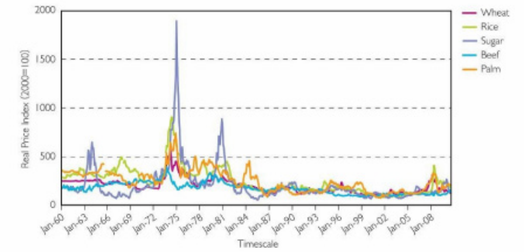
2007-08 Food price spike

Source: Oxfam (2010) Data cited from FAO Hunger Statistics (from 1969 to 2006); UN

Three informative graphs from Foresight: 2

Price volatility

Global real price indices for major agricultural products since 1960

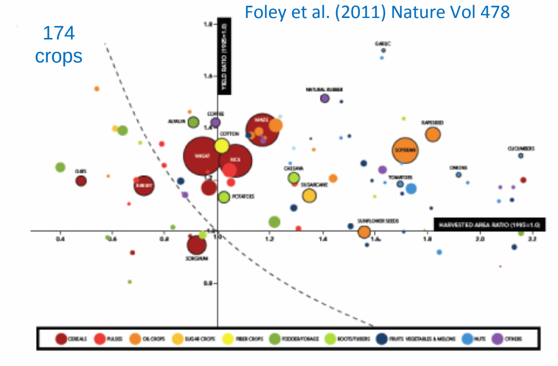


Source: HMG (2010) Data sourced from UNCTAD, BEA

Trends in Global Crop Production 1985-2005

Foley et al. (2011) Nature Vol 478

174 crops



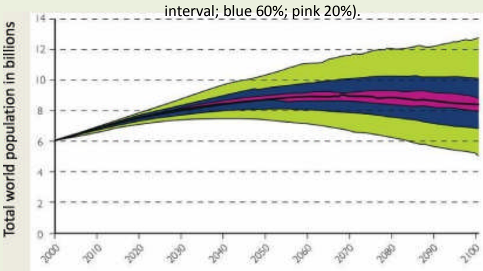
Comparative competitiveness of UK agriculture

Modified from Figure 1 of DR1 (Annex E refers) and Lutz and Scherbov

*Three informative graphs from Foresi*ght: 3

Population

Total world population in billions: probabilistic projections until 2100 (green 95% interval; blue 60%; pink 20%).



Modified from Figure 1 of DR1 (Annex E refers) and Lutz and Scherbov

The food system must not fail on sustainability...

- **Sustainability needs to move to centre stage**
- **Agriculture currently consumes 70% of total global water withdrawals from rivers and aquifers**
- **Agriculture directly contributes 10-12% of GHG emissions**

Modified from Figure 1 of DR1 (Annex E refers) and Lutz and Scherbov

The "essence" of sustainable agriculture:

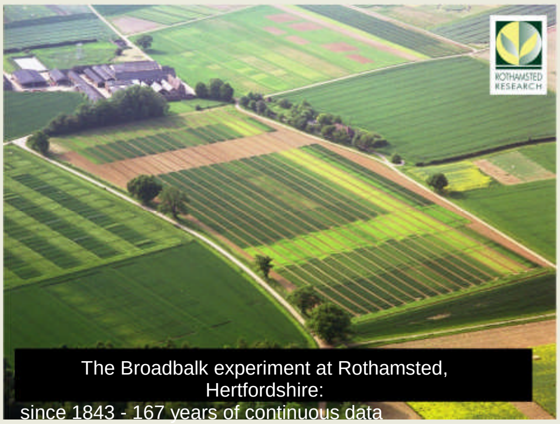
- The primary objective of agriculture is the efficient conversion of solar energy into varied and valued forms of chemical energy for utilisation by mankind.
- Some land is best used to produce feed/forage for animals as intermediates in the energy conversion process.
- The energy conversion involves manipulation and management of the interaction between genotype (animal and/or plant) and the environment
- The requirement to do this consistently and predictably demands continuity of agro-ecosystem functions; this captures the temporal and renewable concept of sustainability.
- Maximising efficiency by using the smallest necessary amount of resources (including land) provides options to achieve other objectives such as CCS; enhanced biodiversity; amenity etc. (which should not be confounded with the requirement to produce food and other agricultural products as efficiently as possible).

Sustainable Intensification

"Simultaneously raising productivity, increasing resource use efficiency and reducing negative environmental impacts of agriculture"

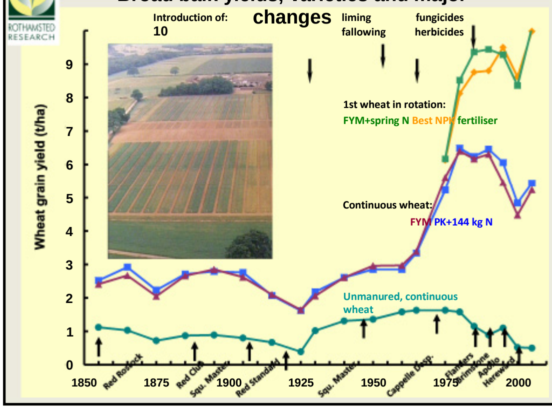
An integrating concept to meet all primary challenges

Producing as efficiently as possible on the smallest footprint of land capable of delivering (market) requirements is the "greenest" and usually the most profitable way to farm

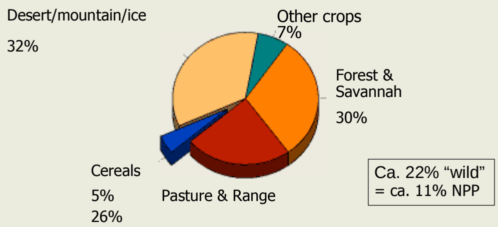


The Broadbalk experiment at Rothamsted, Hertfordshire:
since 1843 - 167 years of continuous data

Broad balk yields, varieties and major changes



Current global land usage (Total = 13,009 M Ha)



Ca 10 M Ha (= 0.25%) non-agricultural land (mostly forest) cultivated per annum

Ca 17 M Ha (= 1%) of agricultural land lost to erosion (5), salinisation (2) and urbanisation (10) per annum

The global significance of crop loss due to diseases, pests and weeds.

Sustainable intensification will contribute to:

U Reducing GHG emissions and adapting to climate change

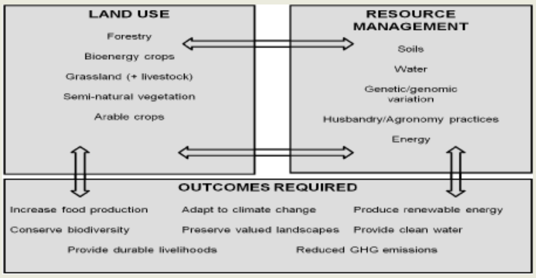
U Increasing production efficiency

U Increasing competitiveness

U Land sparing for:
- carbon capture and storage (CCS)
- bioenergy
- biodiversity conservation

U Maintaining ecosystems services

Managing an ecosystem

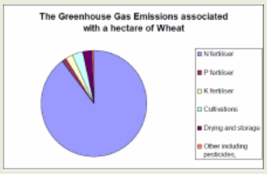


U Maintaining ecosystems services

Crop (and livestock) health is fundamental to GHG emissions reduction

GHG emissions to grow a crop of wheat
ca. 4000 - 5000 $KgCO_2eq./ha$
(N, other ag-chem, machinery, cultivations, spraying, harvesting)
Waste = lost yield + wasted inputs (economic) and > emissions/tonne

Nitrogen inputs, cultivated areas, yield and N use efficiency are key determinants of GHG emissions from cropped land



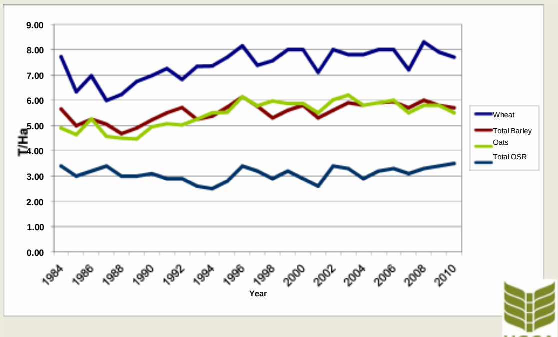
Mortimer (2003)

Nine UK & Danish wheat crops			
	Fungicide	No fungicide	SEM
Opt. N (kg/ha)	158	106	11.5 **
Yield (t/ha)	8.9	6.7	0.55 **
	GHG emissions Kg CO_2 eq. per tonne		
Fungicide/treated optimum	417		
No fungicide/untreated optimum	430		12 (NS)
No fungicide/treated optimum	546		31* *
No fungicide/untreated opt. + LUC	740		70**

Berry et al (2010)

28

UK arable crop yields have been static for 15 years +



HGCA

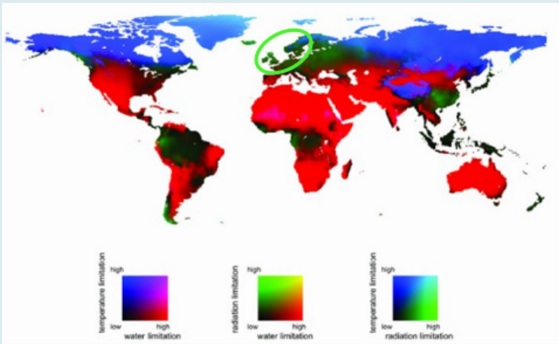
Wheat yields in RL Trials (2009)
(highest yielding variety)

HGCA

	Tonnes per hectare	
	Fungicide Treated	Fungicide Untreated
Group 1 (milling & baking)	10.6	8.3
Group 2 (milling/feed)	10.8	8.4
Group 3 (soft milling/feed)	10.9	9.0
Group 4 (soft)	11.1	8.5
Group 4 (hard)	11.2	8.5

[World record yield: “Einstein” (Group 2) –
15.64 Tonne/Ha - Southland, New Zealand - Mike Solari]

Limiting factors for global plant productivity



Baldocchi et al. 2004 SCOPE 62

SEB 2010

Components of sustainable elevation of bioscience-based solar energy conversion

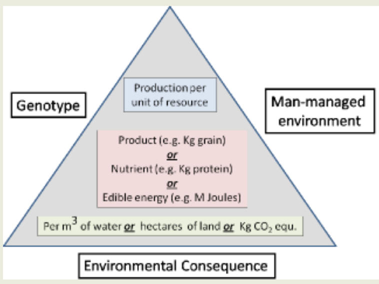
Increase genetic potential (G)

Realise genetic potential (E_O)

Reduce waste (E_L)

Reduce environmental impact (E_I)

Metrics for understanding, managing and manipulating outcomes, impacts and interactions



Constraints on Sustainable Crop Production

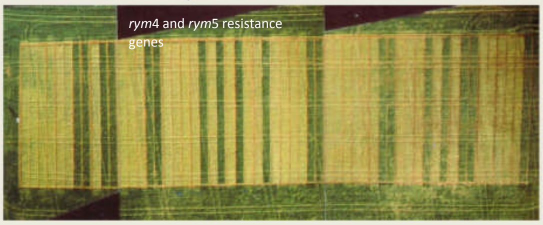
Environment (E_o; E_L; E_I)	Constraint	Genotype (G)
Supplementary lighting	Irradiance for photosynthesis	Engineer > C fixation efficiency (e.g. C4 to C3)
Provide protection	Temperature Too High Too Low	Exploit genetic variation
Irrigation technology	Water Too Much Too Little	Select/engineer > water use efficiency/ submergence tolerance
Fertilisers and soil amendment/management	Soil Fertility	Nutrient (N, P, K) use efficiency/acquisition
Chemical + Biological "pesticides"	Pests - Diseases - Weeds	Genetic resistance
Agronomy and cultural practices	Composition and Quality	Engineer/select novel products and qualities
Budget for GHGs, N & P in all the above	Reduce Emissions To air To water	***Quantify and targets gains from genetic improvement***

Two examples of disease resistance in action:
- often due to single genes
- genomics should enable

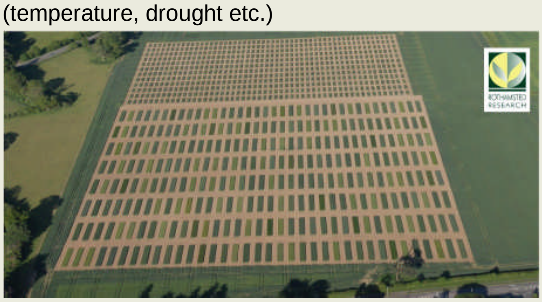
efficient identification and selection of gene combinations

Yellow rust

Soil-borne mosaic virus



Genomics will make it possible to identify and select efficiently for traits with complex inheritance such as: yield, N-use efficiency; water-use efficiency, take-all resistance and abiotic stress (temperature, drought etc.)

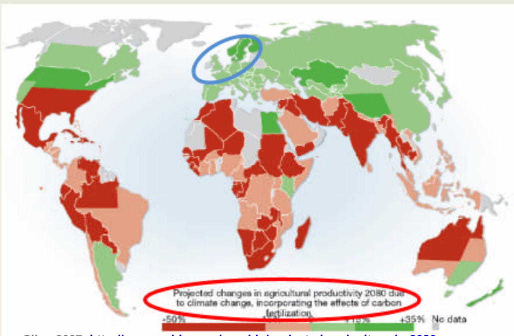


Expected climate change (2030-2050): Britain

- Warmer (1ºC at least)
- Increased frequency of warm dry summers
- Increased frequency of mild wet winters
- Little change in overall annual rainfall but:
  – wetter winters and drier summers
- Increased variability of winter rainfall
  - more frequent extreme events

Projected impacts from climate change in different EU regions
(source: http://europa.eu, © European Union, 1995-2010
DG Agriculture and Rural Development webpages)

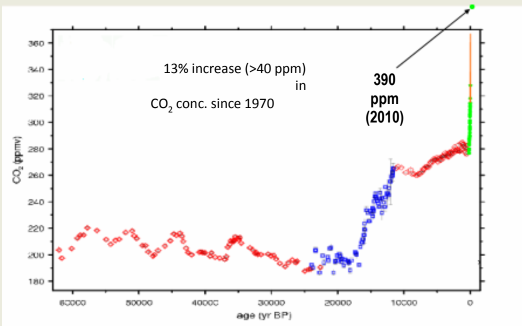
Projected changes in agricultural production due to climate change - 2080



Source: Cline 2007, http://maps.grid.no.go/graphic/projected-agriculture-in-2080-due-to-climate-change

Source University of Berne and National Oceanic and Atmospheric Administration

Carbon dioxide levels over the last 60,000 years



Source University of Berne and National Oceanic and Atmospheric Administration

Six main concluding points:

- N. European challenges and global challenges are closely connected
- R&D is essential (but not sufficient)
- Efficient land use and its management provide the key to meeting the challenge (= "Sustainable Intensification")
- A focus is needed on increasing and realising genetic potential as well as reducing waste and environmental impact – *new metrics will be required to drive this*
- Innovation which adopts an "ecosystems approach" coupled with new technologies is necessary
- Climate change presents opportunities as well as risks and adaptation will require investment (and more information)

Source University of Berne and National Oceanic and Atmospheric Administration

Explaining cereal yields in 2011

John Spink and Shane Kennedy
Teagasc, Oak Park Crops Research

SUMMARY

Ireland has globally high cereal yields with, over the last decade or so, the highest average wheat and second highest average barley yields in the world. Despite this history of high yields the 2011 season produced some of the highest yields on record; on average across all the cereals yields were up 13% on 2010 yields.

The 2011 season had a very harsh winter but frosts did not penetrate the soil to sufficient depth to affect structure apart from in the very surface layers of the soil. This may well have improved seedbed structure for spring crops which in combination with plentiful soil moisture and good drilling conditions resulted in good plant stands.

Average temperatures were well above the norm from the start of the year until May providing very good conditions for leaf and tiller formation. Monitoring of spring barley crops showed that this resulted in crop canopy sizes and ear numbers significantly above those achieved in 2010. From May until harvest temperatures were well below normal, whereas in 2010 they were above normal. Over the same period both 2010 and 2011 had above average solar radiation. Above average solar radiation gives above average rates of growth during grain filling. In 2011 this, in combination, with low temperatures which prolonged grain filling allowed crops to fully fill the high grain numbers set during the favourable spring growing conditions. The amount of solar radiation per unit of accumulated temperature ($Mj/m^2/oCday$) is known as the 'Photothermal Quotient' and is a measure of the likely total amount of growth during a given developmental period, during grain filling in 2011 it was 17% above average.

Shading experiments at Oak Park showed that had photosynthesis been limited during grain filling, grain size and yield would have been reduced as the crops would have been unable to fully fill all of the grains set.Whilst there is nothing that we can do to alter the weather, and must live with whatever the season throws at us, there are lessons we can learn from the 2011 season. It highlights the importance of early season growth for barley yield potential, which can be maximised through careful sowing and nutrient timing, early disease control and timely weed control. The maximum potential length of grain filling is determined by accumulated temperature so cannot be altered through management but we can, through nutrient use and disease control, ensure that the crop has the longest grain filling period that the season allows.

Explaining cereal yields in 2011

John Spink & Shane Kennedy
Teagasc CELUP
Oak Park Crops Research

The Irish Agriculture and Food Development Authority

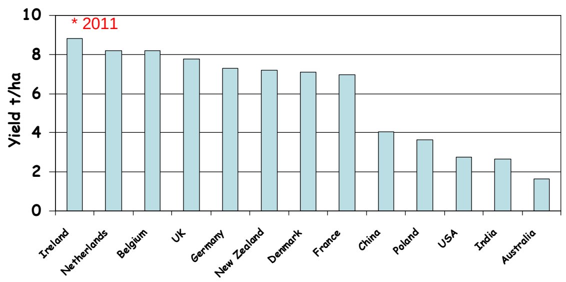
Farm yields up 13% in 2011

	2011 (t/ha)	2010 (t/ha)
Winter Wheat	10.2	8.9
Spring Wheat	8.2	7.6
Winter Barley	9.0	8.5
Spring Barley	7.5	6.7
Winter Oats	7.5	7.8
Spring Oats	7.9	7.2

Source: SFP and CSO data

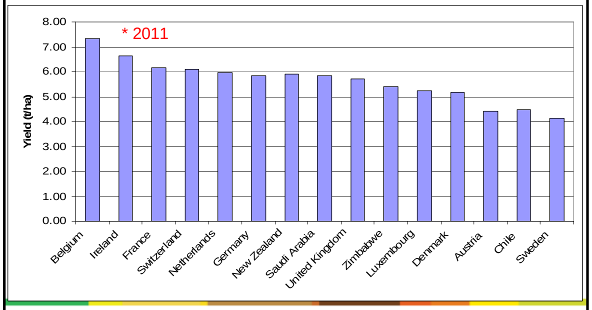
The Irish Agriculture and Food Development Authority

Highest wheat yields in the world 1998-2007



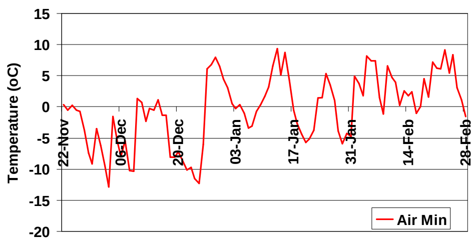
The Irish Agriculture and Food Development Authority

Second highest barley yields in the world 2000-2007



Teagasc The Irish Agriculture and Food Development Authority

Over-winter temperatures – Oak Park



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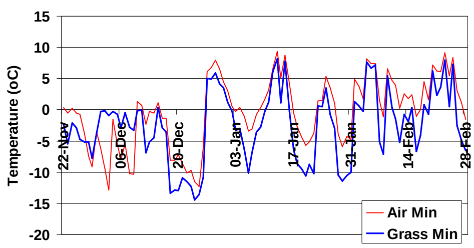

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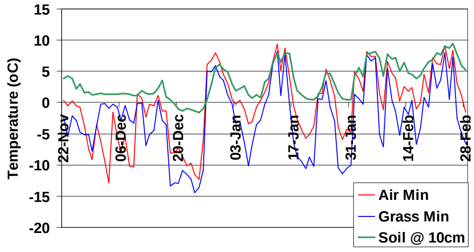

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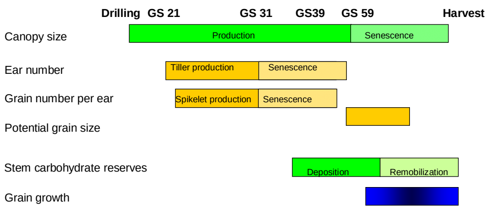
Barley Development



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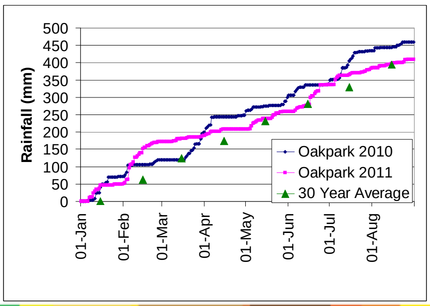
Oak Park cumulative rainfall – both years wetter than average



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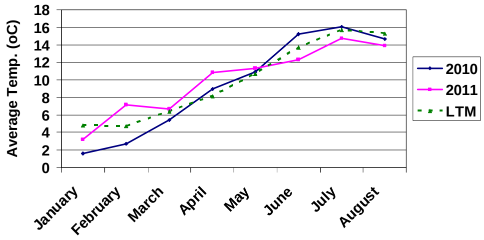
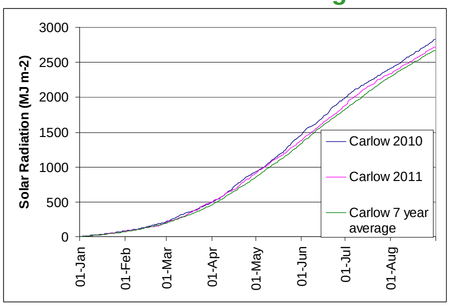
The Irish Agriculture and Food Development Authority

Air temperature: 2011 a warm start and a cool finish



The Irish Agriculture and Food Development Authority

Solar radiation: 2011 lower than 2010, but above average



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Spring Barley growth and development monitoring

- Sites: 2010 - Oak Park, Carlow

  2011 - Oak Park, Carlow
  Fermoy, Cork
  Duncormick, Wexford
- Variety: Quench
- Sowing date: 9th -25th March
- Nitrogen split: Early post-emergence
  During tillering

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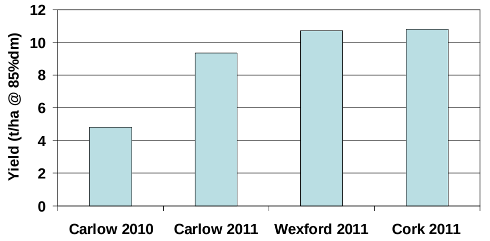
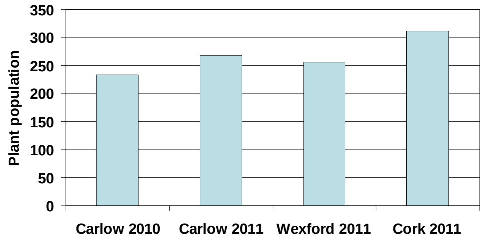
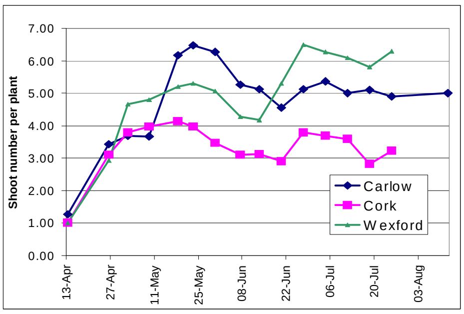
Spring Barley monitoring crop yields



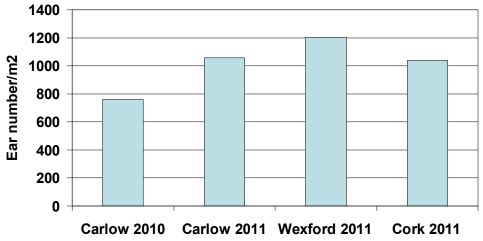
Plant population slightly higher in 2011



Rapid shoot production with little tiller death



Ear numbers significantly higher in 2011



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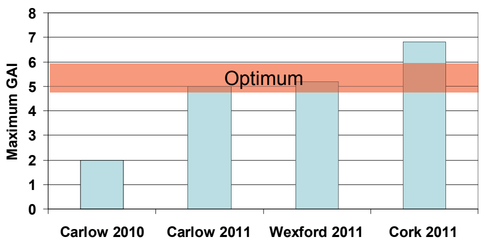
Canopy size significantly higher in 2011



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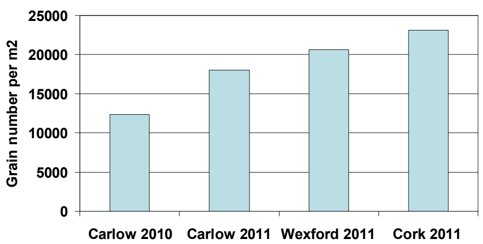
Grain number per m^2 significantly higher in 2011



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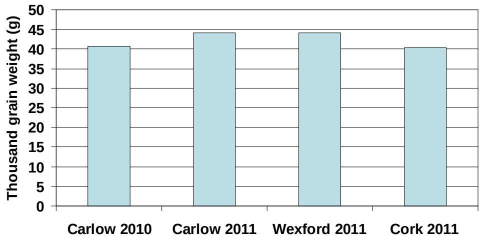
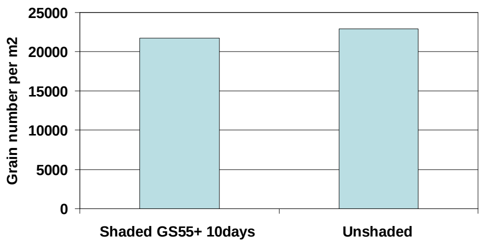
Thousand grain weight: 2011 slightly above 2010



Effect of shading during grain filling on crop growth

Teagasc
The Irish Agriculture and Food Development Authority

Little effect of shading on grain number



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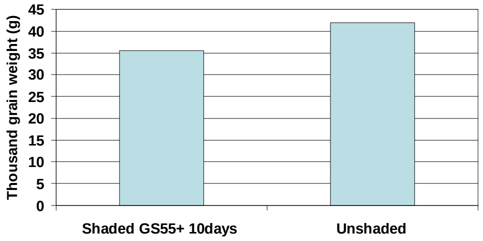
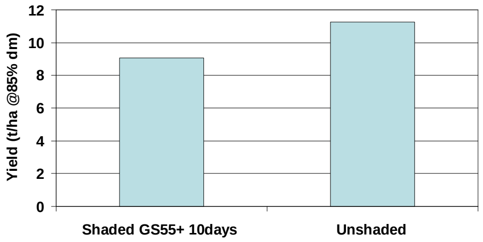
Big effect of shading on grain size



Big effect of shading on grain yield



Summary

- Average cereal yields up 13% in 2011 compared to 2010
- 2011 season had:
  - Good conditions for growth in the spring – setting up high grain numbers
  - Cool and reasonably bright grain filling conditions allowing successful filling of high grain numbers
- Lessons for maximising crop yield?
  - Maximise early season growth to maximise grain number
  - Can't prolong grain filling but can ensure it is not shortened by disease

Future prospects and issues for tillage farming in Ireland

Andy Doyle,
Irish Farmers Journal

SUMMARY

There is general consensus that the prospects for grain demand and prices will be good in the years ahead. Population growth, coupled with increasing demand for meat proteins, will drive this demand which has been increasing at roughly 20 million tonnes per annum in recent years. The challenge now facing the sector is to continuously supply this demand in the medium to long term as global population increases from the current seven billion towards the predicted nine billion by 2050.

The ability of Irish growers to be part of this effort depends on their continued profitability. We are a high cost producer with a high dependence on chemical inputs to control our pest, weed and disease problems. We are also forced to carry excess machine capacity to help cope with our uncertain climate. Our scale is relatively small by international standards and the cost of expansion is very high because of our land rental prices.

While many of these will be slow or difficult to change, our main advantage is yield potential in the generally cool damp Irish climate. But average farm yields have not kept pace with improved genetics, partly because of less than optimum growing years, partly because of decreased soil fertility, and partly because of on-going damage to many of our soils as a result of increasingly heavy machinery, which must often be operated in damper than desirable conditions. To help address these issues, growers must look more towards rotations plus the incorporation of a range of organic matter to stimulate increased biological activity in soils. These practices can help increase yields, decrease fertilizer and some other costs, and help improve overall soil condition and productivity. There may also be scope for tillage farmers to co-operate more with grassland farmers enabling livestock farmers easier access to more productive reseeds and tillage farmers access to some grass in the rotation.

Yield is the key to profitability in our high cost environment and so the optimum use of all inputs is critical for efficiency and productivity. This must be driven and guided by research. However, our national research effort has been hit, in particular, by decreasing numbers over the past two decades and this must be reversed. In order to make this happen the overall research effort will need to be supported by industry to help maximise efficiency for all sectors.

Future prospects and issues for tillage farming in Ireland

Andy Doyle
Irish Farmers Journal

Looking forward

- Prospects for the future
- CAP
- Production costs
- Yield levels
- Land access
- Farm structures
- Competitiveness
- Disease resistance
- New regulations

Prospects

- Global
  - Demand is increasing
    - Population
    - Increasing demand for meat
- Climate uncertainty
- Production and price volatility
- Re-opening of the food vs fuel debate

Production uncertainty

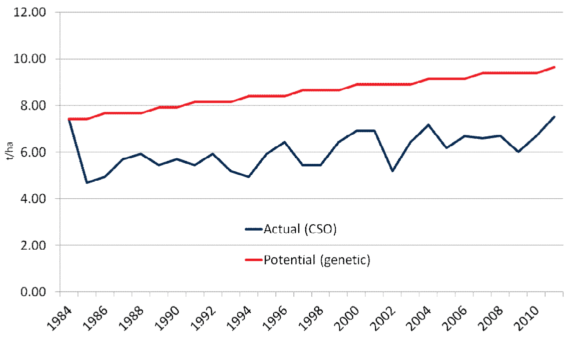
Costs

- Continue to increase
  - Fertilizer
  - Diesel
  - Compliance
  - Land
  - Farm security
- Calculating costs
  - Your labour is a cost
  - There are real machinery costs on conacre
  - Fixed costs are real bills

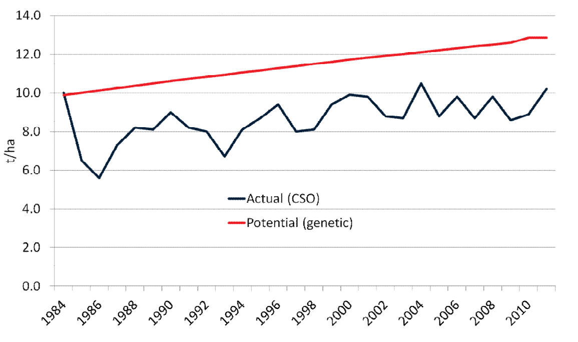
Yield levels

- We believe we are good because we were good
- Our average yields have slipped in *real* terms
  - Husbandry
  - Soils
- Our genetics are better than our performance

Spring Barley Yields
1984 – 2011 (t/ac)

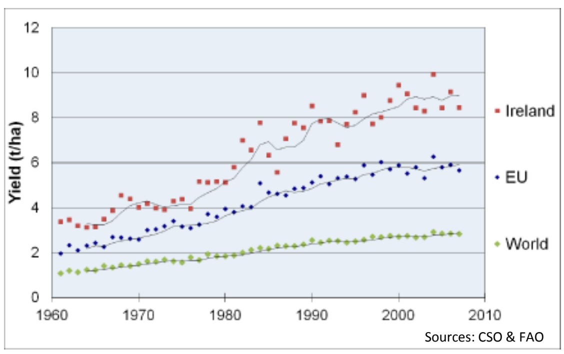


Winter Wheat Yields
1984 – 2011 (t/ac)



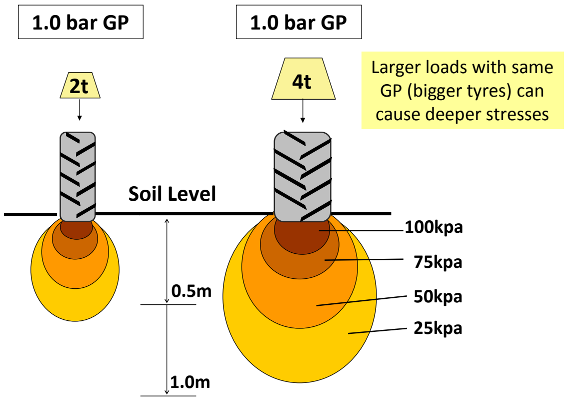
Winter Wheat Yield Trends

1980s: increase of 2.1 % per annum
1990s: increase < 1.0 % per annum



Soil management is key to output

- Soil has three main facets
  - Physical
  - Chemical
  - Biological
- A healthy soil
  - Self repairing
  - Self fertilizing
- All sections must be maintained
- Organic manures can play a vital role



Increasing interest in soils

Land access

Method	Relative cost	Potential for profit
Conacre	*****	*
Repeated annual renting	***	**
Leasing	***	**
Share farming	*	***

Production in Ireland

- We are a high cost producer – double the cost of some low-cost producers €150/t vs €78.70
- Imports normally guide our prices
- Tillage is only about 10% of our land area
  - 40-60% in many big grain producing countries
- Use the dominance of grass to get productive advantage by getting access to grassland and animal manures

Trade will drive global prices

Competitiveness

- Yield is key – production cost is per tonne
- Think outside the box
  - Reseeding is important for grassland productivity
  - Consider land swops with grassland neighbours
  - Rotations
- Access organic manures
  - Barter grain or straw for slurry
  - Consider swopping straw for compost or dung

Organic manures – many options

Research

- The driver of productivity
- Production research reduced
- Lot of modern farm practices with questionable economics
- Crop research resources have been badly hit in recent decades
- The industry must invest more in research

To conclude

- Fundamentals are good for grains but volatility will remain
- We must drive for increased productivity
- Tillage soils need to be improved
- Examine new options to access land
- Research is critical to drive productivity

Share Farming - A new farm business model

Michael Hennessy, Teagasc Oak Park and Ollie Whyte, Whyte Bros. Co Dublin

SUMMARY

Share farming, introduced two years ago, is still a new business model in Ireland. Share farming is an arrangement where two parties, the landowner and a share farmer, carry on separate farming businesses on the same land without forming a partnership or company. Each party agrees to share in the growing costs of the crops and take a share of the gross output (e.g. grain, straw, etc.)

The corner stone to a Share Farming agreement is trust between the parties and the correct operation of the agreement. The share farmer and landowner keep their own financial accounts and calculate their own profits as independent businesses. Share Farming defines itself from land rental as there is no guarantee of a fixed return for the landowner and both parties carry a production risk. Share Farming offers the share farmer an opportunity to increase their farmed area with shared risk but without upfront payments or minimum returns for the landowner.

Share Farming offers the landowner the opportunity to leverage the buying power, knowledge and expertise of the share farmer to increase output. The increased output, at lower costs, ultimately benefits both parties in the agreement. The agreement is fully compliant with schemes from the Department of Agriculture, Food and the Marine, and the Revenue Commissioners.

Ollie Whyte farms in the Naul, Co Dublin with his six brothers and seven of their sons. They run a substantial business of over 1,200 hectares focusing on first wheat's with some potatoes and other enterprises. The business relies heavily on conacre and deals with a diverse base of land owners. Ollie has recently seen landowners expectations change due to higher grain prices (and returns) and also due to the reform of the Common Agricultural Policy (CAP) post 2014.For the Whytes protecting the Single Farm Payment is vital as Cross Compliance becomes more stringent each year. Share Farming has allowed the business to claim all entitlements (both for the Whyte Bros. and landowners) and to farm all lands fully under Cross Compliance rules.

The Whytes currently have two Share Farming agreements and has siged another three agreements in early 2012. The approach taken to Share Farming with landowners is to outline the agreement then encourage landowners to seek independent advice. Once the landowners are happy with the Share Farming concepts both parties sit down and negotiate a deal. All areas are discussed including purchasing, invoicing, sales, Cross Compliance, etc. The key to success with share farming is to keep the agreement simple and understandable by the landowner. Another vital aspect is a reliable record keeping system and the ability to be transparent with all aspects of purchases. Whytes offer landowners various options for sales of grain (direct delivery to a merchants yard, dry and storage on farm, etc.) but in all cases the land owners are encouraged to sell grain in their own name. Ollie keeps in constant contact with landowners through the season concerning market trends and input spend. "Share Farming is working well for us and has allowed us to develop a sustainable business, while farming within all aspects of Cross Compliance rules" added Ollie Whyte.

Share farming - A new farm business model

Michael Hennessy
Teagasc, Oak Park

Ollie Whyte
Whyte Brs. Co Dublin

Outline

Joint talk

- Michael Hennessy, Teagasc
  - Introduction to Share Farming
  - Basics to setting up an agreement
- Ollie Whyte, Whyte Brothers, Naul, Co. Dublin
  - Why Share Farming?
  - Setting up an agreement
  - Working with landowners
  - Summary

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Introduction

- Share Farming operating for 2 years in Ireland
- Share Farming to date..
  - Total numbers difficult to assess (no official register)
    - Website: hits 2,000
  - Number of signed agreements increasing
  - Increasing enquiries from all sides
- Drivers for change
  - CAP post 2014 and ↑ grain prices

CAP 2014

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What is Share Farming?

- Two parties jointly farming the same area of land
  - Each party remains as a separate business
  - Not a new business venture
- Sharing outputs (not profits)
  - Agreeing to grow a crop and share
    - Grain and Straw & other income
    - Jointly pay for inputs
- Share Farming is fully compliant with
  - Department of Agriculture
  - Revenue

Note: Partnership Agreement =sharing/distributing profits

Where can Share Farming fit?

- Mixed tillage farmer
- Land owner using a Contractor
- Between family members
- Existing arrangements
- Long standing conacre arrangements
- Can the Share Farmer add value??

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How does Share Farming work?

- Both parties seen as active farmers
  - Share in rewards and risks
- Both parties must contribute to growing costs
  - Agreement allows flexibility
- Initial agreement on the following essential
  - Division of inputs (who pays for what)
  - Division of outputs (who gets what)
  - Term of the agreement
  - Individual responsibilities

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How does Share Farming work (contd.)

- The following areas should also be discussed
  - Single farm Payments & Cross Compliance
  - Insurance
  - Finance of inputs
  - Selling options
  - Facilitator (in case of disagreement)
- Fill in agreement
  - 7 tables (if no livestock)
  - Both parties may want independent advice
  - Sign the agreement

Examples of Agreements

Winter Wheat

Land owner (Share)		Share Farmer (Share)	
Materials	50%	Materials	50%
Machinery	50%	Machinery	50%
Grain	50%	Grain	50%
Straw	50%	Straw	50%
S.F.P.	100%	SFP	0

Spring Barley

Land owner (Share)		Share Farmer (Share)	
Materials	50%	Materials	50 %
Machinery	50%	Machinery	50 %
Grain	45%	Grain	55 %
Straw	100%	Straw	0
S.F.P.	100%	SFP	0

Experiences to date…

- Good interest in the concept
- Successful agreements
  - Generally uncomplicated agreements
  - Both parties already known or working together
  - Larger farms participating (scale/buying power)
- Stumbling blocks to agreement
  - Perceived complexity
  - Work around solutions (de facto conacre)
  - Uncertainty about exact return
  - Fear of change by land owners (trust missing)

More information

- Share Farm Agreement information
  - http://www.teagasc.ie/advisory/share_farming/index.asp
- Information available
  - Leaflets
  - Notes
  - Calculators
  - Specimen Agreement
  - Blank Agreement
  - Revenue tax briefing

Summary: Seting up an agreement

- Share Faming is working successfully
- Simple agreements work best
- Flexible agreements will suit most situations
- Share Faming works well
  - Trust between parties
  - high crop output
- Landowners need more information
  - Independent sources
  - Teagasc (website)

Share Farming: Our experience …

Ollie Whyte, Whyte Brothers, Co Dublin

- Farm Profile
  - Farming 1,200 hectares
  - Mostly cereals and some potatoes
  - Emphasis on first wheats
  - Dry and sell from store
- Farm run by seven brothers and seven of their sons
  - More income generation needed year on year!!
  - 2 agreements running for 2 year
  - 3 more agreements signed for 2012

Why Share Farming?

Access to land to generate income is paramount

However

- Not at any cost!!
- Protect Single Farm Payments vital
  - Entitlements and Cross Compliance
- Diverse land owner base
  - Business needed an alternative to conacre
  - Our conacre agreements are changing
  - Landowners want to share in high grain prices
  - Share Farming allows landowner active participation

Why Share farming? (Contd.)

- Alternative to conacre
  - No up front payments (helps our cash flow)
  - Landowners benefit from
    - Whyte Bros. business model
    - Our growing expertise
    - Machine capacity
  - Land treated as owned (shared benefit)
- Landowners: entitlements post 2014?
  - Active farming versus renting?

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Basic rules (for Share Farming)

- Trust is essential on both sides
- Honesty in all dealings
- Transparency in all aspects
  - Outline the Rewards and **Risk**
- Keep the Agreement simple
- Get independent advice

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Where we start with Share Farming

- Share Farming discussed with land owners
  - with mixed enterprises
  - using contractors
  - following a change in ownership
  - Long term conacre
- Initial contact with landowner
  - Outline Share Farming concept
  - Highlight the advantages
  - Direct landowner to Teagasc (or independent advisor)

Developing the Share Farming agreement with land owners

- Keep the agreement simple
- Main responsibilities of each party
  - Division of inputs/outputs: easy to understand
  - Land owner sells his share of output
  - Sale of outputs (options set out)
- Single Farm Payment and penalties
- Information flow through the year

Practicalities of a Share Farming

- Landowners consulted through the year
  - Cropping options (type/variety)
  - Material costs
  - Market trends (forward selling option)
- Excellent record keeping essential
  - Purchases, PCS records and Weighbridge
- Schedule of payments for landowner
  - Landowner share of Inputs invoiced as agreed

Lessons learned so far…

- Keep the agreement simple
- Must keep agreements confidential
- Transparency in all transactions essential
- Keep regular contact with landowner
- Hope to expand Share Farming base further in 2012
  - All growers should look at this to expand their business

Thanks for listening

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Nitrogen use in barley

Richie Hackett
Teagasc, Oak Park Crops Research

SUMMARY

Issues with low protein levels in malting barley and potentially insufficient fertilizer N allowances for high yielding crops have indicated that a reappraisal of fertilizer N strategy for spring barley is required. In 2011 Teagasc began a multi-year programme of work examining various aspects of fertilizer N use under experimental conditions and also began a survey of commercial barley crops. The focus of the work is to determine the most appropriate fertilizer N strategy for spring barley to achieve high yields and, where required, an acceptable protein content.

The results presented are the main results of the 2011 field trials and survey of commercial crops. As they are results of only one seasons work caution is required in drawing any definite conclusions from them, particularly as 2011 had a weather pattern that deviated from the long term average.

In 2011 applying the first N at sowing (combine drilled) compared to early post emergence was beneficial in terms of yield and protein content, although effects were modest. This may have been as a result of dry weather experienced after the early post emergence N was applied, preventing it from being efficiently utilised. Applying large amounts of N early, either at sowing or early post-emergence, generally decreased yield with a small negative effect on protein. Past research over a number of years found little effect of applying a large proportion of N at sowing on yield, on medium to heavy textured soils, but protein was normally reduced when a larger proportion of total N was applied early. On lighter textured soils, particularly in wetter seasons, applying high amounts of N at sowing tended to result in yield reductions.

In 2011 there was a modest positive effect on protein by delaying 30 kg N/ha out of total of 150 kg N/ha until the crop had eared out. However there was sometimes a yield penalty associated with this approach and more research is required before more definite guidance can be given. Preliminary analysis of data from the survey of commercial crops would indicate that repeated use of organic manures over time can lead to both higher yields and proteins.

Similarly both yields and proteins tended to decline as the number of years a field had been in tillage increased.

Nitrogen use in barley

Richie Hackett
Teagasc CELUP
Oak Park Crops Research

Outline

- Overview of current regulations
- Overview of 2011 trials
  - Effects of seedbed vs post emergence application
  - Effects of N splitting/timing
- Effects of factors other than N on protein
- Preliminary survey results

Basic N allowance for Spring Barley

Soil N index			
1	2	3	4
135	100	75	40

Applies to yields up to 6.5 t/ha

Extra N is allowed for high yields and low proteins

- **High yields**
- 20 kg /ha for each tonne over **6.5** t/ha at 20% moisture
- **Low proteins**
- 20 kg/ha for malting barley where proteins were low
- (requires proof and agronomic advice)

Example

Yield = 7.5 t/ha
Proteins < 9.5%

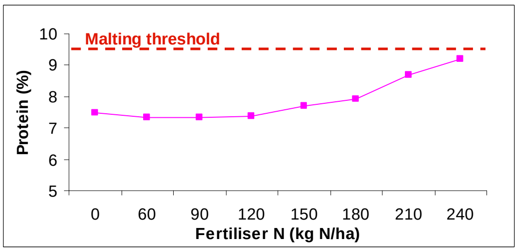
Must have proof of higher yields and low proteins + agronomist advice

	kg N/ha
Base N =	135
Extra yield N (1 t/ha)	+ 20
Extra protein N	+ 20
Total	175

2011 Teagasc trials

- 7 sites (different locations/soil types/site histories)
- 1 years data needs to be treated with caution – (how representative were 2011 conditions?)
- Questions addressed:
  - Amount of first N applied
  - Combine drilled vs top-dress first N
  - Effect of splitting main application
  - Effect of late N

On a low protein site even very high rates of fertiliser N failed to get proteins to malting threshold



Tipperary 2011

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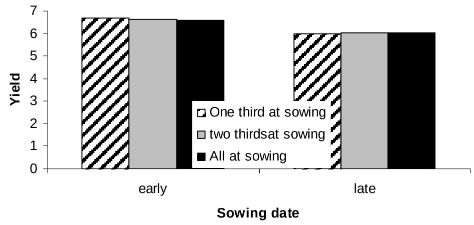
Past Research - Amount of N applied at sowing had little effect on yield



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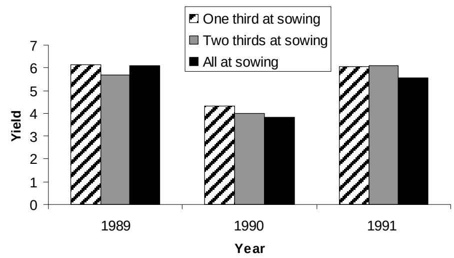
On light soils too much early N can lead to yield loss



Trial carried out on a light sandy soil

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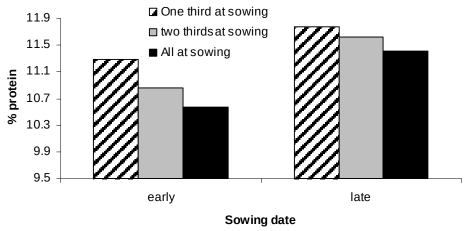
Past Research- For high proteins don't apply a lot of N at sowing particularly if sowing early



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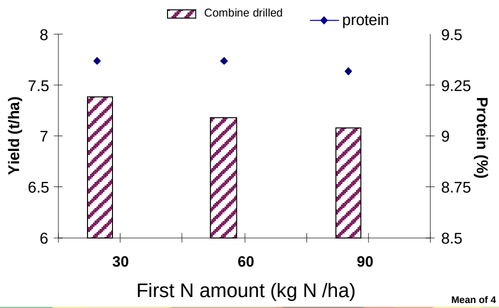
Effect of amount of N applied at sowing



Mean of 4 sites 2011

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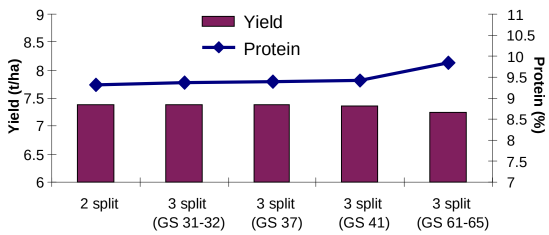
Keeping some N for late in the season can increase protein BUT yield loss can occur



Mean of 4 sites 2011

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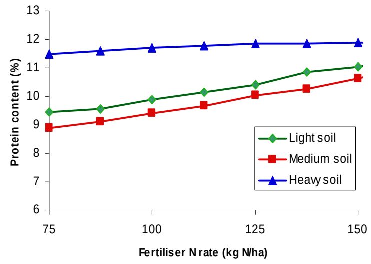
Heavier soils tend to have higher proteins



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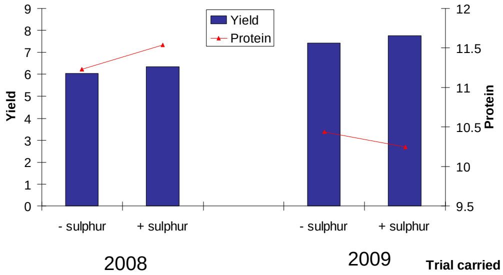
Sulphur can have positive effect on yield particularly on light soils



Trial carried out on light sandy soil

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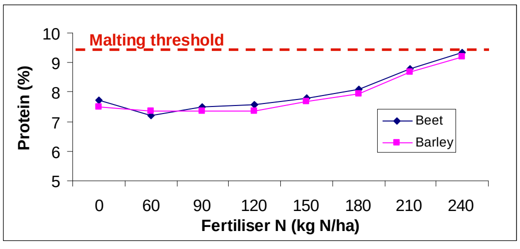
Beet had negligible effect on protein (Single site in 2011)



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Spring Barley Survey

- Examine factors affecting yield and protein content of spring barley at farm level in Ireland
- Both feed and malting barley covered
- Data from all over Ireland being collected
- Data from over 70 fields collected in 2011
- Preliminary results being presented

TREAT WITH CAUTION (Low no. of data points)

Spring Barley Survey

- **Field history details**
- Years in tillage
- Previous organic manure additions
- Previous crop
- Lime application
- Soil nutrient levels

Short 2 page questionnaire (completed before planting)

- **Samples**
- Soil sample
- Grain sample

- **Crop management details**
- Cultivation type
- Sowing date
- Variety
- Fertilisers
- Yield

Short 2 page questionnaire (completed in autumn)

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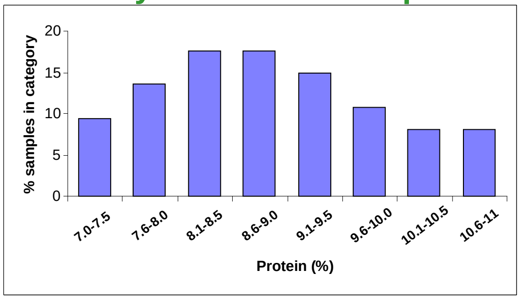
Survey- Proteins were low in many commercial crops



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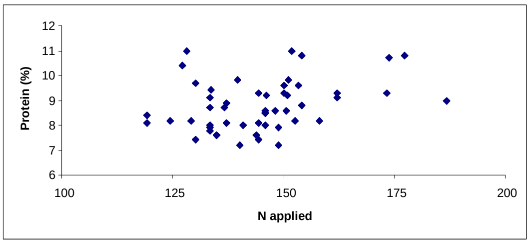
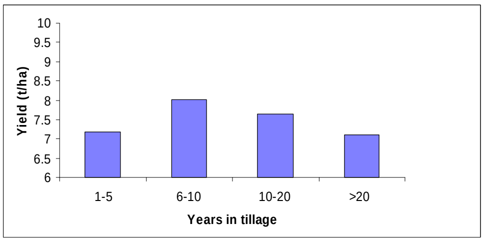
Survey - Effect of N applied on grain protein



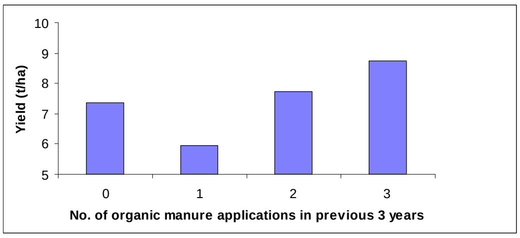
Survey – Effect of years in tillage on yield



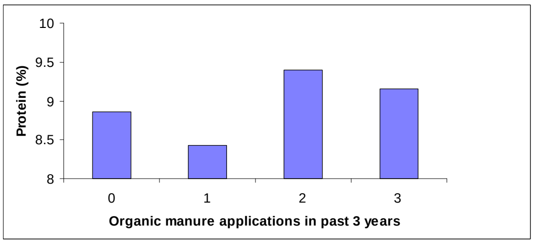
Low no. of fields at 1-5 years

Survey - Effect of years in tillage on protein

Survey – Effect of previous organic manure additions on yield



Survey – Effects of previous organic manure applications on protein



Survey 2012

- Ongoing study
- More years and growers required
- Cant have too many fields (but we can have too few)

Summary

- On ‘low’ protein sites even very high fertiliser rates had low proteins
- Nitrogen in seedbed was beneficial in 2011 (dry March?)
- Lower N at sowing was beneficial in terms of yield and protein
- Delaying N until flowering increased protein but risk of yield loss
- Factors such as years in tillage and organic manure history affect yield and protein

Fertiliser Spreading: Getting the Mechanics Right

Dermot Forristal,
Teagasc, Oak Park Crops Research

SUMMARY

The cost of fertiliser, and restrictions on its use, demand that we use fertiliser efficiently. Fertiliser costs of up to €430/ha can be incurred in cereal production. Fertiliser must be applied accurately and evenly and the fertiliser spreader, whether owned or contracted in, plays a key role in that process.

The most important feature of a spreader is its ability to spread fertiliser evenly across its bout width. This depends on: the machine design; its setting and operation; the fertiliser, and field conditions on the day. While there has been considerable research in some fertiliser spreading areas, there are deficits particularly relating to field performance. Today the ‘twin-disc’ spreader design dominates the arable market due to its simple robust design and ability to achieve even-spreading over wide bout-widths in test-hall conditions. Two series of independent tests in the 1990s had a positive impact on spreader development for the arable grower. However all twin-disc machines are not the same. The design of fertiliser drop point, discs and vanes is critical for good spreading and, where required, the adjustment of these components to suit the bout width, and fertiliser type is also vital. Evenness is tested in test halls by analysing the spread pattern across the full width of the machine and the quality of spread is assessed by examining the shape of the spread pattern and the coefficient of variation (CV) of the overlapped pattern. Generally the CVs achieved by modern spreaders have improved, but there are differences between machines and in particular in their basic spread patterns. Machines that produce well-shaped spread patterns are generally easier to set and less influenced by small differences in fertiliser quality and field conditions.

Fertiliser quality impacts on spreading evenness. Larger size, well-rounded particles are easiest to spread. Where blends are used, all components should ideally be of a similar granule characteristic. The setting of the spreader for evenness and it’s calibration for the correct application rate, are vital for efficient fertiliser use and are aided by manufacturers setting information which is increasingly based on fertiliser quality. The cost of inaccurate spreading is difficult to estimate, but could be up to €80/ha. While fertiliser spreaders will continue to develop, manufacturers must strive to produce spreading mechanisms that perform well in the field, and have the least reduction in performance compared to the test hall.

Fertiliser Spreading: Getting the Mechanics Right

Dermot Forristal
Teagasc CELUP
Oak Park Crops Research

Think Safety, Farm Safely

- **22 killed in 2011**
- **Fertiliser Spreading Risks**
  - **Loading: 500kg bags**
  - **Back injuries: 50kg bags**
  - **Manoeuvring (partic. farmyard)**
  - **Tractor, PTO, high speed discs**

Outline

- **Why Consider Spreaders**
- **Spreading evenly**
  - The Machine
  - Fertiliser
  - Setting / Adjustment
  - Applying the correct rate
- **The cost of uneven spreading**

Why Consider Spreaders

- Fertiliser is expensive:
  - W.Wheat €430/ha,
  - S.Barley €272/ha,
  - Potatoes €734/ha
- N and P quantities limited by legislation
- A 30% error in N
  - €180 loss in grain (W.wheat)

Must apply Accurately and Evenly

Why Consider Spreaders

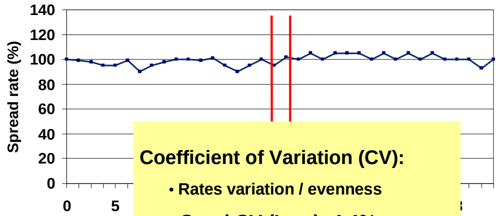
- 100 ha Farm: Winter Wheat 9t/ha 8 years



€7,000 Spreader → €344,000 Fertiliser → €1,000,000 Wheat

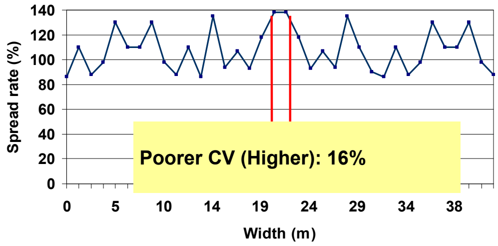
Spreaders must spread Evenly!

- Evenly across bout width



Coefficient of Variation (CV):
- Rates variation / evenness
- Good CV (Low): 4.4%

Spreaders must spread Evenly!



Spreading mechanisms

- Twin Disc development dominates
- Single disc – one sided
- Reciprocating Spout limited to 9 – 12m
- Pneumatic
  - Too expensive particularly >> 12m
  - Maintenance and corrosion issues
  - Test hall CVs no better
  - Windy conditions ++Advantage
  - Poor quality fertiliser - Better
  - Sharp shut-off – Research farms

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Spreading Evenly

- Machine Design: Spreading elements
  - Discs, Vanes, Fertiliser delivery point
- Machine Setting - some of:
  - Disc speed and type,
  - Vane type, length, number, angle
  - Fertiliser drop position
  - Disc angle and height over crop

  ➢ Depends on Machine type
  ➢ Determined by Fertiliser and Bout width
- Absence of wear on spreading components
- Fertiliser characteristics
- Weather conditions

Fertiliser characteristics

- Granule size, shape, density and strength
- Influences:
  - Movement on disc
  - Throw off from vanes
  - Movement through air
- Ideal:
  - 80% of particles in 2-4mm range
  - Rounded and smooth
  - Blend components : mean particle size within 10% of mean
- Move to ‘Bulk’ – deterioration in spread characteristics?
- Interaction between fertiliser and spreader

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Evenness testing

- Test hall – indoor controlled environment – 0.25m2 trays – ⟶ Detailed pattern
  - Independent (Bygholm, CEMAGREF) and Manufacturers
- CV values and Shape of spread pattern
  - CV: less than 15% = acceptable but some <5%
- Field full-testing – very little
  - Poor repeatability
- Field checking – 4-7 trays
  - Basic pattern checking; Poor repeatability

Field performance: Poorer

- Weather conditions: +++Wind++++
- Angle of disc to crop
  - Top Link, Machine movement, Sinkage
- Uneven ground: Ground impact point and machine
- Variations in disc speed
- Variations in fertiliser physical quality
- Incorrect component setting
- Wear in spreading components

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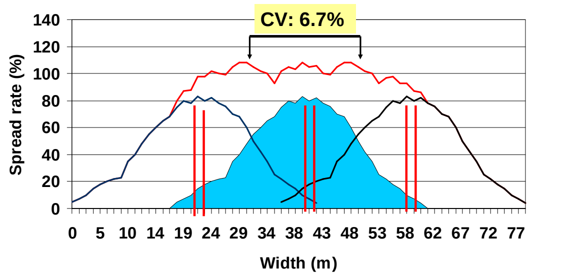
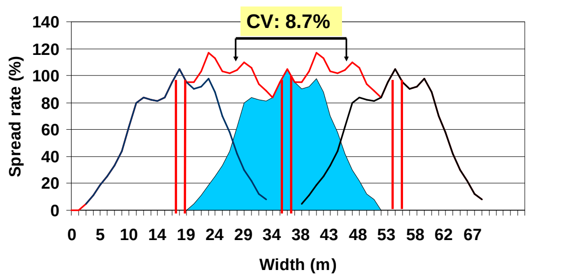
1999 -2000 tests

- Test Hall tests
- Independent at Bygholm Demmark
- All major twin-disc machines tested
- Very comprehensive
- Many Widths and Fert types
- Influenced Fert spreader development
- Little since !!!

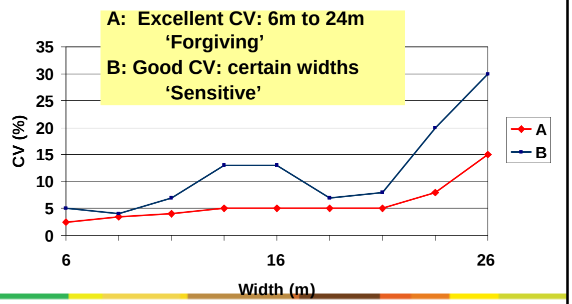
Spreader A Std 18m: Good pattern



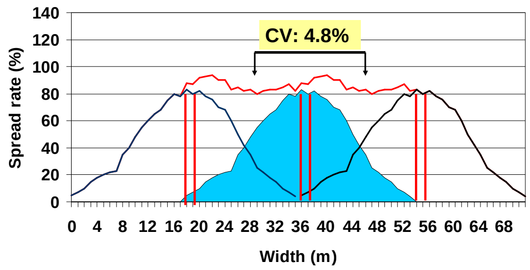
Spreader B Std 18m: Shouldered



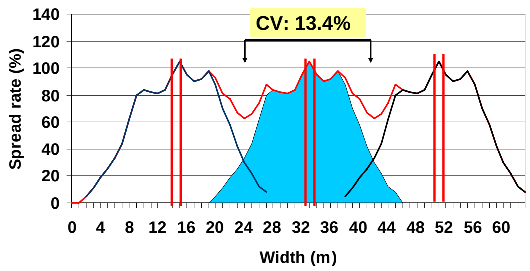
Spreaders A, B: CV at bout widths



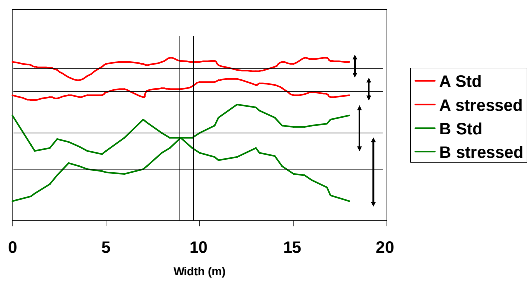
Spreader A: Stress tested



Spreader B: Stress tested



Stress tested:
Spreader A-Robust pattern less variation



Direction of disc rotation

- Inward turning discs towards centre:
  e.g Lely, Bogballe, Bredal
  - Strong overlapping of disc patterns
  - More forgiving pattern
  - Less ability to shut-off part width
  - Not a guarantee of good spread!!
- Others – spread out from centre
  - More careful setting required

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Settings for evenness

- **Determined by fertiliser characteristics and bout width**
- **Adjustments depend on machine:**
  - **Discs, speeds, angles, vanes, drop point**
- **Manufacturers charts / websites / databases**
- **Sieve /strength /density tests to characterise fertiliser**
- **Simple tray tests to check pattern**

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Applying the correct rate

- Fertiliser Flow characteristics vary
  - Between fertiliser types
  - Between batches
  - Depending on weather conditions
- Individual machine settings can vary
- Calibration essential
  - Fertiliser flow rate
  - Tractor forward speed
  - Correct bout width

Without calibration – errors likely

- Farmer with 40ha in 5 fields
  - Start with last years settings or poor 'book' value
  - Spread the first field at 20% more than intended
  - Adjust: 2nd field at 15% less than intended rate
  - Adjust: 3rd field at 5% more than intended
  - Adjust: Last 2 fields correct
  - Overall farm rate is correct but 40% of area well outside target rates

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Calibration practice

- **Manufacturers support**
  - Rate charts
  - Web based material
  - Tests of Irish fertiliser
  - Test kits (sieve test and ID charts)
  - Flow testers
  - Calibration procedures and kits
  - On-board weighing and automatic calibration

Calibration practice-2

- **Calibration**
  - Flow Rate measurement
    - Time flow and weigh
    - Discs removed, or stopped + calibration kit
    - Varies with machine – easy best
  - Driving speed check (wheelslip – 20% ploughed)
  - Bout width check (GPS, measure)

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Active rate control

- Constant rate with:
  - Variable forward speed
  - Variable flow rate
- Can change application rate 'on the go'
  - Manually
  - Variable rate Precision Ag type system
- Controlled headland operation
  - Graduated shut off for angled headland etc
  - Using GPS to determine position

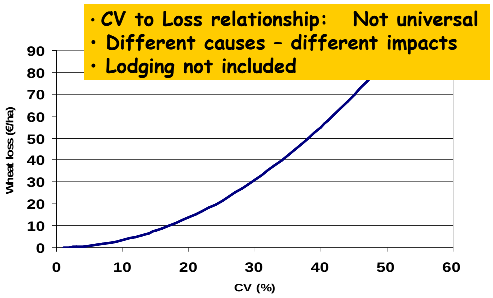
Cost of poor spreading

- Two factors contribute
  - Spread quality on farms – unknown
  - Cost of poor spread quality
- Some research
  - Frequently theoretical studies
  - Millar et al most recent – 2009
  - Effect of problem patterns modelled
    - Impact on CV and Cost (W.Wheat)

6 pattern defects studied

Problem	CV range	Cost(€/ha)
A	6 – 21	1 - 14
B	5 – 27	1 - 23
C	5 – 50	1 – 74
D	7 – 57	2 – 135
E	7 – 55	2 – 75
E	8 – 41	2 - 47

CV & Wheat loss(€/ha): Sample



Likely losses

- Poor spreading:
  - If visible CV= 30% - 50% ?
  - Loss in WW: €31 - €80/ha
  - 5% to 10% = €2.50/ha
- Lodging and quality
  - Lodging – big loss potential
  - Quality – malting barley, milling wheat, all

Focus on improving 'field' performance

100 ha Farm: Winter Wheat 9t/ha 8 years

€7,000 Spreader → €344,000 Fertiliser → €1,000,000 Wheat

- CV= 10% €2,000 loss in life
- CV= 30%: €24,800 loss in life

Practical considerations

- Spreader choice:
  - Even spreading: CV + robust pattern must have priority
  - Correct spec: hopper, control systems, calibration equip etc.
- Fertiliser choice:
  - Actively look for good spread quality
- Use Manufacturers resources:
  - Instruction manuals / Web resources
  - Calibration and fert test equipment
- Calibrate the spreader, tractor and bout width
- Maintain and check for wear

Finally

- Fertiliser spreading – hugely important technical task
  - Must get it right
  - Also true of contract spreading
- Researchers / Manufacturers
  - Must focus on field performance
  - Ensure test hall CVs reflect good field performance

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Cereal fungicide sensitivity and performance

Steven Kildea and Liz Glynn

Teagasc, Oak Park Crops Research

SUMMARY

The environmental and climatic conditions that contributed to the above average yields achieved in 2011 also contributed to levels of disease not observed for a number of years. Significant septoria control problems were reported in the South west from mid to late June onwards. Sensitivity monitoring of the septoria population throughout the country to epoxiconazole, prothioconazole and tebuconazole showed levels of sensitivity similar to those recorded in 2010. Strains with reduced triazole sensitivity are now widespread throughout the country but no resistance to the SDHI fungicides has been detected.

As in previous years products containing a mixture of triazoles (e.g. Gleam) outperformed products containing a single triazole. This was most pronounced under curative conditions. The SDHI based fungicides Adexar (epoxiconazole and fluxapyroxad) and Aviator (prothioconazole and bixafen), gave levels of disease control similar to or better than the triazole mixture Gleam (metconazole and epoxiconazole). As part of disease control programmes the mixing or sequencing of triazoles and/or inclusion of the SDHI based fungicides at the T2 timing provided the greatest disease control (particularly later in the season) and yields.

With disease pressure already high in many early sown crops increased emphasis must be placed upon weather conditions, crop growth stage and disease pressure present in deciding product choice and rate at the key septoria fungicide applications at T1 and T2.

Cereal Fungicide Sensitivity & Performance

Steven Kildea & Liz Glynn
Teagasc CELUP
Oak Park Crops Research

Outline

- 2011: A difficult disease control season
  - What happened in Cork?
- Sensitivity issues
  - Triazoles
  - SDHIs
- Product performances
- Conclusions

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2011: Truly a disease season

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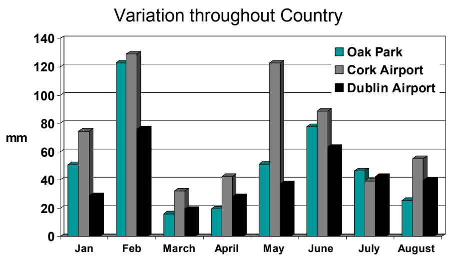
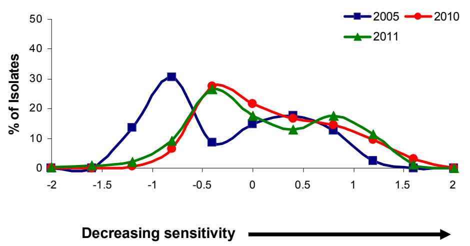
…Dry Spring & Wet Summer

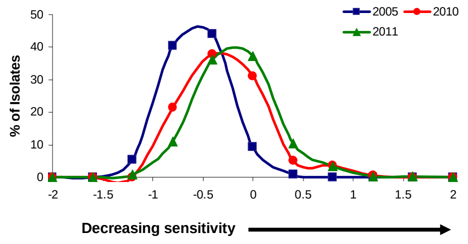


Serious disease problems in Cork

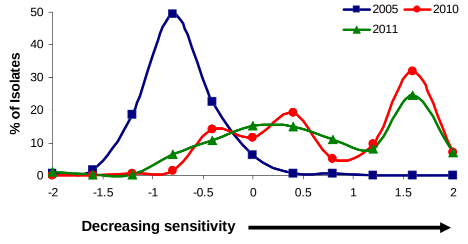
No change in Folicur sensitivity in 2011



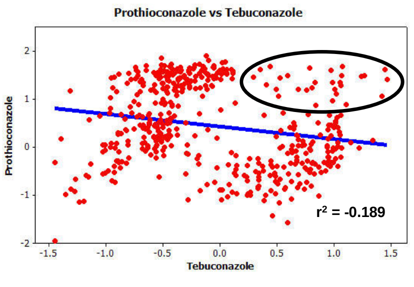
No change in Opus sensitivity in 2011



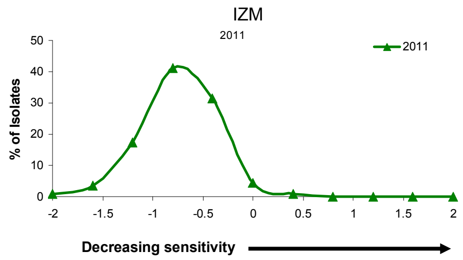
No change in Proline sensitivity in 2011



Differences between triazoles still dominate



No resistance to SDHIs detected



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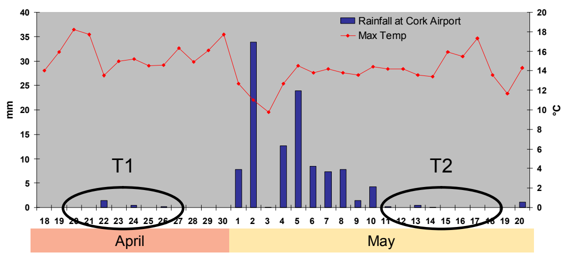
Weather conditions vital to disease development

Early sown susceptible varieties & poor weather conditions



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Product Performance-2011 (*Septoria*)

- Trials at Oak Park (Cordiale) under moderate disease pressure
- Disease control from ¼ - 2x recommended rate
  - Applied T2 (16th May)
  - Straight triazoles, triazole mix & SDHI/triazole
  - Assessed 1st July (leaves 1-3)
- 2011 included ½ rate trial
  - T1: 26th April
  - T2: 16th May
  - Straight triazoles, triazole mix & SDHI/triazole
  - Assessed 6th July (leaves 1-3)

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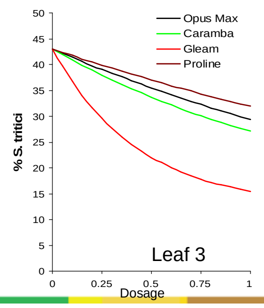
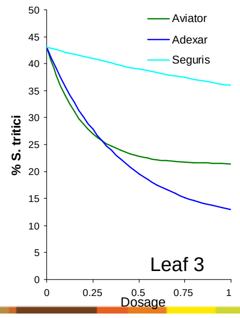
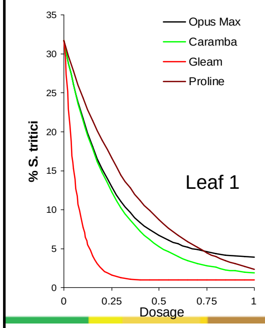
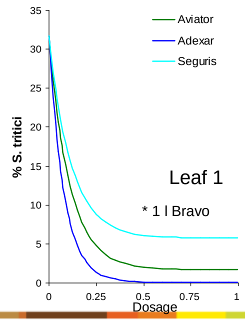
Eradicant activity of triazoles reduced



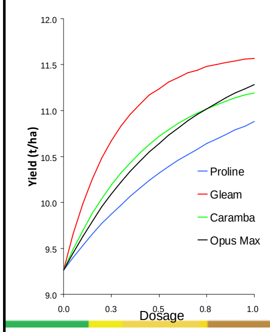


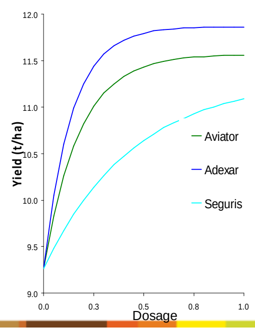
New SDHIs show strong protectant activity…



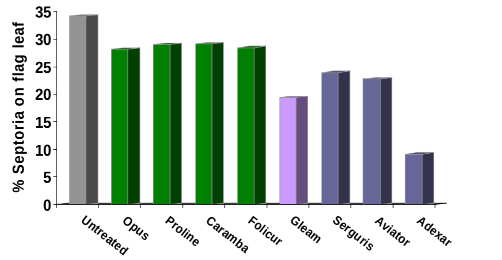


…..and increased yields



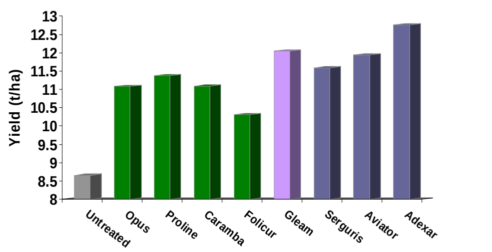


Products applied at ½ rates at T1 & T2



LSD = 1.25

Products applied at ½ rates at T1 & T2

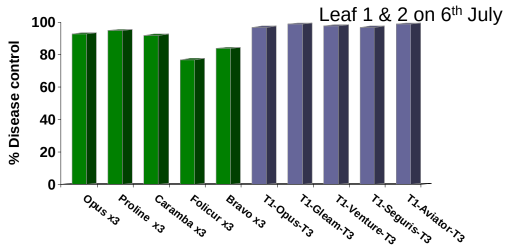


LSD = 0.68

Product Performance-2011 Summary

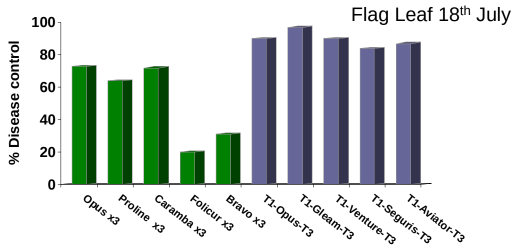
- Trials were VERY curative in nature!
- Eradicant activity of triazoles most notably affected
- Gleam continues to out perform solo triazoles
- SDHIs are adding to disease control & yield
- Curative nature of trials did not suit Seguris
- Adexar, Aviator and Gleam strongest both curatively and protectantly

Limited differences between programmes early in season



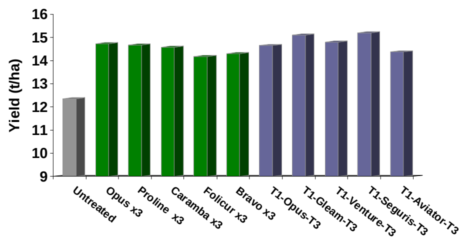
T1: Proline + 1L Bravo T2: above + 1L Bravo T3: Caramba

Well timed & robust programmes maintained good disease to the end of season



T1: Proline + 1L Bravo T2: above + 1L Bravo T3: Caramba

Yields resultant from good disease control early in season



T1: Proline + 1L Bravo T2: above + 1L Bravo T3: Caramba

2012 – Disease pressure already high

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Considerations for 2012

- Sensitivity issues
  - Strains with reduced triazole sensitivity are widespread
  - Most strains still sensitive to one of the triazoles
  - Strains with reduced sensitivity to all triazoles are present
  - No SDHI resistance detected but we **must** protect

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Considerations for 2012

- Product Performance
  - Curativity of solo triazoles has been reduced
  - Newer SDHIs showing excellent protection & curativity
- Programmes
  - Watch leaf emergence and respond to weather risks
  - Timing & Product choice at each application essential
  - No triazole at T0 & Chlorothalonil essential at T1 &T2
  - Use of mixtures or sequences of triazoles still important
  - **NEVER** use SDHIs alone

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