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Agronomy is a complex challenge...

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Welcome to the first edition of Growing Matters, the new magazine for business minded farmers and growers from Agrii, the UK’s leading provider of agronomy services, technology and strategic advice.

Issued twice a year it will provide practical and timely insight into the key issues that determine profitable farm production.

At Agrii, our aim is always to equip our skilled agronomists with the best ‘agri-intelligence’ targeted firmly at improving the productivity and sustainability of farming in the UK.

This fundamental link between agronomy, agri-science, and profitable crop production lies at the heart of our ‘agronomy plus’ approach and also the topics covered in this issue which tackle many of the latest challenges and opportunities, from producing 15 t/ha of wheat to investing in the UK arable sector.

We thank you for your interest and hope that you find plenty of value in this and future issues.

Mark Thomas
Editor

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Rising to the 15t wheat challenge

Agrii Technology Centre trials show it’s perfectly possible to achieve close to 15t/ha with current winter wheat genetics under UK conditions. But how can this be done with the greatest consistency on a commercial scale?
Key criteria for 15t/ha wheat

Agrii trials producing yields close to 15t/ha over the years have had the following key factors in common:

- Well-established crops with good autumn and early season rooting;
- Sufficient early nitrogen, plant growth regulation and trace element supply;
- Minimal restrictions on other nutrient availability;
- Limited mid-season N uptake resulting in more upright and small leaves with better canopy light penetration;
- Disease free leaves down to and including leaf 4;
- Good grain set;
- Cool, sunny grain fill with adequate moisture and low night-time temperatures.

In a field-scale pilot, agronomists Tom Goodman and Todd Jex have had considerable success in boosting the performance of wheat with two Wiltshire growers under far from ideal conditions over the past two seasons. In 2012 they harvested 12.7 t/ha from a challenge crop of KWS Santiago on Stephen Moore’s Manor Farm, Stapleford near Salisbury compared with 10.8 t/ha from the same variety grown alongside it under Top 25% agronomic practice. And last season at nearby Wilton Estates they achieved 11.8 t/ha from a late-sown crop of JB Diego against 10.15 t/ha.

“Although our challenge crops fell short of the 15t target, they did so in two particularly difficult seasons,” reflected Tom Goodman. “This and the extent to which they out-performed the same varieties grown alongside them through our enhanced agronomy gives us considerable confidence in our ability to improve farm performance.”

15 t/ha is the latest challenge Agrii groups across the country have set themselves under their industry-leading Best of British Wheat Initiative.

A whole range of yield-optimising nutrition, disease, weed and pest management strategies are currently under detailed investigation throughout the company’s research network. At the same time, regional teams are comparing the best research-led agronomy with current practice in split fields of Dickens at 12 iFarms from the Black Isle in Scotland to Wiltshire in the south west. And individual agronomists and growers up and down the UK are taking up their own 15t challenges on a field scale under their own conditions.

“We really don’t know whether 15t/ha is a realistic commercial aim on any scale,” observed Professor Jimmy Burke, chair of Agrii’s scientific strategy board. “However, we’ve set it as a target to give a clear focus to our improvement efforts. And we have adopted the approach of parallel field scale and small plot research work that has proved so successful in maximising the pace of progress in our Best of British Oilseeds project.”

Against this background, an Agrii workshop of more than 30 leading cereal specialists at Nottingham University earlier this year highlighted climatic variability, sub-optimal fertilisation, shorter rotations, increasing weed, pest and disease control issues and less resilient soils as key factors preventing current wheat varieties achieving their genetic potential in practice.

“We agreed that overcoming these constraints to move commercial yields towards our 15t/ha goal can only be achieved with a thoroughly integrated approach to performance improvement,” reported senior Agrii agronomist, Andrew Richards who co-ordinated the event.

“Given the positive relationship between crop biomass and yield, optimum canopies were considered an essential element for future progress, with greater use being made of available light through crops with a more erect growth habit.

“Better rooting and improvements to soil structure and organic matter content to aid root penetration, nutrient uptake and crop water supply were also identified as priorities. As were more accurate nitrogen, phosphate, potash, sulphur and key trace element application and more effective control of the most damaging foliar diseases, amongst other key agronomic improvements.”
“Although our challenge crops fell short of the 15t target, they did so in two particularly difficult seasons...”
At Manor Farm, Stapleford
Stephen Moore has found the Agrii challenge work very instructive.

“The challenge crop always looked much better than the standard,” he recalled. “It stayed far greener and, despite having more nitrogen, it was noticeably shorter. It was the last crop we combined and I have to say it was a bright spot in one of the worst harvests we’ve had in recent years. I’m sure it would have done 15t in almost any other season.

“Seeing what’s possible even under these conditions gives us something to aim at and useful insights into things we could do to consistently improve wheat margins across our 1300 acres.”

We’re keen to see how achievable and consistent this sort of extra input agronomy can be commercially. You certainly can’t argue with the extra value it has delivered.”

Much of the problem in Rodger Shirreff’s experience stems from the fact that seed treatment decisions tend to be very much of an add-on after variety choice, and sold by seedsmen rather than prescribed by agronomists. Just like foliar sprays, he insists that crop protecting seed treatments all have different properties and must be specified every bit as carefully to match both variety, situation and agronomic need.

“Our extensive R&D work shows that fluquinconazole seed treatment ahead of a range of spring spray programmes can raise first wheat yields by up to 0.75 t/ha with some varieties, as well as giving much needed flexibility to T0 and T1 spray timings,” he points out. “At the same time, Redigo Deter has proved invaluable in raising first wheat yields by well over 1.0 t/ha regardless of sowing date. And Latitude treatment has been equally valuable for both second wheats and wheats after barley.

“Just like T0, T1 and T2, significant improvements are also available from combining crop protection treatments with both growth manipulating and nutritional inputs at T(-1). “All of which means the first question everyone should be asking themselves ahead of the coming season is ‘what will we be doing at T(-1)’?”
Addressing more than 500 growers, crop advisers and specialists at this year’s Agrii Northern Farming Conference at Bishop Burton College, Tom O’Mahony urged UK farming to take full advantage of its opportunities in a world of growing affluence and food demand with sustainable, research-based productivity improvements.

“Looking beyond the inevitable seasonal production and market challenges, we see huge strategic opportunities for the UK arable sector, in particular,” he stressed.

“Not least for its long heritage and reputation as a quality food producer, excellent access to global markets, track-record of innovative research adoption and well-proven resilience and dynamism.”

This thinking has informed Origin Enterprises’ development of Agrii from its strong Masstock, Dalgety, CSC and UAP roots with a carefully structured additional £20 million R&D investment programme.

It aims to provide Agrii’s 300-plus field specialists with research-based intelligence second-to-none in helping producers overcome the most important knowledge gaps limiting crop productivity and profitability.

As part of this programme, a six-fold expansion of Agrii research and development is underway across northern England and Scotland. This extends current season work to well over 6000 trial plots under northern R&D manager, Jim Carswell, working from two new technical centres – the first under construction at Bishop Burton and the second to be unveiled later in the year in Scotland.

In addition to hosting the company’s new northern England Technology Centre, the partnership with Bishop Burton forms part of a structured technical training and development programme to support the rapid increase in young agronomists and advisers being attracted to the business.

“At the same, it and our increasingly close relationships with other leading centres of educational and research excellence are designed to encourage and nurture the young farming ideas and enthusiasm at all levels that we see as vital to UK farming’s exciting future,” pointed out Tom O’Mahony.
Innovative R&D strategy

Genetics, nutrition and soils, precision agronomy, crop protection and emerging technologies are the central pillars of the innovative five year research strategy plan underpinning Agrii’s expansion in applied research, development and technical support for UK farming.

“We’ve put impartial research right at the heart of the business we’re building from our strong ‘evidence-based’ heritage,” promised Agrii head of technology and services, Clare Bend.

“Our first five-year plan is based on an extensive national R&D priorities study conducted with customers and agronomists across the country, refined into a list of more than 50 research projects validated for their contribution to growers’ needs and prioritised by region.

“Increasing the efficiency of production systems and improving product quality and safety with the greatest economic and environmental sustainability is the core purpose of the plan. It builds on the extensive trials programme we already have underway to optimise the performance of current systems and identify new solutions to the most pressing agronomic challenges. Managing risk and volatility and maximising return on investment are central to all its components.”

Key Agrii Research Strategy Pillars

Agrii trials producing yields close to 15t/ha over the years have had the following key factors in common:

1. Identifying superior genetics and the best ways of exploiting them through variety-specific agronomy.
2. Improving crop nutrition and soil management through a better understanding of individual nutrients, their interactions and soil health.
3. Employing precision agronomy, electronically-driven aids and real-time trials data for more effective crop management and decision-making.
4. Harnessing the full range of cultural controls alongside agrochemicals for the most integrated and effective crop protection; and...
5. Exploring the practical value of exciting new nano-science, bio-pesticide and other emerging technologies in crop protection and nutrition.

“We have no doubt that future crop production progress will depend more on novel genetics and improved agronomic regimes than new agro-chemistry. So we simply have to have sufficient research scale and focus to identifying the best of these technologies, make them practicable for UK growers and bring them to the market in ways that offer the greatest immediate and lasting benefits.

“Our carefully focussed investment is designed to bring forward an increasing range of new products and enhanced approaches that growers can rely on to address the challenges they face and make the most of the many opportunities they have with the support of the best informed advice in the business,” he concluded. “We are hugely excited by the prospects for UK farming and the leading role we shall be playing in turning them into reality in the years ahead.”

Origin ENTERPRISES PLC
“The most important thing is to avoid half-way measures which mix black-grass seed throughout the soil profile...”

Cultural Gains

Now into its fourth season, the country’s most comprehensive rotation-wide black-grass management trial is providing a wealth of valuable intelligence to improve cultural control.
Recent results at Agri's 16 ha Stow Longa trials site near Huntingdon highlight the critical importance of cultivations in taking the pressure off chemistry across a typical heavy land rotation under acute pressure from resistant black-grass.

Indeed, the five-year study with Lemken shows cultivations can have a greater effect on black-grass control than pre- and post-em herbicides. Ploughing, in particular, can be very valuable in burying black-grass seed. But ploughing after ploughing merely brings it back to the surface to cause greater problems two years down the line.

Regardless of cultivation system, the work is also emphasising, time and again, that early drilling is the worst strategy with bad black-grass. Instead, good pre-planting control with glyphosate is essential ahead of crop establishment.

“Actually, the key lesson from our rotational establishment work is that there’s no right cultivation system,” reported trials manager, Steve Corbett. “It’s very much horses for courses. Black-grass control is a numbers game. Providing you get a good kill before you drill, any system can give high levels of control.

“Some are more reliant on effective pre and post-em herbicide activity than others, though. And those that are less chemistry-dependent tend to more expensive and time-consuming. So, the best approach depends on your priorities. And it will involve maintaining sufficient flexibility to address problems field-by-field, season-by-season. For which you need to know exactly where your black-grass is, both across the farm and within the soil profile.”

In fields where black-grass becomes problematic, Steve Corbett has found that ploughing down the seed can give valuable instant relief. But only if it’s good quality, full-inversion ploughing. Equally, once the bulk of the seed is buried out of harms way, it should not brought back up again with any form of deep cultivation. Instead, reverting to shallow tillage and minimal soil disturbance will keep any remaining seed near the surface where manageable populations are easiest to control.

Alternatively, he suggests keeping the bulk of the weed seed near the soil surface the whole time and hitting it hard with repeated stale seedbeds and delayed drilling, insisting that his trials show either strategy can do the job.

“The most important thing is to avoid half-way measures which mix black-grass seed throughout the soil profile,” he stressed.

“This means persistent problems every year and the greatest risk of failure if the weather gets in the way of pre-planting or pre-em activity.

“Here at Stow Longa we know that every 100 ears/m² of black-grass knocks wheat yields by 1t/ha. So we have to tackle it with a flexible and thoroughly integrated strategy that takes the greatest advantage of every cultural control opportunity: a strategy in which, I have to say, in-crop herbicides are our last – not first – consideration these days.”

A Competitive Advantage

Wheat variety choice can be almost as important as robust herbicide treatment in managing difficult grass weeds, according to the latest Agri research at Stow Longa.

Major differences in both black-grass competitiveness and yields were evident between 20 of today’s leading varieties grown under both robust and poor herbicide regimes but otherwise identical agronomy in the fully replicated trials.

Under the robust regime, black-grass control levels varied from more than 85% in the best varieties to less than 60% in the worst while the gap was even wider under the poor herbicide regime – ranging from 75% to just 25%.

The 17% average yield loss recorded from the poor treatment regime across all varieties underlines the critical importance of robust black-grass treatment. But a similar difference between varieties – from just 11.5% yield loss in the most competitive to 27.8% in the least competitive where spraying was compromised (Figure 1) – shows that well-informed variety choice should be an equally important consideration in modern control strategies.

Figure 1 - Yield Differences between Robust and Poor Herbicide Regimes
Coping with crop diversification

The three crop rule need be nowhere near the issue for most British growers that many have feared, believes Agrii head of farm business consultancy, Paul Pickford.

Paul Pickford’s assessment of the crop diversification regulations coming into force for the coming season shows that little or no rotational change will be necessary for the vast majority of arable farms; especially so since it is anticipated the rules will be applied on a farm business rather than holding basis. And even where changes are necessary, his newly-developed Agrii Enterprise Planner shows they are unlikely to have any negative impact on farm margins.

For a typical 200 ha winter wheat and winter rape business, for instance, at reasonable yields, crop values and input costs swapping 10 ha of second wheat for spring wheat or rape to satisfy the three crop requirement will, his analyses show, make little, if any, difference to the whole farm gross margin (Table 1). And taking 75 ha out of 200 ha of continuous wheat growing to establish a parallel winter wheat, winter barley and oilseed rape rotation will actually deliver a significant margin increase, albeit with a more complicated system.

“Our analyses show how little negative impact the three crop rule is likely to have for most growers, even if rotational changes are required,” stressed Mr Pickford. “What’s more, they don’t account for the fact that the least productive or most troublesome second wheat land will almost certainly be used for any spring cropping, allowing far better grass weed control. Add in the spread in key operations like drilling, spraying and harvesting that broader rotations enable and easing workload pinch points at critical times in the season is likely to deliver further benefits.

“Crop diversification is eminently manageable for almost everyone,” he stressed. “Even for most of those not currently growing three crops, it only affects a very small proportion of the farmed area – in most cases just the 5% that has to be in a third crop. Not only that but there are plenty of viable rotational solutions available.

“It’s all a matter of looking at your set-up closely and, if necessary, assessing the many options you have for your particular business in an open-minded way with the right guidance. That’s why we’ve equipped all our agronomists with the new computer-based planner linked to our extensive and regularly updated enterprise costings database.”
The Rules at a Glance

The three crop rule applies to all farms with more than 30 ha of cropping.

A maximum of 75% of the farmed area can be in Crop 1.

Crops 1 and 2 can occupy a maximum of 95% of the farmed area.

A minimum of 5% of the farmed area has to be in Crop 3.

Table 1: Wheat/Wheat/Rape Alternative Margin Comparisons

<table>
<thead>
<tr>
<th>Cropping</th>
<th>Area (ha)</th>
<th>Yield (t/ha)</th>
<th>Gross margin (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First winter wheat (feed)</td>
<td>67</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Second winter wheat</td>
<td>66</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Winter oilseed rape</td>
<td>67</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>TOTAL GROSS MARGIN</td>
<td></td>
<td></td>
<td>143,318</td>
</tr>
<tr>
<td>First winter wheat (feed)</td>
<td>67</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Second winter wheat</td>
<td>56</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Winter oilseed rape</td>
<td>67</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Spring wheat (milling)</td>
<td>10</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>TOTAL GROSS MARGIN</td>
<td></td>
<td></td>
<td>143,885</td>
</tr>
<tr>
<td>First winter wheat (feed)</td>
<td>67</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Second winter wheat</td>
<td>56</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Winter oilseed rape</td>
<td>67</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Spring oilseed rape</td>
<td>10</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>TOTAL GROSS MARGIN</td>
<td></td>
<td></td>
<td>143,241</td>
</tr>
</tbody>
</table>

Assuming feed wheat prices of £137/t and OSR prices of £266/t
The arrival of the Sustainable Use Directive, which brings to an end ‘grandfather rights’ for sprayer operators next year, is seeing a whole generation of growers and staff needing to gain the appropriate qualification to enable them to continue spraying. But a new initiative by Agrii, who arranged a series of sprayer training days last winter mainly for the fruit growers among its clients, is finding growers more than keen to enrol staff new to spraying as well as ‘old-hands’ who want some preparation for their certificate assessment. More than 80 people attended the training events over this winter and achieved the required level of competence in their assessments.

What makes these training events so popular is that they are run on growers’ own farms using their own equipment, where candidates are also later assessed.

“We put on a couple of courses in the south-east the winter before last, to see what the response was like, and again this winter,” says Agrii fruit agronomist for Kent, Sussex and Herefordshire, Brendan Rhodes. “But I have been surprised by the uptake so far. We found that, quite often, we’d started to organise a course because we were confident that we had enough interest from growers – and by the time it was ready to run, we had so many enquiries we had to set up another, later date. All growers have to do is say ‘yes’ and we do everything else for them.”

The courses, which are offered at a competitive rate, have mainly been for the PA1 award – a qualification covering the principles for safe handling and application of pesticides, which all operators new to spraying must hold whatever type of sprayer they will be using – and the PA3 certificate for variable geometry boom or broadcast sprayers, which includes air-assisted sprayers.

“Operators enrolled onto the courses have ranged from complete novices to experienced sprayers working under grandfather rights,” says Paul Bannister of Amenity Training & Consultancy, who has been the trainer for the fruit courses that Agrii has arranged.

Those spraying under grandfather rights may be holding training certificates that are no longer recognised under the new legislation; others may have already got as far as the PA1 but not progressed to an application module, or sat the courses and not got as far as the actual assessment.

Training for the PA1 foundation course takes a day and a half and is spent in the classroom. “This covers key aspects of legislation which apply to the use of pesticides,” says Mr Bannister. “At the end of the course, candidates will also understand how to store pesticides correctly, how to dispose of empty pesticide containers...
and washings, and how to maintain the correct personal protective equipment. They will also understand the need for record-keeping and the situations where pesticide application may pose a risk to people or the environment.”

The PA3 application module, which takes two days, looks at how to prepare the sprayer for work and how to maintain and use it safely. This includes how to check the equipment for mechanical defects; how to select spray volume and quality, and to calibrate application; and how to calculate, measure and mix the pesticide and fill the tank.

Those born before December 31, 1964, who have been allowed to apply plant protection products on their own or employer’s land under grandfather rights, need to qualify for a certificate of competence if they want to carry on spraying after November 26, 2015. At the same time, anyone who buys such products authorised for professional use must ensure that whoever is going to apply the product holds the appropriate certification.

There are two options open to those currently spraying under grandfather rights: either they achieve competency in the PA1 and an appropriate application module, such as the PA3; or they apply for a new certificate of competency, the Level 2 award in ‘safe use of pesticides replacing grandfather rights’. This involves one mandatory unit plus at least one further unit depending on the type of sprayer equipment the operator uses, for which there is just one practical assessment.

While it is down to personal choice which route such operators opt for, Mr Bannister points out that the new ‘replacement’ award will allow you only to apply pesticides on your own or your employer’s land. “It is not transferable and does not cover contractors,” he says.

Sprayer courses are obviously available elsewhere, but Mr Rhodes says they sometimes fail to run through lack of enough interest or because they’re just too inconvenient for growers’ staff to get to easily.

One of the attractions of an Agrii-organised course for apple grower Robert England, farm manager at Boxford (Suffolk) Farms, who hosted a training event in February, was that his staff didn’t have to leave the site at Sudbury. Six of his workers attended the course along with two from neighbouring fruit farms. “If I had to send staff out of the county to sit a course, I would have only probably sent my two operators who are working under grandfather rights because of the time away from the business,” says Mr England. “This way I could also train up some of the younger staff who have never sprayed before at the same time.”

Another benefit of running such courses on the farm, he says, is that workers are more comfortable using equipment they are familiar with. “If it was held elsewhere, the equipment could be older or just different,” he says.

An added extra is that Agrii arranges for the assessment of candidates too. “It’s not unknown for some people to complete the training but never get round to the test,” says Mr Rhodes. “So when we set the date for a training event we book a block of assessments, too, which are normally for the following week.”

Agrii is planning a series of seminars later this year to explain the changes in legislation and what is now required of operators spraying under grandfather rights in terms of qualifications. “Some may decide they don’t need any extra training,” says Mr Rhodes. “But growers just have one more ‘dormant season’ left to them in which to make sure they or any of their staff spraying under grandfather rights gain the right certification. And the Agrii team will be looking forward to arranging a new round of training courses starting in the autumn.”

Candidates study pesticide product labels as part of the PA1 foundation course

Trainer Paul Bannister (in high-vis jacket) explains the liquid flow of an air-assisted sprayer

Sprayer output is checked as part of an exercise in calibration
Local Support

Wherever you are, whatever you farm, Agrii has more to offer:

+ 6 Technology Centres, 62,000 Trial plots across the UK: representing all regions and crops, 460 Replicated Trials nationally
+ 32 demonstration iFarms: putting R&D into practice
+ 166 weather stations
+ 44 local offices
+ Integrated support from 300 agronomists
+ All tailored to meet your specific needs
+ Supporting over 1.4mHa of farming

UK Weather Station Network

Our ADCON weather stations process weather data to forecast pest and disease pressure and allow more accurate decision making on input applications.

Precision Agronomy

Our national network of 300 highly trained agronomists who tailor the latest research and technology into individual farm situations.

Decision Support Services

Agrii’s suite of 21st century agronomy tools for accessing and interpreting data to fine tune input use and improve the bottom line.

Connecting Agri-science with farming

Agrii harnesses the power of skilled agronomists and the best intelligence to deliver unrivalled expertise and support for sustainable and profitable farming systems in the UK.
Seed Processing
Four state of the art Master Seeds processing plants and a fleet of mobile units ensure our customers’ crops get the best possible start.

Input Technologies
Access to the latest seed, crop protection and nutrition inputs, all supported with a logistics service that sets the standard in the industry and ensures “farming on time”.

Agronomy Research
Investing more than £1 million every year in R&D enables Agrii to keep farmers up to date with the latest methods of profitable production.

iFarms – Knowledge transfer
This network of 32 working farms across the UK – Agrii customers – allows farmers to view, and discuss, the latest agronomic innovations.

Farm Business Consultancy
Our Farm Business consultants complete the Agrii offer, providing a full suite of services from strategic planning to environmental stewardship.

Soil Quest
Field scanning, satellite technology and soil sampling are used to create detailed Soil Survey Maps which allow more precise agronomic decisions and techniques.

Agrii UK Coverage

Distribution depots
Seed plants

Growing Matters - Summer 2014
Greater precision in soil management

Precision agronomy specialist, John Lord insists that a far more precise understanding of soils and their variation across every field is vital to make the most of the latest GPS-based farming technologies.
"Modern precision technologies enable us to automatically adjust a wide range of inputs to the surprisingly wide variations in soils across our fields," points out John Lord responsible for Agrii’s range of precision agronomy services. “But without accurately mapping and appreciating these variations we cannot tailor inputs to make the most of them. “We know from our long-standing SoilQuest experience that accurate soil maps produced from in-field scanning are far more valuable precision farming resources than those developed through either conventional whole field or grid-based soil sampling. Allied to precision sampling, they show us how the soil actually varies across the field rather than how either informed guesswork or computer predictions suggest it might. “In just the same way, our studies underline the importance of moving beyond traditional manual to much more precise laser soil texture analysis,” he explains. “To such an extent that we’ve made this independent laboratory analysis of soil samples standard across our mapping services. “Relatively small differences in the particle size distribution of soils can make big differences to their properties; and, in turn, to the best strategies for liming, nutrient application and sowing, not to mention cultivation, slug and weed control. “Knowing the precise sand, silt and clay contents of soils across our fields allows us to make the most of the precision input technologies already at our disposal. It also enables us to take the greatest advantage of new technologies for precision agronomy as they are developed.” At the same time, John Lord stresses Agrii is using this knowledge to develop the most accurate rule sets to translate the findings of its black-grass competitiveness, soil improvement, crop nutrition and other research into the most accurate precision agronomy plans. Add real-time information from the company’s network of weather stations, data from its automatic soil moisture probes and alerts from its increasingly sophisticated pest and disease prediction models and he sees precision farming moving up a major gear in the opportunities it offers for arable improvement. Importantly, though, he insists, it must all be built on the solid foundation of the most precise understanding of our basic resource – soil.

Assessing Soil Texture

Rolling soil between the fingers to judge clay, silt and sand content – as we were all taught to do at college – is highly subjective. However precisely it’s done, one man’s silty clay loam can easily be another’s clay loam and a third person’s sandy silt loam.

What’s more, even the best trained hands can only accurately allocate a soil to one of eleven standard classifications. Yet within these soil types there are huge variations in particle size distribution that can have a major impact on crop establishment, nutrient behaviour, water-holding, pH correction, nutrient mineralisation, compaction risk and friability for cultivation, amongst other important crop management considerations (Figure 1).

Laboratory laser texture analysis, on the other hand, allows soil zones within a field to be accurately and consistently characterised for their actual proportions of sand, silt and clay particles for the greatest agronomic precision.
Valuing Greater Precision

A better understanding of the variations in soil texture across their fields is enabling father and son team, Bill and Eric Wright to be much more precise in managing 1600 ha of cropping in 30 separate parcels across north Leicestershire and south Nottinghamshire.

SoilQuest is so valuable, that as well as scanning their own ground, they insist on scanning and zoning all the land they farm on contract as part each new agreement they enter into from Glebe Farm, Saxelby near Melton Mowbray.

“We base all our crop management on accurate zoning for what we’ve found to be very considerable soil variations, providing our contract partners with duplicate field maps for their own information,” says Eric Wright. “That way we both have a much better understanding of the potential of every piece of ground and how best to make the most of it sustainably.

“Differences of 5% in clay content across a field may not seem much on the face of it. But accounting for them effectively in our agronomy can make a big difference across such a large acreage. We’ve been able to make major savings in lime use. Applying phosphate and potash to the specific needs of each part of every field is paying dividends in improving performance too. As are varying both our cereal and oilseed rape seed rates to soil status.

“We need to rapidly get to grips with the ground we take on to deliver the best possible returns for ourselves and our contract partners. The complete picture scanning, laser texturing and soil analyses give us from the outset is invaluable in fine-tuning our immediate farming operations so we don’t have to rely on trial and error. It also allows us to look after soils better for the longer term.

“We have no doubt precision agronomy based on the best possible understanding of our soils is the way ahead,” he insists. “We’ve given-up managing in fields to concentrate on managing by soil zones. It’s an approach we’ll be building on increasingly in the future to make the most of the exciting opportunities offered by the latest precision technologies supported by the best decision support services.”
Opening the door to precision weed management

Carefully targeted grass weed management is set to join the growing precision farming tool box if a pioneering development project has anything to do with it.

Offering the opportunity to improve weed control while significantly cutting herbicide costs, the four year eyeWeed project is co-funded by the Technology Strategy Board. Its Agrii-led consortium of commercial and academic partners includes the University of Reading, Knight Farm Machinery, Syngenta, Patchwork Technology and NIAB-TAG.

Using cameras along the sprayer boom to capture images during T3 spraying, black-grass heads are identified, densities estimated and maps of weed concentrations produced by specialist computer software for accurate pre- and post-emergence patch spraying in the following crop.

“EyeWeed is part of our company-wide focus on precision agronomy and decision support,” explains Agrii agronomist Carl Flint who leads the project. “Potentially there are big savings to be made in one of growers’ biggest crop protection costs by spraying only where the weeds actually are. This is also very positive environmentally. Indeed, it might even be the key to retaining chemistry that would otherwise be lost through growing legislative pressures.

“We’re confident we can separate black-grass at low levels from wheat once the heads are above the canopy,” he reports. “We’ve also proved we can develop accurate maps of black-grass infestations using current geo-referencing technology. And we know patches of seed heads in one season are closely correlated to areas of infestation in the next.

“We’re currently fine-tuning our camera set-up to work equally well over 24m and 36m boom widths. At the same time, we’re extending our field testing to more farms and a wider range of conditions. And we’re validating the degree of black-grass control we achieve through patch pre-emergence spraying from our maps with a 6m buffer zone around each patch to allow for GPS drift and some seed dispersion.”

A fully-functioning automated farm black-grass detection and spraying system is clearly a way off yet. But the eyeWeed team is convinced they’ve got all the elements in place. So they see it as just a matter of time before a valuable management tool emerges for commercial use.

“Our project has concentrated almost exclusively on black-grass to date, but there’s the clear potential to develop eyeWeed to detect and map a range of other problem weeds which form stable patches, like barren brome, ryegrass, wild oats and cleavers,” adds Carl Flint.

“Then, there’s the possibility of using other colour and texture changes across field crops to accurately pinpoint and manage a number of other agronomic challenges. Add on the extent to which the system can be integrated with other key components of precision agronomy like Soil Quest mapping and its future becomes even more exciting.”
Coping with growing climatic variability

If one thing is certain about the future it’s that we’re going to have to cope with far greater climatic variability than ever, warns University of Reading crop and climate specialist, Professor Tim Wheeler.

Working with Governments across the world, Professor Wheeler of the University’s Walker Institute for Climate System Research has nearly 25 years of cutting edge climate change research to his name.

All his studies and the Institute’s advanced modelling tools clearly indicate that the main impacts of global warming in the UK will be seen through increased climatic variability as much as a warmer overall climate.

In practice, this means growers will be facing increasingly uncertain seasonal rainfall patterns with more prolonged and frequent summer droughts as well as more winter flooding and storms.

He sees this as far more of a challenge for crop and livestock production than the gradual increase in mean temperature.

“The heat wave that knocked European wheat production by a good 10% in 2003 was a one in 250 year event at the time,” he points out. “However, our increasingly accurate models predict we’re likely to be facing this sort of heat extreme almost as a normal year by 2050.

“Warmer seasons and higher levels of atmospheric CO₂ will generally improve the prospects for agriculture across northern Europe in the next few decades; especially so in comparison with other major grain producers like Australia and the USA which are already very much more sensitive to the climate. At the same time, though, we need to be prepared for far greater seasonal weather risks along the way.”

Since such extreme weather events can only really be reliably forecast a day or so in advance, Professor Wheeler stresses that the best way growers can gear-up to address them is to build far greater resilience into their cropping systems in as many ways as possible.
Building cropping resilience

From more stress tolerant varieties to better structured soils, an Agrii think tank has identified a whole host of opportunities by which growers can cope with an increasingly variable climate through greater cropping resilience.

While early maturing varieties have traditionally been a key drought avoidance technique in European wheat growing, head of agronomy Colin Lloyd is conscious that later maturing varieties have often fared better in recent seasons, mainly because they stay green longer to take advantage of higher levels of mid- and late-summer rainfall.

“It’s all a matter of when the drought occurs,” he notes. “But since this is becoming less predictable, the best way of managing the risk has to be grow a balance of earlier and later maturing varieties – whether they be cereals or oilseeds. Which will, of course, be valuable in spreading both harvest risk and workloads too.”

Mr Lloyd explains that Agrii R&D is highlighting useful differences in the ability of wheat and OSR varieties to tolerate environmental stresses. In addition it is pinpointing varieties that establish better under challenging autumn conditions, develop faster and more strongly ahead of the winter, compete more aggressively with weeds, and are more tolerant of less-than-ideal agronomic regimes.

“Extensive testing through our network of iFarms across the country is providing hugely valuable information on variety suitability for different regions and soil conditions,” he adds. “This is allowing growers to select those likely to perform most consistently in their specific localities rather than just ones that are top-rated on the official national list.”

At the same time, Agrii specialists insist there is much growers can do to improve cropping resilience by improving soil management and ensuring the most responsive agronomy at all times.

“Good soil conditions also really promote the superior root development so essential to maximum crop resilience. So we need to put at least as much effort into improving soil conditions as we do into other areas.

“Equally, we know that certain combinations of cultivation regime, seed treatment, nutrition and crop protection are extremely valuable in boosting the performance consistency. So we need to apply this understanding through the best-planned and, above all, most responsive agronomy”.

Four steps to greater cropping resilience

01 Spread your risk with better balanced combinations of crop varieties.

02 Growing varieties that are more stress tolerant or better suited to local conditions.

03 Improving your soils to provide a better environmental buffer.

04 Be far more responsive to changing conditions in all aspects of your agronomy.
Placing greater priority on early OSR agronomy

Maximising oilseed rape establishment and early growth must be particular priorities this autumn in the absence of neonicotinoid seed dressings, growers were advised at a specialist AgriiFocus event.

“Getting crops up and running as rapidly and strongly as possible will be vital in countering flea beetle pressures without the aid of Modesto, Cruiser or Chinook,” stressed Agrii agronomist, Greg Taylor. “Just as it will also be in coping with slugs, pigeons, early phoma infections, weed infestations and challenging winter conditions. Studies at Brackley and our other iFarms across the country and R&D trials at our Agrii Technology Centres highlight many opportunities for improving OSR establishment. In particular, vigorous, fast-developing varieties sown at the right seed rates into the best possible seedbeds with effective early nutritional and root development support.”

Alongside these priorities, Greg Taylor sees timely post-planting treatment to counter early threats from weeds and diseases as well as both flea beetles and aphids as important components. And he notes that the option of mesurol-treated hybrid seed imported from France could also be valuable.

He pointed out that pioneering Agrii work shows some varieties develop far more vigorously and rapidly than others. While hybrids tend to be better than pure lines, there are important differences between individual varieties in speed of autumn development, in particular, which need to be taken into account.

“We invariably see the best, fast developing hybrids performing better at sowing rates of 50 seeds/m2 or less. While the lowest rates may be too risky for many in case conditions prove difficult, the last thing I’d advocate in response to the neonic ban is increasing seed rates. This could easily do more harm than good by producing over-thick and poorly-structured canopies.

“Crops sown into fine, firm and moist seedbeds almost always establish better than those put into dry or cloddy conditions. So seedbed conditions should always be more important than calendar date in determining sowing date.”

“Seedbed nitrogen can be very valuable,” he added. “Equally, our work shows double rolling can really help ensure rapid germination and root development as well as preserving soil moisture, restricting slug activity and supporting pre-em herbicide activity.”

Agrii studies also show specialist seed dressings like Take-off or early foliar applications of Nutriphite PGA or Quark can give a noticeable boost to crop establishment and early growth.
Top Tips for better OSR establishment

1. Select vigorous, fast-developing varieties
2. Employ Mesurol seed dressings, where appropriate
3. Treat seed with Take-off for better rooting
4. Drill by seedbed conditions not calendar date
5. Plan seed rates for spring populations of 20-30 plants/m²
6. Consider applying seedbed nitrogen
7. Roll effectively for the best seed-to-soil contact
8. Minimise slug damage with well-targeted pelleting
9. Time foliar herbicides, insecticide and fungicides through careful monitoring

Extra variety information

Detailed monitoring over several contrasting seasons at Agrii’s Brotherton iFarm in Yorkshire shows the fastest-developing varieties require just 425 day degrees (around 30 days on average) to grow from emergence to five full leaves while the slowest need 700 day degrees (or around 50 days).

“Fast early development is an important attribute,” points out Agrii OSR specialist, Philip Marr. “Apart from enabling varieties to perform better under difficult autumn conditions, it means greater green area development ahead of the winter so less spring fertilisation is needed for the optimum canopy. It also means more effective early weed competition and earlier ground cover to deter pigeons.

“Of course, care does need to be taken with early sowings, in particular, to avoid over-leggy crops but this can be managed very effectively by avoiding excessive seed rates, ensuring timely plant growth regulation and controlling spring nitrogen applications.

“Detailed autumn development data from our studies is providing growers with valuable extra guidance on variety selection and management to complement and extend information from Recommended List trials.”

“If the neonic ban stimulates the right sort of extra emphasis on key aspects of oilseed rape establishment agronomy like these, dare I suggest it could prove a blessing in disguise,” concluded Greg Taylor. “In much the same way that increasing black-grass resistance is leading us to develop far more integrated, robust and sustainable approaches to weed management.”

Greg Taylor inspecting Rapeseed
Prioritising wildlife farming
We need to take up the immediate challenge of CAP Greening with a determined ‘must do’ attitude if we are to avoid the possibility of increasingly serious constraints on our freedom to farm.

This is the firm view of independent industry specialist, Marek Nowakowski of the Wildlife Farming Company, taking up his national consultancy role with Agrii.

"After more than 30 years working on habitat improvement within profitable farming as an agronomist and adviser to growers, organisations and Government, I think the 5% Environmental Focus Area (EFA) requirement we face from next January is just the start," he stresses.

"Around £4 billion has been spent since the introduction of ELS/HLS yet we've seen a continued decline in many farmland birds and pollinators. So now we're facing this new 'greening' challenge which looks a little like the old set aside. The immediate penalties for failing to implement it are swingeing enough, but my real concern is what happens if these EFAs also fail to halt the decline in farmland wildlife.

"Well, the obvious political response is simple. Take more land out of production until the decline is halted. All the more so since the Government has opted out of match funding money moved from pillar 1 to 2."

Mr Nowakowski’s concern is heightened by the knowledge that the easy option of putting the whole EFA requirement down to fallow is unlikely to deliver the goods. Sufficient gains will only be made, he is adamant, if the land taken out of production is positively managed for wildlife with the right approach.

Several long-running studies have shown the way here. The most recent and comprehensive of these on a large arable farm has, for instance, achieved a wildlife increase of 12% from sowing wildflowers on less productive margins and awkward field corners compared to a gain of just 1% under a typical ELS programme of tussocky grass and natural regeneration strips.

As well as highlighting the impressive scale of improvements possible in farmland bird, bumblebee, butterfly and other bug populations, the studies confirm that the most successful and stable systems stem from a diverse farmland wildlife base. They also prove that the key to achieving this biodiversity is creating and maintaining the right quality and variety of habitats.

So how can we make sure EFAs deliver more wildlife within profitable farming systems? Well, Mr Nowakowski has no doubt that an altogether more positive management approach is essential, backed by the best scientific understanding and supported by the right guidance. "Growing wildlife is no different to growing crops," he concludes.

"It’s all in the management. Just like the best agronomy, with the right practical support I have no doubt farmers will be able to achieve the wildlife improvements that, I’m convinced, will be as essential to their profitable futures as first class crop performance has long been."

Practical greening support

A pioneering new Agrii training course has been developed by Marek Nowakowski to help growers see the wood for the trees in wildlife improvement alongside profitable farming.

Supported by Natural England and the Centre for Ecology & Hydrology, the one day course combines theory with practice at iFarm demonstration sites across the country. Amongst other things, it provides a working knowledge of:

+ Which habitats to create and where;
+ How to zone them for the best ecological balance;
+ Which grass and wildflower mixtures to use and where, and;
+ How to establish and manage them for the best results.

Like the enhanced Agrii range of grass and wildflower seed mixtures introduced this season, the entire focus is on effective delivery rather than just compliance.
Particularly effective at removing unhealthy, discoloured or spotted grains – including those affected by fusarium – as well as foreign and weed seeds, the advanced unit is central to the £2 million expansion of the seed production centre currently being completed as part of the company’s current MasterSeeds investment programme.

With more than 35 years in the business Finmere seed production manager, Martin Vousden sees the latest colour sorting technology providing important benefits in the consistent production of the best quality seed for UK growers.

“Amongst the many advantages it gives, the efficient elimination of ergot is especially important with the scale of modern barley contamination, in particular,” he pointed out. “The 10 cameras and 270 air jets they control in the fully computerised sorting unit identify and remove ergots far faster and more consistently than conventional tables and water separation.

“So, as well as boosting Finmere production capacity by a good 30% to 60t/hour, the extra seed line of which the sorter is part will seriously increase quality processing options and flexibility across our four UK MasterSeeds plants. This is essential in allowing us to meet the ever-shorter lead times of our customers while offering the widest possible range of variety and seed treatment combinations.”

With extra intake facilities, full cleaning and separation equipment, the latest Bayer Evolution precision seed treatment unit and its own weighing and packing system, the all-new Finmere seed line is being installed parallel to and fully integrated with the plant’s existing three.

The existing building complex has been substantially extended to accommodate it, and a new finished product warehouse will be erected to complete the plant’s current expansion.

Martin Vousden with the full colour sorter
Variety Intelligence From Agrii

The 2014 Master Seeds Yearbook is now available.

This valuable guide provides insights on a wide range of varieties and their agronomic performance. It is an essential tool for crop planning. Hard copy versions can be requested from your usual Agrii contact and will be available at Agrii iFarm events this summer. Alternatively, please email us at info@agrii.co.uk including your contact details, to receive a digital flipbook version.

New Master Seeds Seed Rate Calculator

Our new and improved Seed Rate Calculator is now live and ready to use. The web app has been designed to make it easy and convenient for agronomists and growers to plan seed requirements and calibrate sowing equipment to establish the optimum plant populations for high performing crops.

Uniquely, the app enables comparison of planned target population against the actual crop establishment. This knowledge provides the user with a sound evidence base for adjusting variable rate and whole-field seed rates as well as subsequent crop management protocols.

The web app is initially available on the website only however versions for all mainstream smartphone and tablet computers will follow later in the year.
Working for you

Did you know...

As an Agrii customer you have the reassurance that your agronomist’s advice and support is backed by the industry’s most innovative agronomic research and development programme in the UK.

We do this work so our customers can stretch the productivity of their hectares, optimise the economics of crop growing, stay abreast of the latest technologies and farm efficiently and sustainably for the future.

Every year we invest more than £1 million in R&D to ensure that our skilled Agrii agronomists are always equipped with, and can swiftly communicate, the most up to date intelligence and expertise.

You can see the scope and depth of our work opposite. If you would like to learn more, speak to your usual Agrii contact or visit our website for forthcoming iFarm events – our network of local knowledge transfer sites.

Unrivalled in R&D

Our national R&D programme represents the UK’s leading trials facility and ensures that Agrii agronomists, together with their customers, receive the best intelligence to support sustainable and profitable farming in the UK.

New agronomy approaches are regularly trialled on our demonstration and working farms. To register your interest visit www.agrii.co.uk

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6 TECHNOLOGY CENTRES

60,000 TRIAL PLOTS across the UK: representing all regions and crops

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Growing Matters - Summer 2014
Connect with the Agri-intelligence network

If you would like to learn more about Agrii, we invite you to connect with us in any of the following ways:

+ **Via our Agronomy and advisory teams** – we have 300 agronomists throughout the UK who can advise on all aspects of modern crop production, and also seed and nutrition specialists.

+ **At an Agrii iFarm event** – we have 32 locations where, in conjunction with our host farmers, we demonstrate the latest technologies and production techniques. Lively events provide an opportunity to meet other farmers and quiz industry experts.

+ **On AgriiPlus** – a comprehensive information database available to our agronomy customers (more details from your Agrii agronomist).

+ **At www.agrii.co.uk** – for more information, to check your local contacts or to ask us a question. Visit regularly for news and details of our events.

+ **On Twitter** – @AgriiUK – for regular updates.

+ **Sign up for our email newsletters** – eBulletin is a monthly update or eJournal for news and information relevant to your region.

+ **Speak to our Customer Services Team** – with any queries on 0845 6073322

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2014/15 Insights

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Agri-intelligence Insights from Agrii.

Agrii is producing a series of project reports designed to spotlight the latest research and thinking relating to a number of key agronomic challenges that our agronomists and customers face on farm.

Written by Agrii specialists and populated with findings from our own trials and third party research work, the guides will signpost practical solutions to improve the physical and financial performance of crops.

Two versions of the guide are available:

**FULL REPORT** – a more detailed version, containing greater insight and information, available to Agrii advisers to share with their agronomy customers. Please consult your agronomist.

**OVERVIEW REPORT** – an executive summary version, containing general insight into the subject area, available to all. Look out for your copy, or email us on info@agrii.co.uk to request a copy.
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