Update on barley pests & diseases.

Management practices to maintain crop health while reducing environmental risk.

30th August 2018

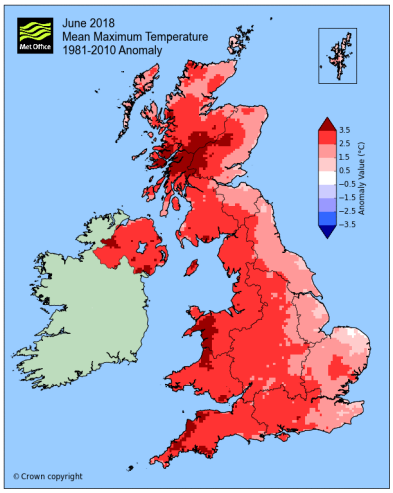
Fiona Burnett,
Professor Applied Plant Pathology
Head Crop & Soil Systems

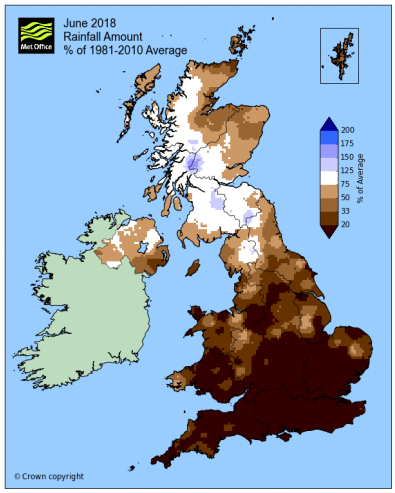
Leading the way in Agriculture and Rural Research, Education and Consulting

Efficient and sustainable barley production

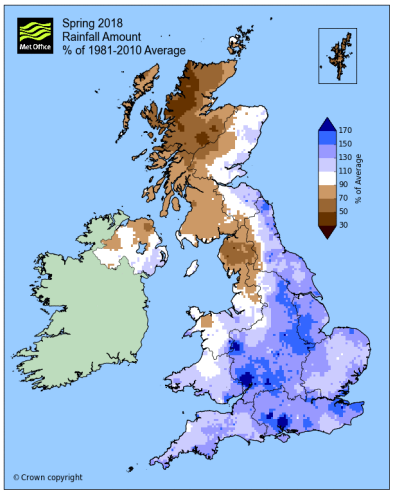
- Growing for a quality market
- Efficient production
- Sustainable production
- Recognising main pest and disease risks
- Managing these in a sustainable and integrated way

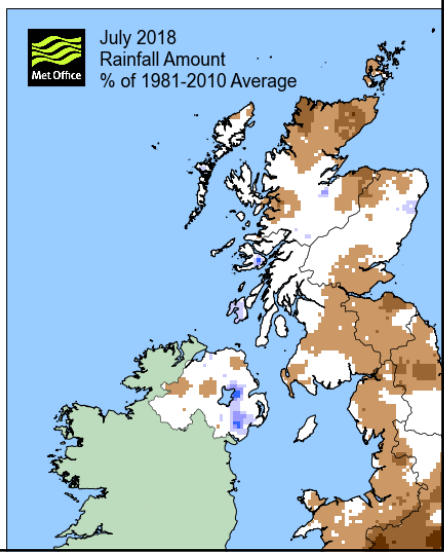
2018 issues – dry and hot start





2018 issues – dry and hot start – wet finish?



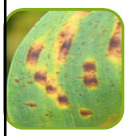


Drivers and opportunities

SRUC

Global challenges / Rapid technical change

Increased demand for food and ecosystem services



Increased need for sustainable and efficient production

Advancements in capability

Challenges
Mind the gap….

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- Issues raised by stakeholders

- Efficient and sustainable production
- Increased yield and quality of crops
- Perception that the loss of solutions is outstripping the arrival of new solutions
- Product losses – legislation / resistance
- Limited options in minor crops
- Food safety issues such as ergot and mycotoxins
- Integrated Pest Management
- Reduced reliance on pesticides
- Increased technology
- New crops / rotations

- Context

- Public care about food production
- Tensions: cheap food v sustainably produced food
- Perceptions and attitudes key
- Growers locked into in production systems
- Broadest possible view of solutions
- Some are more acceptable than others
- Integrated thinking
- Solutions impact on other sectors
- Solutions could be applicable to other sectors (ag tech / chem industry partners)
- Communication and collaboration are core – please get in touch fiona.burnett@sruc.ac.uk

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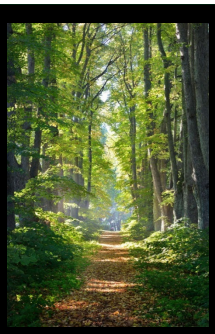


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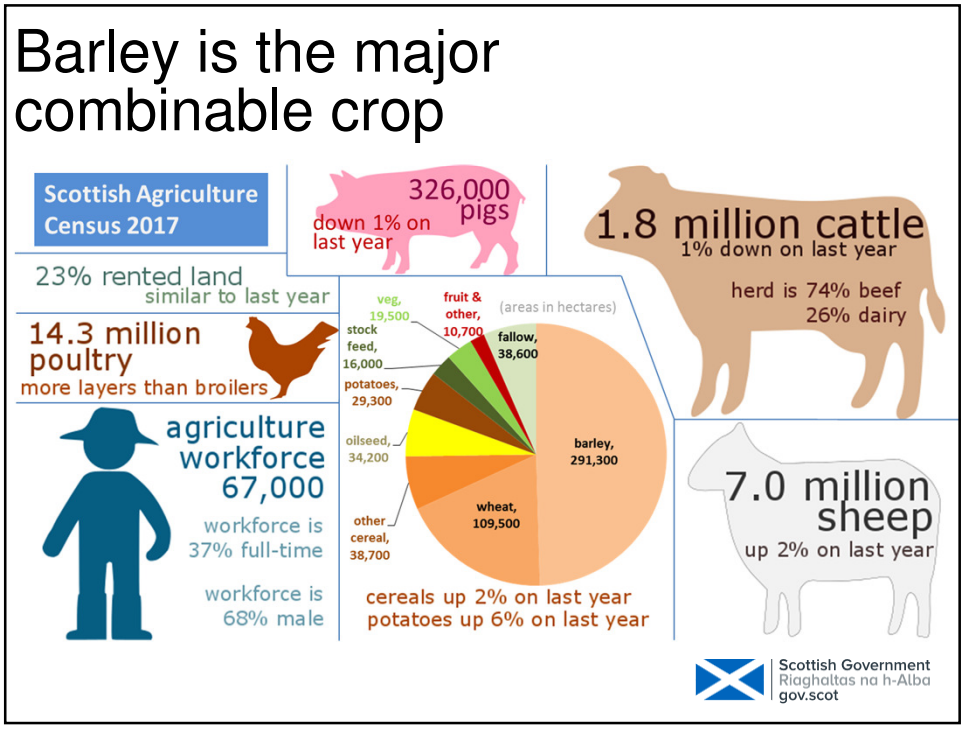
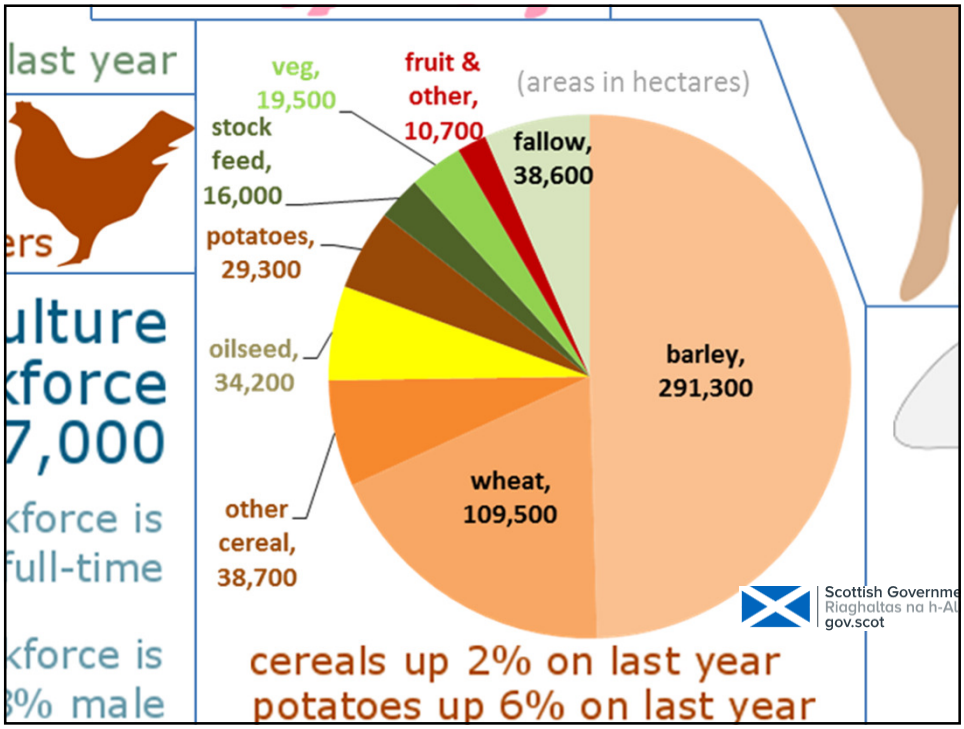

Barley is the major combinable crop
Scottish Agriculture Census 2017
326,000 pigs
down 1% on last year
1.8 million cattle
1% down on last year
herd is 74% beef
26% dairy
23% rented land
similar to last year
14.3 million poultry
more layers than broilers
agriculture workforce 67,000
workforce is 37% full-time
workforce is 68% male
(areas in hectares)
veg, 19,500
fruit & other, 10,700
stock feed, 16,000
fallow, 38,600
potatoes, 29,300
oilseed, 34,200
barley, 291,300
wheat, 109,500
other cereal, 38,700
cereals up 2% on last year
potatoes up 6% on last year
7.0 million sheep
up 2% on last year
Scottish Government
Riaghaltas na h-Alba
gov.scot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Scottish Governme
Riaghaltas na h-Al
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Innovative solutions -

but some solutions more acceptable than others

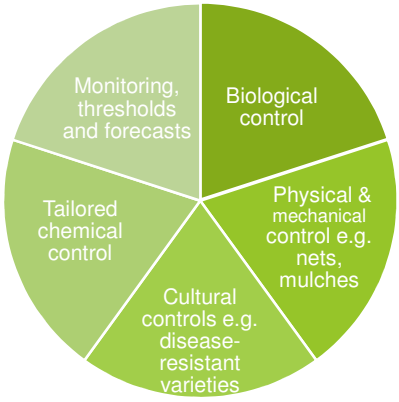




Fighting pests the clever way….

Integrated Pest Management (IPM) takes a whole farm approach to managing the land which:-

- Maximizes the efficiency of crop production
- Minimizes negative effects on the environment



What are the key components of integrated crop health in barley?

Pre planning

- Crop rotations
- Identify key risks
- Resistant varieties
- Cultural controls – i.e. drilling date, density, tillage
- Certified seed
- Protection and enhancement of important beneficial organisms

In season

- Monitoring/forecasting
- Thresholds
- Use of biological, physical and other non-chemical methods
- Targeted application of pesticides (optimised timings, best products)
- Anti-resistance strategies

Issues for 2018

Pesticide withdrawals

- Clothianidin seed treatments - BYDV
- Chlopyriphos – leatherjackets
- Metaldehyde – slugs
- Others at risk such as chlorothalonin and methiocarb

Leatherjackets

Leatherjackets 2018

- High grub populations in grasslands similar to 2017
- average density recorded 1.1 million grubs per ha.
- 66% fields had grub densities of over 0.6 million per ha (damage threshold) = very high risk of damage to any spring crops planted after grass
- >50% of fields had > 1 million grubs per ha (the damage threshold for grass) - many grassland fields are also likely to see grass yield losses
- No 'quick fix' through chemical control now that chlorpyrifos is no longer approved for use means that the focus has switched to damage limitation.

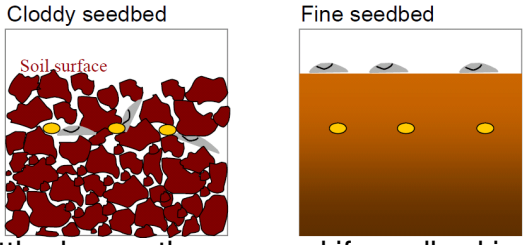
- Survey key fields to know what densities are present so the results can inform grassland management decisions and spring crop choices.
- Identifying fields at risk is key before time, effort and money is wasted applying fertiliser to fields where the forage yields will be much lower or spring crops are planted into a field where they will be subsequently decimated by the grubs still present after ploughing and cultivation.
- Knowledge on densities will inform choices on spring cropping in subsequent years.
- Field cultivations - ploughing rolling etc can disturb grubs and be helpful

Slugs

- Grain hollowing and leaf shredding.
- Create a fine, firm seed bed
- Assess the risk using bait traps – 3-4 per trap likely risk of damage

Slugs - management

- Minimum tillage gives considerable reduction in slug damage compared to direct-drilling
- Production of fine firm seedbeds is most important



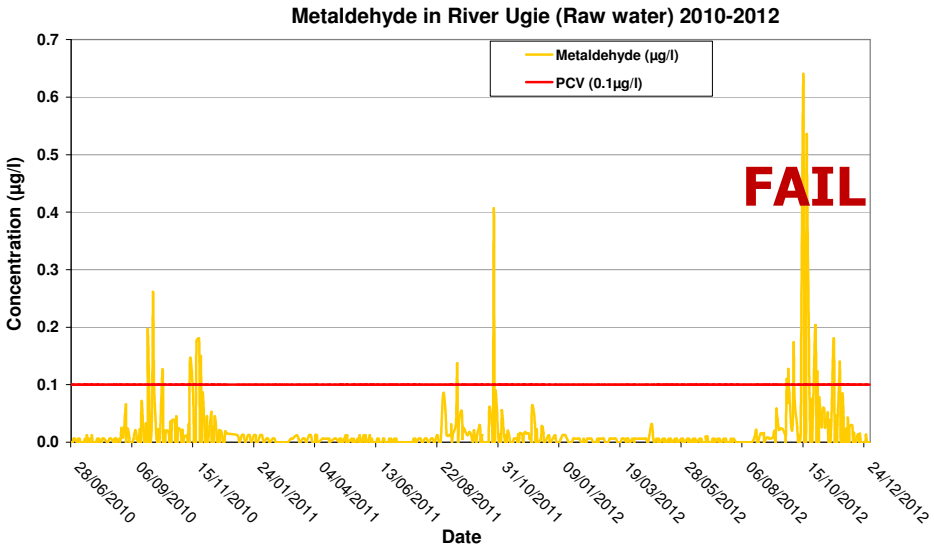
- Drill a little deeper than normal if seedbed is cloddy – but not if crop is late sown
- In cloddy seedbeds with large slug populations effective slug control is difficult

Slugs are getting all the breaks

- 2014 European Union has voted to revoke the use of methiocarb in slug pellets, due to their risk to grain-eating farm birds
- Metaldehyde also at risk – stewardship very important especially around water
- Ferric phosphate would be only remaining active – effective and similar cost but dead bodies not so evident

- Cereal seed treatments (primarily for BYDV) reduce grain hollowing to some extent (Deter, Redigo Deter)
- Pellets - more baiting points the better
- Use pellets when slugs are on the surface - moist soils, no rain, warm, no wind
- Avoid treating areas adjacent to water – metaldehyde issues in particular
- Use all available actives: methiocarb and ferric phosphate

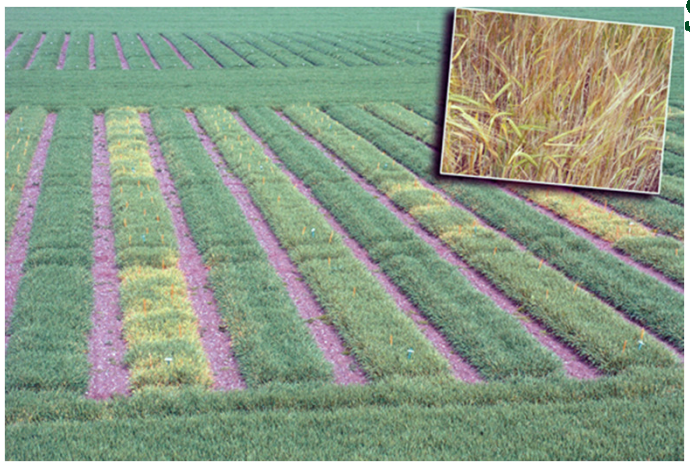
Metaldehyde in drinking water issues



Metaldehyde Guidelines

- Use minimum active per hectare to avoid drainage and run-off losses
- No pellets to be applied within six metres of a watercourse or ditch
- Maximum single application: **210 g metaldehyde a.i./ha**
- Maximum total dose rate from 1st August to 31st December: **210 g metaldehyde a.i./ha**
- For additional protection of water, supplies, could reduce rates to 160 g a.i./ha or less
- Work out the **total pellet application rate** for the % of a.i. in your chosen metaldehyde product
- Maximum total dose rate: **700 g metaldehyde a.i./ha/calendar year** (from any combination of metaldehyde products)
- Do not apply when heavy rain is forecast
- If drains are flowing do not apply metaldehyde slug pellets

Aphids - BYDV



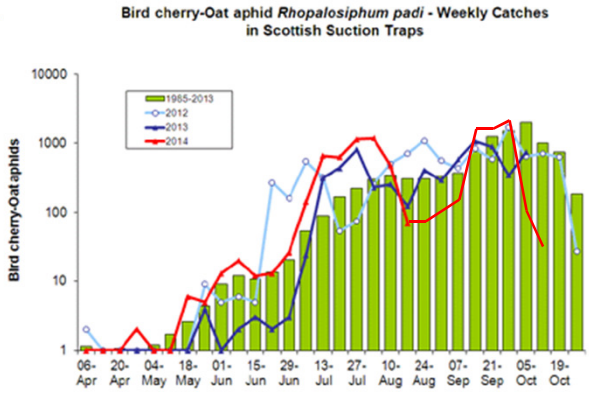
- Yellowing/purpling of leaves, stunting of plants, affects barley, wheat, oats
- BYDV transmitted in the autumn and to spring crops mainly by bird-cherry aphid

BYDV management - decision to ban the neonicotinoid clothianadin

- Risk in warm seasons so common in 2017 and 2018
- Crop losses to BYDV vary from 1 to 2.5 t/ha in winter cereals to potentially 90% crop loss in spring barley depending on how early infection occurs.
- The neonicotinoid clothianidin seed treatments (Deter, Redigo Deter, NipsIT INSIDE) for use on winter cereals are on their 'last hurrah' this autumn and treated seed cannot be drilled after 19th December
- Grain aphids resistant to the pyrethroid aphicides. Reliance on a pyrethroid aphicide alone is a risk as grain aphids may not be controlled.
- Bear in mind that seed treatments are not available for spring cereals, so reducing the availability of BYDV reservoirs in winter cereals and volunteers/stubble, and aphids overwintering on winter cereals will reduce the risk to spring cereals, where a pyrethroid aphicide spray at early crop emergence is the only option currently available, and this won't take care of the grain aphid due to resistance.

- Aphids can fly into germinating cereal crops or walk from grassy stubble and volunteers.
- Manage 'green-bridge' of aphids on volunteers and stubble is to kill off any aphid host plants before sowing.
- Ideally stubble from the previous crop should be desiccated with a herbicide, ploughed in 7-10 days later and left for another 2 weeks before sowing the next crop.
- This will ensure that any aphid host plants will be dead and any aphids on them will have starved to death.
- Alternatively, stubble can be ploughed in and sowing delayed for 4 weeks to allow enough time for plants to die along with the aphids.
- Aphids are quite resilient and can work their way up to the soil surface after ploughing, so killing off the plants is essential so that they won't have anything to feed on underground.

When do aphids fly into crops?



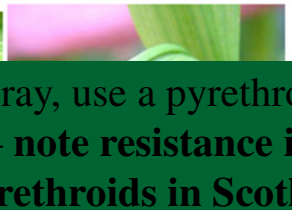
Bear in mind all the different cereal aphids
http://www.sasa.gov.uk/wildlife-environment/aphid-monitoring/cereal-aphids

Optimising BYDV treatments



Winged aphids fly in, produce wingless young	Ist generation of wingless start to breed	2nd generation of wingless start to breed
BYDV transmitted to one plant	BYDV spread to adjoining plant	BYDV spread to patch
No treatment	Spray if can tank mix	Spray urgently

Optimising BYDV treatments


Wi fly wi		of to
BY tra one		to
No	mix	

If need to spray, use a pyrethroid insecticide – **note resistance in grain aphid to pyrethroids in Scotland (50%) and England (60%).** If a risk use chlorpyrifos (but issues with drift)

e.g. Toppel 100 EC (cypermethrin), Decis, Bandu (deltamethrin), lambda-cyhalothrin (Hallmark, Karate), zeta-cypermethrin (Fury) – stick to label rates

Sowing date and BYDV

Spring barley: seed treatments

SRUC

- Many changes due to new way of doing risk assessment
- Raxil Star approval lost
- new MAPP no for Raxil Star is for winter crop only
- Rancona also under same threat.
- Redigo is next best option as Raxil Star replacement ‘almost’ as good.
- Emerging resistance issue in loose smut to azoles and SDHIs? Cases in 2018

Good seed health: Barley seed-borne diseases

- Start early – treat crops intended for seed well
- Testing seed / buying certified seed is the starting point
- If home-saving 'know what you've got'.
- Seed treatments should not be used to 'pull up' seed of a low standard – do not rely in them for loose smut
- Lab germination shows seed potential under ideal conditions
- Knowing diseases present allows you to select the most targeted seed treatments

Spring barley seed treatments

Product	Loose smut	Leaf stripe	Seedling blight	Net blotch	Wireworm / WBF
Beret Gold	X	Some	√	√	X
Austral plus	X	Some	√	√	√
Anchor	Some	Some	√	√	X
Beret multi	√	√	√	√	X
Redigo	√	√	Some	X	X
Rancona i-MIX	√	√	√	X	X
Redigo Pro	√	√	√	X	X

Spring barley varieties

Spring barley - Choice of variety and market requirements

Before choosing a variety consider the following factors and decide which will influence your decision:

- Sale for brewing, distilling or feed (check with your buyer)
- Earliness or need to spread the harvest period
- Ear loss and sprouting risks
- Straw strength and length (barley straw can be of considerable value)
- Specific weight
- Disease risk

Protecting crop yield and quality

- The most economic way of avoiding yield loss and poor quality due to disease is to grow disease resistant varieties
- Disease ratings are calculated from assessments of disease in naturally infected trials and in inoculated tests
- Ratings are UK ratings on a 1-9 scale, where 9 indicates good resistance and 1 poor resistance

Variety choice can reduce disease risk

- Concerto is the clear market leader for malting in Scotland, with Laureate likely to become increasingly important in 2018. Odyssey and Belgravia are now outclassed
- Sienna and KWS Sassy also have Full Approval from the IBD, but their future market uptake is uncertain. Check seed supply and maltsters' requirements for 2018.
- Four spring barley candidates are being evaluated for malting use.
- Waggon and Scholar are preferred feed options but Waggon is no longer in trials.
- Propino is also often grown as a high yielding feed variety. Likewise, new high-yielding malting varieties are good options.

Spring barley list 2018

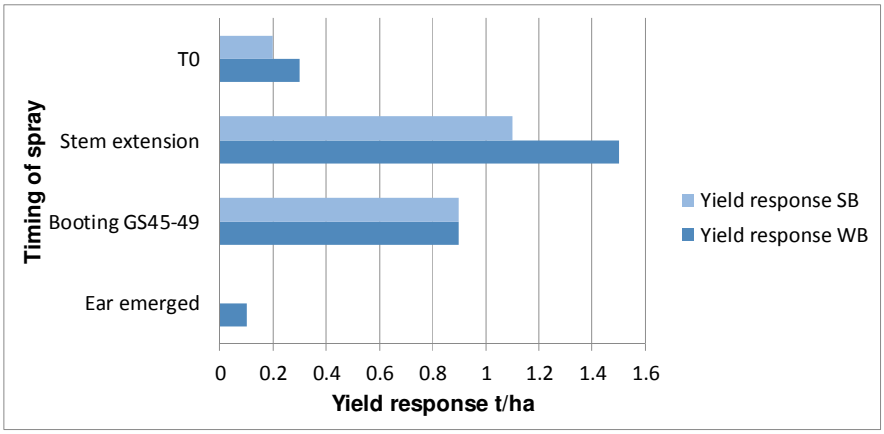
Recommendation		Yield (%)	Ram rating	Position
P1	LG Diablo	109	6	***New***. Potential for B and D
P1	LG Tomahawk	107	6	***New***. Potential for D
R	Laureate	105	6	Full Approval for B and D
R	KWS Sassy	105	6	Full Approval for D
R	Sienna	103	6	Full Approval for D
P1	RGT Asteroid	102	6	***New***. Potential for B, D and GD
P3	Fairing	96	6	Provisional Approval for GD
R	Concerto	93	6	Full Approval for B and D
R	RGT Planet	104	6	Brewing varieties (Full Approval). Also consider for feed
R	KWS Irina	104	6	
R	Propino	101	6	
R	Scholar	105	7	Feed variety
Varieties no longer on the Scottish list		Belgravia, Odyssey, Olympus, Octavia, LG Opera and Waggon		

AHDB Recommended List
Spring barley 2018

SRUC

Yield, agronomy and disease resistance	LG Diablo	LG Tomahawk	RGT Planet	Laureate	Chanson ~	KWS Irina	RGT Asteroid	KWS Sassy	Olympus	Sienna	Propino	Fairing	Concerto	Scholar	Ovation	Hacker
End-use group	Malting varieties													Feed varieties		
Scope of recommendation	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	UK	Sp	UK	Nr	UK	W
	NEW	NEW	c			c	NEW				c		c			
Fungicide-treated grain yield (% treated controls)																
United Kingdom (7.7 t/ha)	106	105	105	104	104	103	103	102	102	102	100	97	94	104	103	100
East region (7.9 t/ha)	108	106	105	105	104	103	105	101	101	99	98	96	94	104	105	[98]
West region (7.8 t/ha)	[102]	[100]	105	102	101	102	[102]	100	102	101	99	97	96	102	102	102
North region (7.4 t/ha)	109	107	104	105	106	104	102	105	103	103	101	96	93	105	104	100
Untreated grain yield (% treated control)																
United Kingdom (7.7 t/ha)	98	95	96	96	94	93	97	94	91	93	88	88	85	94	88	91
Agronomic features																
Resistance to lodging (no PGR) (1-9)	7	7	7	7	6	8	7	6	7	7	7	7	6	7	7	7
Straw height (cm)	76	72	75	73	76	71	76	80	75	79	77	74	80	69	73	75
Ripening (+/-Concerto, -ve = earlier)	+1	+1	+0	+1	-1	+0	+1	+0	+1	+1	-1	-2	+0	+0	+1	-1
Resistance to brackling (1-9)	8	7	8	8	7	9	8	6	7	7	8	7	8	9	7	8
Disease resistance																
Mildew (1-9)	[9]	[9]	9	8	[8]	8	[9]	9	9	9	6	8	8	9	9	[9]
Yellow rust (1-9)	[5]	[8]	[5]	[6]	[6]	[6]	[8]	[5]	[7]	[6]	3	[8]	8	[8]	[6]	[6]
Brown rust (1-9)	5	4	4	5	5	4	5	5	4	6	5	4	5	5	4	5
Rhynchosporium (1-9)	5	6	6	6	5	5	6	5	6	6	5	7	4	5	6	5
Ramularia (1-9)	6	6	6	6	6	6	7	6	6	6	6	6	6	7	6	6

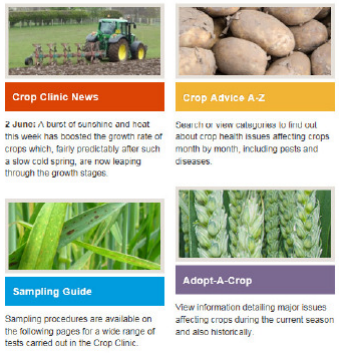
Fungicide use: Optimise timings



Principles of fungicide use in barley

- Manage crop to maximise grain number and potential grain size
- Some fungicide groups can increase grain number through physiological effects (NB only Proline & Comet have been tested)
- Early T1 sprays retain healthy tillers hence more ears
- A T2 application at GS49 gives sufficient protection of canopy post-anthesis to ensure grains fill to their storage capacity

Keep up to date on emerging issues



- Tan spot
- Ramularia
- New products
- Old products failing because of fungicide resistance

https://www.fas.scot/topic/crop-plant-health/

www.sruc.ac.uk\crops @SRUCCropClinic

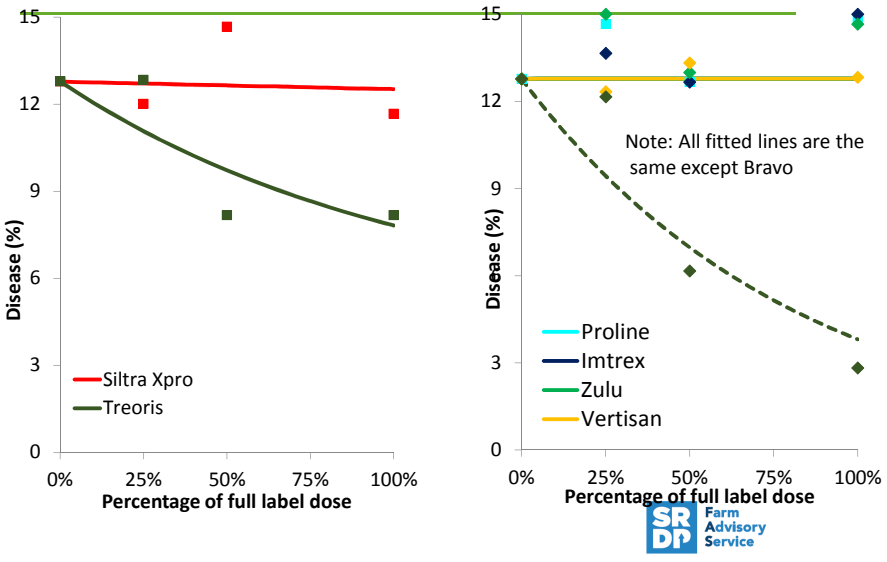
Stay technically aware: Trial data from 2017

Ramularia

- Biggest changes to 2018 programmes because of resistance issues
- Advice limited
- SB varieties all 6s and 7s literally
- W Barley (4-6)
- Farm history
- Use CTL

- Training?
- Watch for updates

Lanark

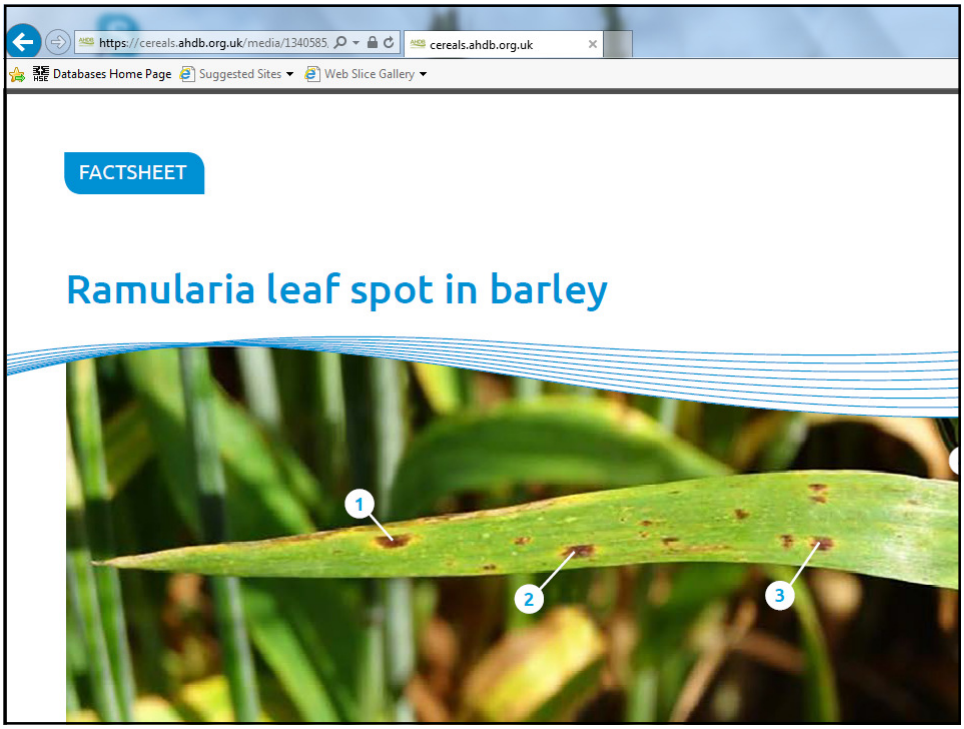


Accurate diagnosis to build experience of on farm risk

SRUC

The 5 R's

- Reddish brown spots
- Rectangular
- Restricted to veins
- Right through the leaf
- Ring of chlorosis



Steward products:

Barley is accumulating resistance issues

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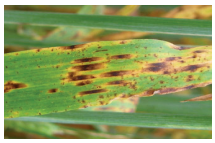
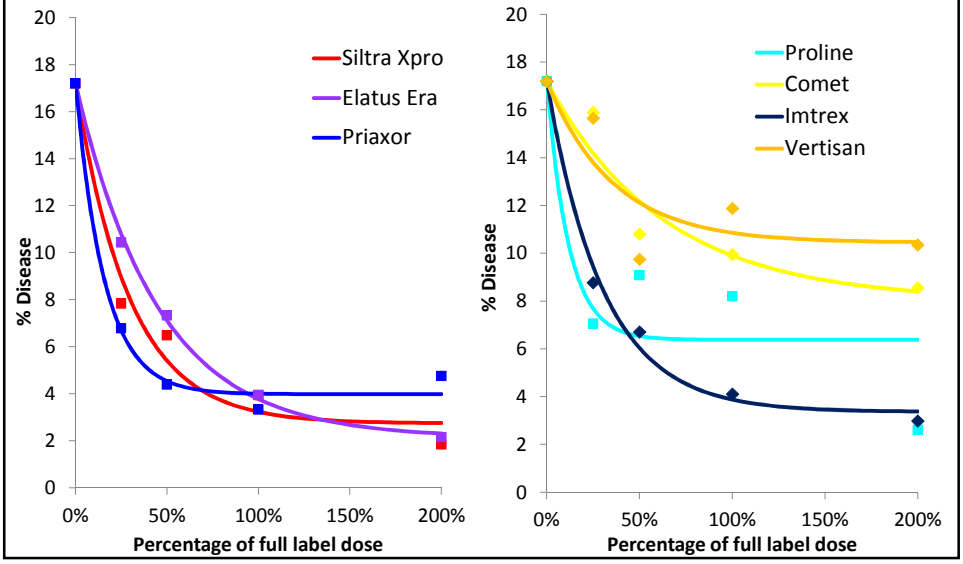
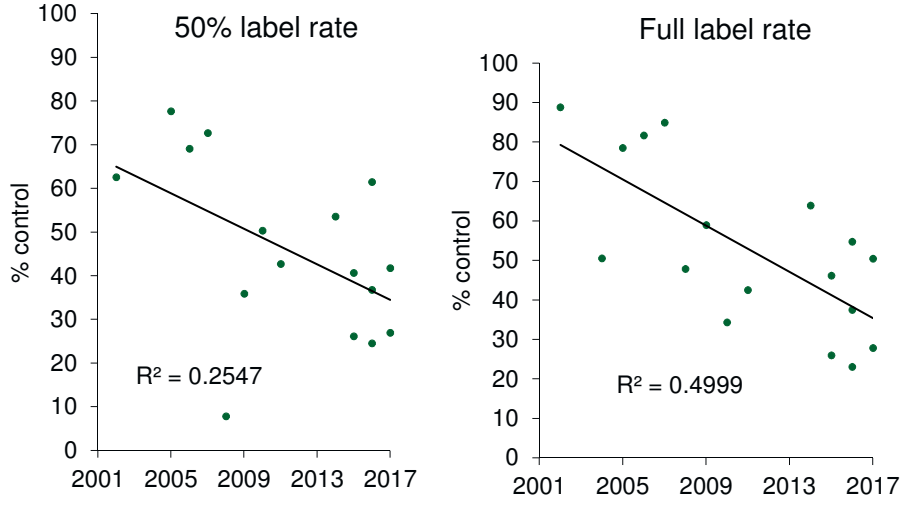
Fungicide	Diseases affected to some degree
Strobilurins	mildew, net blotch, tan spot, ramularia, rhynchosporium, M. nivale
Azoles	mildews, ramularia, rhynchosporium
MBCs	eyespot, M. nivale, ramularia
Quinoxyfen	mildew
SDHI	net blotch, ramularia
Metrafenone	mildew
Chlorothalonil	None



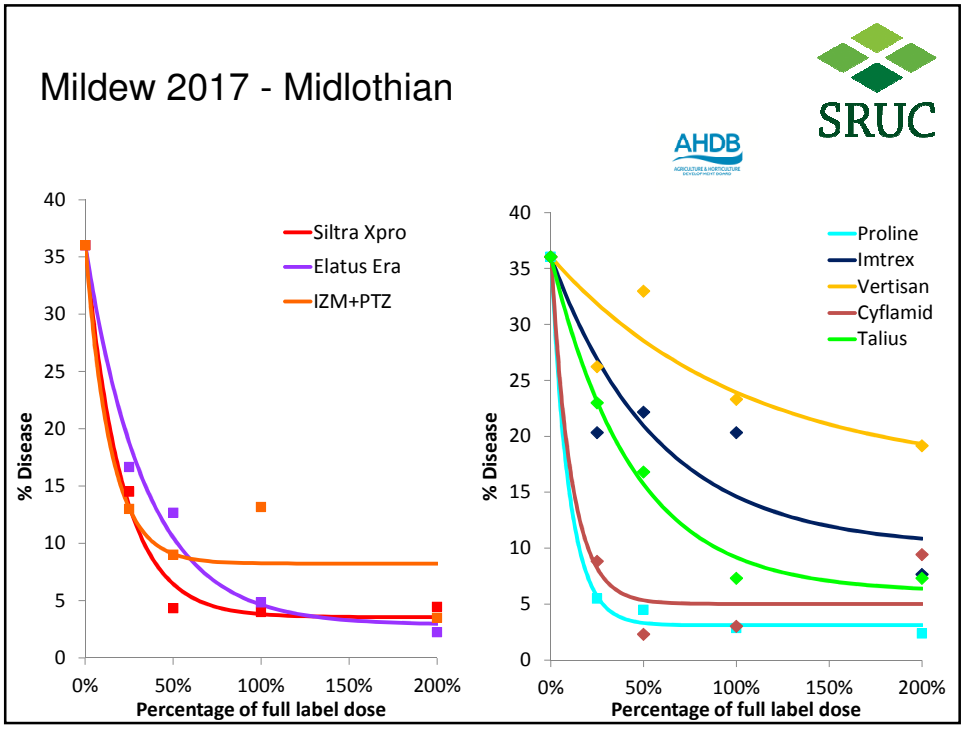
Rhynchosporium 2017 protectant data (n=2)

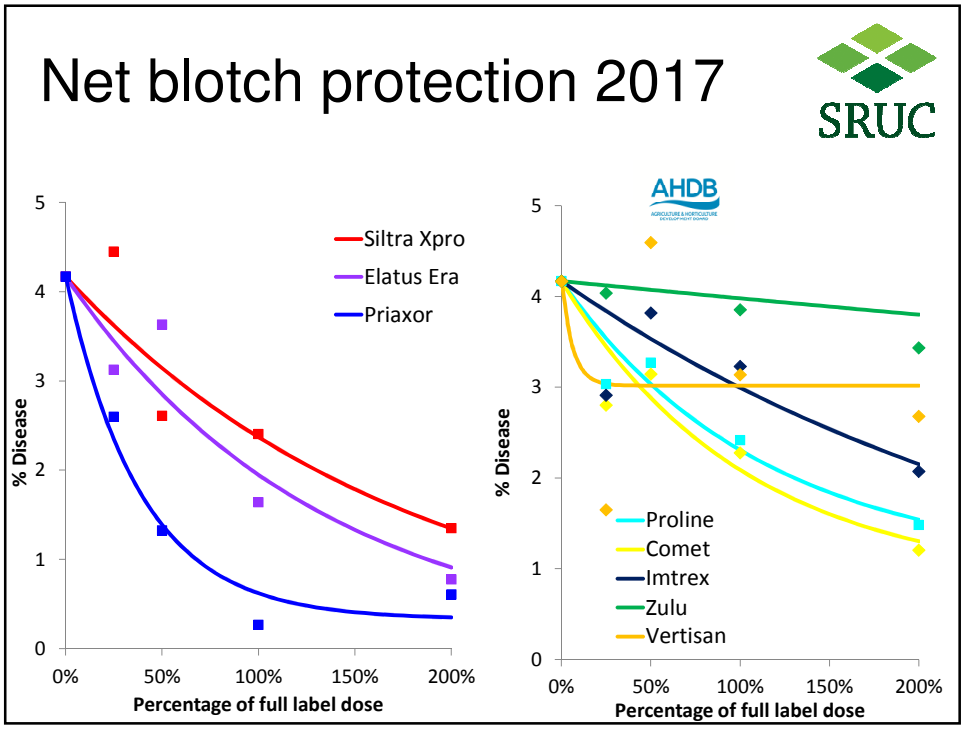


QoI (strobilurin) efficacy' on Rhynchosporium (2001 – 2017)

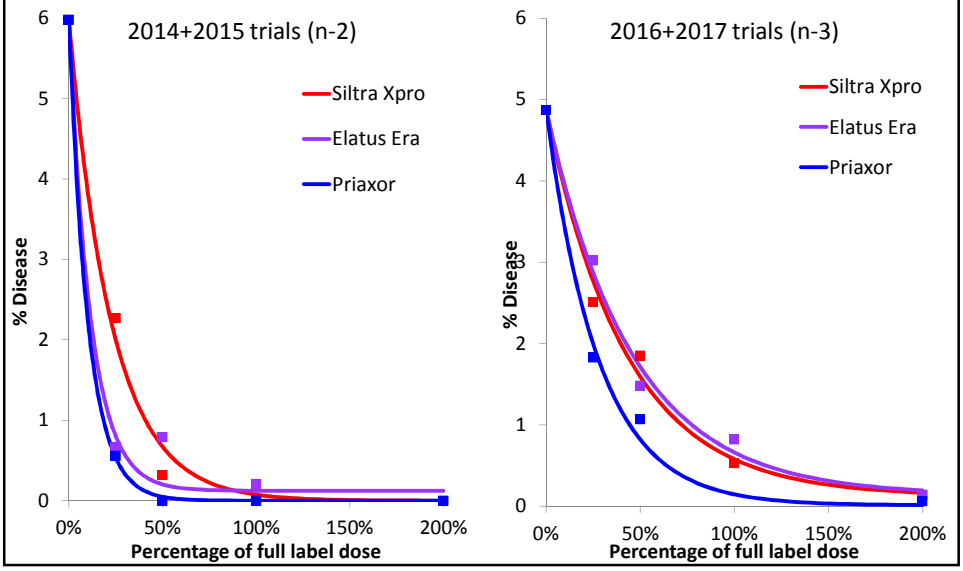


Data based on efficacy of comet (pyraclostrobin)

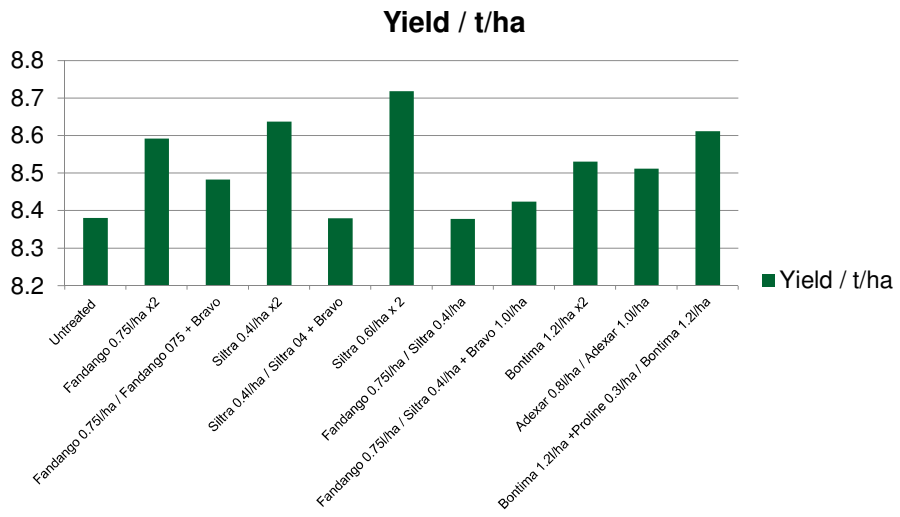

Mildew 2017 - Midlothian
SRUC
AHDB
% Disease
Siltra Xpro
Elatus Era
IZM+PTZ
Proline
Imtrex
Vertisan
Cyflamid
Talius
0%
50%
100%
150%
200%
Percentage of full label dose


Net blotch protection 2017
SRUC
AHDB
% Disease
Siltra Xpro
Elatus Era
Priaxor
Proline
Comet
Imtrex
Zulu
Vertisan
0%
50%
100%
150%
200%
Percentage of full label dose

Net blotch - changes in protective activity – mixtures



Spring barley programmes



Barley fungicide summary

- Siltra Xpro - good broad spectrum activity
- Adexar/Imtrex, or Vertisan+Proline similar on rhyncho and net blotch
- SDHIs still show good net blotch activity
- SDHIs no longer have good efficacy against Ramularia, nor does Proline
- Strobilurins have very good efficacy against rhyncho and good efficacy against net blotch
- Avoid over-reliance on SDHI + azole: other mixtures are available
- Make use of chlorothalonil

Barley programmes

- Mixtures essential in the face of changes in rhyncho, net blotch and ramularia
- T1 timing retains tillers and hence grain sites so builds yield potential - use strongest mixtures at rates that factor in your main risks
- T2 keeps a lid on any earlier disease and protects against ramularia
- Chlorothalonil at T2 important, use at T1 is debateable
- Concern over high levels of use / also at threat from regulatory loss

New SUD means you are 'strongly encouraged' to have an IPM plan

and it is now a requirement in SQC quality assurance scheme



On-line planning tool for Scotland

SRUC

The Scottish Government

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Integrated Pest Management Plan for Scottish Growers

Overview

This plan has been adapted from the National Farmers Union Integrated Pest Management (IPM) plan, promoted by the Voluntary Initiative, to help Scottish farmers meet their legal obligation to take reasonable precautions to protect human health and the environment when using pesticides. Completing an IPM plan will help the landowner/contractor to make the best possible and most sustainable use of all available methods for controlling pests, weeds and diseases.

What is Integrated Pest Management (IPM)?

Integrated pest management is a site specific, whole farm approach to maximising the efficiency of production whilst minimising negative effects on the environment. This should involve minimising pest, weed and disease risks and includes the use of crop rotations, appropriate cultivation techniques, the use of resistant varieties, tailored and efficient use of artificial inputs such as fertilisers, pesticides and fossil fuels and the enhancement of wildlife habitats. Pest monitoring and the use of thresholds for treatment are a component in reducing reliance on pesticides.

Contact
christian.storstein@gov.scot

Key Dates
Status: Open
Runs from 11 May 2016 to 14 Jun 2022

Other Information
Audience:
People of Scotland

Interests:
Farming

http://bit.ly.pestmanagementplan

Scottish IPM plan asks for

- Background
- Pre-planning
- Identification of major risks
- Sustainable use of pesticides
- Use of monitoring and surveillance
- Further plans and additional reading

Takes around 15 minutes, you can view all the questions when you enter your email. Your data is protected and your email is only required so that your plan can be emailed to you.

What are the benefits of completing an IPM plan?

- Give you an idea of what you currently do on-farm that is considered to be IPM
- Help you reduce reliance on pesticides
- Maximise the effectiveness of all crop protection methods
- Make long-term plans to reduce the pest burden on farm
- Tailor annual inputs to the in-season risks
- Reduce waste and improve business practice and productivity
- Improve pesticide stewardship

Key messages

- Product losses through legislation and resistance
- Loss of chlothianidin seed treatments
- New pesticide resistances in loose smut, ramularia and grain aphids

- Plan ahead to manage leatherjackets, slugs and aphids
- Plan fungicide programmes to avoid over reliance on any one active
- Chlorothalonil important for ramularia control

Thanks – questions?