Chair’s welcome
Judith Stafford – Knowledge Exchange Manager (North), AHDB
### Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00</td>
<td>Registration</td>
</tr>
<tr>
<td>10:15</td>
<td>Chair’s welcome Judith Stafford – Knowledge Exchange Manager (North), AHDB</td>
</tr>
<tr>
<td>10:20</td>
<td>Outside the box weed management Lynn Tatnell – Research Consultant, ADAS</td>
</tr>
<tr>
<td>10:55</td>
<td>Integrated Pest Management Steve Ellis – Entomologist, Manager Pest Evaluation Services, ADAS</td>
</tr>
<tr>
<td>11:30</td>
<td>Refreshment break</td>
</tr>
<tr>
<td>11:45</td>
<td>Making the most of your soil biology Simon Mattson – 2014 Nuffield Scholar &amp; farmer, Queensland, Australia</td>
</tr>
<tr>
<td>12:10</td>
<td>Sustainability in practice: a story of change Tim May – Kingsclere Estates</td>
</tr>
<tr>
<td>13:10</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:45</td>
<td>RB209 recommendations for cereal growers Sajjad Awan – Resource Management Scientist, AHDB</td>
</tr>
<tr>
<td>14:20</td>
<td>AHDB update Judith Stafford – Knowledge Exchange Manager (North), AHDB</td>
</tr>
<tr>
<td>14:30</td>
<td>Summary and close</td>
</tr>
</tbody>
</table>

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**Outside the box weed management**

Lynn Tatnell – ADAS
Why do we need to get out of the box?

Herbicide reliance

Resistance
Legislation
Yield loss

Tight rotations
No new actives
Over reliance on limited actives

Long-term thinking

UK resistant species: year 1\textsuperscript{st} detected

1982
1993
2000
2001
2002

Glyphosate resistance is a real threat!
An integrated approach to weed management: prioritising decisions
Seed bank and weed emergence

- Identify your weeds
- Choice of cultivation
- Germination enhancers?
  - Smokey water
- Cultivations in the dark?
- Allelopathy
- Dormancy
- Cover crops
- Crop trash

Effect of cultivation on the seed bank

![Diagram showing the effect of ploughing on the seed bank.](image)

- Shed weed seed
- Seeds in seedbank
- Old seed comes to the surface
- New seed is buried
- Ploughing
- New seed is buried
Cultivation options and effect on weed seedbank

Source: HGCA Rotational weed management guide, 2014
Cultivations in the dark?

- Improvements in night vision and RTK guidance

Is light needed for germination?

- Limited data available
- Old data - Trials data from 1995
- Does this require more research?
Growth

- Competitive crops
- Mechanical weeding
- Patch spraying
- Electrical weeding
- Laser and flame weeding
- Grazing

Competitive crops and cultivars

- Hybrid barley: 63%↓
- Conventional barley: 83%↓
- Wheat
System Cameleon

- A combined machine for seeding & hoeing
- 25 cm & 50 cm row systems
- 3.5 cm on each side of the crop row is left uncultivated

Sensor based inter and intra row hoeing

- Inter row – duck foot hoe
- Intra row – finger weeder
- Camera system identifies weeds and operates a pulse generator
‘Electroherb’

Zasso group, Germany

Integrating beef production into arable systems

• AHDB Beef & Lamb (Project 61100013)
• **Aim** – to investigate the practical, economic, environmental & agronomic implications of integrating beef enterprises into arable systems
Seed production

- Preventing seed return
- Seed harvest management
- Cleanliness
- Silage or crimped grain?

Above crop weed control

- Weed wiper
  - Glyphosate
  - Electric
- Need crop/weed height difference
Drones or UAVs

- Continuing advancement in drone technology
- Cameras take multispectral images recording weed patches
- Pre-programmed path, continuous monitoring
- Process multiple images
- Data set used in sprayer to treat patches

*eyeWeed, TSB project (previously CRD & AHDB project 471)*
‘Today’s world’ technology?

• Combining current technology will lead to Robots
  – Identify and kill weeds (by varied means)
  – Work tirelessly day and night
  – Recharge themselves?

This technology is already here

Google self driving car project

Automatic lawnmowers and vacuum cleaners
‘Ladybird’

University of Sydney

• Detects seedling in 3D using a stereo camera
• Triggers a small and controllable volume of spray at each target.
• eyeSpot (AHDB CP134) is developing this type of technology in the UK

Useful tools

Don’t forget!
‘Out of the box’: Summary

- Rotations and diversity
  - Cropping/land use/chemistry
- Integrated weed management approaches
  - Non-chemical technologies/grazing/crop competition
- Embrace new technologies
- Experiment & communicate results to learn
- Cleanliness- vitally important reducing seeds
- Long-term approach
- Be persistent and patient!!

Questions?
Thank you

Integrated pest management

Steve Ellis, ADAS
Crystal ball gazing

- Fewer actives
- More expensive actives
- Threat of resistance
- Environmental concerns
- Legislation

Fewer new products

New active ingredient (AI) registrations by decade

<table>
<thead>
<tr>
<th>Decade</th>
<th>No. of AI registrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960s</td>
<td>40</td>
</tr>
<tr>
<td>1970s</td>
<td>80</td>
</tr>
<tr>
<td>1980s</td>
<td>120</td>
</tr>
<tr>
<td>1990s</td>
<td>40</td>
</tr>
<tr>
<td>2000s</td>
<td>20</td>
</tr>
<tr>
<td>2010s</td>
<td>10</td>
</tr>
</tbody>
</table>
% area of arable crops treated with insecticides

The days of cheap insurance sprays are over

Source: Pesticide Usage Survey Reports for arable crops in Great Britain
Graph produced by Sacha White, ADAS
Pyrethroids & their alternatives: Pollen beetle control in UK

<table>
<thead>
<tr>
<th>Standard treatment</th>
<th>Alternative products</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pymetrozine</td>
<td>Indoxacarb</td>
<td>Thiacloprid</td>
</tr>
<tr>
<td>Lamma-cyhalothrin @</td>
<td>£40.86/ha</td>
<td>£31.34/ha</td>
<td>£19.32/ha</td>
</tr>
<tr>
<td>£7.48/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The science of doing nothing

- Most difficult decision you can make
- Do you need to treat?
- Requires 100% confidence in available information
Thresholds: Outdated, obsolete, onerous!!

- Most current thresholds at least 20 years old
- Limited if any scientific background (10/34 peer reviewed)
- Too many
- Best information at present

Assessment methods not user friendly

- Time consuming
- Temperature dependent
- Elusive quarry
Entomology/physiology collaboration

- **Entomology**
  - Pest biology
  - Assessment methods
  - Control options

- **Physiology**
  - Plant number
  - Yield parameters
  - Crop tolerance e.g. pollen beetle & stem borers

What have the Americans ever done for us? (Litsinger, 2009)

<table>
<thead>
<tr>
<th>Insect feeding group</th>
<th>Example pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue consumers</td>
<td>Slugs, flea beetles, pea and bean weevil, pollen beetle, seed weevil</td>
</tr>
<tr>
<td>Leaf senescence accelerators</td>
<td>Aphids</td>
</tr>
<tr>
<td>Stand reducers</td>
<td>Slugs, wireworms, leatherjackets, dipterous stem borers</td>
</tr>
<tr>
<td>Photosynthetic rate reducers</td>
<td>Aphids (honeydew &amp; sooty moulds), leaf miners, leaf beetles</td>
</tr>
<tr>
<td>Assimilate sappers</td>
<td>Aphids, saddle gall midge, orange wheat blossom midge</td>
</tr>
<tr>
<td>Turgor reducers</td>
<td>Nematodes, leatherjackets, wireworms through root damage</td>
</tr>
</tbody>
</table>
Loss of green leaf area

Insecticides targeted at pollen beetle
What should a threshold scheme consider?

1. How many buds can a beetle destroy?
2. How many excess flowers does an oilseed rape plant produce?
3. Is it possible to predict the excess flowers per plant using an easier in-field measure (e.g. plant population?)

On average a single beetle can destroy nine buds per plant

\[ y = 9.5766e^{-0.046x} \]

\[ R^2 = 0.9823 \]
Excess flower number is dependent on variety

<table>
<thead>
<tr>
<th>Variety</th>
<th>Excess flowers/m²</th>
<th>2008/2009</th>
<th>2009/2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castille (OP)</td>
<td>3747</td>
<td>8816</td>
<td></td>
</tr>
<tr>
<td>Excalibur (Hybrid)</td>
<td>7019</td>
<td>10760</td>
<td></td>
</tr>
<tr>
<td>PR54D03 (Semi dwarf hybrid)</td>
<td>7107</td>
<td>9505</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5958</td>
<td>9694</td>
<td></td>
</tr>
</tbody>
</table>

Excess flower number is inversely related to plant number
Polling beetle threshold varies with plant number

![Graph showing the relationship between pollen beetle threshold and plant number]

### Aims & Methods

Validating the new threshold...

<table>
<thead>
<tr>
<th>Insecticide</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
</tr>
<tr>
<td>Rumo</td>
<td></td>
</tr>
<tr>
<td>Hallmark</td>
<td></td>
</tr>
<tr>
<td>Plenum</td>
<td></td>
</tr>
<tr>
<td>Biscaya</td>
<td></td>
</tr>
</tbody>
</table>

Is damage to the main raceme likely to result in greater yield loss?

What about pigeon damage?
Insecticide experiments

• Five sites over 3 years
• Varying plant populations: 17 to 63 plants/m²
• Thresholds ranged from 11 to 25 pollen beetles/plant
• Beetle numbers ranged from 0.9 to 4.8 beetles per plant – Threshold never exceeded.
• No significant impact upon yield

Defoliation treatments

120 seeds/m² Non defoliation

120 seeds/m² Defoliated
Artificial pollen beetle

- Does what it’s asked
- Can be relied upon to cause consistent leaf damage
- Prune 0%, 50% or 100% buds on main raceme

Impact of defoliation on yield

![Graph showing yield comparison](image)

- **HM14**: Defoliated - 5.2 t/ha, Non Defoliation - 4.8 t/ha
- **RM14**: Defoliated - 5.1 t/ha, Non Defoliation - 4.7 t/ha
- **RM15**: Defoliated - 6.0 t/ha, Non Defoliation - 5.5 t/ha
- **HM15**: Defoliated - 5.3 t/ha, Non Defoliation - 5.0 t/ha
Impact of pruning on yield

- No significant interaction with defoliation.
- No significant interaction with seed rate (exc. HM15 WOSR).

Take home messages

- Pollen beetle numbers rarely exceed threshold.
- Simulated pigeon damaged crops do not incur larger yield losses from pollen beetle damage.
- Crops with lower plant populations are no more at risk to pollen beetle damage than crops with high plant populations
- Severe simulated pigeon damage may not always reduce yield.
- Pruning all buds from the terminal raceme did not reduce yield.
Managing wheat bulb fly

- The minimum shoot number required for average UK yield is 400 shoots/m².
- BUT plants typically produce > 1000 shoots/m² by GS30.
- A number of excess shoots could therefore be lost to WBF without affecting yield.
- Shoot number is influenced by sowing date.

Take home messages

- Reliance on chemicals will decline as uptake of IPM increases.
- Days of cheap insecticide treatments are over.
- Need to be more confident of when to do nothing.
- Physiology input is vital for developing robust thresholds.
- Link pests in terms of their effects on the crop.
Thank you

Thank you

#agronomy17
Making the most out of your soil biology

Simon Mattson – 2014 Nuffield Scholar & farmer, Queensland, Australia

Making the Most of Your Soil Biology

2015
International Year of Soils
Nature provides four things for free

- Rainfall
- Sunlight
- Carbon
- Nitrogen

Those farmers who are able to maximise what they get for free are better able to ride season variability.

As land managers we are expected to manage four things

Listed below in order of importance

- Air
- Water
- Decay
- Nutrient

A satellite image shows primary, secondary and tertiary plumes, changing from brown to light green to dark green as attached particles of nitrogen and phosphorus, and organic matter.

(Supplied/Australian Institute of Marine Science)
THE POWER OF CARBON
Natures answer for healing

Plant diversity the key to nutrient cycling in nature and it needs to be in agriculture
Always cover the soil, limit tillage

Always have a living plant in the soil, maximise photosynthesis to build carbon.
CARBON THE KEY

SAME FIELD NO HERBICIDE

06/19/2013

07/21/2013
Benefits

- Diversity – Mimics Nature
- Building Soil Aggregates all Summer
- High Mycorrhizal Crop & Covers
- Provides Food For The Predators & Parasitoids
- Grass Herbicide Option Still Available – All Broadleaves
- No Insecticide Or Fungicide
- No Commercial Fertilizer On Half The Field
- Reduces Our Fossil Fuel Footprint
- Reduces Evaporation
- Livestock Integration – Winter Grazing
WHAT IS A DIRTY ORCHARD

Commitment must come from all quarters, change costs money, are you Committed.
Animal diversity in Kenya

Making the MOST of Your Soil Biology

- Study of soil microbial activity as influenced by plant diversity
- Declining sugar cane productivity, Mackay area production has suffered a 9% decline every five years for the last 20 years
- Can we reverse this by building soil health through the promotion of biological activity.
Making the Most of Your Soil Biology

A presentation by
Simon Mattsson
2014 Nuffield Scholar

Farming in the next Green Revolution

Contact me
Phone: 61417 862 979
Email: mattsson@mcs.net.au
171 Newmans Road
Marian 4753, QLD
Australia
Major Change takes Commitment

Thank you
Sustainability in practice: a story of change
Tim May – Kingsclere Estates

#agronomy17
Herbal ley

<table>
<thead>
<tr>
<th>1.00</th>
<th>ABERDART (int dip rg)</th>
<th>0.25</th>
<th>CRUSADER (white clover)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>ABERMAGIC (int dip rg)</td>
<td>0.25</td>
<td>AURORA (alsike clover)</td>
</tr>
<tr>
<td>2.00</td>
<td>LIDACTA (cocksfoot)</td>
<td>0.25</td>
<td>LEO (Birdsfoot trefoil)</td>
</tr>
<tr>
<td>1.50</td>
<td>PROMESSE (timothy)</td>
<td>2.50</td>
<td>ESPARCETTE (Sainfoin)</td>
</tr>
<tr>
<td>2.00</td>
<td>ARITA (meadow fescue)</td>
<td>0.50</td>
<td>PUNA II (chicory)</td>
</tr>
<tr>
<td>0.50</td>
<td>MILVUS (red clover)</td>
<td>0.25</td>
<td>FORAGE BURNET</td>
</tr>
<tr>
<td>0.50</td>
<td>AVOCA (white clover)</td>
<td>0.20</td>
<td>YARROW</td>
</tr>
<tr>
<td>0.25</td>
<td>VIOLIN (white clover)</td>
<td>0.25</td>
<td>SHEEPS PARSLEY</td>
</tr>
<tr>
<td>0.20</td>
<td>TONIC (rib plantain)</td>
<td>TOTAL ACREAGE = 14.40kg/acre pack</td>
<td></td>
</tr>
</tbody>
</table>
The business case for holistic management

The circle of influence

• Are you making decisions that fit with your mission statement?
• Are you fixing a cause or a symptom, 5 whys.
• Are you increasing your natural capacity.
• Are you using more non renewable energy and less human energy?
• Are you planning for profit?
My aim in business

• To provide me and my family with a lifestyle now and into the future from the resources available to us; working towards these principals...

  – Local trade.
  – Quality products lead the way to profit.
  – Pride where and how we work.
  – Look after people.
  – Make the most of what we have before looking to expand
Holistic Management Framework

WHOLE UNDER MANAGEMENT
Decision-Makers  Resource Base  Money

HOLISTIC CONTEXT
Quality of Life  Statement of Purpose  Future Resource Base

ECOSYSTEM PROCESSES
Community Dynamics  Water Cycle  Mineral Cycle  Energy Flow

ECOSYSTEM MANAGEMENT TOOLS
Human Creativity  Technology  Pest  Fire  Grazing  Animal Impact  Living Organism  Money & Labor

HOLISTIC CONTEXT CHECKS
Cause & Effect  Weak Link  Social  Biological  Financial  Marginal Reaction  Gross Profit Analysis  Energy / Money Source & Use  Sustainability  Society & Culture

MANAGEMENT GUIDELINES
Learning & Practice  Organization & Leadership  Marketing  Time  Stock Density & Herb Effect  Cropping  Burning  Population Management

PLANNING PROCEDURES
Holistic Financial Planning  Holistic Land Planning  Holistic Planned Grazing

FEEDBACK LOOP
Plan  Monitor
Replan  Control
Enterprise stacking

- Use the same bit of land for more than one enterprise.
- Each enterprise complements the other.
- The rent that each enterprise needs to pay reduces.
Example: cows and chickens

- Cows eat grass move through the area staying in one place for a day or two.
- As cows move on their muck is left behind, this muck contains readily available nutrients and animal parasites.
- Over a period of time nature breaks down the manure and the parasites go through their cycle ready to be consumed by the cow again.
- Ground eventually becomes "cow sick" to many muck spots and a build up of parasites

- Chickens sit in sheds, bedding is brought in and the sheds are cleaned out onto the surrounding fields to remove pathogens from environment.
- Chickens eat grain, but also need Protein which is expensive not a very varied diet.
- Eventually land around the sheds become overloaded with nutrients from sheds so the manure has to be taken further away.
- Birds like to scratch away at the ground to find their food.

What could Kingsclere estates look like in 5 – 10 years

- Mix of enterprises, complementing each other and the soil.
- Mix of species within enterprises, and varieties within species
- More Partners than employee’s
- Pay for services

Change Management...
Some closing thoughts

- Work out what you are aiming for.
- Do something now.
- Ask Why and Why Not.
- Let the Youngsters in, know when to retire.
- You are surrounded by abundance, see it.
- Get some counselling.

Thank you
My approach to building soil health and productivity

Clive Bailye, TWB Farms

Who am I?

• Clive Bailye – Managing partner TWB Farms
• A rapidly expanding and diversified business
• All arable / combinable crops........... but........!
• Light soils, low CEC’s drought prone
• Owned land, FBT’s and contract farming at scale
• Zerotill for 6 seasons now, previously “mintill”
Disclaimer!

I am not a salesman
I am not a scientist

I am a Farmer

We Farm Differently

TWB Farms JD 750a
Zero-Till Winter Wheat into green cover
Why ? Lots of good reasons !

Desire for sustainability of my business both financially and environmentally

Maximize output / margin from my primary resource (soil) and the season

Ag subs post 2020 ??? - we all need to be in position to cope without

Contract Farming USP
Primary Reason

……..Soil Health

Healthy Soil = Healthy Plants

Natural selection / survival of the fittest
Top 3 Farmer complaints?? Problems or Symptom?

- Blackgrass
- Aphids
- Slugs

- The real issue we face is soil health is declining

How do farmers fix problems?

Bags & Bottles?

Expensive & short term solutions often with undesirable side effects
Too Complex ? Unaffordable ? Sustainable ?

• Back to basics
• Soil is our foundation

My Farming principles

• Always want something growing – would you ever turn off a solar panel?
• No bare soil – reduce water loss
• Maximize diversity – a varied diet is a healthy diet
• Minimize disturbance, allow biology to thrive and build strong networks
• Feed soil biology buy building SOM
• Improve water infiltration with #rootsnotiron
How?

- Diverse rotation
- Cover Crops
- Companion crops
- Lowest possible soil disturbance
- Re-introduction of Livestock “enterprise stacking”
- Low fixed cost structure less output reliant
- Aim for maximum margins and return on inputs

Diverse Rotation = Opportunistic

**Winter Crops**
- Winter Wheat
- Winter Barley
- Winter OSR just 5% of area
- Winter Beans

**Spring Crops**
- Spring Beans
- Lupins
- Linseed
- Peaola
- Linseed
- Spring Oats
- Millet
- Soya !!!!! ????
- Summer cover
Cover Crops

Very “on trend” caution in farming trendy can = expensive!
“Enterprise stacking” – sheep use existing resources to bring additional income

My aim is £25/ha or less using as much FSS as possible
2017 mix includes

- Spring Oats (FSS)
- Beans (FSS)
- Peas (FSS)
- Linseed (FSS)
- Millet (FSS)
- Lupins (FSS)
- Sunflower
- Forage radish
- Phacelia

Companion Crops

- Peaola – Pea and spring OSR mix
Minimal soil Disturbance

Our Drills - Farm Modified JD750a
Our Drills – CO6 ULD conversion

Low cost – the £8000 zero-till drill
Livestock in arable Rotation

Arable staff enjoying the new role!
Radical Fixed cost structure change

Much reduced capex / ha

• Zero Till = £500 /ha
• Old "mintill" high HP system = £1000 /ha

Radical Fixed cost structure change

Much reduced HP /ha - all machinery included

• Zero Till = 1.2 hp /ha
• Old "mintill" high HP system = 1.9 hp /ha
Radical Fixed cost structure change

Much reduced fuel use - establishment

- Zero Till = 4L / ha
- Old "mintill" high HP system = 32 L / ha

Radical Fixed cost structure change

Much reduced labour costs

- Zero Till = £ 100/ha / year
- Old "mintill" high HP system = £150/ha /year
Radical Fixed cost structure change

Overall fixed costs cut by 50 % vs ‘mintill’
Costs vs plough based system ? !!

This is the kind of changes UK ag requires to
survive unsubsidized in the future

Measurement ? Does this work ?

• Yield – 5 best years of last 20
• Profit
• Capital employed
• Lifestyle
• Infiltration tests, wish I had done more at the start
• Traffic carrying
• Variable cost use, slug pellets, herbicides and insecticides reductions
• Soils test results
• No longer dependent on BPS for profit
• Lots of on farm trails

• Coincidental ? ............ Maybe !
The best Measurement?

Worms are the intestines of the earth.

Aristotle
Finally another disclaimer………

I DON'T ALWAYS KNOW WHAT I'M TALKING ABOUT BUT I KNOW I'M RIGHT
- MUHAMMAD ALI
MUHAMMADALIQUOTES.COM

Thank-you

@ TWBFarms

www.thefarmingforum.co.uk
Thank you

Nutrient Management using ‘New’ RB209
(AHDB Nutrient Management Guide)

Agronomy 2017, 16th February 2017
Sajjad Awan
RB209: 50 years of evolution

Key Questions

1. Why RB209 has changed?
2. How did we change it?
3. What is different?
4. What has stayed the same?
5. How and when you can find out more?
1. Why?

- Until now research at a national level was uncoordinated
- Revision of RB209 was unplanned
- RB209 was out of date

2. How?

- Steering Group
  - Technical Working Group Livestock
  - Technical Working Group Arable
  - Technical Working Group Horticulture

38 Partners
Arable Technical Working Group

- Agrii
- BBRO
- Bunn Fertiliser Ltd
- CF Fertilisers UK Ltd
- Catchment Sensitive Farming
- Cropwell
- DAERA (NI)
- Defra
- Frontier Agriculture Ltd
- H L Hutchinson Ltd
- K + S UK & Eire Ltd
- OMEX Agriculture Ltd
- Paul Towns Ltd
- Pepsico International
- PGRO
- Potash Development Association
- Scottish Government
- Velcourt Ltd
- Welsh Government
- Yara UK Ltd

Steering Group

- Agricultural Industries Confederation
- AICC
- BBRO
- Catchment Sensitive Farming
- Defra
- DAERA
- FACTS
- PGRO
- Professional Nutrient Management Group
- Scottish Government
- Welsh Government
Review of new data

• ~£11 million spent on relevant research since 2008
• Review of 2008-15 data
• Started September 2015, ended May 2016
• Five academic partners
• Significant in-kind contribution from the industry
• www.ahdb.org.uk/cropnutrition

Nutrient Management Guide (RB209)

• Seven sections
• Easier to navigate, carry and use
• Navigable tablet and mobile version
• Straight forward to up date
Section 1: Principles of nutrient management and fertiliser use

• More concise
• Removed repetition
• Highlighted sulphur deficiency

Section 2: Organic materials

• Includes nutrient contents from digestate
• Highlights importance of analysis
Section 4: Arable crops

- Cereals and oilseeds
- Sugar beet
- Peas and beans
- Biomass crops

Updating nitrogen rates in cereals
Recommendations for soils
Wheat nitrogen rates

• **Winter wheat**
  Increased recommendation for light sands and silts by 20kg N/ha

• **Spring wheat**
  No changes: not enough evidence available

Winter barley nitrogen rates

• **Winter feed barley**
  Increases of 10-20kg N/ha for:
  1. Light sands and silts for all SNS indices
  2. Shallow soils at SNS index 0
Winter malting barley N rates

• Small rise for sands

• Reductions for other mineral soils

• Greater reduction needed to meet 1.8% grain nitrogen target for malting

Spring barley N rates

• **Spring feed barley**
  Increases of 20-30 kg N/ha for light sands

• **Spring malting barley**
  – Small rise for sands at SNS Index 1
  – Reduction for other mineral soils, as greater reduction needed to meet 1.8% grain nitrogen target
Winter oats, rye and triticale nitrogen rates

• Oats
  Increased recommendations by 40 kg N/ha

• Triticale
  – Same nitrogen rates as winter wheat, except
  – Reduce rates according to prices, yield potential and lodging risk

• Rye
  No changes

Adjusting nitrogen rate for expected yield
Typical yield response to Nitrogen-Winter Wheat

Adjusting nitrogen rates for expected yield

• Need to be confident of achieving expected yield

• Any yield limiting factors must be dealt with:
  – Weeds
  – Supply of other nutrients
  – Poor soil structure (could take several years)

• If expected yield is unlikely to be achieved e.g. poor weather conditions, pests or diseases then do not apply an increased nitrogen rate
Six step plan to yield adjustment

1. Assess your field’s SNS- Field Assessment method OR Measurement Method
2. Take yield data for the past 5 years-Remove high & low-Take average of the remaining 3 years
3. Work out how many tonnes above/below the average yield is, add 20kg N/ha above per tonne….
4. During spring assess your crop and assess how the season might impact on yield (assessed in step-2)
5. Decrease/increase final N application in response to the crop’s yield potential
6. Harvest your crop and LEARN from your experience

Adjusting nitrogen rates for expected yield

Nitrogen rates should be adjusted (up or down) by 20 kg N/ha per t/ha in expected yield from:

- 8.0t/ha in winter wheat (up to 13t/ha)
- 6.5t/ha in winter barley (up to 11t/ha)
- 5.5t/ha in spring barley (up to 9t/ha)
Adjustment for yield
Winter barley, Yorks 2015

Effects of yield on N requirement
Winter barley

Extra 20 kg N/ha for each additional t/ha above 6.5t/ha

\[ y = 19.6x - 135 \]
\[ R^2 = 0.44 \]
Updating N timings

Winter barley: nitrogen timing

• Earlier nitrogen increased yield by 0.3 t/ha
• Less than 100 kg N/ha
  Apply as single dressing by GS30-31
• 100-200 kg N/ha
  Apply half during late tillering (mid-Feb/early March) and half at GS30-31
• 200 kg N/ha or more
  Apply 40% during late tillering (mid-Feb/early Mar), 40% at GS30-31 and 20% at GS32
Winter oilseed rape N timing

- Use "Canopy Management" principles
- Reduce and delay N for crops with large canopies (GAI>2)
- Apply additional N at yellow bud/early flowering for crops with expected yield >3.5t/ha

Example: Medium canopy

- GAI = 2 (100kg N/ha)
- Soil N = 30kg N/ha
- Expected yield 4.5t/ha

N Fertiliser
- 80kg at green bud
- 60kg at yellow bud / early flowering
Key messages

• Higher nitrogen rates for cereals at some SNS indices and soil categories (e.g. light sands)

• A clear link between expected yield and N requirement

• Earlier N recommended for winter barley

• Adopt canopy management principle in OSR

• No change for sulphur requirement

4. What has stayed the same?

• Create and maintain good soil structure

• Maintain right pH
  • Use sulphur if needed
  • Make use of soil analysis
  • Make good use of organic materials
What’s next?

• Nutrient Management Guide (RB209) published May 2017

What’s next?

• New research programme on sulphur and nitrogen for spring barley

• Revisions of the Arable crops section in 2018 and 2020
Thank you

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AHDB Update & Summary
Judith Stafford – Knowledge Exchange Manager (North), AHDB

#agronomy17
Monitor Farms

- 80 meetings (approx. 5 per group) in 2015/16
- Attendance from 15 to 55
- Monitor Farm survey 2016

Monitor Farms 2016/17 meeting topics

Theme 1: Soils
- Headland management
- Cultivations, drill choice & crop establishment
- Cover crops
- Livestock
- Compaction
- Soil health

Theme 2: Farm business
- Getting more from your farm accounts
- Grain marketing
- Increasing income
- Reducing costs
- Benchmarking
- Resilience

Theme 3: Technology
- Controlled traffic farming
- Precision farming

Theme 4: Yields & agronomy
- Rotations
- Weed management
- Reaching your yield potential
- The yield plateau
- Alternative cropping

Theme 5: Machinery
- Drill and sprayer costs
- Labour, power and machinery
Monitor Farms 2016/17

England & Wales

- 8 new Monitor Farms in 2016
- 24 Monitor Farms
- Approx. 120 meetings Nov 2016 - Jul 2017

Phase 4 Monitor Farms
Monitor Farm meeting dates

Driffield
2\textsuperscript{nd} March - Variable rates for seeds and nitrogen
4\textsuperscript{th} July – Summer meeting

York
8\textsuperscript{th} March – Weed control
29\textsuperscript{th} June – Summer meeting

Arable Business Groups

- Stand alone or attached to a Monitor Farm
- Comparison of cost of production costs through AHDB benchmarking tools
- 296 Cropbench+ datasets uploaded
- 45 meetings 2015/16
- Change from Cropbench+ to Farmbench
How to get our publications

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0845 245 0009

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http://www.ahdb.org.uk/brexit
Many ways to find out what we do...

Events

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Thank you

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Thank you

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