With the kick-off to the new sugar beet season approaching, it’s time to start making the smart, key decisions that can have a big impact on your final yield. Ensuring a solid, even establishment can help suppress weed growth and forms the first step of your weed control strategy.

Just one tall weed for each 1m² of crop can decrease yields by 11%*, so planning a weed control programme that is both highly effective and gives good crop safety is essential for your final yield. Betanal maxxPro can help control a broad range of weeds with excellent crop safety for your young crop.

For advice and information for how we can help you get your beet crop set for great yields this spring, visit: cropscience.bayer.co.uk/sugarbeet

*Source: BBRO. Betanal maxxPro contains desmedipham, phenmedipham, ethofumesate and lenacil. Poncho Beta contains clothianidin and beta-cyfluthrin. Escolta contains cyproconazole and trifloxystrobin. Betanal, maxxPro, Poncho and Escolta are registered Trade Marks of Bayer. Use plant protection products safely. Always read the label and product information before use. Pay attention to the risk indications and follow the safety precautions on the label. For further information, including contact details, visit www.cropscience.bayer.co.uk or call 0808 1969522.

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contents

regulars

Industry update from British Sugar, BBRO and NFU 2
BBRO activities 43
Factory news 44

features

Great opportunities for our industry - Head of BBRO 4
Take-2: it only takes two minutes By Tom Brown 5
Sugar Industry Programme – what it means to me! By Bethan Williams 6
Looking out for our own: mental health awareness in the farming and rural communities By Dr. Alys Cole-King and Jo Hoey 7

Germins: Supporting Generations of UK Sugar Beet Growers By Kate Lindley 9

Trial planning - attention to detail always pays By Gina Gould 13

Focus on PhD students By Siobhan Hillman 16

Some thoughts on beet herbicide use for 2018 By Philip Simons 17

Seedbed preparation and improved soil management By Philip Wright 19

Understanding and reducing sugar losses at harvest By Stephen Aldis 22

Beet Yield Competition – 2017 update By Simon Bowen and Toby Townsend 26

Precision crop nutrition By Patrick Jarvis 29

Grower profile – success in clay By Stephanie Hendy 32

Crop protection issues during 2017 By Dr. Mark Stevens 33

‘Believing is seeing’ By Simon Bowen 36

Getting to know the BBRO – Stephen Aldis 39

Getting to know British Sugar – Sarah Bebb 40

BBRO Stakeholder Board update By Alison Lawson 41

Obituary – George Milford 42

Cover picture: BBRO trial plot drill in operation.

BASIS / FACTS – CP/59333/1718/g 2 CPD points (1CP, 1E)

NRoSO – NO461414f 2 CPD points
British Sugar update

Since the last edition of British Sugar Beet Review was published, our aim to raise awareness of the home-grown sugar beet success story has been heading in the right direction.

A survey we ran last year with the market research company, ComRes, showed that six out of ten adults in the UK were totally unaware that we grow sugar in the UK. That result clearly highlights the need to raise our profile, to ensure as many people as possible know about our superb home-grown beet sugar industry.

We have been engaging with the general public in a range of different ways, and have been really appreciative of the support we’ve been getting from our growers. Not only have you been helping us to promote British Sugar through Twitter and Instagram, but you have also been getting involved in some of the recent media coverage.

Some of our end-user customers are also championing the cause. The dairy farm, ‘Our Cow Molly’, who use our sugar in their home-made ice cream, have been focused on educating the good folk of Sheffield, not least through their university contacts.

We’ve also been building our relationships with a whole range of people through, for example, hosting visits for politicians out at our factories, or broadcasting to children aged four to six through the C-Beebies ‘Down on the Farm’ programme.

Another group we have been talking to extensively are future graduates. A team of our September 2017 graduates has been visiting a selection of campuses, not only to tell the British Sugar story, but also to spread the word on how innovative and forward-thinking the sugar beet industry has become, and how rewarding careers in this sector can be.

You may have seen from our Twitter feed that I’ve also been out and about championing the industry. I’ve done interviews with the BBC: talking about the removal of quotas on both ‘Look East’ and the ‘Sunday Politics’ shows. I also presented at the East of England Farming Conference in November and at the NFU East Midlands Brexit Conference. Most recently I was delighted to join the Sugar Industry Programme (SIP) reception at Westminster which saw lots of MPs showing their support for home-grown sugar.

We have a fantastic story to tell as an industry, and we need to continue our momentum into 2018 to ensure as many people as possible become aware of us and the value we bring to local and national economies, and the communities within which we operate.


Graduates and apprentices at career fair.

Colm McKay,
Agriculture Director, British Sugar plc
BBRO and NFU

BBRO update

There is a certain amount of comfort to be found in the seasonal work associated with agriculture. As the beet harvest comes to an end, we watch for the first glimpses of spring sunshine before we start the sugar beet drills rolling across the region again. However, whilst farming activity revolves around the seasons, decision management should not. For some time, sugar beet has been seen as a necessary part of the rotation; its consistent performance against other crops makes it a reliable staple worthy of a bit more attention. Who would have thought in May that we would be seeing the bumper crops now harvested? The Beet Yield Competition has proved that there is still much more to be gained, but it does come down to the details. Good soil management, careful selection of varieties and a planned fungicide programme will all help to pay dividends.

One of the biggest decision-management questions for a sugar beet grower will be ‘to drill or not to drill?’ This is not a weather- or time-related question, but one that should have been addressed long before the drill was overwintered. How well did your drill perform last year? Is it worth looking at the long-term investment of an upgrade or engaging a contractor? Maybe carrying out a little bit of TLC (tender loving care) will put your drill back on the straight and level. At the BBRO we have made a concerted effort to support growers in improving crop establishment. In November we published the ‘Sugar Beet Drill Maintenance and Testing’ booklet which provides details of common drill problems, maintenance requirements and a list of drill-testing centres. We also ran a couple of drill-operator training days and are about to launch a Drill Testing Programme similar to the Harvester Testing Programme delivered by Stephen Aldis, the BBRO Mechanisation Specialist. Stephen will be investigating the performance of beet drills, new and old, supporting operators to make a few small changes to improve establishment and ultimately yield. Speak to your Area Manager if you would like Stephen to call.

We are all looking forward to a busy bumper year, under the direction of Dr. Vicky Foster the new Head of BBRO; on behalf of Vicky, and the BBRO staff, I would like to wish you well with the 2018/19 campaign.

NFU Sugar update

Following the last edition, I’m pleased to report that NFU Sugar and British Sugar have worked in partnership to engage both civil servants and politicians in telling the story of the home-grown sugar industry, and urge them to #BackBritishSugar.

Before Christmas 2017, Defra civil servants were invited to ‘walk the home-grown sugar chain’. So, on a rainy day in December, they saw beet being lifted, taken to Wissington and processed into crystal sugar. At Wissington they were also briefed on all aspects of the industry, from agronomy to the market place post quota; we also delivered our policy asks for both now and post-Brexit. In late January we jointly presented a ‘masterclass’ on our industry to a much wider group of civil servants who have trade in their brief; not just from Defra, but the Department for International Trade and the Treasury too. We explained how our industry operates, how efficient and sustainable we are and why home-grown sugar is a success story that Britain can be proud of. A particular focus was on our policy asks: that we welcome free, but fair, trade post-Brexit; are asking for reciprocity on tariffs and standards with the EU-27; and that no unilateral reduction of sugar tariffs is made (particularly given the significant policy distortions in Brazil and other major producing countries). We also stressed the need for regulatory equivalence in trade policy, to ensure that UK growers and the domestic industry are not put at a disadvantage due (for example) to other countries’ approval of plant protection products which are banned here.

We also held a joint reception for MPs in the House of Commons, to deliver the same messages to politicians*. Many of the 17 who attended were from beet growing areas. Of particular note, George Eustice, Minister for Agriculture, delivered very positive messages about the importance of our industry and recognised the challenges we’re currently facing: not least the potential loss of neonicotinoids. Significant questions remain over his view that emergency authorisation might be a route to retain neonics (should the EU vote for a ban this spring) and we are due to meet Defra officials to explore this further. The delay of the neonics vote in Europe has at least given NFU Sugar, along with British Sugar and our European allies, the opportunity to keep arguing the case to retain these vital actives.

Sugar Industry Programme

The eighth year of the Sugar Industry Programme (SIP) is well underway, the current cohort having just (late January) spent the last two days in Westminster. Over 100 beet growers and British Sugar staff have been through the programme since it was launched in 2010/11 and it was a real pleasure to make contact with many of them again at a SIP alumni dinner jointly hosted by NFU Sugar and British Sugar. I’m delighted that the first of a regular series of SIP alumni profiles is published in this edition. It’s never too early to contact NFU Sugar if you would like to be considered for the next SIP programme starting in autumn 2018.

BBRO

Finally, all at NFU Sugar look forward to welcoming Dr. Vicky Foster as Head of BBRO on 19th February. Her recruitment is another example of effective joint working between NFU Sugar and British Sugar, and we’re delighted she will lead BBRO to the next phase of its success.

*See the NFU Sugar website (nfuonline.com/sectors/nfu-sugar) for more information about the MP reception.

James Northen,
Head of Sugar, NFU

Ches Broom,
Interim Manager
Sugar beet has never been a more important crop in the arable rotation, having an important part to play in the management of soils, soil health and the increasing pressure from weeds, pests and diseases. Whilst the loss of key plant protection products through legislation is a big concern for beet growers, presenting us with some significant challenges in the short term, we in the UK have an excellent research base; this puts us in a very strong position at BBRO to help develop new solutions and identify new work practices to deliver effective integrated pest management, helping farmers deal with this challenging situation. Whilst innovation has an important role to play in taking our home-industry forward, we should also look to our colleagues overseas to share knowledge and best practice where possible.

I am therefore really pleased to be joining the BBRO at such an exciting time for the sugar beet industry. Whilst there are going to be some big challenges for the industry over the next few years as we leave the European Union, this will also present us with some great opportunities to review our industry and identify new markets and a new vision for the future.

Unfortunately, I was not able to attend this year’s BBRO winter conferences but I do hope you enjoyed them and took advantage by asking the experts your technical questions. I look forward to getting out and about in 2018, meeting lots of you and listening to your thoughts about the BBRO and how we can continue to support you in the future.

Dr. Vicky Foster
Head of BBRO
Take-2: it only takes two minutes

As has been mentioned many times in the British Sugar Beet Review, farming can be an extremely hazardous activity. Farmers and farm workers work with dangerous machinery, vehicles, chemicals, livestock, at height or near pits and silos. They are exposed to the effects of bad weather, noise and dust. Agricultural work can be both physically and mentally demanding, and the repetitive nature of some of the work can cause a range of health problems.

With high numbers and rates of fatal injury, the agriculture, forestry and fishing sectors are the riskiest in the UK. Just over one in a hundred workers (employees and the self-employed) work in agriculture, but it accounts for about one in five of the fatal injuries to workers. In the last ten years, almost one person a week has been killed as a direct result of agricultural work; many more have been seriously injured or made ill.

In the past, I have written various articles about specific hazards: powerlines or mud on the road for example. However, in this edition I’m going to explain the Take-2 principle, and how it can work to make your activities safer. We introduced it in British Sugar over ten years ago, and the system that is used has been through various incarnations. However the standards behind it remain the same; without question, it has helped to improve British Sugar’s safety record and is in use daily at all of our sites, not only by our own staff but many of the contractors too.

Risk assessments are the lynchpin of good health and safety practices, and a Take-2 review can be viewed as being a very simple risk assessment. It’s about looking around you and having a really good think about, ‘What can hurt me and others?’, and then ‘What do I need to do to stop it hurting me?’.

Who should do it?

- Anyone who is involved with a task that may result in them coming to harm.

When should I do it?

- Prior to starting a new task if it is non-routine, especially if it involves manual work.
- When your job doesn’t go to plan, or changes for any reason.

The Steps

1. Carry out a Take-2 on a daily basis or if you start working at a new location. A formal record is desirable but not totally necessary: paperwork doesn’t save lives, actions do.
2. Have a look around at your environment and see what can cause you harm (the hazards). In British Sugar we use a checklist as a prompt (see right – this one is geared towards agricultural staff).
3. Ask yourself what needs to be done to protect you from the hazards (the control measures).
4. Consider others that may be in the area. How may your activities affect them?
5. Consider what else you may need to help protect you e.g. Is my mobile phone close to hand if I need to summon help? Is it charged sufficiently?

The process of carrying out the above, forces you to stop and think about what may cause you (and others) harm and what you can do to prevent it. If something looks unsafe, it usually is. If there is nothing that you can do to reduce the risk, you may be putting yourself in real danger, and you need to question whether you should be carrying out that task. Building this into your everyday working can make a real difference. We have seen many real examples where carrying out the Take-2 has resulted in action that may have prevented harm.

Examples

In carrying out the short look-around, you see:

- A power take-off shaft
  - Does it have guards fitted?
  - Are the guards in good condition?
  - Will I need to be near the shaft?
  - Do I have loose clothing?
- The machinery that you are working on is quite noisy
  - Are all the covers shut?
  - Am I going to be in the vicinity for an extended period of time?
  - Do I have some hearing protection that I can wear?
  - Will this affect the likelihood of me not hearing something else?

“No job should be so important that you cannot Take-2 minutes to stop and think: Safety!”
Sugar Industry Programme – what it means to me!

Currently a partner in the family farm in Southwell, Nottinghamshire, Edward Hammond was on the Sugar Industry Programme (SIP) in 2012. The family farm has been ‘growing sugar beet since I can remember’ and the business is now mainly arable with sugar beet and potatoes providing the root crops. As he attended the SIP in 2012 and then sat on the NFU Sugar Board as a co-opted grower, we asked Ed how attending the SIP has helped him both on and off the farm.

Before you attended the SIP, how much did you know about the sugar beet industry?
We have always grown beet on the farm, however I only really got to grips with the dynamics of the sugar sector, whether from a UK, European and World perspective, since I participated in the programme. The SIP opened my eyes to the importance of farmers getting involved with policy, alongside how the UK sits with our wider competitors in Europe and in the world market.

From your SIP year: Which visit really impressed you and developed your knowledge? Which event did you most enjoy?
Before participating with the SIP I really only knew the industry up to the factory, so all the visits provided me with new insight. The visit to Brussels, which included going to European parliament, SesVanderHave Research Facilities and a French sugar beet factory, was a fascinating learning curve and my first real introduction to politics.

Learning about international markets and sugar production through the International Sugar Organisation (ISO) was also really interesting. Understanding cane production and markets such as Brazil really put it into perspective how markets intertwine.

Did you develop any specific set of skills from attending the SIP?
I definitely came away from the SIP with a lot more knowledge about how the industry works and how I can contribute to its future. Specifically, the media training gave me confidence to say yes to media opportunities following on from the SIP, which I have already done as I have spoken on behalf of East Midlands farmers for the NFU on both regional news programmes and the radio.

Why is it important for young growers to get involved with the SIP?
Programmes like SIP definitely open your eyes to the wider world and make you see your business from a different perspective. The SIP showed me what role I could play within farming and what influence we can all have on the industry. The SIP also gave me the opportunity to sit on the NFU Sugar Board for a couple of years which was a great chance to better understand UK sugar beet growers and the dynamics of the industry.

Following the SIP, did you change how you managed your business?
The SIP provided me with knowledge and confidence just when I was returning to my family farm. It has enabled me to make well thought out decisions. It also has enabled me to better manage risk within my business as I understand in more detail the political and commercial factors that affect the sugar beet crop.

How do you think sugar beet fits within your farm business?
For us, sugar beet is key to our rotation and to farm planning as the security of the contract enables us to forward plan our farm accounts. Currently we split our tonnage on both the one and three year contracts as they both provide us with opportunities and benefits.

Finally, any passing thoughts for the next generation of farmers and SIP alumni?
We are in a generation where farming is under scrutiny and we have to open our doors to reconnect the general public with farming. It is therefore important that young growers should get involved in activities off the farm in programmes such as the SIP, as it has definitely broadened my horizons and given me great opportunities to take my business forward.
Looking out for our own: mental health awareness in the farming and rural communities

For those not involved with agriculture there is probably an idyllic idea of farming life: four-wheel drive vehicles, good income, rolling acres, charming farmhouses and maybe the view of attractive livestock from the window. The reality is very different. One of the harsh facts of farming, horticulture and rural trades is that the group is at a higher risk of depression and suicide.

Those in the farming community are well aware of some of the main reasons for this. These include increasingly erratic weather patterns, animal diseases such as the recent bird flu outbreaks, stresses with marketing produce, workplace isolation, lack of respite, increasing regulation, poor financial returns (a recent study shows the farmers’ average annual income is under £20k) and, no doubt, the uncertainty with Brexit as yet another factor, as well as a historical reluctance to discuss mental health.

Of course, depression and anxiety in the rural communities is not caused simply by factors connected with the industry. They are as susceptible as any to problems with health, relationships, bereavements, and genetic predisposition; up to 1 in 3 people may experience a mental health problem at some point in their lives.

Unfortunately, the farming community has historically been poor at communicating about health, emotional and well-being problems. They might visit their GP and discuss their bad back, but only as they are about to leave the surgery will say, ‘Oh! by the way doctor…’ A stiff upper lip, a carry-on attitude, and not letting the generational business down is inherent. Fortunately, times are changing. Those in their 40s are better at acknowledging problems than those approaching retirement age, and young farmers are even better at understanding symptoms and the actions to take.

Between 2006 and 2015, Public Health Norfolk recorded 35 deaths by suicide from the farming and rural trades cohort: nearly twice the rate for the general population. Suicide is not just about numbers of course: it is about ordinary people in despair who lose the ability to think of solutions, believing, incorrectly, that they may have no other option but to end their lives. It’s about someone believing their loved ones are better off without them, when nothing could be further from the truth. Essentially, it’s about people dying from a preventable cause of death; a cause of death where you can save someone’s life right up to the final moment.

The higher suicide rate is related, at least partially, to those in farming having ready access to the means, and people should not be afraid to intervene if they are concerned about a friend, colleague or even a stranger. Suicidal thoughts usually start because people feel overwhelmed by their problems or situations: usually there is not a single cause. This can happen to anyone, and does not necessarily mean they want to end their life. It is just that they cannot cope with their emotional pain any more. Asking if someone is ‘OK’ may be the first step in saving their life. Showing your concern, staying with the person and persuading them to seek support could save someone’s life. The on-line resource ‘Staying Safe’ includes suggestions where someone in distress can find support: www.connectingwithpeople.org/StayingSafe

The YANA (You Are Not Alone) Project, which works through Norfolk and Suffolk, hosts a website (www.yanahelp.org) and provided support and a warm welcome at the Royal Norfolk Show in 2017 after being nominated as the President’s Charity.
along with YANA’s informative leaflets describes the symptoms of depression and action to take. This, together with YANA’s presence at every agricultural event in those counties throughout the year, has successfully raised the profile of mental health, highlighting that it is ‘ok not to feel ok’ and encouraging those who are suffering from depression, stress or anxiety to visit their GP promptly or contact the YANA confidential helpline. Whilst the YANA Project has been highly successful in Norfolk and Suffolk, there are several other charities that can provide support across the country, and a real network is emerging.

At a time when the NHS is experiencing enormous pressures, it is good to know that the farming and rural communities are reaching out and supporting their own. Finally, please know that if you are struggling, seeking help is not a sign of weakness; it may be the bravest thing you ever do, and might even save your life.

Common symptoms of stress and depression:
- Low mood (sadness, frequently tearful or unable to cry)
- Anxiety (worrying obsessively or disproportionately)
- Changes in appetite
- Disturbed sleep patterns
- Lack of energy/feeling tired
- Reliance on alcohol
- Lack of interest in family and friends
- Unable to enjoy hobbies as before
- Loss of sex drive
- Confused thinking or poor concentration
- A change in personality (e.g. uncharacteristic aggression)
- Negative thoughts

Where to find support and information:

- **Connecting with people** (online resource)
  ‘Staying safe if you’re not sure life’s worth living’
  www.connectingwithpeople.org/StayingSafe
  ‘U Can Cope’ 22m film
  www.connectingwithpeople.org/ucancope

- **Samaritans**
  Tel: 116 123 www.samaritans.org
  Confidential emotional support.

- **RABI (The Royal Agricultural Benevolent Institution)**
  Tel: 0808 281 9490 www.rabi.org.uk
  Financial support for farmers in times of crisis.

- **Farm Community Network**
  Tel: 0845 367 9990 www.fcn.org.uk
  Volunteers from rural communities providing pastoral and practical support.

- **The YANA Project**
  Tel: 0300 323 0400 www.yanahelp.org
  Confidential helpline, informative website, funding for counselling for those in farming and rural trades, Norfolk & Suffolk.

- **Beds & Cambs Rural Support Group**
  Tel: 0300 323 1244 www.ruralsupport-bedscamsbs.org.uk
  Dedicated to combating stress in rural areas, providing free advice and practical support.

- **Lincolnshire Rural Support Network**
  Tel: 0800 138 1710 www.lrsn.co.uk
  Providing help and support to farmers, farming families and rural communities in times of crisis, stress and change.

- **Professional Cricketers Association Self-harm and suicide Prevention on-line Module**
  www.thepca.co.uk

- **Upper Teesdale Agricultural Support Service**
  Tel: 01833 641010 www.utass.org
  Works with and for the people of upper Teesdale and beyond, across the rural communities of County Durham to help prevent problems from getting to the desperate stage and assist in maintaining a safer, happier self-sustaining community.

- **The DPJ Foundation – Pembrokeshire**
  www.thedpjfoundation.com

- **The Maytree Centre – A Suicide Respite Centre**
  Tel: 020 7263 7070 www.maytree.org.uk
  The only place of its kind in the UK and fills a gap in services, between the medical support of the NHS and the helplines and drop-in centres of the voluntary sector.

- **Dear Distressed**
  www.connectingwithpeople.org/DearDistressed
  Heartfelt letters written by people with lived experience of suicidal thoughts and who are now in an emotionally-safer place, to share hope and to send a message to anyone thinking that life isn’t worth living, that suicidal thoughts are a sign to change something in your life, not to end your life.

- **Nottingham Rural Support**
  Tel: 0800 138 1710 www.nottsrruralsupport.org.uk
  NRS provides free volunteer support for farmers, their families and others in the rural community who are going through difficult times that may be leading to anxiety and stress.
Germains: Supporting Generations of UK Sugar Beet Growers

Since 1966, Germains Seed Technology has been lovingly treating sugar beet seed for the UK sugar industry. Pioneers in sugar beet technology, Germains introduced ‘Filcoat’ pelleting technology to the UK market over fifty years ago. This was followed by another seed-enhancing technology: priming, which Germains branded as Advantage in the 1990s. Further innovation in the 2000s led to enhanced priming technologies: Xbeet® in 2008, Xbeet® plus in 2013, and a new product, Xbeet® enrich100, which will launch commercially in the 2019 sowing year. UK growers are being given the opportunity to trial Xbeet® enrich100 on farm this year. Germains continue this passion by striving to develop innovative sugar beet seed treatments, not only for today’s growers but for future generations of sugar beet growers, too!

Meet Tom Clarke

Tom Clarke is the Managing Director of T.W.H. Clarke & Son in Prickwillow, Ely. Germains first met Tom last year when he was part of the 2016-17 Sugar Industry Programme group. Inspired by his enthusiasm for the industry and family history, Tom and his children were chosen to feature on Germains’ new advert to represent the value of supporting sugar beet growers through the generations.

Although now a fourth generation farmer, Tom started farming and took over the farm only nine years ago, following the unexpected loss of his father. Taking on the farm was a challenge for Tom having previously worked in London as a management consultant, and about to marry his wife Louise. He says, “It was a steep learning curve and I would have been lost without the dedication and wisdom of our long-serving...”
employees and agronomist. Nine years later, and I’m still learning, but more confident of where we can afford to make mistakes and try something new”.

History of the Clarke’s family farm

The earliest records of the farm date back to the 1700s, following the draining of the fenland area. In the 1800s, Thomas Clarke (Tom’s Great Grandfather) acquired the current farms from the Church Commissioners and some small farmers in the area.

Around this time, Tom’s Great Grandparents were describing themselves as, ‘Potato, Celery and Root Growers …’.

Sugar Beet on the farm today

Still growing sugar beet today, T.W.H. Clarke & Son have also transferred in contracts from some of their neighbours, growing and harvesting on the neighbour’s land. Looking forward to 2018, Tom is planning to grow around 100 ha of sugar beet on the farm. While the peaty black Fen can be a challenge for growing sugar beet, Tom’s best fields achieve around 80 adj. tf/ha, which he is continuously looking to improve.

Seed treatment is important for the sugar industry and Tom recognises this in his decision making today: “The primed and pelleted seed from Germaines is really a silver bullet solution for the protection and quick establishment of the crop. The late frosts we get in our low-lying fields mean we can’t drill as early as some in March, so we need a flying start to catch up. The seed are usually up within a week of drilling and never look back.”

Tom is a keen enthusiast of trialling new technology, and has been actively involved in trialling not only Xbeet enrich100 on his fields, but also potential options for trialling our next developments in advancement technology: Xbeet enrich100 and Xbeet enrich100. All UK sugar beet growers have the opportunity to trial Xbeet enrich100 on farm this coming season. Please contact your British Sugar Area Manager to obtain some units to trial.
Backing British Farming through the Generations

Supporting Generations of Sugar Beet Growers for over 50 Years

Germains is passionate about backing British farming with its continuing commitment to deliver industry-leading seed technology to current and future UK Sugar Beet growers!

Maximise your Sugar Beet Yield with Germains’ Seed Technology

- Faster emergence in UK field conditions
- Increased yield potential
- Increased tolerance of stressful conditions
- Improved uniformity

Contact Us

Email UKSugarBeet@germains.com
Visit our website at Germains.com
Tweet us! @GermainsofUKBeet

Germains is a registered trademark of Germains Seed Technology
Future of T.W.H. Clarke & Son Ltd

Despite uncertain times, with challenges surrounding climate change and the end of the CAP, Tom hopes to continue his work; improving the farm and supporting the environment. He adds, “As for my kids, their future is up to them, not me. All I try to do is leave things in a better state than I found it.”

Not only a sugar beet grower...

Tom is not only a proud sugar beet grower but is also conscious about the benefits that he can bring to the environment through farming:

“Our farm has some of the most fertile soils on the planet, yet we are in HLS and have built new reed beds and permanent nectar plots as well as growing more than 6 ha of wild bird seed too. We also host more than 30 ha of overwintered stubbles.”

The farm’s land is also home to several Red Flag species such as corn buntings, grey partridge and Bewick’s swans that fly 3,000 miles from the Russian Arctic to spend the winter on the farm eating sugar beet. One of these swans was named after Tom’s daughter, Daisy Clarke; its yearly migration can be tracked via www.wwt.org.uk/swans/follow-the-swans/

Thank you

Germain would like to say a big ‘Thank you’ to Tom and his family for participating in the new Germain advert. This would not have been possible if it wasn’t for their enthusiasm and fantastic smiles!

Tom’s daughter Daisy.

Tom with his two children Daisy and Joseph.

Germains visiting T.W.H. Clarke & Son Ltd.

From left Kate Lindley (Germain), Tessa Seymour (Germain’s EU Commercial Sugar Beet Manager), bottom-left Daisy Clarke, right Tom Clarke.
Trial planning - attention to detail always pays

By Gina Gould, British Beet Research Organisation

As part of my role as a Trials Officer for the BBRO, I have to produce field plans for the BBRO field team. Fitting all the trials into field areas is a challenging task. This job needs to be completed before any drill enters the field to ensure that what we are planning to do will logistically work. This process is a fundamental part of the trials’ success, as once a trial is drilled it cannot be moved!

Before any planning commences we need to head out to the proposed fields to assess them and establish if there are any areas to avoid like wet holes, large slopes etc. At this stage we take soil samples to understand the nutrient levels, including soil mineral nitrogen (SMN), and if BCN is present. Drone flights are then undertaken to obtain an aerial view, which is then checked against Google Maps. This will allow us to ensure we avoid areas previously identified as not being appropriate, or in a worst case, we need to select another field. Once this information has been fed back to me I sit down and use a computer programme called SketchUp. This programme permits me to get a Google Earth image of the field and, once I have all the relevant information about the field and the trials, it allows me to place trials in the fields to scale so that I can see how, and if, they fit together as we want. The programme allows me to move trials around and try out different arrangements. The aim is to get many trials into a desired area and so maximise the efficiency of fieldwork throughout the year.

I work alongside the relevant Trials Officer who oversees the site; this ensures they agree that what I have in mind is going to work. Our Technical Manager is also on hand to ensure all the trials follow the protocols that have been designed, to ensure full scientific and statistical rigor. This is done by setting up the protocols in a trial management programme called ARM. ARM is then used to generate something called a randomisation: effectively ARM takes a grid of all the plots in the trial and then randomly assigns a treatment to each one.

Some of our fields are fairly straightforward to plan, as they only have one or two trials to fit in, or they are a nice square shape. Others, however, are a bit more complicated; for example, our 2016/17 Bracebridge site was the most challenging and went through the most changes because it had a large number of trials, plus the BBRO demonstration area, and was an odd shape. I have used this site in the diagrams on pages 14 and 15 (Pics. 2 to 7).

So, once the fields and trials have been confirmed, how is it done? The first step is to find out which way the field was ploughed, from this we can determine which way we are going to drill the trials (at 90 degrees to the ploughing is standard protocol). It is important we work with the grower on this and confirm this detail before any planning takes place as it will affect how the plans are produced. After working this out we find a straight edge in the field that is going to become our base or GPS AB line when drilling, and everything is then worked off this line.

We also need to find out the sprayer width that the grower uses, so that we can work out the tramline spacings. Normally they are 24 m or 36 m and are set out across the plots. This works well for us as we prefer our plots to be a total 12 m in length (7.5 m plot with a 4.5 m cross headland between the plots). The BBRO trials use 50 cm rows, so if a grower has a 45 cm row system this is another challenge for me to overcome.

Picture 1 was taken during harvesting of a trial, after the cross headlands had been harvested, and it shows how the plots are laid out in the field, and how different trials fit together. This picture shows three separate trials, outlined by different colours.

Planning the layout of the trials

This depends on several factors, one of these being what the objective of the trial is. For the Recommended List trials, once the number of varieties entering the trial is finalised, NIAB randomise the treatments and then produce several different
possible layouts. I then look at these and decide which option will work in the space we have; ideally for these trials we want as many randomised blocks as possible laid out in parallel, so the trials are long; this makes them easier to manage when it comes to in-field operations such as spraying, hoeing and harvesting. In terms of the other trials, unless dictated by a set protocol, we can be fairly flexible with how they are laid out, so these can be adapted depending on space available, as long as we meet the criteria set out in the protocols and are still going to produce scientifically reliable results.

Using the trial layouts from ARM which shows the number of plots, reps and rows per plot required for the trial, the dimensions can then be worked out. If the plots are three rows wide, each plot is 1.5 m wide and 12 m long. If the plots need to be six rows they are 3 m wide and 12 m long (providing the sprayer is 24 m or 36 m). From here we can work out the depth and width of a particular trial. For example, for a trial that is going to be four plots deep and 12 plots wide (with six row plots), the trial would be 48 m deep and 36 m wide. Once we have worked these out for all the trials, it is time to go to SketchUp and play tetras!

### Placing of the trials

If a trial site contains a Recommended List trial, the first job is to decide where it will go, as it is generally the largest single trial and has the most requirements around placement. These include the topography of the field, soil type and absence of BCN.

**Picture 2** shows the boundaries of the field at Bracebridge with an outer line and then a second line around 24 m into the field which marks the headland. Any landmarks that need to be avoided, for example a tree or telegraph pole in the middle of the field, are also marked out.

Once this is done, and the direction of ploughing is established (left – right on this example) 12 m guidelines are placed across the whole field. These can then be used to line up the trials. Small circles are then added to show where the tramlines will be; this helps later on when deciding where to place the trials (**Pic. 3**).

We now start to place the trials and see how they fit in, starting with the variety trial (**Pic. 4**). The area was chosen owing to it being the best soil type, and it didn’t take up too much of the large area of the field, which can be used to fit in other trials.

After this the open day area was planned in, as we knew we wanted that near the grass area (**Pic. 5**).

Some of our trials need to be harvested at different times and this information is taken into account when planning. Ideally we don’t want an early-lift and late-lift trial stacked on top of each other with not enough space to turn the harvester around in between.

In **Pic. 6**, the top contract fungicide trial plots are due to be late lifted. The first two sections of the bottom contract fungicide trial area are due to be harvested as an early lift and a normal lift. Therefore, the trials are offset to allow for this to occur easily and ensure the harvester has plenty of
room to turn during the first two lifts. As a minimum, the harvester requires 24 m to easily turn around each end of the trial, which is a major factor when trying to fit lots of trials into one field. If different trials are being harvested at the same time (and they require the same harvester to lift them), then the gap between is not as crucial, as the harvester can continue straight through and lift and bag them in one pass. The plans are crucial in this case when preparing harvest labels in the office.

As well as leaving enough room above and below the trials, sufficient space needs to be left to the side to allow enough time for sprayer booms to be turned on and off between trials; we work on a minimum of 9 m (18 rows); however if the sprayer doesn’t need to be turned off then this gap can drop to 6 m (12 rows).

Another consideration is any nitrogen trials; for these the type and size of spreader needs to be considered when making decisions. Based on a spreader being 24 m, then a 36 m buffer zone needs to be left around the trial, however this increases to 48 m if the spreader is a spinning disc.

Once all these factors have been taken into account, we can start arranging the trials but this can often take a few attempts before we settle on the final version, which for this particular field, can be seen in Pic. 7.

Throughout the planning process, regular meetings and contact is kept with the relevant Trials Officer in charge of the site, and with the Trials Manager to make sure everyone is in agreement with what is being proposed and how the set up will work.

Once the final plans have been agreed amongst the team, we can head out to the field and start drilling! These plans will help on many occasions throughout the season. Firstly, they are essential to the field team at drilling, they can also be given to host growers and their spray operators to ensure joined up communications. Other uses include field visits, to locate particular trials, field team operations and finally, harvest, both with contractors to open up the fields (harvesting the spray wheelings and discards) and plot harvesting. These plans are a vital part of an integrated planning process.

Summary of main factors to take into account when planning layouts:
- Areas in the field which vary in soil type
- Possible areas of BCN
- Sprayer widths
- Row widths
- Trial sizes/replications etc.
- Trials to be sprayed by us and not the grower
- Host grower’s drill/harvest set-up
- Trial layouts are governed by ARM for BBRO trials and NIAB for the RL trials
- If we are spraying them, can we get pathways to them?
- How will they be harvested, is there enough space to turn

Pic. 5 – The BBRO demonstration plots were located near the grass area.

Pic. 6 – Location of fungicide trials with early, normal and late lifting dates.

Pic. 7 – Final layout of all the trials and BBRO demonstration plots.
Focus on PhD students

Since outlining the work of our first four PhD students in the spring 2016 issue of the British Sugar Beet Review, the BBRO is pleased to welcome new PhD student Siobhan Hillman to the world of sugar beet research. Siobhan is the first PhD student from the University of East Anglia to join BBRO, commencing her studies with us in September 2017. We look forward to introducing her in person at our future events. Siobhan explains her interest and why she chose the BBRO to further her studies.

New BBRO PhD into the life of times of the mangold fly

By Siobhan Hillman, University of East Anglia

My background

I became interested in entomology during the second year of my BSc at the University of Derby, where I got involved in a range of different entomological activities, and liked studying a broad range of insects. It was during my BSc dissertation on host plant resistance against the cabbage aphid, *Brevicoryne brassicae*, that I became especially interested in agricultural insect pests and their behaviour and ecology. After I finished my undergraduate degree, I was awarded a scholarship to study for an MSc in entomology at Harper Adams, and this course helped me narrow my interests down to pest ecology and integrated pest management. I’m specifically interested in aphid and fly pests of crops, and have increasingly become interested in the sugar beet industry in the UK. I came across a PhD advertisement at UEA in Norwich, looking for a student to investigate the population genetics and ecology of the mangold fly or sugar beet leaf miner species complex, and I decided to apply. I was pleased to be offered the position, and I have now just started the first year of this four-year studentship, partnered with the BBRO.

Mangold fly

There have been few studies on this species of leaf mining insect, which is a known pest of sugar beet crops. Mangold fly adults lay their eggs in small rows on the underside of the leaf (Ref. 1), and once the larvae hatch, they burrow into the leaf and feed on the mesophyll between the upper and lower leaf epidermis, destroying the photosynthetic cells and causing a reduction in yield. If numbers of the larvae are high enough, they can even cause plant death (Ref. 2). This has been particularly problematic later in the sugar beet season, when the effect of the insecticide seed coating has worn off, and the plants have no protection against the second and third generations of the mangold fly (Ref. 3). The potential future ban on neonicotinoid insecticides could mean that the only effective chemical currently available to control this pest is gone. Therefore, a better understanding of the ecology and life-history of the mangold fly is needed to help control it, and ultimately protect sugar beet crops.

This project first aims to determine whether the mangold fly is one species of leaf miner or a complex of leaf miners that affect sugar beet crops; past literature varies widely in defining what the ‘mangold fly’ is, and the number of species that may be in this complex. By using molecular and genetic techniques, I aim to determine how many leaf miners exist in this species complex. The project also aims to investigate the factors which influence the distribution of the mangold fly populations and their species complex, as well as in-depth investigation into the life histories of the species. Finally, I hope to investigate alternative hosts for the mangold fly, as well as the parasitoid complex that is associated with it.

I look forward to working on this project with the BBRO, and I hope that the results will provide a better understanding of a pest that affects the sugar beet industry.

References

Some thoughts on beet herbicide use for 2018

The post-harvest wash-up meetings with customers in winter can sometimes be a bit uncomfortable for agronomists. ‘You know we’ve spent nearly £200/ha on herbicides on the beet and been through them six times post-emergence?’ ‘No, can’t have done’, but the Gatekeeper evidence is there for all to see. ‘The beet are clean but that’s nearly ten tonnes per hectare on weed control. Is that justified?’

So that gets you thinking, why are these beet so expensive to keep clean? Let’s look at the budgeted figures first. At Prime we produce a Gross Margin Booklet each year for clients. Costings for beet are based on our experience and our planned programme approach with modern beet herbicides. We have budgeted for some years so it’s useful to have a look back, say to 2008, while going forward this season (Table 1).

Table 1 – Sugar beet gross variables budget comparison.

<table>
<thead>
<tr>
<th>2008 Variables budget £ per ha</th>
<th>2018 Variables budget £ per ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed 167</td>
<td>Seed 220</td>
</tr>
<tr>
<td>Fertiliser 146</td>
<td>Fertiliser 244</td>
</tr>
<tr>
<td>Herbicide 80</td>
<td>Fungicide 49</td>
</tr>
<tr>
<td>Fungicide 19</td>
<td></td>
</tr>
<tr>
<td>412</td>
<td>653</td>
</tr>
</tbody>
</table>

Interestingly, in 2008 we were planning on a spend of £80/ha for beet herbicides, while in 2018 we plan a spend of £140/ha for a typical beet crop (if there is one!); that’s before any thistles and volunteer potatoes. So we are budgeting at least a £60/ha increase in ten years. You can argue the figures, but beet has certainly increased in cost per hectare to grow (much like most other broad-acre crops). Is this increase justified and after all a budget is only there to be beaten?

What has changed in that time?

1. We have always had a preference for using pre-emergence herbicides in all but the most exceptional circumstances; largely for some timing insurance and weed sensitisation for follow-up post-emergence sprays. This has usually been based on a relatively cheap chloridazon (e.g. Pyramin DF). There is more black-grass about now which requires robust pre-em s based around metamitron (e.g. GOLTIX 70 SC) and ethofumesate (e.g. Nortron Flo). This has increased cost.

2. We now have more actives in a single product to simplify weed control and offer increased safety at early stages of beet growth (e.g. Betanal MaxxPro, Betasana Trio). This has added some expense, but has much improved safety and weed control.

3. Early drilling to maximise the beet crop leaf area by May often means that the first cultivation no longer takes out that first difficult flush of weeds (e.g. knotgrass). They come with the crop and have to be controlled early.

4. We have lost the use of some actives in certain situations. We no longer have chloridazon as a cheap post-emergence mixer option, nor as ethofumesate mixes (e.g. Magnus), which were good to use cost-effectively late season.

5. We seem to be chasing grassweeds more these days, particularly black-grass, which appears late in beet when it shouldn’t (in theory). An overspray of clethodim (Centurion Max) is around £25/ha. We also seem to be tidying up wild oats perhaps more than we used to after the broad-leaved weed control has been completed. This can add £15/ha.

At the time of writing we don’t know whether we will have a later start this season, which could mean fewer passes when
we drill later, but I wouldn’t ever bank on it. I have analysed the beet fields I worked on last year, to assess how many times they were sprayed. The results are shown in Table 2.

### Table 2 – Herbicide use in 2017.

<table>
<thead>
<tr>
<th>Number fields</th>
<th>105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-em</td>
<td>105</td>
</tr>
<tr>
<td>2 post-ems</td>
<td>0</td>
</tr>
<tr>
<td>3 post-ems</td>
<td>35</td>
</tr>
<tr>
<td>4 post-ems</td>
<td>57</td>
</tr>
<tr>
<td>5 post-ems</td>
<td>10</td>
</tr>
<tr>
<td>6 post-ems</td>
<td>3</td>
</tr>
<tr>
<td>Overspray grass</td>
<td>65 (Falcon, Fusilade, C. Max)</td>
</tr>
</tbody>
</table>

Everything had a pre-emergence treatment. The vast majority of crops had four post-emergence sprays; there were none where we could get away with just two post-em and over half were oversprayed for grassweeds. These were largely wild oats, with some fields only requiring spraying on headlands, but an increasing number had to be sprayed for black-grass with clodhod. I am concerned how much we are relying on this active (in both rape and beet), particularly as we have now lost Aramo (tepraloxydim).

There are reasons why we have to keep spraying some fields; we tend to find that farms with a history of high muck use (which is a good thing) are fertile and the weed flushes just keep coming (particularly fat-hen). Marshes and fen are similar. I would suggest that the 35 fields which had three post-em-s are on particularly clean farms which don’t use much muck. Some may also be slightly later drilled. No thistles, no volunteer potatoes and no grassweeds also makes a huge difference to cost.

There is usually a reason why post-emergence sprays for broad-leaved weeds get beyond four. We generally tend to find that if the first two post-em sprays are very well timed, that’s half the battle won; if you are chasing big weeds from the start you usually have to keep going and going. All weeds that shade the crop later on are hugely competitive with beet for light, so you have to control them somehow.

Interestingly, the cost of these beet programmes varied between £85/ha and £220/ha, almost three times best to worst!

### Lessons learnt and tips for this season

BBRO has well-published data to show why we cannot tolerate weed competition in sugar beet. Just one tall weed (such as fat-hen) per 1 m² of crop can rob yield by 11%. That pays for a lot of post-emergence sprays. For an 80t crop that’s potentially £180/ha (the cost of a very comprehensive programme).

Sugar beet really cannot stand weed competition. It’s usually the weeds that emerge within eight weeks of crop emergence that cause the main problems if they are not well controlled, and those which grow above the canopy (e.g. fat-hen, volunteer potatoes) cause the most damage.

There are many ways to approach your beet weed control (table 3); you need to know your weed spectrum, sprayer capabilities and workload. From there devise a strategy. Whether you go for the FAR technique or prefer the Broadacre approach, both can work in the right circumstances. The BBRO produce a comprehensive weed control publication, accessible via their website www.BBRO.co.uk/publications.

We have found over the years that whilst the FAR technique is very sound, it can be hard to achieve on larger units, albeit there is a good discipline in saying “blight sprays Monday, sugar beet Tuesday!” A slightly modified FAR has been our preferred method, but getting the first two sprays on early and close is the key. Newer formulations like Betanal MaxxPro and Betasana Trio allow you to start early at reduced rates.

### Table 3 – Herbicide approaches in sugar beet.

<table>
<thead>
<tr>
<th>System</th>
<th>Components</th>
<th>Weed size</th>
<th>Flexibility</th>
<th>Management</th>
<th>Weed size</th>
<th>Flexibility</th>
<th>Management</th>
<th>Weed size</th>
<th>Flexibility</th>
<th>Management</th>
<th>Weed size</th>
<th>Flexibility</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard managed approach</td>
<td>Contact + Residual</td>
<td>(High)</td>
<td>Selected for weeds present</td>
<td>Expanded cotyledon</td>
<td>10-14 days between sprays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAR</td>
<td>F – Phenmedipham</td>
<td>(Low)</td>
<td>Some input on later sprays</td>
<td>Early cotyledon</td>
<td>Meticulos timing every 7 (early on) to 10 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Active’ – manufacturer programmes</td>
<td>A – Activator R – Residual Low rates</td>
<td>(Medium)</td>
<td>Broad Spectrum</td>
<td>Early true-leaf stage</td>
<td>Flexible Wider spray window</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadacre</td>
<td>Debut + high rates contact &amp; residuals</td>
<td>(Medium)</td>
<td>Broad Spectrum</td>
<td>First true-leaves 1 cm</td>
<td>Aim to use 2 ‘big hits’ 14 days apart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Other points to consider:

- A pre-drilling glyphosate may leave you some wheelings to deal with but this is much cheaper than trying to contend with transplanted knotgrass, or indeed large black-grass.
- Go early with low rates of safe products and be prepared to get back fairly promptly. You may not be able to stick to seven days but try not to get beyond ten. You can always adapt the programme with a holding spray if conditions are tricky.
- Don’t be afraid to use oils and adjust according to temperature. These can enhance and cheapen programmes effectively.
- Mix and match products according to weed spectrum. You can probably plan and book the first two post-emergence sprays well in advance of planting and judge the third and subsequent on what’s left.
- Good timeliness pays, especially the first two post-em-s.
- Can use cheaper simpler formulations from the third spray with more active when the beet are larger and more robust.

And always remember, if you are wondering if you should spray again – spray again!
Seedbed preparation and improved soil management

Extremely variable weather during this harvest has highlighted the need for a non-prescriptive approach to soil management. Cultivations need to be considered on a field-by-field basis, and are highly likely to vary across the farm according to conditions found.

Autumn tillage following wet weather

Many farms experienced wet conditions at some point during harvest; this could well have limited the opportunities for making any autumn cultivations at the most appropriate time, and in optimum conditions. Careful examination of the soil profile in spring will be needed, to best manage cultivations ahead of establishing this season’s beet crop.

Where drier conditions followed a wet harvest, the usual ‘plough heavy land when it is dry, and it will stay dry’ maxim, which favours early autumn ploughing, may not be totally valid. That being said, unless moisture after the wet period was removed by volunteers or a catch/cover crop, soil moisture at plough depth has potentially not been reduced by any time delay. However, on medium soils, such a delay could certainly have benefits, especially if moisture has been removed following harvest. Supplementing volunteers with an economic cover/catch crop mixture at relatively low seed rates can assist ploughing and management of deeper levels of compaction, provided that the canopy is controlled. In that situation ploughing or non-inversion tillage can benefit from working the soil at times when it is at the most appropriate level of moisture.

In all cases on heavy and medium soils where the primary tillage is carried out in autumn, it is vital to aim for a level and a ‘half way to a seedbed’ surface which can take weather, but will not need excessive spring cultivations before drilling (Pic. 1). In these situations moisture can be conserved, and importantly, weathered tilth, formed before cultivations in spring, is retained evenly on the surface. This contrasts to a weathered, unlevel surface where natural tilth is then lost.

Pic. 1 – Pressing after ploughing to get ‘half way to a seedbed’.
Note: the use of a wide-spaced ring press (at appropriate times) on lighter soils also provides a more level, consolidated surface (Pic. 3). This assists seedbed cultivation, and retains moisture whilst also giving a stable surface to resist wind erosion and capping where there is a time delay before drilling.

**Seedbed preparation**

Ideally, seedbed preparation on all soils needs to be a single pass if possible, provided moisture levels are appropriate for this. Judgement should be made field-by-field as conditions and soils are likely to be variable. Early preparation is best; however, waiting for the soil moisture levels to become ‘ friable ’ to cultivation depth is more important than rushing to get a seedbed made. If the soil being cultivated can be rolled into a thin plastic worm between the palms of the hands, then it is too damp to create the fine aggregates needed by the crop. Cultivations under these conditions are likely to reduce seedbed porosity overall, and especially at the depth of the cultivation pass. The result is a coarser, cloddi er finish which will not achieve consistent and efficient germination. Here, provided drainage is effective, a three or four day delay before cultivation can produce a far more effective seedbed than rushing in when soils are too moist.

Other key points to note when preparing the seedbed are as follows:

- The use of a spade to check to below plough depth is **essential** to understand the ideal requirements for the field as a whole, and parts of variable fields too.
- Minimise tractor axle loadings **provided the correct weight balance between front and rear axles is achieved**, and the tractor overall weight is **suitable for the power needed to pull the cultivator**. An imbalanced tractor will result in higher levels of wheel slip for either

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**Soil levelling**

Where fields have been set up under less than ideal conditions this autumn, it may be possible to cultivate on the frost to level and create a more consistent surface; provided the soil is firm enough to allow machinery to travel without further damage. This then can create a better surface finish ahead of the final seedbed pass in the spring. Such operations usually require minimal pressing at these times. Where pressing could be a benefit, this should be by a wide-spaced, ring-type press leaving a corrugated finish. Another option, although likely to be too late for this season, is to consider ploughing followed by loosening where damage is deep. This operation on heavy and medium-to-heavy soils creates a level corrugated finish (provided an appropriate press-type roller is fitted to the soil loosener) and usually gives an efficient loosening action at depth, provided it is dry enough at that level. This is a result of the loosener having to lift only a shallow depth of soil below the plough layer, which is usually drier if compaction has limited water infiltration.

Effective ploughing in spring is possible on lighter soils, and is necessary on those which are prone to slumping. Where loosening is needed deeper than plough depth (a likely occurrence following harvest damage in wetter conditions) a set of subsoiler ‘ bottoms ’ (Pic. 2) can be fitted to the plough provided:

- the soil is dry enough at depth for effective operation of the looseners to shatter the soil.
- the plough can be pulled without undue extra effort that would result in high levels of wheel slip and surface damage (note: fitting looseners to alternate bodies is also an option).
- this does not limit the use of a press roller with the plough if that is normal procedure.

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**Pic. 2 – Loosener units fitted below the plough bodies.**

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**Pic. 3 – Integral plough and press for lighter soils,**
If using dual wheels, these must be set at their lowest, safe-operating pressure (and equally for all wheels on the same axle), otherwise the benefits of using them are completely negated.

- Minimise working depth of the cultivator, provided sufficient tilth is created for the drilling operation. Sometimes slightly shallower operation creates finer tilth and less clod where soil at the deeper levels is too moist for ideal cultivations. In this situation default to a shallower setting, and only increase depth if needed and if this results in more tilth being created.

- Avoid a disc-action or intensive power harrow action at seedbed depth if soils are damp or moist as this has a high risk of smearing; here, ‘less can be more’.

- Minimise levelling actions provided this produces a sufficiently level seedbed with a consistent finish. Moving soil comes at a cost, and is better done well ahead of the final seedbed pass if possible.

- Roll after drilling if the seedbed is cloddier than ideal, although not if heavy rain is forecast.

**Reduced tillage**

In reduced tillage situations, including strip-tillage, it is often possible to travel sooner in spring and with less damaging results than in a fully cultivated situation. Such operations can also be combined with inter-row cover or companion crops to further improve the management of seedbed moisture levels and stability (Pic. 5). Appropriate management of plant residues is essential, both at harvest and when cultivating and drilling. Such techniques will provide effective results as long as drainage and soil structure is in good order, and soil biology has developed to better cope with residues and residual herbicide effects in the resulting seedbed. Clearly, in these situations the drill needs to be appropriately equipped.
Technical

Understanding and reducing sugar losses at harvest

The potential of a crop can only be fully realised once it has been harvested and delivered. As with any crop, sugar beet poses its own unique challenges which must be understood and overcome. The British Beet Research Organisation (BBRO) is investing more of its time and effort into researching the problems and sharing opportunities with growers looking to maximise their crops’ recovered potential (Pic. 1).

The Harvester Testing Programme is one part of the BBRO Crop Recovery initiative, assessing commercial harvesters working across the four UK factory areas. Testing takes place throughout the season, giving a fair representation of the harvester and operator performance under the ever-changing weather conditions which impact on the process. Consistent assessment will help to build an understanding of what is achievable across the growing region, giving due consideration to the many variables in soil type and lifting conditions.

Whilst the Harvester Testing Programme provides a useful measure of the performance of specific machines and operators working on particular sites, it is important for all growers to interact with the scheme and take a closer look at their crops whilst they are being harvested. Some simple guides for this are featured in this report, with more information being available at BBRO events and on the BBRO website (www.bbro.co.uk) for those looking to reduce losses further.

The harvester test can be considered in two sections, with data collected being both qualitative and quantitative. The test report focuses on the quantified surface loss and root breakage, but equal attention is given to the visual assessment of crowning and damage.

Crowning results

The first process of harvesting is the topping and scalping of the beet, this is often the first thing discussed at meetings as this can be the easiest thing to improve. Fig. 1 shows the BBRO Crowning Guide used to make the visual assessments, and Fig. 2. presents the results observed through this campaign.

It is clear from Fig. 2 that the over-crowned section makes up more than half of the tops seen. The financial significance of this isn’t precisely quantified; however it provides a clear message that there are further gains to be made, particularly where even moderate over-crowning (Fig. 1) can cause tissue losses equivalent to those observed in root breakage and surface loss (Fig. 3).

When looking to maximise crown recovery the introduction of additional green material into the clamp sample is often the result. Tradition has taught us that this can be a problem but under the fixed-tare agreement this must become the norm. Figure 3 shows the dramatic losses that can be incurred by incorrectly over topping. Judgement must rest with the growers as they alone see their full picture, knowing that length of storage and final cleaning system will have a huge impact on whether and when the excess green material will be removed. Communication between grower and operator is therefore vital to achieve the best results and highest returns; growers looking for advice on this should contact their British Sugar Area Managers.

Pic. 1 – Harvester loss workshop in September at a BBRO Demonstration Farm.
Assessing surface losses

1. Biological yield

The first quantified harvester assessment is evaluating the crop in front of the harvester through four yield digs taken across the field. The main purpose of this is to establish the population and yield before harvesting to estimate the maximum potential against which losses can be calculated. However, this also gives a valuable insight into the crop and soil conditions which will influence the performance of the machine and dictate its set-up.

2. Measuring surface losses

The most obvious and widely-known part of the test is the surface loss inspection which is made directly behind the harvester, looking for any whole sugar beet. The area sampled is always the full width of the machine, whilst the length of area differs according to the width of

Pic. 2 – Surface-loss test in progress – growers should target losing less than 0.5 t/ha.
mechanism being able to lift as much of the complete root as possible from the ground, and the cleaning system damaging the beet as soil is removed.

3. Sample and calculate root breakage

Root breakage makes up the largest quantifiable value of harvest loss for the vast majority of assessments. It is calculated by measuring the diameter of root breakage in the clamp; this breakage value therefore incorporates all causes of root break. The two main areas of concern are the lifting mechanism being able to lift as much of the complete root as possible from the ground, and the cleaning system damaging the beet as soil is removed.

Early season results

Poor establishment of some crops in the difficult spring sowing season, coupled with challenging autumn conditions, led to some inconsistent harvester test results. Table 1 shows the best, worst and average scores for the campaign up to the New Year. Whilst the averages appear very respectable, the maximum and minimum clearly show how varied the results are. Figure 4 gives a visual representation of how losses have increased as the campaign progressed; however the dramatic variation between scores shows how unique each test is. This demonstrates that every field condition is different and requires regular inspection to ensure the best results are maintained.

Impact of high yields

An increased yield will inevitably contribute towards a larger total loss, the same root break evaluation will give a higher t/ha loss when multiplied by a larger yield. Where lower plant populations have led to extreme individual beet size, a second increase in loss can be found. The added size and weight of the beet inevitably increases the damage caused by beet impacting on each other, resulting in larger breaks and more bruising, increasing the percentage of loss.

Table 1 – 2017/18 Harvester test loss results to 22/12/17.

<table>
<thead>
<tr>
<th></th>
<th>Root breakage (t/ha)</th>
<th>Surface loss (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>3.74</td>
<td>0.38</td>
</tr>
<tr>
<td>Maximum</td>
<td>11.30</td>
<td>1.67</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.97</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Pic. 3 – Insufficient share depth breaking tap root – growers should target a minimum of 50% of roots with a root breakage of 2 cm or less.
The 2017/18 season has produced some extremely ‘gappy’ and uneven beet crops which has had a negative impact on potential harvest yield as a result of increased losses and this should be a key focus going into the 2018-19 season. Consistent beet on a level seedbed is the first step towards a successful harvesting operation and every step should be considered. As shown in Pic. 4, a beet without competing neighbours can grow to an impressive, but impractical size. The first step to a good harvest is ensuring even establishment at the start of the season.

**Surface damage/bruising**

Surface scars, cracks and blemishes are all observed when assessing root breakage, whilst bruising cannot be seen until many days after harvesting. This type of damage doesn’t result in an immediate fresh weight reduction, although the potential sugar and financial loss can be significant.

Laboratory test results (Figs. 5 and 6) show the extent of sugar loss both from surface area damage and physical impacts which would show up visually as cracking or bruising. Figure 5 shows that increased surface damage to the beet can cause a continuous reduction in sugar content as beet is stored, whilst Fig. 6 shows the immediate loss of sugar when subjected to impacts. The two graphs fail to highlight a third scenario of sugar loss: large surface wounds increase the incidence of disease and rot as the crop is stored.

Whether preparing for short- or long-term storage, all types of damage will result in sugar loss and therefore, every effort should be made to minimise them. Compromise will always be required, regarding harvesting damage, with soil tare as a major trade-off. As with the crowning, the importance of communication between grower and operator is vital to ensure the optimum compromise is achieved according to the crop, soil and storage conditions.
Beet Yield Competition – 2017 update

2017 was the inaugural year of the industry’s Beet Yield Competition (BYC); it was expected that, by the close of the year, all or most of the competition fields would have been harvested, delivered and processed, and we would be able to report some of the trends and learnings back to growers in this issue of the ‘British Sugar Beet Review’. Clearly, the 2017 season had other plans! By mid-December, whilst over 60% of the thirty fields entered in the competition had been harvested and processed, the remainder had yet to be delivered. We believe it is important for us to wait so that the data from these crops can be analysed with the pre-Christmas harvested ones. One of the benefits of the long campaign is that this certainly allows us to assess performance against a wider range of factors: for example, which soil types, varieties and fungicide programmes have performed better across the wide range of different harvest dates?

The word ‘competition’ is possibly a slight misnomer regarding the aims of the initiative as it is not about which grower can achieve the highest yielding crops, but is primarily about understanding why and how some crops achieve a higher percentage of their potential yield. It is therefore important that we do analyse all the crops, before translating this into information for growers to learn and apply to crops to improve yields.

The fields

Over thirty fields were entered in the competition at the start of the year, and whilst a couple were withdrawn due to poor emergence, we anticipate capturing the yields from all the remaining crops when they are harvested. The first BYC field was harvested at the end of September. All the fields have had root digs taken as part of the BS Field Survey to provide one estimate of yield. However, the main assessment of yield will be the delivered crop with fields being flagged on the BS system through harvesting and delivery to the factory to give us commercial yields.
Information gathering

The BYC team has been very industrious behind the scenes collating data submitted by growers and other sources to use in the model that estimates crop yield. A big ‘thank you’ to growers who supported this process, particularly submission of regular updates on crop canopy development and rainfall. It is vital to have reliable information, so we can provide not only reliable estimates of potential yield but also an understanding of differences between crops in terms of performance. There have been a few missing bits of data such as canopy cover and rainfall, but we’ve been able to obtain these from other sources. We have also been looking at how we can use remote sensing to assist in assessing crops, estimating yields and understanding the variation within fields. Estimates of yields using the specific crop data are made by running the BeetGro crop growth model (Ref1). It was estimated that, by the end of September, the campaign base-line yield ranged from 89.5 - 109.8 t/ha across the 30 fields. Of course, as each crop is harvested this estimate is updated according to new yield information and weather data.

Weather in 2017

Crops clearly benefited from some substantial rainfall in May, June and July which was above the long-term average (Fig. 1). Few crops would have been limited by moisture and there were only small differences seen across the range of soil types represented. High summer rainfall is clearly one of the factors behind the high yielding season.

However, one of the standout features of the crops in the competition was the speed of canopy expansion, particularly in June. Despite the dry start to the season in March and April, the subsequent warm temperatures and higher rainfall in May and June allowed crops to reach full canopy cover very quickly in record time (Fig. 2). This graph shows the estimated canopy (1.0 = 100% canopy cover) development in June, showing the average as well as the minimum and maximum.

The assessment of crop canopy expansion (ground cover %) submitted by growers reflected this rapid canopy expansion and reinforces the fact that leaf development, particularly early leaf development, was favoured by above-average temperatures (Fig. 3). The slight decline in predicted canopy area after full canopy has been reached (Fig. 2), is the combined effect of foliar diseases and senescence in crops as crops progress into the autumn growth period. Clearly, foliar disease also has an important effect on this, and therefore disease incidence and severity have been recorded in all the crops along with the fungicide programme used.

Intra-field variation

An important part of the project is to understand the effect of intra-field variation on whole field yield levels. It was clear that the dry conditions in March and April affected germination and emergence as well as the effectiveness of weed control. Aerial drone imagery on many of the crops has highlighted the high levels of variation within some of the fields. The two photographs (Pics. 1 and 2) demonstrate the variable nature of poor emergence and weeds within fields. It is hoped the BYC will begin to demonstrate the impact of this at a whole field yield level and help formulate ways to make improvements and to assess the cost/benefits of taking action.
Aldis of BBRO and, whilst losses were relatively low during the early stage of the season, there has been an increase in losses as soil conditions have become more difficult as the campaign progresses.

Feedback
The essential element of the BYC for growers is, of course, the feedback. We are planning to give an information pack to each entrant at the end of the competition. This will draw together the information that we have collected over the year, showing actual and potential yields for the field entered, highlighting the potential areas where further yield potential can be gained. We will also provide an anonymised comparison with other crops in the competition to allow benchmarking of performance but, more importantly, identifying trends and common areas of advancing yield potential.

If you weren’t part of the 2017 BYC but would like to join next year’s competition, we are currently signing up growers. We’re hoping for double the number of participants compared to last year.

We’ve learnt a lot over the past year and next year’s competition is going to involve a more thorough look at the fields throughout the year. This year we acted as observers but next year we will be playing a more active role. For example, we trialled using drone photographs this year; next year we are going to take more drone photographs and provide an analysis of these to participants throughout the year, to enable them to use this information to maximise their yield.

A winner will be chosen from each factory area with the title of CHAMPION Sugar Beet Grower being awarded to the entrant reaching the highest percentage of their theoretical potential yield. The Champion and the factory area winners will accompany representatives from the sponsoring organisations on a study tour in Europe.

If you are interested, don’t delay in signing up. Go to the BBRO website and click on the ‘On-farm’ section to find the BYC area to register your interest.

References
Precision crop nutrition

There have been a number of articles on fertilisers for the beet crop in this magazine over recent years but, to my mind, two of the best were in the winter 2012 edition (Refs. 1 and 2). In the first of these, Ian Richards gave a comprehensive overview of crop nutrition for the beet crop. The substance of knowledge and, hence, advice has not changed since that time.

In the second of the two Steve Mackinder gave reasons not to neglect base fertiliser dressings and proposed ideas to be considered for a more precise use of these.

However, ‘precision’ is the essential direction of modern agriculture; what can we add to the debate in the way of precision nutrition?

Nitrogen

Dose: The amount of nitrogen the crop requires is well established and published in the current Fertiliser Manual (Ref. 3 – formerly Defra RB209). There seems no reason to exceed those recommendations. An analysis conducted by the BBRO suggested that, in high soil fertility situations, there may be a case to increase plant populations and subsequently increase rates of nitrogen to facilitate an equivalent rate per plant. It was suggested that this would be mimicking some continental situations but subsequent BBRO trials have been unable to support this, possibly because suitably fertile sites have not been found to really test the hypothesis in the UK.

The national crop nitrogen rate has risen very slightly in recent years, and this suggests either that some growers are under the misapprehension that they need a little more N, or that beet growing is moving away from some of the higher residual N soils that require less N fertiliser (Ref. 4). Today’s higher yielding crops do not need more N fertiliser but, to be higher yielding, the canopy needs protection all of the way through the season, and the way to achieve that is through the correct use of late-season fungicides (Ref. 5).

Placement: There is also a debate about the benefits of fertiliser placement: below the seed or adjacent to the rows. Work in the UK in the past has shown no benefits to placement, but it will be interesting if further work undertaken now by the BBRO allows for reductions in the total N inputs to the crop. Whatever the situation in this area, it is indeed important to ensure that there is no double dosing of fertiliser by way of spreader overlaps, and no unnecessary applications; there is a place for sophisticated GPS, metering, switching on/off of fertiliser applicators/spreaders, all preceded by routine maintenance and testing of the equipment used.

Timing: So if the question is not, ‘where’ or ‘how much’, what is it? It is ‘when’. Some of the biggest perils to the crop occur when fertiliser is applied at the wrong time. The BBRO Reference Book advice is that, “The application of the fertiliser N should be timed to avoid impairing germination and seedling establishment whilst ensuring that sufficient N is available to sustain rapid leaf canopy growth. This requires 30-40 kg/ha of the fertiliser N to be applied at, or soon after, drilling and the remainder – if any – at full emergence”. Such advice is given for good reason: apply N too early and it may have moved down the soil profile and not be where you want it when you want it; apply it too late and it certainly won’t be available to promote the rapid early leaf growth so essential to achieving sugar yields in the UK climate. Why then do we still sometimes get it wrong on-farm?
compaction) over the land where the crop will be grown. However, additionally, it was reported that, in some cases, N was applied 1-2 months or more ahead of drilling: this is not really acceptable practice if the goal is to maximise yield. If the whole fertiliser requirement was being applied (either simply the N or N:P:K) as a single dressing, this might have a seriously deleterious effect on germination, especially in a dry season. Philip Draycott (Ref. 6) produced a startling graph (Fig. 1) to show the potentially deleterious effect on plant establishment from applying nitrogen fertiliser before sowing.

Fig. 1 – Reducing establishment from increasing N applied pre-drilling.

Of course seed quality and processing have improved since that work was done, but it does highlight the risks; over the years, when it is dry after drilling, lots of growers have come to grief because they have put all the N on in one dose: it really isn’t good practice.

It also seems (from the same survey) that almost a third of the crop that required a second N dressing received it more than a month after drilling; that again is not good normal practice; but it could have been a result of delayed emergence in the spring conditions experienced in 2017. The crop needs the N for early leaf development, and a supply of N needs to be present to promote rapid spring growth. If applied too late, an opportunity for early growth is missed, and uptake later in the year will lead to unnecessary storage of N products in the plant and poorer quality beets.

**Potassium and phosphate**

In the other article I referred to at the outset, Steve Mackinder talks about the off-take approach to base fertiliser applications; this, of course, is the way to do it. This is one area where there have been some developments. The amounts of phosphate and potash recommended in the Fertiliser Manual are to replace the offtakes in a 60 t/ha crop (with tops ploughed in). The three-year average crop size reported by British Sugar is a clean yield of 67 t/ha, but as with any average, many growers routinely exceed this by significant levels. Indeed there are many reports this year of crops exceeding 80-90 t/ha clean yield. Larger crops will remove more nutrients from the soil and offtakes need to be recalculated accordingly. Know your clean yield of beet, because they have put all the N on in one dose: it really isn’t good practice.

It also seems (from the same survey) that almost a third of the crop that required a second N dressing received it more than a month after drilling; that again is not good normal practice; but it could have been a result of delayed emergence in the spring conditions experienced in 2017. The crop needs the N for early leaf development, and a supply of N needs to be present to promote rapid spring growth. If applied too late, an opportunity for early growth is missed, and uptake later in the year will lead to unnecessary storage of N products in the plant and poorer quality beets.

**Sulphur**

More and more crops (including perhaps beet) require an input of sulphur fertiliser to maximise yield potential, but it is only value for money if the crop requires it. I think few of us have seen S deficiency in the commercial crop, but if S shortages are there, then it needs to be addressed. Sulphur can be found in many of the conventional fertiliser inputs: kainite, kieserite and, of course, LimeX all contain significant amounts of S that should be taken into account when thinking of fertiliser quantities.

Fig. 3 – S deficiency – pale yellowing seen on inner leaves first.

So in summation, how can we apply precision fertiliser practice? Whilst there is nothing novel or new, the way ahead is to apply precision to the application of our knowledge and do what we currently do, but better.

**References**

8. BSonline Beet Account – allocating loads to individual fields
Precision crop nutrition work at the BBRO

Simon Bowen reviews the current BBRO nutrition trials programme (see also page 36)

Nutrition is a key area of focus for BBRO and there has been a lot of work undertaken to determine if there is a need for higher rates of nitrogen on modern beet crops, especially in more fertile high-yielding crop situations. However, this series of trial work has not been able to establish consistent evidence for an increase in the recommended nitrogen rates for growers given both in the BBRO Reference Book as well as The Nutrient Management Guide (RB209). BBRO is a full partner of the team that guides and produces ‘The Nutrient Management Guide (RB209)’ and statistically validated data is a clear requirement for any change to published recommendations. However, on the basis that there may be genuine sites where higher nitrogen is required, we decided to look at nitrogen rates across a wider range of sites and soil types and, in 2017, established a set of strip trials across different varieties on our six BBRO Demonstration Farms. We looked at applying additional 20, 40 and 60 kg N/ha above the recommended rate for the site.

To date, we have seen very few root yield and quality responses to increased nitrogen rates across the Demo sites. Although we have been able to show how additional nitrogen can increase canopy top growth, this has not been consistently associated with increases in root weight. This effect was more noticeable when the rate was either 160 or 180 kg N/ha.

BBRO will continue to review nitrogen rates and has started new programmes of research looking at other aspects of crop nutrition. These include placement of nitrogen and phosphate, sulphur rates and the use of foliar-applied nutrients, including some bio stimulant-based products. Most of this work is in the first year of a three-year series of trials and we must see how consistent any response is across seasons and sites before drawing firm conclusions. As a general observation on the 2017 season, growing conditions have been very favourable for plant development and this is reflected in the large yields. Nutrition responses appear to be less than normal, and this is why it is important to undertake trials across a number of seasons. Watch this space for updates of the BBRO crop nutrition work programme as it progresses in 2018. Alternatively, come and see some of this work in practice at the BBRO Demonstration Farms. Check the BBRO website for details on where and when.

The effect of 120 kgN/ha (left) and 160 kgN/ha (right) on canopy rather than root growth.
Grower profile – success in clay

Essex farmer Peter Graves and his son Sam grow 50 ha of sugar beet on Hanslope clay. They have taken advantage of the past year’s growing season: achieving a yield of over 100 t/ha, as many growers have impressively managed to do this year, whilst averaging over 18.5% sugar and maintaining a 5% dirt tare.

The farm has grown beet since the 1940s on a one-in-four rotation which includes wheat, OSR and occasionally peas. The Graves have an incredible passion for detail which is reflected in their yields. Due to the heavier nature of the soil, the ploughing was carried out back in mid-September 2016, taking advantage of the dry conditions at that time. Ploughing was done on 12 inch (30 cm) furrows as they have found any larger leaves the heavier land just too difficult to get down into a fine, level seedbed. The land was then left until cultivated with a flexi-tine, on a frost very early one morning in late December. A spring tine harrow was then used to create a fine shallow tilth just before drilling, which commenced on the 17th March. The 1.14 units/ha drilled into this fine seedbed managed to achieve a plant population ranging from 98,000 to over 110,000 plants per ha, closely matching the optimum of 100,000 plants per ha recommended by the BBRO.

Like many other farms in the beet growing area, only 36 mm of rain fell on the farm in March, and 9 mm in April. This emphasised the importance of achieving a good seedbed without too much movement to produce an even emergence and optimum plant population. The dry start to the season was challenging for most, with uneven or little emergence to begin with. These difficult conditions at the beginning of the growing season resulted in some challenging decisions on herbicide timings having to be made. There was a fine balance between achieving clean crops with reduced weed competition whilst avoiding chemical damage to the smaller emerging plants. The farm typically applies three post-emergence herbicides to the crop depending on the weed pressures of the season and field. In most situations the seed proved how resilient it can be and came through to show some of the highest plant populations recorded to date in the British Sugar survey fields.

Once the crop got away after the rain in the middle of May, it didn’t look back; ample rainfall throughout the summer and warm temperatures provided almost ideal growing conditions. Two applications of Escolta were applied in July and August to keep the canopy healthy to allow the impressive yields to continue to grow.

The farm takes all of the stages of growing the crop in-house, with the exception of haulage. They run a Stanhay drill, Vervaet harvester, and CTM cleaner loader with a roller bed which they have found to be better for the clods that tend to come with growing beet on heavier land. When travelling on the fields, they take great care to ensure that tyre pressures are as low as possible to minimise the damage being caused to the soil structure. Visiting the farm at the end of summer, it could be seen that the many hours of tractor hoeing and hand rogueing had not gone to waste; there was a noticeable lack of both bolters and weed beet in the fields.

The Graves have the privileged position of being in control of when they lift, so harvesting commenced on the 29th September. Just-in-time harvesting was carried out wonderfully, with each lift sitting in a clamp for less than a week on average. If beet were to come up particularly dirty, then these would be stored in an open fronted barn to speed up the drying process, improving the dirt tare achieved by the cleaner loader. Peter also harvests for a handful of other farms throughout the campaign, sharing his attention to detail.

In preparation for the 2018/19 crop, the ground was sampled during the summer. The soil sampling is carried out rotationally to test for pH and nutrient content, ensuring that the pH is held at optimum levels and the appropriate levels of nutrients are applied in the base fertiliser. This was applied prior to ploughing in dry conditions back in September, in the hope of giving the following crop the best possible start for the season. When choosing varieties, Peter is careful to select characteristics that are well suited to his farm. Located within a high risk wheat bulb fly area, he likes to choose varieties such as Haydn and Firefly that cover the ground well to reduce the risk of this pest, ensuring that the beet complement rotational pest control whenever possible.

As every grower will know, there is no single solution that will achieve best returns every year; instead, solutions are a combination of every aspect of growing, harvesting and delivering the crop being carried out well and in as timely a manner as the season allows. The finer details of crop and soil management are crucial if you want to achieve top yields and get the most out of your land.
Crop protection issues during 2017

Unsurprisingly, sugar beet crop protection issues were heavily influenced by the weather during 2017! There was a very dry start for some, ideal for sowing but not for emergence, followed by near perfect rainfall amounts just at the right time during the summer months (with the occasional monsoon event for the unlucky few) that have helped many crops to reach record yields. Consequently, rainfall and temperature played a major role in the development and prevalence of pests and diseases throughout the season. This article is a summary and reflection of the 2017 season in relation to crop protection challenges, followed by early thoughts for the year ahead.

Virus Yellows and Aphids in general

The mean air temperatures from the reference weather stations for January and February 2017 ranged from 4.4 - 4.6°C (slightly cooler than 2016) although the potential risk from Virus Yellows infection remained high. However, use of insecticide treated seed (Table 1) minimised this risk and protected the 2017 crop from significant yield loss.

Aphid monitoring using the 30 yellow water pan sites was again undertaken and the first peach-potato aphids (Myzus persicae) were caught in Essex and Norfolk; the warm, dry weather during May and June encouraged further flights. Consequently, increasing numbers of winged peach-potato aphids were caught across the four factory areas, particularly at Fulbourn, Cambridgeshire. Seed treatments provided protection for up to 14 weeks, which was critical considering there are currently no foliar sprays available for aphid control.

Also, increasing numbers of beneficial insects were found in June when assessing the BBRO aphicide trial at Morley; black aphids also made a late appearance, too.

Overall almost 5,000 peach-potato aphids were caught across the 30 sites during 2017 (Fig. 1), and subsequent molecular analysis of these individuals showed that only three were

<table>
<thead>
<tr>
<th>Factory area</th>
<th>Option</th>
<th>Virus Yellows (%) on sowing dates of</th>
<th>Intended use of insecticide treated seed*</th>
<th>Mean temperature (Jan/Feb)</th>
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<tr>
<td></td>
<td></td>
<td>15th March</td>
<td>30th March</td>
<td>15th April</td>
</tr>
<tr>
<td>Bury</td>
<td>No pest control</td>
<td>17.7</td>
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<td>0.6</td>
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*source: British Sugar

Fig. 1 – 2017 aphid monitoring data.
carrying virus, all caught at Fulbourn.

The first Virus Yellows infected plants were recorded at the BBRO demonstration site at Rougham, Suffolk on the 16th June. Nationally, the Virus Yellows levels were less than one percent of all the beet fields in the UK, although some small patches were recorded throughout the sugar beet growing regions to serve as a timely reminder of the importance of the impact of Virus Yellows. Some fodder beet crops grown in the Midlands and the south West without neonicotinoid seed treatments or foliar sprays showed high levels of virus (over 50%) by the end of the summer (Pic. 1).

![Pic. 1 – Virus Yellows in fodder beet.](image)

**Leaf miner**

The first signs of leaf miner eggs were recorded in Lincolnshire in May, and from experiences in 2015 and 2016, seed treatments should have protected plants from damage for up to 8-9 weeks after sowing. However, some mining was reported in treated crops during this early period, possibly due to the dry weather affecting the uptake of insecticide from these seed treatments.

Overall it was encouraging that very few reports of damage caused by either first, second or third generation leaf miners were received in 2017. Interestingly, at the BBRO trials sites at Morley, Norfolk and Hibaldstow, Lincolnshire, where blocks of beet had been sown without the seed treatments, none of the plants assessed at Morley (on 5th June) were affected by this pest whilst at Hibaldstow no eggs could be found although over 70% of plants showed first generation mining damage.

Control options remain limited once neonicotinoid seed treatments have worn off. Hallmark Zeon has approval but primarily relies on contact action, so once larvae penetrate the leaf they are very difficult to control.

However, as levels of pest damage were low, it was not necessary to seek emergency authorisation for alternative control options in 2017.

In 2017, a new PhD project was initiated in collaboration with the University of East Anglia and the John Innes Centre to study, in more detail, the epidemiology of the UK leaf miner populations; Siobhan Hillman (see article on page 16) started her studies in October. The results should help us better understand the different generations of the pest, how many different species are involved in the complex that attack sugar beet and ultimately how to control leaf miner more effectively. You will hear more from Siobhan in the coming years as she undertakes detailed analysis of this pest.

**Bird damage**

Animal/bird damage appears to be an increasing trend in sugar beet, potentially due to a series of recent dry springs and a lack of moisture at this time, and there was significant damage in several crops. Skylark damage, typified by the loss of the cotyledons and sometimes the first true leaves was reported. Grazing on older leaves by birds such as pigeons was also apparent. However, as canopies develop the likelihood of further bird damage reduces, but it is worth monitoring crops closely and deploying bird scarers such as gas guns where feeding damage has been found.

**Silver Y moths**

Silver Y moths were caught in BBRO pheromone traps but generally in low numbers, and no reports of caterpillar damage were received in 2017.

**Downy mildew**

The first signs of downy mildew were recorded in crops in Norfolk at the beginning of June; the dry conditions during April and May certainly helped to decrease the risk from this disease. In most cases, this was just the odd infected plant, but in one field near Swaffham, sown on the 12th March (with a downy mildew susceptible variety) over 10% of plants were affected, and by August over 30% of plants were showing signs of the disease. As the season progressed further cases of downy mildew were reported, but the hot, dry conditions in June would have helped prevent further secondary spread.

Symptoms ranged from the classic purple/grey fungal ‘bloom’ on the heart leaves, to occasional small yellow patches on older leaves; on the underside of these leaves you will often find signs of the fungus too. In addition, secondary symptoms of downy mildew can cause Virus-Yellows-like symptoms on the older leaves as the fungus affects the physiology of the plant.

**Powdery mildew**

During February and March 2017 only 20 ground frosts were recorded at the reference weather station, in Suffolk. Consequently, the powdery mildew forecast indicated that 48% of the national crop was at risk from infection of this disease. However, with most of the crop now protected by a fungicide by early August, and with less-than-ideal weather for powdery mildew development in recent years, this disease appears to have become less important than it used to be.

**Rust and cercospora leaf spot**

The first pustules of rust were recorded in several commercial beet crops in early June as well as cercospora leaf spot symptoms on red beet crops in Cambridgeshire. These symptoms were very early, so it became essential to monitor crops for further signs of foliar disease and then apply an appropriate fungicide programme at disease onset (as listed in the BBRO Reference Book). However, it is also important to remember to ensure the crop is at full canopy expansion (as highlighted on product labels) and is not wilting under hot conditions.

Once these diseases started to develop further, there were
also reports of rust developing more rapidly than anticipated, even when the first application had been applied only two weeks earlier. The late summer weather was particularly conducive to rust and cercospora development; for future years it is important that first applications are applied at disease onset, and any subsequent sprays are applied according to label recommendations, and at the correct water volume, to limit disease build up further.

However, in most crops, where fungicides were applied at the right time and followed up by subsequent sprays if needed (depending on delivery schedule or disease pressure), these controlled most of the foliar diseases well. To date, there have been no known cases of resistant strains of rust or powdery mildew in the UK, although three cases of cercospora resistance to QoI fungicides were identified in UK beet by Bayer in 2016. This is being looked at further by the BBRO with a new project started with ADAS during 2017, and reflects similar issues on continental Europe where cercospora resistance is widespread and where growers can apply up to eight fungicides in attempts to control this disease. By late autumn, most crops, particularly in east Anglia, had low levels of cercospora (Pic. 2 and 3), and some comments were received by growers and agronomists that variety choice was also important to limit this disease too. In future, UK Recommended List disease trials will be monitored to identify any increasing trends of this disease.

**Stemphylium**

More cases of stemphylium (Pic. 4) were seen compared to previous seasons and it was observed for the first time in all four factory areas. Although disease levels were low it remains a disease that the BBRO will closely monitor to ensure that available fungicides are appropriate for tackling this disease in the future.

**Root rots**

Roots rot, particularly fusarium (with some rhizoctonia), were identified in several fields in December, especially on light, sandy soil types in East Anglia. These fields partially droughted during August and September, which appeared to have allowed pathogens to enter stressed plants via the crown and leaf scars. Unfortunately, many of the affected roots remained intact and were found in Maus clamps, causing some growers significant delivery complications. It is always worth remembering that any crops with root rots should be candidates for harvesting first and that other crops within the rotation can act as hosts of these diseases (e.g. carrots and violet root rot or maize and rhizoctonia). Unfortunately, control options for these diseases are very limited at present so extending the time between hosts within the rotation is key (if possible).

**Nematodes**

Few cases of either BCN or FLN were reported during 2017, in part due to the particularly dry start to spring for many growers. However, each year is different and so it is always worth having a closer inspection of any patches of poor canopy growth during the summer, to check for white females of the beet cyst nematode which may be visible on the root systems on infected crops. Unfortunately, there is nothing that can be done to treat for BCN in this crop but consider marking the area for identification later, and soil testing to confirm BCN levels. This will help you decide whether tolerant varieties should be grown in these areas in the future.

**2018**

Recent fluctuating winter temperatures will have done little so far to limit the overwintering survival of sugar beet pests and diseases. With a potential ‘green bridge’ through until March, it will be important to ensure that all root remnants are destroyed, and cleaner-loader sites removed as soon as possible, preferably before the new crop is sown. Such a strategy will become increasingly important as pressure continues on the sugar beet pesticide tool-box, especially as there are very few options (if any!) to limit certain problems.

Regular pests and diseases updates will be provided in the BBRO bulletins during 2018. If you have any concerns about your crop please contact your British Sugar Area Manager or your agronomist and, if necessary, send a sample for further investigation to the BBRO plant clinic.
‘Believing is seeing’

BBRO Demonstration Farm Grower Meetings

Between September and December of the 2017/18 campaign the BBRO embarked on an intensive programme of grower visits across its Demo Farm network, to offer growers the opportunity to come to BBRO Demo Farms and see the impacts of a range of different agronomy treatments on crop performance, as well as root digs and harvesting demonstrations.

The map below shows the locations of the six BBRO Demo Farm sites which, along with eight BBRO trials sites, highlight how active the BBRO team has been across the beet area in 2017. Of course, these sites would not be possible without the considerable support of the host growers which BBRO gratefully acknowledges. It would also be remiss not to acknowledge the work of the BBRO field team who put so much effort into ensuring the success of the range of trials and grower events.

The demo sites are selected to represent typical local soil conditions as well as providing a range of contrasting soil types to compare agronomy treatments across the sites. The lightest land site in 2017 was at Rougham Estates. The sequence of photographs (Pic. 2) shows crop development at Rougham after drilling on 16th March. As with many crops in 2017, the dry start held back emergence and development in April, but when the warmth and rain came in May and June, there was rapid canopy development with full canopy reached by mid-June, ahead of the longest day of the year on 21st June. You will note the crop just beginning to wilt when the photograph was taken at around lunchtime on the 20th June, reflecting the warm conditions at that time.
The sandy loam soil at Rougham is typically ‘hungry’ low organic matter land where Simon Eddell, the host grower, is assessing and developing a number of approaches to improving organic matter and soil fertility which, among many positive effects, will improve resilience to water stress. The approaches include the use of cover crops, organic manures and reduced/strip-tillage operations. Working in partnership with BBRO, many of the measurements being taken are beginning to demonstrate success.

At the core of each demo site in 2017 has been the variety strip demonstrations. These comprised six-row strips of different varieties drilled across the field. Varieties were chosen to represent different breeders. These strip trials were not intended as variety trials as such, but to begin to assess how we may be able to use varieties more tactically. For example: some varieties may be more suited to early or later harvest dates, or be more effective for weed suppression; information collected could augment the pest and foliage disease susceptibility data generated in the RL trials, and support work looking at potential varietal differences in harvest and storage characteristics.

The range of different canopy growth characteristics was clearly visible at all the sites, leading to interesting discussions with growers around weed suppression, disease and pest susceptibility, as well as suitability for later harvesting and frost protection. Across the strips, different nitrogen rates (120-180 kg N/ha) and a range of foliar feeds have been applied, and at some sites the impact of different fungicide programmes has been monitored during the season.

The BBRO has undertaken some detailed test dig assessments of the yield of different varieties in mid-September, mid-November and mid-December across the demo sites to identify any differences between varieties at these harvest dates. At the Rougham site, the average yield in mid-September was 84 t/ha ranging from 71-93 t/ha across the variety plots. By mid-December, the average yield had increased to 108 t/ha (+28%) and ranged from 97-127 t/ha between the variety plots. We need to carefully analyse the data across all the sites to check consistency, although the early indications suggest that the potential varietal differences in autumn yield-accumulation are certainly worthy of further assessment.

Harvesting has also been a core feature of the Demo Site grower meetings; again with the emphasis on believing is seeing: demonstration areas were set to highlight good and not-so-good practice in terms of topping, surface losses and root damage. Stephen Aldis of BBRO was on hand to provide the latest facts and figures from the BBRO harvester testing programme.
The series of BBRO Demo Farm grower meetings have been very well supported by growers in 2017, and the feedback received from those attending has been unequivocal in approval of this new format. The use of test digs and demonstration areas drives great discussion and information exchange, and there is no doubt that ‘believing’ can really be led by ‘seeing’.

Pic. 5 – Discussing fungicides, fungicide-variety interactions and variety harvesting dates at the Leverington BBRO Demo Site.

Pic. 6 – Harvest operators kindly agreed to lift beet with different harvester set-ups allowing Stephen Aldis to lead discussion on the potential losses in poorly harvested crops.

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Getting to know the BBRO

In each issue we will be meeting a different member of the BBRO team, asking them about their day-to-day roles and what they think is important in the future of sugar beet growing.

Name
Stephen Aldis

Role
Crop Mechanisation Development Specialist

Where are you from?
Suffolk

How long have you been with the BBRO?
I started with the BBRO in September 2017, just in time to meet the team before the start of the campaign.

What did you do previously?
Product Development Manager at Great Plains UK Ltd. My time with Simba/Great Plains involved a wide range of roles including product support, concept generation and field trials.

Why did you want to work here?
I've always had a keen interest in production efficiency, whether it relates to machinery, a factory or crops on the farm. The role with the BBRO gave me an ideal opportunity to investigate and contribute towards production efficiency on a valued British crop.

What does a typical day look like for you during campaign?
During the campaign I keep very busy with harvester testing across all four factory areas. Generally seeing two or three machines a day; there are always new people to meet, conditions to be observed and interesting conversations to be had.

What is your favourite part of the sugar beet year?
As I have not yet worked through the full sugar beet year in this role, it's difficult to say, but usually I prefer the completion of spring drilling with the satisfaction of a job done and good weather to come.

What projects are you involved in?
My initial workload consists of harvester testing; no doubt many have seen me out in the field. Other aspects of crop recovery are now beginning, with the potential gains of chaser technology and direct loading systems being evaluated in a round of preliminary testing.

What do you think is the ‘next big thing’ in agriculture?
With my role and interest in operational efficiency, I can see that many advances in technology can contribute towards this crop’s success, and it is vital that they do as we all now compete on a global stage. The ‘next big thing’ should be a change in growers strategic thinking, using data driven calculations to determine the planning and execution of tasks rather than just on farm tradition.

What are your aspirations for the future?
Continuing to engage with British Sugar growers and contractors and encourage best practices throughout the sugar beet year; building on the positive response I’ve seen so far. As a longer-term goal, I hope the work on crop recovery and mechanisation can begin to deliver quantifiable gains to contribute to the impressive yield increases the industry already achieves.
Getting to know British Sugar

Name
Sarah Bebb

Role
Area Manager at Cantley factory covering the north east section of the Cantley growing area

Where are you from originally?
Staffordshire

How long have you worked for British Sugar?
Six years

What did you do previously?
Before joining the graduate scheme I studied at The University of York. I spent my summer breaks working on a local fruit farm in Staffordshire.

What is the best bit of working in the sugar industry?
We’re lucky in the sugar industry to be involved in the whole process, from growing the crop to processing and selling the final product. This is unique and makes the work really interesting. Through the Sugar Industry Programme (the joint NFU Sugar/British Sugar training and development programme designed to engage younger growers) I was fortunate enough to visit the European houses of Parliament to lobby with other industry partners, so there are plenty of interesting opportunities that have come from being part of the sugar industry.

And the worst…?
It’s got to be spoil heaps! No car air freshener can mask that smell on your wellies!

What does a typical day look like for you during campaign?
At this time of the year I’m working on campaign management tasks, talking with hauliers and feeding back to our agricultural operations manager at Cantley about deliveries and beet supply. I’ll also be on-farm visiting growers, walking crops and dealing with any concerns they may have in relation to beet in the field or in clamp and providing advice. We’ll also be looking ahead to next year’s crop. Crop estimating is also crucial, so I’ll set aside some time each day to put estimates in for growers. This is all about collecting information on what fields growers have lifted, working out their lifted yields, and estimating what I feel their remaining fields will yield. This is important for haulier load allocation and for understanding the size of the crop to ensure we are able to effectively co-ordinate campaign management.

What is your number one piece of advice for sugar beet growers?
Don’t undervalue the importance of seed rate. You’re aiming for a plant population of 100,000/ha. My simple calculation is that if you achieve an established plant count of 100,000 plants/ha, with beet weighing an average of 1 kg, that’s your 100 t/ha (in very rough terms). Increasing your seed rate slightly can go a long way towards achieving this. The growers that I look after are currently drilling at an average of 1.23 units/ha, so 123,000 seeds per hectare.

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BBRO Stakeholder Board update

The BBRO Stakeholder Board increased its interaction with staff over the past few months, in order to ensure the smooth running of the organisation whilst the recruitment process for the new Head of BBRO took place. After a lengthy and thorough process, we are pleased to announce the arrival of Dr. Vicky Foster who has a wealth of knowledge and expertise within the research sector, after 15 years at AHDB. Vicky’s PhD was in plant pathology, so she is well aware of the plant protection issues facing the sugar beet industry. As part of the new staff structure, Dr. Mark Stevens has been appointed as the BBRO’s Head of Science. This promotion is in recognition of Mark’s scientific leadership in the sugar beet industry in the UK and internationally, and the significant contribution he continues to make as the industry’s scientific advisory lead on policy issues.

Ensuring the safety of staff is of course paramount for all businesses, but there are, unfortunately, increased risks within agriculture, with the added hazards of moving machinery, chemical use and of course the changing conditions due to the impact of weather. We have been working closely with Alan Boswell Risk Management Ltd to review all our processes, implementing procedures and training to develop best practice in all areas. This work is led by Daniel Godsmark and Michelle McKnespiey and acknowledges that an increased awareness of the little things will help to prevent mishaps of a major nature and ensure that we continue to provide a safe working environment for all at BBRO and those they work with.

One of the major concerns for all of us in the sugar beet industry is the threat to the future availability of neonicotinoids. The BBRO science team has been working hard to address the potential impact of any such ban, as currently there are no known alternatives. This work has become a key priority for the BBRO Stakeholder Board with a number of new projects about to come on line in 2018. The biggest threat to the crop will be an increase in the presence and spread of Virus Yellows; a disease that Dr. Mark Stevens has been working on for over 20 years. Whilst ‘neonics’ have provided the means of halting the virus spread in the past, the lack of alternatives means that there is a significant challenge indeed for the collective minds of the UK research community.

The 2017 harvest reminded us of the resilience of the crop. Who would have thought that we would be looking at a bumper crop, when so little was evident in the field in April/May? It is also testament to the continual improvements in seed breeding and crop management: pushing the boundaries of production to achieve higher yields year on year. It is clear that, whatever issues arise, pest/disease/weather, the UK sugar beet industry can adapt and will continue to deliver.
It was with great sadness that we learned the news that George Milford had passed away at the beginning of January.

George was a former scientist at Rothamsted Research; before acting as a consultant to British Sugar and more recently the BBRO. He was an accomplished agricultural botanist and crop physiologist. In these roles he made a great and influential contribution to sugar beet research. There are many scientific papers with his name as lead author and many more to which his name was attached as a contributor. More recently he penned numerous articles for the press and gave papers at grower conferences. George reached out to many: the scientist, the adviser, the grower and the processor, in fact all in the industry. His insightful analysis of so much research on the crop has helped forge the advice we work to now.

All of this gives merely a sense of just how important a contributor he was to the advancement of the sugar beet crop in the UK. George left his mark on all he worked with and led most to achieve more than they otherwise would.

I leave you with a few of the words some of his former colleagues have said to me:

“He was a first class agricultural botanist of the old school and had a tremendous knowledge of how plants tick.”

“George was a very kind and thorough man.”

“He had helped me greatly with the practicalities of trial analysis and layout.”

“I wish I had had his knowledge of sugar beet.”

“I really liked George; he never made you feel inferior despite his vast knowledge and was always willing to explain things to you. He would also listen to your thoughts and interpretation of results.”

We will all miss him greatly.

By Patrick Jarvis
Best Practice Agriculture Manager, AB Sugar
BBRO field team

Following the wet cereal harvest, we were keen to get stuck in with the 2017 harvest of the BBRO trial sites at the earliest opportunity, and the first lift commenced on the 20th September. It was a very different start compared to 2016: instead of the ground being too hard, it was too wet to start! The majority of our trials are usually lifted by the end of November, so the wet start was only a small problem; the ground soon dried out and the campaign continued, to become one of the best campaigns for harvesting we have had.

Once the warm September conditions had dried the soil enough, we were quickly into full swing to get the first Recommended List/National List (RL/NL) trial harvested and delivered for analysis at the BBRO plot warehouse at British Sugar Wissington. With close to 10,000 plots to harvest and deliver, forward planning was key, and having the weather with us was very helpful.

The large majority of the plots are harvested with either the 3-row or the 6-row plot harvester. All plots are defoliated rather than scalped. The sugar beet is harvested and put into large plot bags (similar to seed or fertiliser bags), labelled in accordance with the trial plans, removed from the field, and loaded into a walking floor trailer (Pics. 1 and 2). This trailer reduces potential damage from high falls.

The BBRO trials officers work closely with the drivers of the commercial sugar beet harvesters to ‘open up’ the trial sites, ensuring the trial harvesting gets off to a good start. This can be a process that takes some time; great patience from the operators is needed, and their support during this busy period is greatly appreciated.

‘Opening up’ of fields to gain access to trials has to be done correctly; otherwise all the hard work looking after a trial in the growing season can be lost! Following the commercial harvester, the BBRO trial team and other collaborating trial operators will “glean” the pathways of any remaining sugar beet between the plots; walking forwards and backwards, systematically removing all sugar beet to ensure that when the trials are harvested, no contamination between plots occurs. All the BBRO field team are extremely proud of the work they deliver, and are very competitive amongst each other to deliver great standards for the industry.

As the general harvesting campaign continues, planning for next year’s trials is well underway. Forward planning is crucial to allow timely execution of the trials, as Gina Gould explains in her article in this issue on page 13, especially when drilling, thereby minimising problems for the remainder of the growing season.

With some projects coming to an end, it means new projects begin, and with those come new trial protocols to get up-to-speed with. The team host meetings with growers across all eight trial sites, demo sites and open day sites, with the underlying aim to continuously improve: What have we learnt? Can we do that better? What do we need to facilitate this?

Knowledge Exchange is a fundamental part of the BBRO delivery portfolio. All the trials can be completed and analysed, but to keep driving crop performance information gained must be passed on, either by the BBRO or via the many other industry partners and trial companies we work with. The BBRO is particularly pushing Knowledge Exchange during harvest with many demo farm events where Stephen Aldis (the BBRO crop mechanisation specialist) has highlighted the importance of harvester settings and correct topping to maximise yield. This has also continued with the drill operator training events and the winter technical meetings.

It has been a long campaign, with some great yields, and the BBRO field team has been working long hours to ensure that trials are delivered safely and to the highest standards. I would like to thank the team for their hard work and their part in continuing to deliver information for the industry.

Daniel Godsmark, BBRO Trial Manager, 07850 369849
**BURY ST. EDMUNDS**

**Campaign**

The 2017/18 campaign at Bury Factory started on Monday 18th September and will be completed in the last few days of February. The factory has performed exceptionally well with a very stable and consistent performance throughout the campaign from start to finish. The daily slice peaked at 16,116 tonnes in October, and the season has been generally good for beet harvesting and storage with relatively dry conditions up until mid December. Conditions became more challenging from late December onwards following heavy rain over the Christmas/New Year period and through into January.

Sugar content this campaign has been one of the highest on record, increasing steadily through the season until early December where it peaked at nearly 19%; the campaign average will be just over 18%. This high sugar content, in conjunction with very high root yields, has resulted in a record yielding crop, both nationally and for the Bury factory. The final adjusted yield for Bury will be over 86 t/ha, the previous highest yield being just under 80 t/ha in 2014. Crop yields have varied dramatically across the factory areas this season ranging from 50 t/ha to over 120 t/ha.

**Factory**

During the campaign the factory successfully carried out some further purification (BMA 65) trials that looked at the potential benefits of future investments in purification equipment. Once the campaign is completed, the off-season maintenance programme will begin, and we will still be refining sugar on a number of juice runs. There will be further additional investments in the CHP area at Bury this off-season when over £2 million will be spent on our Putsch knife station. The AD plant at Bury continues to perform, using approximately 300 t of pressed pulp per day to produce 5 MW of electricity.

**Putsch knife station.**

**2018 Season**

Please make sure you have made arrangements for soil testing for next year’s crops. Bury offers a full pH and nutrient testing service. Please contact a member of the factory agricultural team to book your fields in, and also to order LimeX. In previous years we have sold out of product in the summer, so please take action now to secure your requirements. Remember that LimeX contains some valuable nutrient content; please seek advice from your British Sugar contact about the nutrient availability within our LimeX products.

Preparations for the BBRO Summer Open Day at Morley Business Centre, Morley, Wymondham, Norfolk on Tuesday 3rd July are under way. The BBRO and local agricultural teams hope you will be able to attend this event and we look forward to meeting many of you on the day. Please make a note in your diary.

I would like to wish everyone a safe and successful 2018/19 beet growing season.

Mark Culloden, Head of Agriculture

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**CANTLEY**

**Factory boiler repairs**

Growers and hauliers delivering into Cantley will be aware that the factory started seeing issues with one of our boilers in late November 2017. We have two boilers that supply the factory with steam, one of which was converted from heavy fuel-oil to gas in the summer of 2017 and the other runs on coal. Combined, they produce 80 t/hr of steam at about 45 bar pressure which is delivered into a turbine to generate the site’s electrical requirements of 10 MW – the steam then goes on to ‘heat’ the process.

We first started to see some symptoms of poor boiler performance on the 20th November when there was some water leakage from the gas boiler and water vapour noticeable in the chimney plume. Whilst we were still able to run the boiler at this point, our level of interest in its performance started to increase. On the 26th November the leaks became more prevalent and the decision was made to take the boiler offline. The leaks were fixed and all the maintenance that was carried out in the summer was checked. The boiler was then pressure tested by British Engineering Services to ensure that it was safe to use. Unfortunately more leaks were found and, after several attempts were made to repair the holes, it was decided on the 4th December to look at alternative options to increase the site’s steam production and electrical needs.

The factory turned on a standby Maxeon boiler and hired a package boiler to produce the remaining 30 t/hr of steam required to get the factory to full throughput. In addition to this, two generators were hired to produce 1.5 MW of electricity which, combined with electricity imported from the National Grid, bridged the shortfall in energy that the gas boiler was producing.

After numerous attempts were made to repair the leaks in the boiler, it was decided to re-tube the section that was leaking. This involved replacing the damaged sections of 112 of the 560 tubes just above the bottom drum. This was a 24/7 operation with specialist welders to ensure the integrity of the repair met with British Engineering Services standards. These repairs were completed in mid-January. The boiler will then be refurbished in the 2018 off-season in readiness for 2018/19 campaign.

**Crop progress**

I wrote in the previous British Sugar Beet Review that the crop was looking very promising; this optimism was generated by some very impressive root samples collected over late summer. If the root digs were to be believed we were on for a record crop! As the season has progressed, the finished grower data has started to deliver on these early promises; many fields in the Cantley area are delivering over 100 adj. t/ha of beet. The crops have been relatively clean with much of the late-lifted beet having received at least two fungicides. This has kept the canopy clean and the yield potential high. Beet supply has been good for the main part of the campaign. However, the factory had to slow down over the Christmas to New Year period due to lack of stock. This was not helped by the significant amount of rainfall over this period, which meant many harvesting contractors were unable to operate. As I write this article, I am still predicting a mid-March finish and a record crop for Cantley. I will update you on the final figures in the next edition of the British Sugar Beet Review.

**LimeX45 – back-loading**

Please take advantage of LimeX45 back-loading whilst the campaign is still running to reduce your haulage costs. We are also offering a free pH soil sampling service to those growers who take LimeX45 from the site. In addition to this we also offer the following range of services: soil nutrient analysis, BCN testing and now free-living nematode tests. Please contact your British Sugar representative if you would like to discuss your soil testing requirements and the fertiliser value in our LimeX products.

Andrew Dear, Agricultural Business Manager
The 2017/18 campaign is progressing well; first deliveries were received on the 13th September. As at 31st January, the average adjusted yield for Newark growers who have already finished is 75 t/ha. I expect this to increase to around 78 t/ha, which would exceed our previous record of 76 t/ha in 2014. This yield is very pleasing given some of the challenges seen over the growing season; starting with a very wet period at drilling, followed by warm and very dry weather through the spring when the crop was establishing. As a result, the average drilling date was 2nd April, a week earlier than in 2016/17 and just a few days behind our long-term average. Thankfully, the crop underwent significant growth over the summer, making use of all the rain we received; much to the frustration of cereal farmers wanting to progress harvest.

After 139 days we’re currently averaging 9,692 tonnes of beet sliced per day, and hope to maintain this throughput until we close: probably around the third week in March. The quality of the crop delivered so far has been very good; currently the average dirt tare is 5.8%, and average sugar content 17.76%.

Projects planned for this off-season include:
- Replacement of pipe work; mild steel for stainless steel to increase plant reliability
- Completion of first stage of hardware replacement of our process-control operating platform
- Waste water treatment tank replacement
- Molasses tank replacement
- Replacement of boiler feed pumps

As thoughts turn to the 2018/19 crop it is worth considering lessons learned from this season. Attention to detail is consistently rewarded with high yields, and particularly when establishing the crop. Achieving quality seedbeds to allow the crop to be drilled by the end of March and establishing 100,000 plants/ha is one of the most crucial elements for a successful crop. Figure 1 highlights that around 40% of the national crop is drilled later than the optimum drilling window and therefore reduces yield potential.

![Fig. 1 – The effect of drilling date on adjusted yield.](image)

As always, our field agricultural team is on hand to advise on seed spacing, drill set-up and seedbed preparation for when conditions become dry enough to drill.

A date for the diary is our BBRO Summer Open Day which will take place on the 5th July 2018 at Bracebridge Heath. Best wishes for a favourable spring.

Nick Morris, Agricultural Business Manager

**NEWARK**

**WISSINGTON**

Campaign update

Wissington has experienced a very challenging campaign from the outset of processing operations.

Filtration has always been the problematic area for Wissington but, using knowledge gained from the successful new filter station at Bury factory a few years ago, five new filters will be installed at Wissington this coming off-season. These new filters will nearly double the filter capacity of the 2nd carbonation filter station, removing this bottleneck in the factory process. Throughout the 2017/18 campaign the 2nd carbonation filters have resulted in a loss of production on many days. This capital project is now planned as the technology has improved and been proven to work, allowing the new filters to be installed in the same location as the old ones in the middle of the factory.

One other area of the factory that has been troublesome this campaign has been the boiler house. A number of full site shutdowns have occurred this year, one caused by a power surge on the external power grid, which was outside the factory control, but others have been due to control system errors. As soon as the campaign finishes the boiler house will undergo extensive maintenance, including the installation of a completely new jet engine.

The new Jet Wash Roller Tables installed last summer have been successful in their aim of delivering higher quality raw material to the slicing machines. They are achieving this by being much more effective at removing soil and green leaf from the beet before the beet is moved into the beet hopper above the slicers. A considerable increase in volume of soil washed from the roots has now been deposited into the soil and water ponds, and green material has been removed and composted. The net result is cleaner beet presented to the factory process, giving less ash in animal feed, and less limestone used in the carbonation process to purify the juice. This results in less material to filter through the process, but also less LimeX production.

2017 Crop

As always, estimating the crop size is very time consuming work for all the agriculture team at Wissington. It is critically important to make an accurate assessment for all parties: growers, hauliers and British Sugar alike. Getting the campaign’s end predicted to within a day is essential to allow all the logistics connected with harvesting, sugar storage and bagging to be in line with capacities available. I currently estimate that this year’s crop for Wissington will yield around 82 adj. t/ha at an average sugar content around 17.5%. The factory’s average dirt tares were running, in October, at around 4-5%, increasing to around 6-7% in December and early January with the onset of wetter weather. Harvesting conditions have been generally good most of the season, with plentiful roadside stocks in clamp all season.

Co-products

With a longer campaign, the topsoil production starts with excavating out the soil ponds immediately after the campaign has finished, then conditioning the soil and screening to make around eight different products at Wissington. Our aim is to sell around 100,000 tonnes of topsoil to the landscaping and construction market before September 2018.

I would like to wish everyone a successful high-yielding 2018/19 season.

Dan Downs, Head of Agriculture
The best variety for the UK: it’s all in the seed.

DAPHNA

- Unbeatable adjusted yield at 106.9% of controls*
- Low early sown bolters
- BCN tolerant

*BBRO Recommended List of sugar beet varieties (based on trials from 2014 – 2016)